МИНИСТЕРСТВО ЭКОЛОГИИ, ГЕОЛОГИИ И ПРИРОДНЫХ РЕСУРСОВ РЕСПУБЛИКИ КАЗАХСТАН

Акционерное общество «Жасыл даму»

Отчет
по подготовке отчетных электронных таблиц в форматах CRF и SEF с учетом рекомендаций международной группы экспертов Секретариата РКИК ООН

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«Отчет по подготовке отчетных электронных таблиц в форматах CRF и SEF с учетом рекомендаций международной группы экспертов Секретариата РКИК ООН»

№	ФИО	Должность	Подпись
1	Самат Жанат Саматкызы	Председатель Правления АО «Жасыл даму»	
2	Кабдолданов Нуржан Кенесбаевич	Управляющий директор по вопросам управления отходами АО «Жасыл даму»	
3	Есекина Айман Сериковна	Руководитель отдела инвентаризации парниковых газов АО «Жасыл даму»	

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1. Введение

Одним из основных обязательств РК по РКИК ООН и Киотскому протоколу является ежегодное предоставление в Секретариат РКИК ООН Национального отчета по инвентаризации парниковых газов, состоящих из Национального доклада о кадастре антропогенных выбросов из источников и абсорбции поглотителями парниковых газов, не регулируемых Монреальским протоколом и отчетных таблиц Общего формата отчетности (ОФО).

После ратификации Киотского протокола в 2009 г. Казахстан начал представлять Национальные отчеты по инвентаризации парниковых газов в Секретариат РКИК ООН в форме Национальных докладов о кадастре и электронных Таблиц ОФО (Common Reporting Format – CRF). Это одно из основных обязательств РК по РКИК ООН. Согласно международным требованиям РКИК ООН, инвентаризация парниковых газов проводится со сдвигом на два года назад (статистические данные даются по прошлому году, сбор данных и обработка занимают год). Все НДК и электронные таблицы ОФО размещены на веб-сайте Секретариата РКИК ООН (www.unfccc.int).

Таблицы ОФО разработаны в едином формате для всех стран, представляющих Национальный отчет по инвентаризации парниковых газов, по 5 секторам экономики: Энергетика, Промышленные процессы и использование продуктов, Сельское хозяйство, Лесное хозяйство и другие виды землепользования, Отходы. Таблицы ОФО включают выбросы шести основных газов с прямым парниковым эффектом (диоксид углерода (CO2), метан (CH4), закись азота (N2O), гидрофторуглероды (ГФУ), перфторуглероды (ПФУ) и гексафторид серы (SF6)). Также для некоторых категорий источников проводится оценка эмиссий четырех ПГ с косвенным парниковых эффектом – окиси углерода (CO), окислов азота (NOx) и неметановых летучих органических соединений (НМЛОС) и диоксида серы (SO2).

Расчеты выбросов и поглощений выбросов парниковых газов осуществляются на основе методологии Межправительственной группы экспертов по изменению климата (МГЭИК), принятой и согласованной Конференцией Сторон РКИК ООН (далее – КС) и изложенной в Руководящих принципах (РП МГЭИК) по подготовке Национальных отчетов по инвентаризации парниковых газов для стран Приложения 1 к РКИК ООН.

С 2015 г., согласно решению КС19, все страны Приложения 1, включая Казахстан, осуществляют расчеты по парниковым газам в соответствии с новыми Руководящими принципами инвентаризации парниковых газов (РП МГЭИК 2006 г.). До этого времени использовались РП МГЭИК 1996 г. Так же с 2015 г. отчетные

электронные таблицы ОФО (Common Reporting Format) предоставляются в соответствии с новым программным обеспечением (CRF Reporter).

Таблицы ОФО за период 1990-2020 гг. разработаны в соответствии с Решением 24/CP.19 (FCCC/CP/2013/10/Add.3) о пересмотре руководящих принципов РКИКООН для представления докладов о годовых кадастрах для Сторон, включенных в приложение I Киотского протокола. Таблицы общего формата отчетности подготовлены в соответствии с Приложением II, а значения потенциала глобального потепления взяты из Приложения III данного решения.

По результатам последнего обзора НДК за 1990-2017гг., проведенного ГЭР Секретариатом РКИК ООН в сентябре 2019 г., по Национальному отчету по инвентаризации парниковых газов были представлены рекомендации международных экспертов.

Данный отчет подготовлен в соответствии с Технической спецификацией к Договору о государственных закупках услуг № 11 от 20 января 2022 года и включает описание к таблицам ОФО в форматах CRF и SEF с учетом рекомендаций международной группы экспертов Секретариата РКИК ООН по каждому сектору. В приложении к отчету представлены Таблицы общего формата отчетности (CRF и SEF).

2. Общее описание таблиц ОФО (CRF)

Согласно итогам по национальной инвентаризации парниковых газов Республики Казахстан, за период 1990-2020 гг., совокупные выбросы парниковых газов Республики Казахстан в базовом 1990 году составили:

- без учета сектора ЗИЗЛХ – 387 227,34 тыс. т CO_2-экв.;
- с учетом ЗИЗЛХ - 383 286,13 тыс. т CO_2-экв.

В 2020 году национальные выбросы парниковых газов составили:

- без учета сектора ЗИЗЛХ - 345 589,56 тыс. т CO_2-экв.;
- а с учетом ЗИЗЛХ - 353 599, 49 тыс. т CO_2-экв.

Таблица 1 – Выбросы парниковых газов за 1990-2020 гг. в Республике Казахстан, тыс. т CO2-эквивалента

Сектор	1990	2020	Изменение, %
Общие выбросы с ЗИЗЛХ	**383 286,13**	**351 798,9**	**-8,3**
Общие выбросы без ЗИЗЛХ	**387 227,34**	**345 428,0**	**-10,8**
Энергетика	318542,9	274000,2	-14,0
ППИП	19290,2	23510,1	21,9
Сельское хозяйство	44742,1	40725,0	-9,0
ЗИЗЛХ	-3856,9	6370,9	265,2
Отходы	4742,0	7192,7	51,7

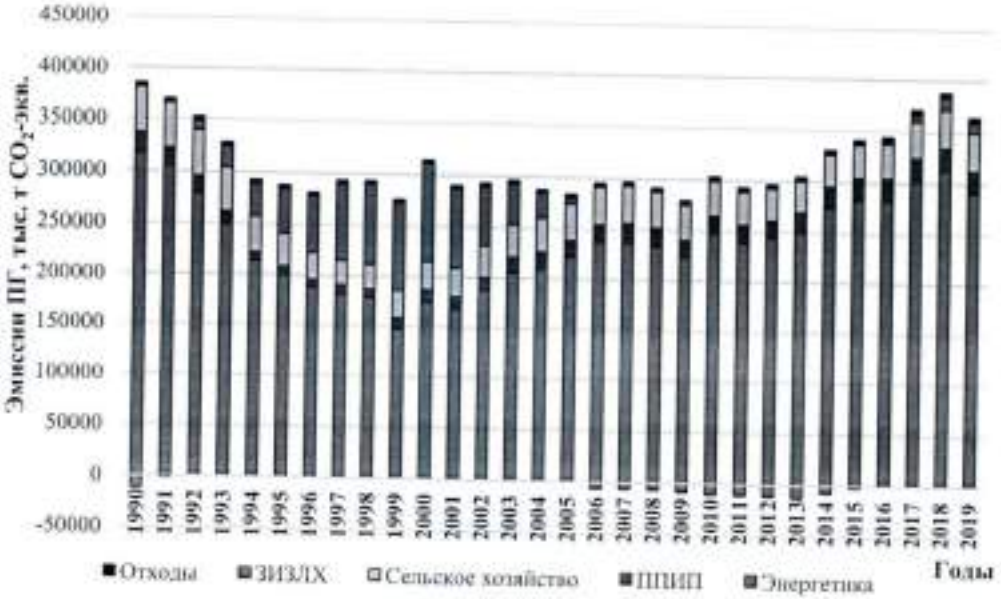


Рисунок 1 – Общие эмиссии парниковых газов по секторам с 1990 по 2020 гг. в Республике Казахстан

Выбросы парниковых газов по базовому подходу за 2020 г. в секторе «Энергетика» составили: 274 000, 2 тыс. т CO_2-экв. или 77,8% от общего количества выбросов за 2020 г.

По сравнению с 1990 годом выбросы парниковых газов по сектору «Энергетика» сократились на 14% (рисунок 2).

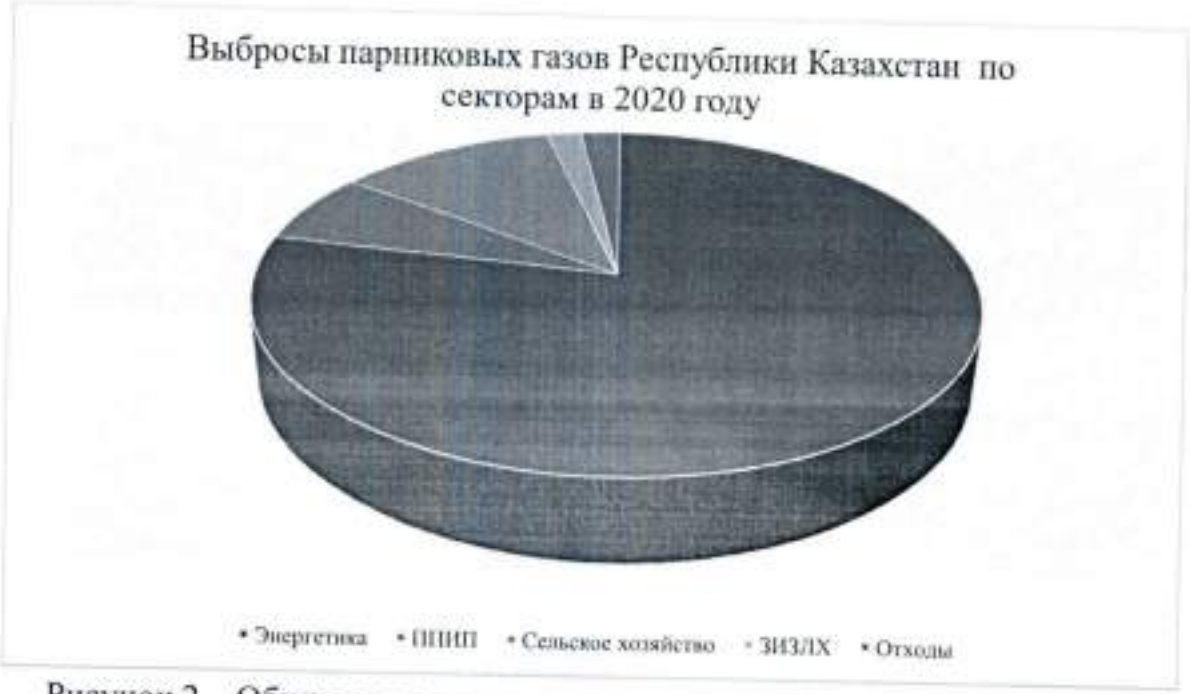


Рисунок 2 – Общие эмиссии парниковых газов по секторам в 2020 гг. в Республике Казахстан

По сравнению с Энергетикой, в секторе Промышленные процессы и использование продуктов (далее – ППИП) происходит увеличение выбросов парниковых газов на 21,9% по сравнению с 1990 г. В 2020 г. совокупные выбросы в секторе ППИП составили 23 510,1 тыс. тонн.

Выбросы парниковых газов в секторе «Сельское хозяйство» в 2020 году составили 40 725 тысяч тонн CO_2-экв и сократились на 9 % по сравнению с 1990 годом.

Выбросы парниковых газов сектора «Отходы» выросли на 51,7% по сравнению с 1990 годом и составили 7 192,7 тысяч тонн CO_2-экв.

Сектор «ЗИЗЛХ» в настоящее время также является эмиттером парниковых газов, выбросы которого составляют 7 192,7 тысяч тонн CO_2-экв.

3. Описание таблиц ОФО (CRF) сектора «Энергетика»
Выбросы парниковых газов в секторе «Энергетика» по секторному подходу за 1990…2020 гг.

Общий объем потребления топлива в секторе «Энергетика» по базовому подходу в 2020 г. составил **2946,735 ПДж.** По сравнению с уровнем выбросов парниковых газов за 1990 г. объем потребления топлива снизился на 10,01%, с уровнем 2019 г. на 10,89% (таблица 2).

Выбросы парниковых газов по базовому подходу за 2020 г. в секторе «Энергетика» составили **228,429 млн. тонн CO_2**, что меньше уровня 1990 г. на 14,75% и меньше уровня 2019 г. на 11,52%.

Значительное изменения наблюдаются в потреблении жидкого топлива, а именно в снижении фактического потребления сырой нефти, с **396,526 ПДж** до **129,065 ПДж** по причине снижение количества производимой сырой нефти. Выбросы парниковых газов от жидкого топлива в 2020 г. составили **27,738 млн. тонн CO_2 экв**. Данный показатель меньше уровня 1990 г. на 57,38% и меньше уровня 2019 г. на 39,91%. Незначительное снижение выбросов наблюдается в потреблении твердого топлива: с **1803,658 ПДж** до **1697,045 ПДж.** Снижение выбросов парниковых газов от потребления твердого топлива в 2020 г. происходит из-за увеличения экспорта энергетического и каменного угля, что в свою очередь повлияло на фактическое потребления твердого топлива.

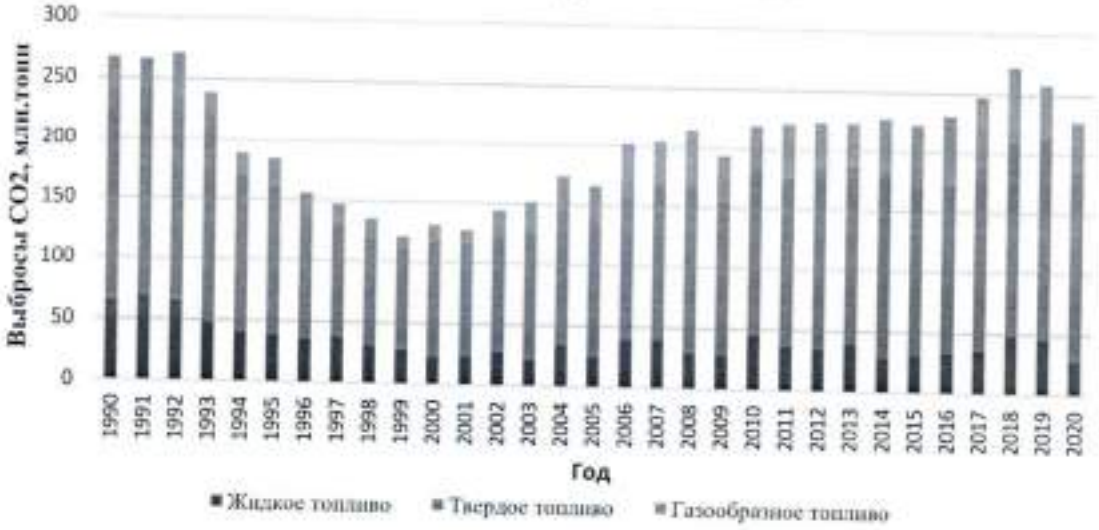


Рисунок 3 - Динамика выбросов CO_2 за 1990…2020 гг. в секторе «Энергетика» по базовому подходу, млн. тонн

Как и в случае с выбросами парниковых газов за 2019 г., сокращение выбросов от потребления жидкого топлива также связано со снижением

потребления автомобильного бензина и дизельного топлива. В случае с автомобильным бензином значительное изменение связано с возросшим экспортом, что напрямую повлияло на фактическое потребления данного вида топлива исходя из применяемой формулы для расчета выбросов парниковых газов.

Таблица 2 – Динамика потребления топлива и выбросов CO_2 в секторе «Энергетика» по базовому подходу за 1990…2020 гг.

Год	Всего,	По видам топлива, ПДж			Всего CO_2 экв.	Выбросы CO_2 по видам топлива, млн тонн CO2 экв.		
	ПДж	Жидкое топливо	Твердое топливо	Газ. топливо	млн тонн	Жидкое топливо	Твердое топливо	Газ. топливо
1990	**3274,402**	926,78	1847,903	499,719	**267,943**	65,089	175,081	27,773
1995	**2225,182**	533,076	1258,262	433,844	**184,122**	38,426	121,358	24,339
2000	**1597,562**	322,078	1003,175	272,309	**131,626**	22,81	93,632	15,184
2005	**2114,049**	357,326	1184,806	571,917	**166,506**	25,007	111,465	30,034
2010	**2807,127**	647,246	1455,721	704,159	**220,271**	45,942	136,168	38,161
2015	**2973,823**	494,831	1479,412	999,58	**223,653**	30,829	137,789	55,036
2016	**3102,705**	520,974	1495,956	1085,774	**231,739**	32,615	139,664	59,461
2017	**3300,067**	572,258	1633,936	1093,873	**247,988**	35,772	152,267	59,948
2018	**3627,508**	751,751	1727,128	1148,629	**272,878**	48,567	161,174	63,136
2019	**3306,762**	709,595	1803,658	793,509	**258,162**	46,158	168,577	43,427
2020	**2946,735**	459,438	1697,045	790,252	**228,429**	27,738	158,155	42,536

Выбросы парниковых газов в секторе «Энергетика» по секторному подходу за 1990…2020 гг.

В соответствии с Руководством МГЭИК 2006 г. оценка выбросов парниковых газов сектора «Энергетика» по секторному подходу (CO_2, CH_4, N_2O, NOx, CO, NMVOC и SO_2) выполнялась по следующим категориям экономической деятельности: **1.A.1 ОФО Энергетическая промышленность, 1.A.2 ОФО Обрабатывающая промышленность и строительство, 1.A.2 ОФО Транспорт, 1.A.4 ОФО Другие сектора, 1.A.5 ОФО Прочие источники.**

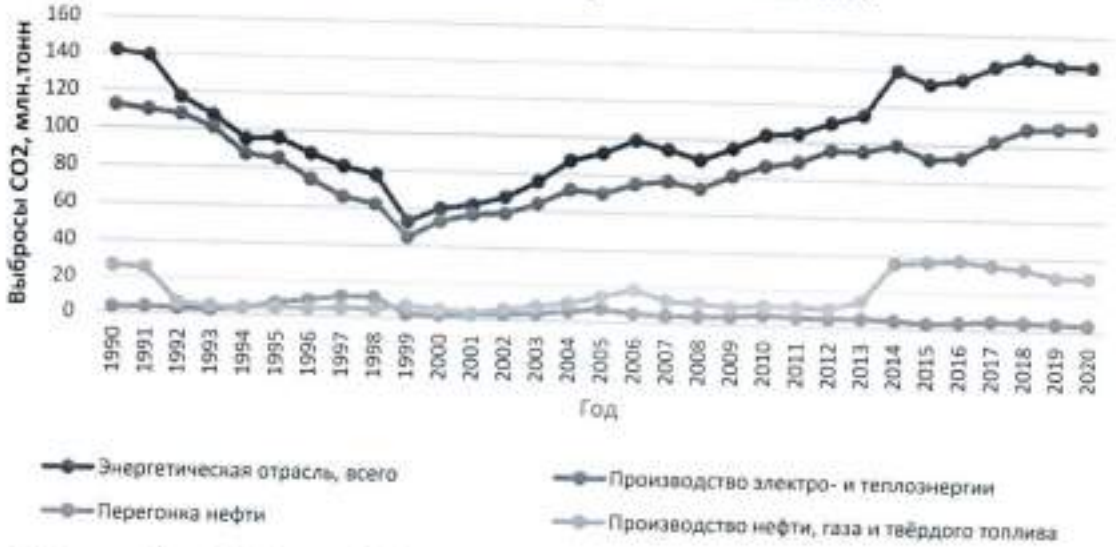


Рисунок 4 – Выбросы CO2 в категории «Энергетическая промышленность» за 1990…2020 гг. по основным источникам (секторный подход, млн. тонн).

Основным источником выбросов парниковых газов в секторе «Энергетика» является категория **«Энергетическая промышленность»**: общее потребление топлива в 2020 г. в данной категории составило **1676,567 ПДж**, что относительно 1990 г. больше на 1,04%, относительно 2019 г. – больше на 0,7% (таблица 2). Общие выбросы парниковых газов в 2020 г. в категории «Энергетическая промышленность» составили **144,383 млн. тонн CO_2 –экв.** (Рисунок 4), что на 0,1% меньше уровня 1990 г. и на 0,1% меньше уровня 2019 г.

Категория **«1.A.2 ОФО Обрабатывающая промышленность и строительство»** включает в себя выбросы парниковых газов от сжигания топлива в отраслях промышленности, действующих на территории Республики Казахстан. К данной категории относятся: **«1.A.2a Черная металлургия», 1.A.2b «Цветная металлургия», «1.A.2c Химическая промышленность», «1.A.2d Целлюлозно-бумажная промышленность», «1.A.2e Пищевая промышленность» и «1.A.2f Производство неметаллических минеральных продуктов», «1.A.2g Все другие отрасли промышленности».** Основное потребляемое топливо данной категории – твёрдое топливо, 72,15% от общего количества потреблённого топлива за 2020 г.

Общее потребление топлива в данной категории за 2020 г. составило **320,268 ПДж**, что больше уровня за 1990 г. на 22,85% и уровня за 2019 г. на 4,28%. Выбросы парниковых газов в категории «Обрабатывающая промышленность и строительство» в 2020 г. составили **26,631 млн. тонн CO_2** -экв. (Таблица 2). Данный показатель выбросов парниковых газов выше относительно уровня выбросов, рассчитанного за 1990 г. на 28,46% и на 2,06%. относительно уровня 2019 г.

В категорию **«1.A.4 ОФО Другие»** включает подкатегории: **1.A.4a «Коммерческий/институциональный сектор», 1.A.4b «Жилой сектор» и 1.A.4c «Сельское/Лесное/Рыбное хозяйство»**. Суммарные выбросы прямых парниковых газов в категории «Другие сектора» за 2020 г. на 40,67% меньше уровня выбросов рассчитанного для 1990 г., и на 20,66% меньше уровня выбросов парниковых газов в 2019 г. Общее количество выбросов парниковых газов в данной категории составили **33,429 млн. тонн** CO_2**-экв**. (Таблица 2). Большую часть выбросов парниковых газов производят два вида топлива – твердое (45,71%) и газообразное топливо (36,33%). Основной источник выбросов в категории «Другие сектора» - 1.A.4b «Жилой сектор». Общее потребление топлива в данной категории за 2020 г. составило **327,104 ПДж**, или 77,87% от общего количество потребленного топлива в данной подкатегории.

Суммарные выбросы прямых парниковых газов в категории **«1.A.5 ОФО Прочие источники»** в 2020 г. составили **22,279 млн. тонн** CO_2**–экв**. (Таблица 3) что почти в 2,5 раз больше уровня выбросов за 1990 г. и на 22,89% меньше уровня 2019 г. Общее потребление топлива в подкатегории «Прочие источники» за 2020 г. составило **255,333 ПДж**, большая часть из которого приходиться на твердое топливо (59,58%).

Таблица 3 – Динамика потребления топлива и выбросов CO_2 в секторе «Энергетика» по секторному подходу за 1990…2020 гг.

Год	Всего,		Энергетическая промышленность		Обрабатывающая промышленность и строительство		Другие сектора		Прочие источники	
	ПДж	Млн тонн CO2–экв.	ПДж	Млн тонн CO2–экв.	ПДж	Млн тонн CO2–экв.	ПДж	Млн тонн CO2–экв.	ПДж	Млн тонн CO2–экв.
1990	**2981,109**	**249,017**	1659,194	142,369	247,096	19,052	656,413	56,345	114,192	8,934
1995	**1839,026**	**155,082**	1118,61	96,573	198,433	16,162	379,457	31,986	19,965	1,414
2000	**1461,061**	**121,725**	707,431	60,805	261,819	22,285	121,887	9,522	229,874	19,522
2005	**2098,024**	**172,185**	1093,513	92,263	338,512	29,223	160,802	13,072	263,091	20,979
2010	**2732,206**	**220,254**	1229,647	103,753	355,08	30,052	216,238	16,533	631,735	48,549
2015	**3345,505**	**270,019**	1559,165	133,166	438,602	37,601	377,137	29,041	672,405	48,466
2016	**3387,535**	**253,502**	1589,076	136,033	423,725	36,629	373,584	28,941	687,567	47,462
2017	**3619,543**	**287,706**	1673,408	143,423	434,615	37,093	400,547	32,357	776,302	50,481

2018	**3814,884**	**301,031**	1724,332	148,184	425,082	36,108	415,631	33,378	886,989	57,21
2019	**3328,895**	**268,266**	1665,331	144,532	306,556	26,082	563,588	42,134	425,208	28,896
2020	**2932,712**	**245,447**	1676,567	144,383	320,268	26,631	420,076	33,429	255,333	22,279

Улучшения национальной инвентаризации по сектору «Энергетика» согласно рекомендациям международной группы экспертов

Согласно предоставленным докуметам по проведенным анализам Национального доклада Республики Казахстан о кадастре антропогенных выбросов из источников и абсорбции поглотителями парниковых газов, не регулируемых Монреальским протоколом, за 1990-2019 гг. международной группой экспертов замечания для сектора «Энергетика» можно разделить на три основные категори: замачания касательно правильного использования ключей обозначений («NO», «NE» и «IE») в таблица общего формата CRF, замечания касательно потребления коксующегося угля (замечания по категории «1.A.5 ОФО Прочие источники») и перерасчет выбросов ПГ за 1990-1998 гг.

В текущем Национальном докладе расчета антропогенных выбросов парниковых газов будет произведен анализ и пересмотр всех ключей обозначении, в правильности использования которых были изложены сомнения группой международных экспертов изменения климата.

Данные по использованию коксующегося угля были пересмотрены и пересчитаны на основе данных, предоставленных предприятиям АО «АрселорМиталл Темиртау». Данное предприятия выступает в качестве единственно крупного потребителя коксующегося угля для нужд черной металлургии. Опираясь на данный факт, было принято решение о пересчете ряда данных за 2014-2019 гг. основываясь на данных о потреблении коксующегося угля АО «АрселорМиталл Темиртау» для последующего преобразования в кокс.

Произвести пересчет данных за период 1990–1998 гг. не удалось ввиду отсутствия достоверных статистических данных по потреблению топлива. Бюро национальной статистики МНЭ РК был предоставлен документ: Топливно-энергетический баланс за 1990 год, но в данном документе не предоставлены полные статистические данные по потреблению топлива на территории Республики Казахстан, требуемых для проведения расчетов по национальной инвентаризации парниковых газов в секторе «Энергетика». Принимая во внимание данный факт, проведения пересчета выбросов ПГ за 1990 год не отвечает Руководящим принципам МГЭИК 2006г.

4. Описание таблиц ОФО (CRF) категории «Транспорт»

Описание причин изменения эмиссий в секторе транспорт за 2020 год

Общие эмиссии в 2020 году в категории транспорт уменьшились с 26620,44 CO_2 до 18725,75 CO_2 рисунок 5.

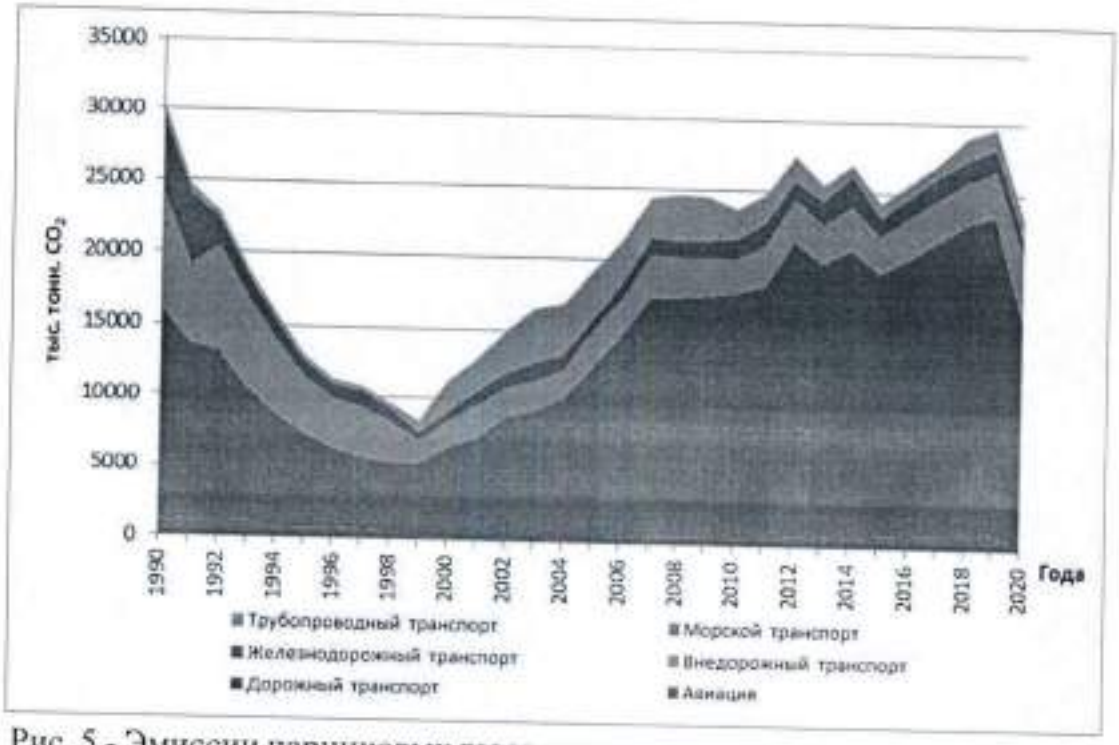


Рис. 5 - Эмиссии парниковых газов от транспортного сектора в 1990 – 2020 гг. (тысяч тонн CO_2)

Согласно данным Бюро национальной статистики объемы транспортных перевозок в РК в последние годы устойчиво росли, не смотря на пандемию COVID19, такая тенденция сохранилась для грузов, однако пассажирские перевозки существенно сократились. Большие сокращения коснулись авиационного, железнодорожного и морского транспорта. Стоит отметить, что существенное снижение эмиссий произошло из-за уменьшения пассажирских перевозок всеми национальными операторами такими как Казахстан Темир Жолы (железнодорожные перевозки) Air Kazakhstan (авиаперевозчик) и другими. Авиационные перевозки уменьшились особенно существенно, так как были отменены более чем на полгода все международные рейсы, за исключением нескольких направлений.

Грузовые перевозки осуществлялись почти в полном объеме и даже несколько выросли, особенно для железнодорожных сообщений. Выполняла международные и внутренние рейсы транспортная авиация, осуществлялись автомобильные грузовые перевозки. Не существенно снизились объемы перекачки

нефти и газа по трубопроводу. Объемы транспортировки для водного транспорта тоже сократились, почти в половину от оборота 2019 года.

Улучшения национальной инвентаризации по категории «Транспорт» согласно рекомендациям международной группы экспертов

Категория «Транспорт» является агрегирующей, в нее включены несколько существенных подкатегорий по количеству эмиссий, однако имеется ряд общих проблем, которые прослеживаются для каждой из под категорий.

В частности это использование ключей обозначения, технические ошибки, которые были обнаружены экспертами или выявлены при проведении дополнительных проверок, а также пересчеты вызванные как рекомендациями экспертов, так и необходимостью связанной с улучшением исходной информации.

Ключи обозначения были изменены по рекомендации экспертов для биотоплива в подкатегории авиация. Был также пересчитан весь ряд для внутренней авиации, так как была обнаружена техническая ошибка.

Пересчеты также коснулись подкатегории внедорожный транспорт, морская навигация, и железнодорожный транспорт. Пересчеты были вызваны рекомендацией использовать другие коэффициенты для закиси азота и метана.

Для полного понимания в основной части отчета расширены комментарии по методическим подходами и прозрачности исходных данных.

5. Описание таблиц ОФО (CRF) категории «Летучие выбросы»

Эмиссии парниковых газов от деятельности в категории «Летучие выбросы» в Республике Казахстан образуются от двух основных источников: разработка угольных месторождений (1.B.1 Твердые топлива), и добыча углеводородного сырья (1.B.2 Жидкие и газообразные топлива). Каждая из представленных подкатегорий имеет еще свои дополнительные источники эмиссий, связанные с транспортировкой сырья, его обогащением, переработкой и хранением, а также распределением конечному потребителю. Кроме того, имеются еще подкатегории источников, связанные с трансформацией топлива (1.B.1.b), вентиляцией и сжиганием попутного газа в факелах (1.B.2.c)[1].

Основным парниковым газом, который образуется в результате деятельности в категории «Летучие эмиссии», является метан (CH_4). В то же время, в значительно меньших количествах в летучих эмиссиях может присутствовать углекислый газ (CO_2), а в некоторых случаях - летучие неметановые органические соединения (НЛОС) и закись азота (N_2O).

В 2020 году суммарные эмиссии от категории Летучие эмиссии составили 28552,7 тыс. тонн CO_2экв. Это на 1952,1 тыс тонн CO_2экв (9.4 %) больше чем в 2019 году и меньше на 143,5 % чем в 1990 г (69525,60 тыс тонн CO_2экв), рис 2. Причины, почему произошли изменения несколько, так доля угля, добываемого закрытым способом, в 2020 г. по сравнению с 1990 г. снизилась более чем в пять раз, с 58,36 до 10,05 млн тонн. В то же время объем угля, добываемого открытым способом, увеличился, и в некоторые годы превышал 1990 год на 30 млн тонн., в отчетный год открытая добыча составила всего 88,78 млн тонн. Такое перераспределение внутри отрасли привело к снижению эмиссий ПГ в 2020 г. до 6014,57 тыс. т CO2-экв., что ниже эмиссии 2019 года на 2,57%, а по сравнению с базовым 1990 г. уменьшение эмиссий составило 325,68 %.

[1] https://www.ipcc-nggip.iges.or.jp/public/2019rf/pdf/2_Volume2/19R_V2_4_Ch04_Fugitive_Emissions.pdf

Рисунок 6 - Суммарные эмиссии CO_2 экв. от категории 1.B. «Фугитивные источники»

По оценке на 2020 год суммарные эмиссии в категории 1.B.2 составили 4845,12 тыс тонн CO_2 экв., что на 388,4% меньше чем в базовом 1990 г. (23665,96 тыс тонн CO_2 экв). Категория постоянно обновляется за счет перегруппировки некоторых категорий, или обновления данных, кроме того постоянно идет работа над улучшением всей категории с учетом сделанных замечаний ГЭР (2019 и 2021 гг).

Эмиссии ПГ от операций с нефтью в 2019 г снизились более чем на 20 %. Это вызвано несколькими причинами. В первую очередь, был пересмотрен весь ряд исходных данных, и были добавлены некоторые операции, такие как перевозка нефти автотранспортом и ж/д транспортом (до этого рассчитывались эмиссии только от деятельности трубопроводного транспорта). Во-вторых, были применены коэффициенты до 1998 года для развивающихся стран, а начиная с 2008 года - для развитых стран. Таким образом, учитывается внедрение новых и оптимальных решений в отрасли, а также выполнение распоряжений Правительства Казахстана о внедрении инновационных технологий.

Улучшения национальной инвентаризации по категории «Летучие выбросы» согласно рекомендациям международной группы экспертов

Данная категория является довольно сложной, так как некоторые исходные данные для нее не отражаются в национальной статистике по этой причине часть данных запрашивается на предприятиях. Однако, предприятия также могут уточнять свои данные, что приводит к вынужденным пересчётам, как это случилось с категорий использование коксового газа.

С улучшением исходных данных, а также рекомендаций были впервые рассчитаны эмиссии ПГ от подкатегорий: Заброшенные подземные шахты Трансформация твердого топлива и Прочие источники.

В целях улучшения качества расчетов и устранения пробелов в данных, по рекомендациям ГЭР в 2019 г. были произведены пересчеты в подкатегориях, Разведка нефти.

Были изменены ключи почти во всех подкатегориях с NO на NA, а в подкатегории Разведка нефти ключ IE заменен расчетными данными.

Для некоторых подкатегорий, были внесены изменения в единицы измерений для категорий производства нефти и газа, Данное замечание касается категорий: Добыча нефти и газа и переработка.

6. Описание таблиц ОФО (CRF) сектора «Промышленные процессы и использование продуктов (ППИП)»

Инвентаризация выбросов парниковых газов (ПГ) в секторе «Промышленные процессы и использование продуктов» (ППИП) включает оценку выбросов от производства минеральных материалов (2.A), химической промышленности (2.B), металлургической промышленности (2.C), использования растворителей и неэнергетических продуктов из топлива (2.D), электронной промышленности (2.E), использования фторированных заменителей ОРВ (2.F), производства и использования других продуктов (2.G).

Казахстанская инвентаризация ПГ включает шесть категорий из данного перечня — это оценку выбросов от производства минеральных материалов (2.A), химической промышленности (2.B), металлургической промышленности (2.C), использования растворителей и неэнергетических продуктов из топлива (2.D), использования фторированных заменителей ОРВ (2.F), а также использование гесафторида серы (2.G.1). В данной главе представлены все промышленные источники выбросов ПГ (CO2 и CH4), имеющиеся в Казахстане.

Следует отметить, что в Республике Казахстан отсутствуют некоторые производственные процессы, которые, согласно методике РП МГЭИК, 2006г., являются значительными источниками выбросов. Это производство адипиновой кислоты, листового стекла, производство сажи, неметаллургическое производство магнезии, производство капролактама, глиоксаля и глиоксиловой кислоты, производство диоксида титана, а также целлюлозно-бумажная промышленность. В Казахстане также нет производства ГФУ, ПФУ и SF6.

Раздел «ППИП» включает оценку эмиссий ПФУ, ГФУ и SF6 от использования этих веществ в холодильном оборудовании, кондиционерах, изготовлении вспененных материалов и др. Данные вещества, используемые на территории республики, импортируются, в основном от европейских и китайских производителей.

По итогам инвентаризации 2022 года суммарные эмиссии парниковых газов по сектору ППИП в 2020 году составили **23510,091 тыс. тонн CO_2-экв.** Это на 6,5% больше эмиссий 2019года, и на 21,9% превышают выбросы ПГ 1990 года в целом по сектору ППИП (таблица 1 и рисунок 1).

По итогам инвентаризации ПГ в секторе ППИП ключевыми источниками выбросов являются: производство цемента (2A.1), использование известняка и доломита (2A.4d), производство чугуна и стали (2C.1) в том числе производство агломерата (2C.1d) и производство окатышей (2C.1e); далее производство ферросплавов (2C.2), производство алюминия (2C.3), охлаждение и кондиционирование воздуха (2.F.1).

Таблица 4 – Значения выбросов ПГ сектора «ППИП» за период 1990-2020 гг., тыс. тонн CO_2 экв.

Годы	Выбросы ПГ по сектору «ППИП», тыс.тонн CO2 экв.						
	Всего выбросов по сектору «ППИП»	Пр-во минеральных материалов (2A)	Химическая промышленность (2B)	Пр-во металлов (2C)	Потребление ОРВ (2F)	Использование SF6 (2G.1)	Неэнергетические продукты из топлива и использование растворителей (2D)
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1990	**19290,169**	3876,593	1656,439	13754,78	0	0	2,361
1991	**18362,854**	3470,197	1589,629	13300,79	0	0	2,242
1992	**16725,065**	3056,001	1086,309	12580,62	0	0	2,125
1993	**12504,281**	1742,727	474,523	10284,652	0,372	0	2,007
1994	**7737,621**	1042,781	206,741	6484,967	1,244	0	1,888
1995	**8688,016**	826,897	278,703	7577,057	3,648	0	1,711
1996	**7641,436**	575,416	352,596	6707,337	4,494	0	1,593
1997	**9924,297**	662,709	236,058	9016,757	7,298	0	1,475
1998	**8455,996**	1182,546	34,269	7143,022	94,802	0	1,357
1999	**10900,968**	1453,996	39,729	9284,051	121,953	0	1,239
2000	**12326,591**	1262,886	34972	10813,828	213,786	0	1,121
2001	**12683,212**	1746,862	59,912	10640,952	235,015	0	0,472
2002	**13772,221**	2331,416	65,314	11091,365	283,536	0	0,59
2003	**15386,306**	2944,291	141,937	11938,539	361,126	0	0,413
2004	**15828,081**	2720,821	148,519	12506,018	452,363	0,007	0,354
2005	**16172,626**	3879,494	59,284	11639,634	592,265	1,653	0,295
2006	**17199,854**	4865,741	118,994	11406,056	807,139	1,687	0,236
2007	**18106,194**	4368,826	399,128	12480,486	855,822	1,695	0,236
2008	**17666,055**	4960,436	416,879	11420,032	866,815	1,715	0,177
2009	**15766,262**	3933,755	332,79	10494,819	885,451	1,735	117,711
2010	**16845,189**	3893,215	319,663	11636,228	877,898	1,735	116,449
2011	**17652,191**	4028,565	430,008	12127,404	931,662	1,749	132,803
2012	**17462,025**	4372,826	336,545	11632,295	952,825	1,827	165,707
2013	**19956,275**	7108,859	364,965	11378,766	961,731	1,925	140,029
2014	**20313,463**	6623,021	542,283	11963,348	1083,994	2,009	98,808
2015	**21749,704**	7779,109	599,213	12213,611	1116,835	2,013	150,752
2016	**22702,647**	6778,693	667,283	13912,352	1156,458	2,062	185,8
2017	**22684,262**	7121,659	688,595	13589,128	1123,841	2,097	158,943
2018	**21535,079**	6752,008	666,342	12822,281	1130,606	2,152	161,689
2019	**22071,795**	7225,453	680,579	12855,646	1140,626	2,319	167,164
2020	**23510,091**	8273,265	679,378	13248,661	1135,441	2,304	171,041

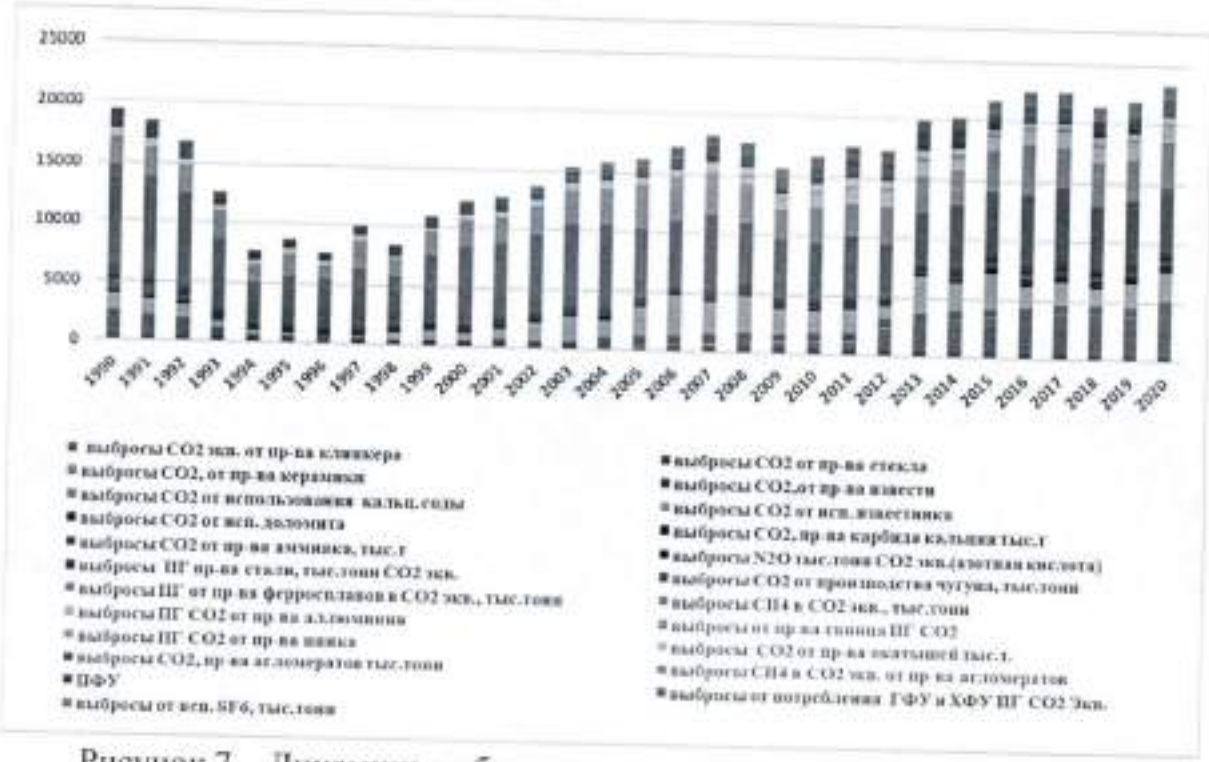
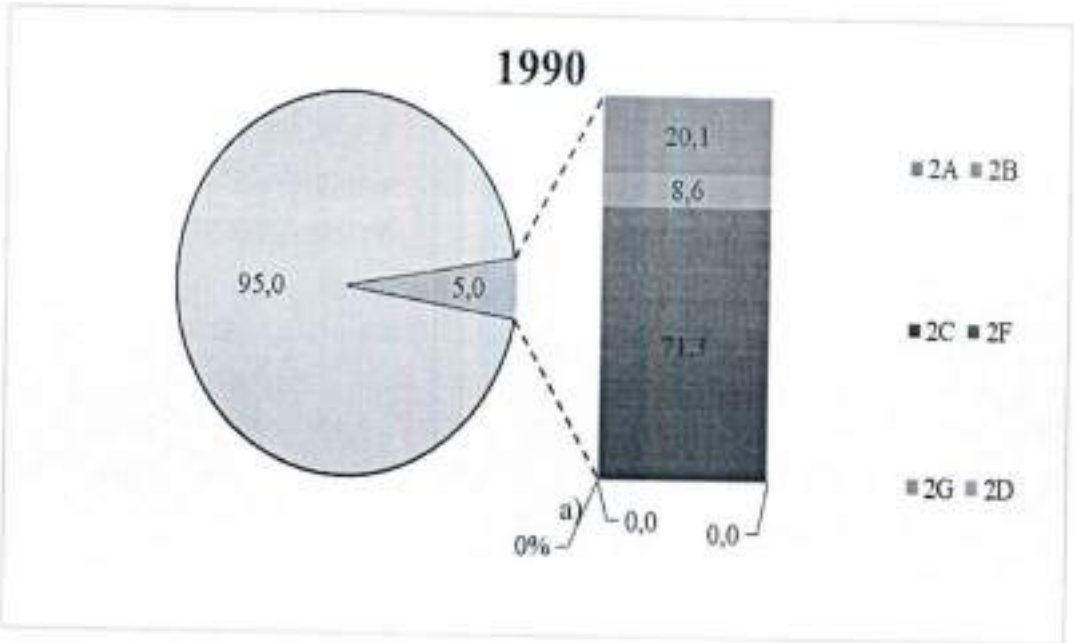


Рисунок 7 – Динамика выбросов парниковых газов сектора «Промышленные процессы и использования продуктов» за 1990-2020 гг.

Вклад в целом сектора «ППИП» в общие национальные выбросы ПГ в 1990 г. и в 2020г., (% без учета сектора ЗИЗЛХ) представлена на рисунке 7. Доля выбросов ПГ по сектору ППИП в общенациональные выбросы ПГ без учета ЗИЗЛХ в 2020 году составила 6,8%, это на 36,5% превышает долю выбросов сектора в 1990 году (5,0%).



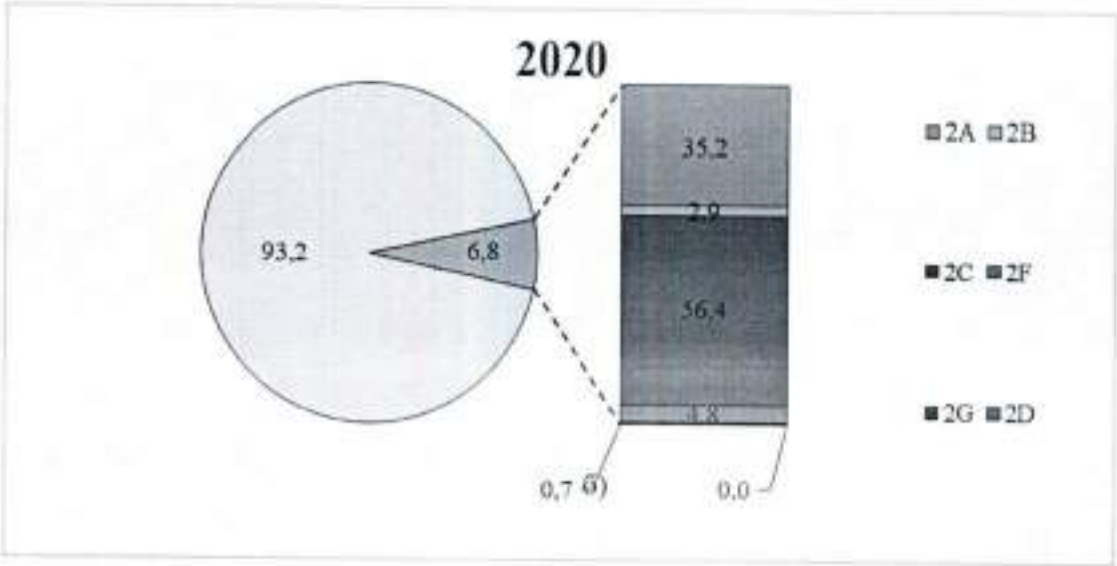


Рисунок 8 – Вклад сектора «ППИП» в общие национальные выбросы ПГ в 1990 г.(а) и в 2020г. (б), % (без учета сектора ЗИЗЛХ)

Источниками парниковых газов в подкатегории «Использование растворителей и других продуктов» являются выбросы неметановых летучих органических соединений (НМЛОС) и закиси азота (N_2O). Расчеты выполнены по следующим подкатегориям: использование красок, обезжиривание и сухая чистка, другое использование растворителей и смежная деятельность, производство асфальта – «дорожные покрытия» и «продувка асфальта». В этих подкатегориях, согласно методологии МГЭИК 2006 г., оценивались выбросы только НМЛОС, которые относятся к косвенным парниковым газам и поэтому в общие национальные эмиссии не включаются. В подкатегории «Использование смазочных материалов» выбросы CH_4 и N_2O очень невелики по сравнению с CO_2. Поэтому они не были включены в отчет.

Смазочные материалы на территории страны применяются, в основном, в промышленности и на транспорте. Смазочные материалы получают на нефтеперегонных заводах или нефтехимических предприятиях путем обработки и выделения их из сырой нефти.

Выбросы CO_2 от использования смазочных материалов в 2020 г составили 30,486 Гг, таблица 5.

Таблица 5 – Суммарные выбросы НМЛОС в секторе «Использование растворителей и другой продукции», тысяч тонн

Годы	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Выбросы НМЛОС	202,66	201,45	200,72	199,39	196,02	191,45	188,74	184,73	181,23	179,16	179,39	179,97	181,29

Продолжение таблицы

Годы	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Выбросы НМЛОС	183,31	184,51	185,93	187,68	190,81	194,28	198,59	202,45	208,75	212,12	216,69	228,60	231,53

Продолжение таблицы

Годы	2016	2017	2018	2019	2020
Выбросы НМЛОС	234,68	244,21	250,75	255,67	261,98

В результате анализа национальных данных по видам использования и применения SF_6, включая данные по статистике внешней и взаимной торговли, экспорта и импорта Республики Казахстан со странами ЕАЭС и остальными странами за 2016-2020гг. Бюро национальной статистики Министерства национальной экономики РК, было выявлено, что в Казахстане SF_6 используется только в электротехническом оборудовании.

В связи с модернизацией национальной электрической сети (существующих подстанций, распределительных устройств, межрегиональных и межгосударственных линий электропередачи) и строительством новых объектов на территории РК с 2004 г. производится замена старого оборудования на герметизированное оборудование с применением гексафторида серы. Срок службы этого оборудования составляет более 35 лет (согласно техническому паспорту и гарантийным обязательствам изготовителя). На рисунке 9 представлена динамика ввода в эксплуатацию оборудования за 2004 - 2020 гг. С 2010 г. наблюдается устойчивый рост применения герметизированного электрооборудования в существующих и новых подстанциях в стране. С 2019 года произошла стабилизация показателей.

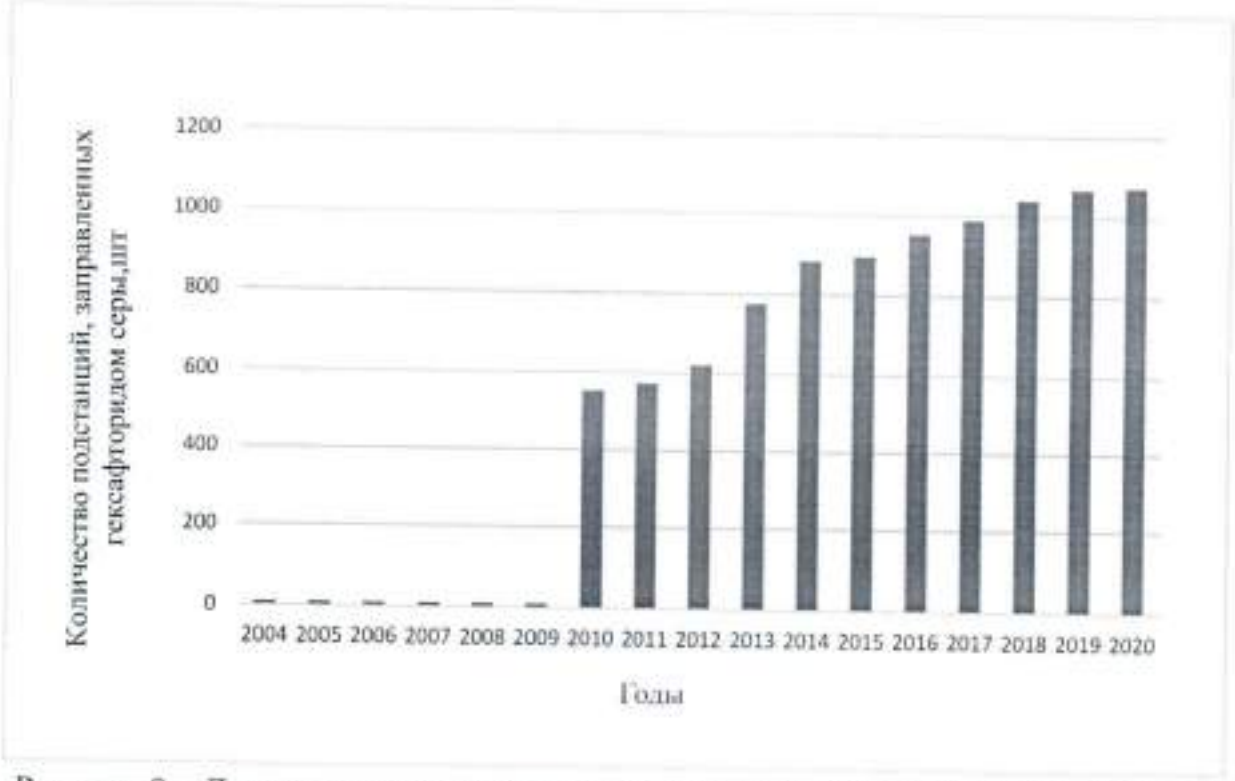


Рисунок 9 – Динамика ввода в эксплуатацию электротехнического оборудования с применением гексафторида серы на территории РК

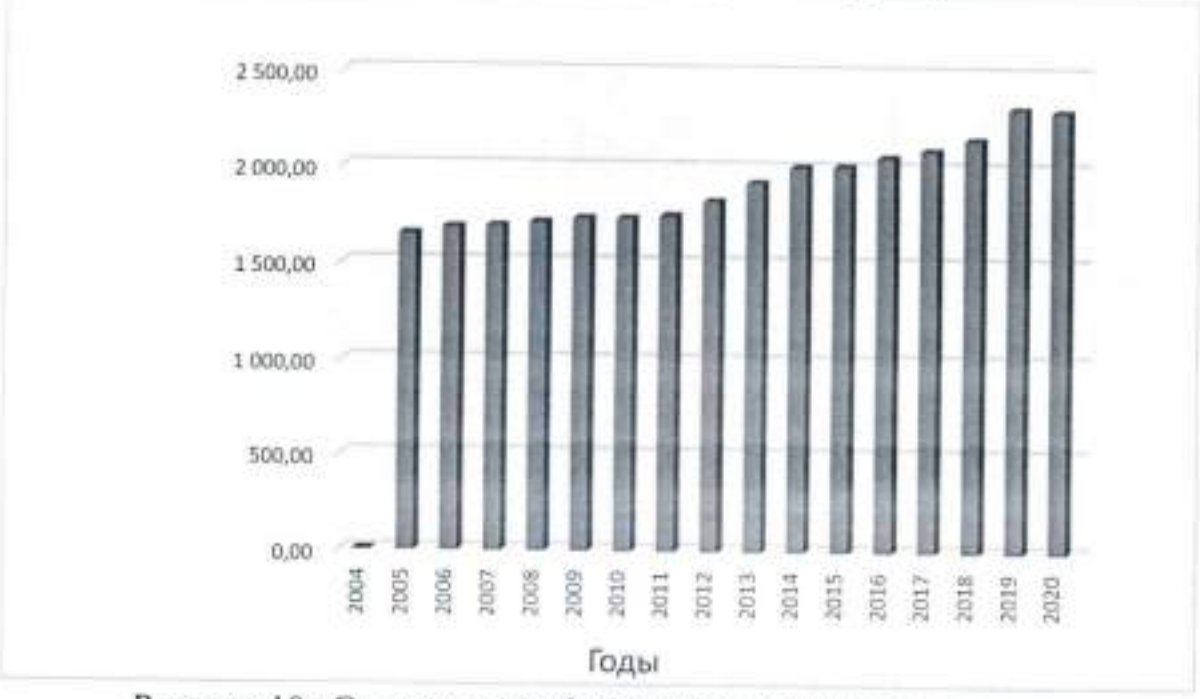


Рисунок 10 - Эмиссии гексафторида серы от герметизированного электротехнического оборудования в электрических сетях АО «KEGOC», т CO_2 - эквивалента

Улучшения национальной инвентаризации по сектору «Промышленные процессы и использование продуктов» согласно рекомендациям международной группе экспертов

По итогам ежегодного обзора НДК (Обзор НДК НИР 2021г.) по замечаниям и рекомендациям ГЭР в разделе «Краткого обзора сектора ППИП» выполнены улучшения: 1) дополнена информация по целлюлозно-бумажной промышленности в РК; 2) были внесены изменения в структуры секторальных глав, в частности, включено описание категории 2.E «Электронная промышленность»; 3) включено описание использования продуктов категории 2.F в качестве заменителей ОРВ и электрического оборудования 2.G.1, а также 2.G.3 - выбросы N2O от использования продуктов перенесены из раздела по выбросам металлургических процессов в отдельные разделы. Также в целом по НИР были внесены следующие изменения: 1) в таблицу 2 (I) ОФД включена информация по данным о деятельности; 2) в категориях 2B.2 «Производство азотной кислоты»; 2C.1b «Производство чугуна»; 2C.1e «Производство окатышей»; 2.C.2 «Производство ферросплавов»; 2.C.6 «Производство цинка» были проведены пересчеты за весь временной ряд. Впервые в таблицы ОФО в категории 2.D.3. «Прочее» была включена подкатегория «Использование мочевинных конвертеров» так как согласно РП МГЭИК, 2006г. учет эмиссий от данной подкатегории ведется в секторе «ППИП», но при этом описание этой подкатегории включено в раздел по транспорту категории 1.C. сектора «Энергетика». В соответствующих разделах НДК НИР приведены подробные описания причин и результатов пересчетов, а также представлен сравнительные таблицы полученных изменений инвентаризаций ПГ 2019 и 2020 годов.

7. Описание таблиц ОФО (CRF) сектора «Сельское хозяйство»

Инвентаризация выбросов парниковых газов в секторе «Сельское хозяйство» включает результаты расчетов эмиссии парниковых газов за 1990…2020 гг. по следующим категориям деятельности:

– выбросы метана (CH_4) при внутренней ферментации сельскохозяйственных животных (категория 3A CRF);

– выбросы метана (CH_4) и закиси азота (N_2O), от систем сбора, хранения и использования навоза (категория 3B CRF);

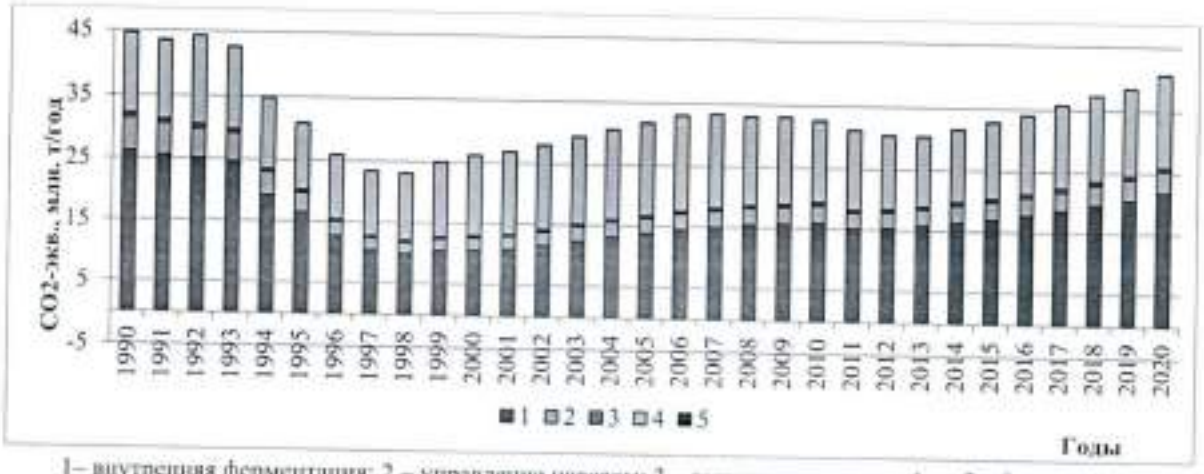
– выбросы метана (CH_4) при выращивании риса (категория 3C CRF);

– выбросы закиси азота (N_2O) из обрабатываемых почв (категория 3D CRF);

– выбросы диоксида углерода (CO_2) при удобрении мочевиной (категория 3H CRF).

Сектор «Сельское хозяйство» является вторым по величине источником выбросов парниковых газов после сектора «Энергетика». Доля выбросов парниковых газов в секторе от общенациональных выбросов увеличилась с 11,5 % в 1990 г. до 11,8 % в 2020 г. Наиболее существенными источниками эмиссии парниковых газов в секторе «Сельское хозяйство» являются выбросы метана (CH4) в результате внутренней ферментации сельскохозяйственных животных (53,7 % в 2020 г.), выбросы закиси азота (N2O) из обрабатываемых почв (36,2 % в 2020 г.) и выбросы метана (CH4) и закиси азота (N2O), от систем сбора, хранения и использования навоза (8,8 % в 2020 г.).

На рисунке 11 и в таблице 6 представлены результаты расчетов эмиссии парниковых газов от сектора «Сельское хозяйство» по категориям деятельности в соответствии с классификацией МГЭИК.



1– внутренняя ферментация; 2 – управление навозом; 3 – выращивание риса; 4 – обрабатываемые почвы; 5 – применение мочевины.

Рисунок 11 – Выбросы парниковых газов от деятельности в секторе «Сельское хозяйство» за 1990…2020 гг.

Суммарная эмиссия парниковых газов в 2020 г. составила 40,725 млн. тонн CO2 экв. и по сравнению с 1990 г. уменьшилась на 4,017 млн. тонн (9 %). По сравнению с 2019 г. выбросы в 2020 г. выросли на 2,226 млн. тонн (6 %). Минимальные значения эмиссии наблюдались в 1998 г. (23,067 млн. тонн).

Таблица 6 – Эмиссия парниковых газов от деятельности в секторе «Сельское хозяйство» за 1990…2020 гг., тыс. тонн CO_2 экв

Годы	Внутренняя ферментация	Управление навозом	Выращивание риса	Обрабатываемые почвы	Применение мочевины	Итого
	3A	3B	3C	3D	3H	3
1990	26245,50	5278,88	651,00	12462,36	104,40	44742,14
1991	25592,75	5084,87	624,75	12173,30	91,36	43567,03
1992	25167,00	4769,37	603,75	13675,22	78,31	44293,65
1993	24613,50	4655,76	567,00	12727,58	65,27	42629,11
1994	19261,00	3694,36	535,50	11312,08	52,23	34855,17
1995	16616,75	3084,72	441,50	10757,80	39,19	30939,96
1996	12717,50	2293,45	472,50	10447,88	26,14	25957,47
1997	10420,50	1905,25	435,75	10564,10	13,10	23338,70
1998	9834,50	1826,72	385,25	11020,04	0,06	23066,57
1999	10416,50	1932,96	372,75	12316,34	0,17	25038,72
2000	10601,25	2010,03	378,50	13171,60	0,08	26161,46
2001	10853,25	2073,80	363,25	13556,02	0,07	26846,39
2002	11564,50	2222,82	357,00	13907,66	0,06	28052,04
2003	12325,75	2406,33	439,00	14312,94	0,06	29484,08
2004	13169,00	2483,44	423,75	14622,86	0,24	30699,29
2005	13811,75	2580,51	445,75	15010,26	0,25	31848,52
2006	14497,50	2690,63	460,00	15466,20	0,13	33114,46
2007	15005,75	2786,68	458,75	15138,40	0,15	33389,73
2008	15533,00	2840,29	396,50	14315,92	0,56	33086,27
2009	15748,25	2887,05	456,25	14017,92	0,23	33109,70
2010	16077,50	2937,79	493,50	13150,74	0,68	32660,21
2011	15146,50	2755,96	489,75	12903,40	2,47	31298,08
2012	15322,00	2713,39	488,25	11970,66	0,72	30495,02
2013	15841,25	2750,16	472,00	11371,68	0,20	30435,29
2014	16514,75	2819,55	500,25	11842,52	0,55	31677,62
2015	17085,00	2905,32	518,75	12340,18	0,27	32849,52
2016	17808,00	2986,42	495,00	12784,20	0,59	34074,21
2017	18652,50	3122,41	548,75	13368,28	1,97	35693,91
2018	19683,25	3292,39	532,75	13773,56	2,54	37284,49
2019	20546,25	3418,36	546,00	13985,14	3,11	38498,86
2020	21853,50	3573,86	537,00	14756,96	3,67	40724,99

Основная доля эмиссии парниковых газов на 2020 г. в секторе приходится на метан (CH4) – 23,236 млн. тонн CO2 экв. (57 %). Эмиссия закиси азота (N2O), составляет 17,487 млн. тонн CO2 экв. (43 %), объем эмиссии CO2 от применения мочевины является незначительным (около 0,01 %) (рисунок 12).

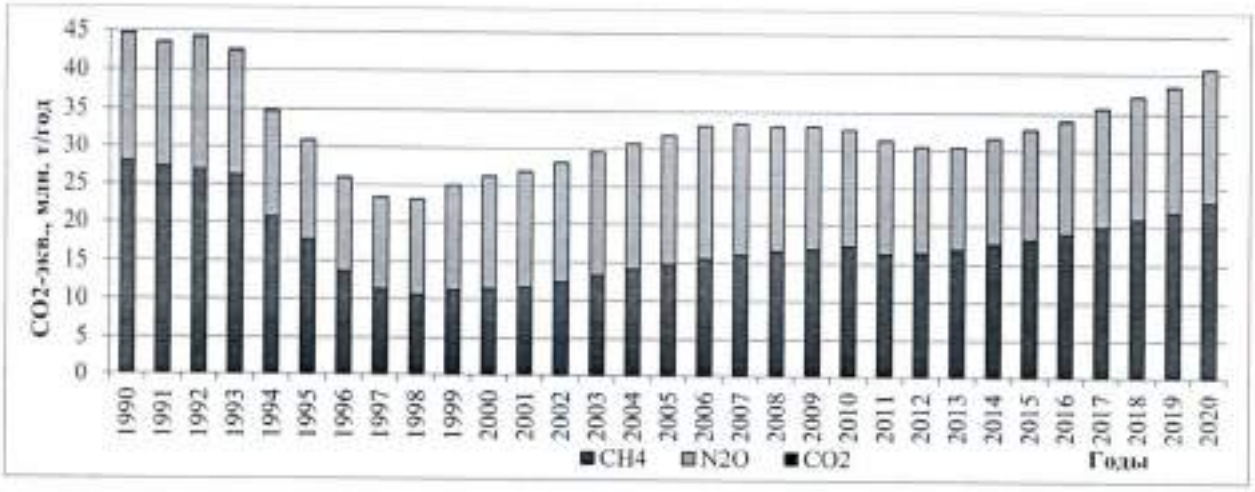


Рисунок 12 – Эмиссия по видам парниковых газов от деятельности в секторе «Сельское хозяйство» по видам газов за 1990…2020 гг.

Улучшения национальной инвентаризации по сектору «Сельское хозяйство» согласно рекомендациям международной группы экспертов

Уточнено поголовье ослов и буйволов за 2015-2019 гг. по данным FAO, однако эти уточнения ввиду малых значений почти не повлияли на величину эмиссии закиси азота при внесении органических удобрений.

Выполнены пересчеты и исправлена техническая ошибка за счет переоценки количества азота, высвобождаемого в процессе минерализации органического вещества за 1990…2019 гг. Это количество находится в прямой зависимости от изменения количества почвенного углерода в категории «Возделываемые земли» сектора ЗИЗЛХ.

Скорректировано количество азота, полученное от удобрений и других сельскохозяйственных ресурсов, которое теряется в результате выщелачивания и стока.

8. Описание таблиц (CRF) сектора «Лесное хозяйство и другие виды землепользования»

Для отчетности по Конвенции РКИК ООН, в соответствии с обязательствами Республики Казахстан, в разделе ЗИЗЛХ НД - 2022 представлены результаты оценки поглощения / эмиссии парниковых газов (ПГ) связанные с деятельностью в лесном хозяйстве и другими видами землепользования за 1990…2020 годы.

Оценка поглощения /эмиссии ПГ для сектора выполнена в соответствии с требованиями РП МГЭИК, 2006, Том 4 Сельское хозяйство , лесное хозяйство и другие виды землепользования, касающихся согласованности при категоризации земель по системам пользования и управления (6 категорий), преобразований в практике пользования (6 категорий) в соответствии с их классификацией и определениями на национальном уровне.

В электронных таблицах ОФО (CRF) результаты инвентаризации ПГ для сектора ЗИЗЛХ за 1990…2020 годы представлены в основных таблицах:

4. Land Use, Land –Use Change and Forestry ;

4 A Forest Land; 4 B Crop land; 4 C Grassland ; 4 D Wetlands;

4 E Settlements ; 4 F Other Land ; 4 G Harvested Wood Products.

Оценка запасов углерода и их годовых изменений представлена по всем компонентам природных экосистем и агроэкосистем с учетом перераспределения углерода по резервуарам накопления, включая живую биомассу, мертвое органическое вещество (валежная древесина и подстилка для леса) и минеральную почву. Также в таблице показаны площади , на которых осуществляется деятельность связанная с конкретными видами землепользования.

Представленные в электронной таблице ОФО (CRF) результаты инвентаризации ПГ по сектору ЗИЗЛХ согласуются с результатами оценки потоков поглощения / эмиссии ПГ по вышеупомянутым категориям деятельности за 1990-2020 гг. , обобщаемых в таблице 6.1 НД - 2022. Как видно из таблицы 6.1, расчетами за 2020 год подтверждается сохранение поглощения CO_2 для категорий землепользования Лесные земли (FL), Пастбища (GL), а также Поселения (SL) . Возделываемые земли (CL) в РК остаются источником эмиссий ПГ, что в итоге определяет и сохранность общего потока ПК как эмиссии в секторе ЗИЗЛХ почти за все годы временного ряда. На 2020 год итоговые эмиссии ПГ для сектора получены по расчетам на уровне 8009,94 тысяч тонн в эквиваленте CO_2, что превышает итоговые эмиссии для сектора за 2019 год на величину 3658,53 тысяч тонн CO2. По отношению к базовому году итоговая величина потоков ПГ за 2020 год превышает по абсолютной величине аналогичную за 1990 год на 11951,14 тысяч тонн CO2 , с учетом противоположного

знака направленности итогового потока CO2 за 1990 год , характеризующего его как поглощение.

Антропогенные эмиссии / поглощения ПГ для сектора ЗИЗЛХ представлены в электронной таблице ОФО (CRF) для управляемых земель, поскольку допускалось, что все лесные и сельскохозяйственные угодья в РК, а также земли под поселениями, искусственными водоемами из категории «Водно-болотные угодья», относятся к управляемым. К не управляемым землям относились озера, реки, болота и прочие угодья. Для категорий землепользования Лесные площади (FL) и Возделываемые земли (CL) расчеты динамики углерода и объемов поглощения / эмиссий CO2 в НДК 2020 выполнялись за 1990-2020гг на региональном уровне. Полученные результаты на уровне административных областей обобщались для электронных таблиц ОФО (CRF) на национальном уровне.

Таблица 7 - Годовые величины чистого поглощения (-) / эмиссии (+) CO_2 и других видов парниковых газов, рассчитанные для лесного хозяйства и других видов землепользования в РК за 1990…2020 гг.

Годы	Итого поглощение/эмиссии для сектора ЗИЗЛХ с учетом эмиссии от лесных пожаров, тыс, тонн /год в экв, CO_2	Лесные площади и древесно-кустарниковые насаждения, с учетом эмиссии от пожаров, тыс, тонн /год в экв, CO_2	Возделываемые земли, включая пашню в севообороте, выводимую в залежь, пастбища и многолетние насаждения, CO_2 тыс, тон /год	Пастбища и сенокосы при родные, с учетом эмиссии от степных пожаров, тыс, тонн /год в экв, CO_2	Поселения (дополнительно обустроенные земли), CO_2 тыс, тонн /год	Водноболотные угодья (искуственные водоемы), CO_2 тыс,тонн /год
1990	-3941,2	-1478,033	5599	-6911,67	- 1166,00	4,25
1991	1470,04	-2248,033	13566,66	-8666,90	-1202,66	1,46
1992	7016,13	-2638,166	21307,00	-10422,13	- 1241,90	0,00
1993	11142,77	3823,233	28413,00	-12177,37	-1281,13	1,10
1994	17027,6	-3509,366	35753,66	-13932,60	-1321,83	0,00
1995	23344,86	-3194,766	43424,33	-15701,03	-1362,17	0,00
1996	29774,26	-2613,233	51153,66	-17432,07	-1401,40	0,00
1997	36207,0	-2567,033	58736,33	-19187,30	-1441,00	0,00
1998	28569,18	-2957,9	53845,0	-20942,53	-1481,33	0,00
1999	49143,22	-864,600	74048,33	-22697,78	-1521,66	0,00
2000	56572,04	1229,066	81246,00	-24453,00	-1560,90	0,00
2001	53636,35	3208,33	76277,66	-24412,67	-1598,66	0,00
2002	52154,35	5303,833	72735,66	-24372,33	-1639,73	0,00
2003	48018,53	5057,066	68680,33	-24332,00	-1682,26	0,00
2004	43179,44	3594,800	65420,66	-24291,67	-1722,60	0,00
2005	37883,98	1868,166	61926,33	-24258,67	-1762,93	0,00
2006	33682,33	369,233	59150,66	-24233,00	-1802,53	0,00
2007	27759,98	-1129,700	54699,33	-24181,67	-1842,86	0,00
2008	24706,88	-363	51062,00	-24145	-1881,00	0,00
2009	20910,37	-1814,63	48726,33	-24099,53	-1921,33	0,00
2010	15251,35	-3265,533	44887,33	-25527,33	-1228,33	342,79

2011	11593,37	-4716,433	41367,33	-23184,33	-2001,26	107,47
2012	7244,65	-6167,333	37719,00	-22311,66	-2041,60	29,19
2013	2321,76	-8365,866	34232,00	-21431,67	-2116,03	0,00
2014	3427,55	-7352,03	33498,66	-20555,33	-2191,56	0,00
2015	4434,42	-6338,566	32739,66	-19682,66	-2456,66	106,37
2016	4972,96	-5314,1	31735,00	-18810,00	-2645,50	0,18
2017	5487,41	-4311,633	30411,33	-17941,00	-2859,27	14,89
2018	7961,59	-3797,200	30560,1	-15775,66	-3202,83	0,00
2019	4351,41	-7066,033	28372,66	-13768,33	-3245,27	0,00
2020	8009,94	-10335,60	31905,13	-10120,00	-3540,90	0,00

Улучшения национальной инвентаризации по сектору «ЗИЗЛХ» согласно рекомендациям международной группе экспертов

В рамках Ревью-2019 в сентябре –октябре 2021 , экспертами международной группы от Секретариата РКИК ООН рекомендовалось РК продолжить деятельность направленную на дальнейшее развитие национальной системы инвентаризации парниковых газов, включая сектор ЗИЗЛХ, в частности для обеспечения расчетов на региональном уровне для ключевых категорий антропогенной деятельности.

В соответствии с полученными рекомендациями касающихся отчетности по Конвенции РКИК ООН, в рамках НДК -2020, сектор ЗИЗЛХ продолжались методические работы по раз агрегированию расчетов ПГ на областном уровне для категорий землепользования Лесные угодья и Возделываемые земли с расширением архива национальных эталонов углерода, уточнением коэффициентов деятельности, получением согласованной информации из ведомственных архивов. Рассчитанные впервые за 1990-2020гг. на областном уровне (всего 14 областей) годовые изменения запасов углерода и объемов поглощения /эмиссии для категорий деятельности Лесные угодья и Возделываемые земли представлены в НДК -2020, сектор ЗИЗЛХ. С целью представления результатов в электронных таблицах ОФО (CRF) показатели обобщались предварительно на национальном уровне.

9. Описание к отчетным электронным таблицам в формате SEF с учетом рекомендаций международной группы экспертов Секретариата РКИК ООН

Электронные таблицы формата SEF содержат описание и информацию по единицам сокращения и поглощения в рамках Киотского протокола.

Как Сторона Киотского Протокола, РК в первый период действия обязательств по КП (2008…2012гг.) по результатам деятельности таблицы SEF не предоставляла, поскольку не имела количественных обязательств по Киотскому протоколу. Вместе с тем, в соответствии с документацией по КП (Статья 3 и 8 КП, Решение 16/CMP.1 , Приложение к решению 2/CMP.7 и др.), РК может предоставлять дополнительную отчетность за второй период действия обязательств (2013...2020 гг.) на добровольной основе.

Согласно рекомендациям международной группе экспертов, Страна также может предоставлять в Секретариат дополнительную информацию, включая ее стандартную электронную форму, для облегчения расчета своего установленного количества и для демонстрации своей способности учитывать свои выбросы и свое установленное количество.

Таким образом, таблицы электронного формата SEF являются необязательными для представления отчетности по парниковым газам, но были рекомендованы к представлению. Так как в Казахстане нет проектов в рамках деятельности по механизмам Киотского протокола, таблицы SEF заполнены нотационными ключами NO, т.е. такая деятельность не осуществляется.

Таблицы SEF представлены в Приложении к настоящему отчету.

10. Описание таблиц ОФО (CRF) сектора «Отходы»

Ежегодно в Казахстане образуется 5-6 млн. тонн твердых бытовых отходов. В ближайшие годы следует ожидать увеличения объемов образования ТБО за счет увеличения номенклатуры продовольственных и непродовольственных товаров, ассортимента и видов упаковки для них, роста уровня жизни населения.

За 2020 год в Республике Казахстан образовано 4,6 млн.тонн ТБО (по данным Министерства экологии, геологии и природных ресурсов Республики Казахстан), из которых 2,8 млн. тонн составили коммунальные отходы, собранные специализированными предприятиями и индивидуальными предпринимателями по сбору и транспортировке отходов, число которых составило 625 единиц. Основная доля приходится на отходы домашних хозяйств (71,4%), 14,6% составили отходы производства (приравненные к бытовым), 9,9% - уличный мусор, 2,2% - рыночные отходы.

В 2020 году на официально действующие полигоны (свалки), объекты сортировки и переработки коммунальных отходов поступило 3,7 млн. тонн отходов. Из них 68,6% поступило для их дальнейшего депонирования, 30,3% отсортировано. Из объема отходов, поступивших на депонирование, 61,8% - составили смешанные коммунальные отходы, 30,9% - остатки отходов после переработки.

На конец 2020 года на официально действующих полигонах (свалках) накоплено более 45,7 млн. тонн отходов.

В секторе «Отходы» эмиссии парниковых газов образуются от захоронения на свалках твердых бытовых отходов (СТО), переработки сточных вод (коммунально-бытовых и промышленных), продуктов жизнедеятельности человека, сжигания медицинских отходов. Общие эмиссии парниковых газов в секторе в 2020 году составили 7355,84 Гг CO2-экв., что больше уровня выбросов предыдущего 2019 года практически на 10%. Существенная разница связана с значительным увеличением выбросов от коммунально-бытовых сточных вод. В 1990 году эмиссии в данном секторе составляли 4648,7 Гг CO2-экв. За весь период с 1990 г. по 2020 г. рост эмиссий от данного вида деятельности увеличился в 2 раза, за счет роста образования ТБО. Рост экономики и продолжающаяся урбанизация в Казахстане являются причинами ежегодного повышения объемов ТБО. Тренды выбросов парниковых газов приведены в таблице 8.

Таблица 8 – Эмиссия парниковых газов в секторе «Отходы» за 1990…2020 гг., тысяч тонн CO_2-эквивалента

Годы	Полигон ТБО г.Нур-Султан	Свалки твердых отходов (СТО) г.Алматы	Свалки ТБО, остальные города Казахстана	Коммунально-бытовые сточные воды	Промышленные стоки	Закись азота N2O	Сжигание медицинских отходов	Общие эмиссии от сектора «Отходы»
1990	45,19	144,35	1526,56	1344,17	1323,92	264,50	0,00	4648,70
1991	44,46	165,12	1604,37	1350,89	1169,14	266,01	0,00	4600,00
1992	43,74	184,41	1673,29	1346,09	758,79	271,78	0,00	4278,11
1993	43,26	202,94	1733,68	1331,01	415,24	270,27	0,00	3996,39
1994	42,93	220,56	1785,78	1296,30	226,45	264,01	0,00	3836,03
1995	42,79	237,18	1823,89	1273,63	188,02	262,35	0,00	3827,86
1996	42,75	252,34	1860,42	1258,57	165,28	261,96	0,00	3841,31
1997	42,78	266,26	1895,02	1236,40	173,09	257,01	0,00	3870,55
1998	42,94	279,38	1927,93	1220,11	105,12	250,29	0,00	3825,76
1999	45,01	291,66	1959,13	1216,52	122,42	246,55	0,00	3881,28
2000	48,98	303,30	1988,80	1215,71	138,18	245,96	0,00	3940,92
2001	55,44	313,96	2017,01	1215,94	214,08	245,72	0,00	4062,15
2002	63,84	324,10	2044,49	1145,20	292,57	248,81	0,00	4119,00
2003	71,68	334,49	2071,22	1152,23	277,78	253,00	0,00	4160,40
2004	79,04	345,75	2097,26	1178,62	327,10	255,09	0,00	4282,84
2005	86,45	357,83	2122,55	1180,06	392,87	260,43	0,00	4400,20
2006	94,12	371,34	2147,11	1270,98	463,38	269,26	0,01	4616,20
2007	100,25	380,41	2186,68	1251,71	578,43	275,20	0,73	4773,41
2008	102,67	378,52	2277,57	1292,37	521,85	282,47	1,07	4856,53
2009	104,82	378,25	2367,98	1318,88	628,97	292,46	9,65	5101,00
2010	106,93	370,60	2482,35	1365,90	631,84	299,88	10,35	5267,85
2011	111,14	364,76	2582,37	1394,18	535,45	304,14	8,21	5300,26
2012	116,91	360,43	2688,24	1422,08	528,90	308,45	7,56	5432,57
2013	124,20	361,41	2768,90	1450,28	540,77	311,16	9,34	5556,71
2014	132,51	364,81	2843,72	1511,10	582,69	314,89	9,07	5758,79
2015	142,28	376,33	2906,59	1525,73	566,72	323,12	7,85	5848,63
2016	153,19	393,65	2954,28	1551,43	722,26	328,59	7,88	6111,28
2017	170,40	420,29	2976,53	1586,52	773,63	336,71	7,27	6271,35
2018	184,01	435,81	3031,01	1632,26	790,67	364,82	7,51	6446,08
2019	196,40	448,44	3098,18	1673,89	871,18	393,50	7,31	6688,89
2020	210,93	463,55	3161,05	2185,37	909,17	394,84	30,92	7355,84

Общая динамика эмиссии парниковых газов от сектора «Отходы» за 1990…2020 гг. представлена на рисунке 13

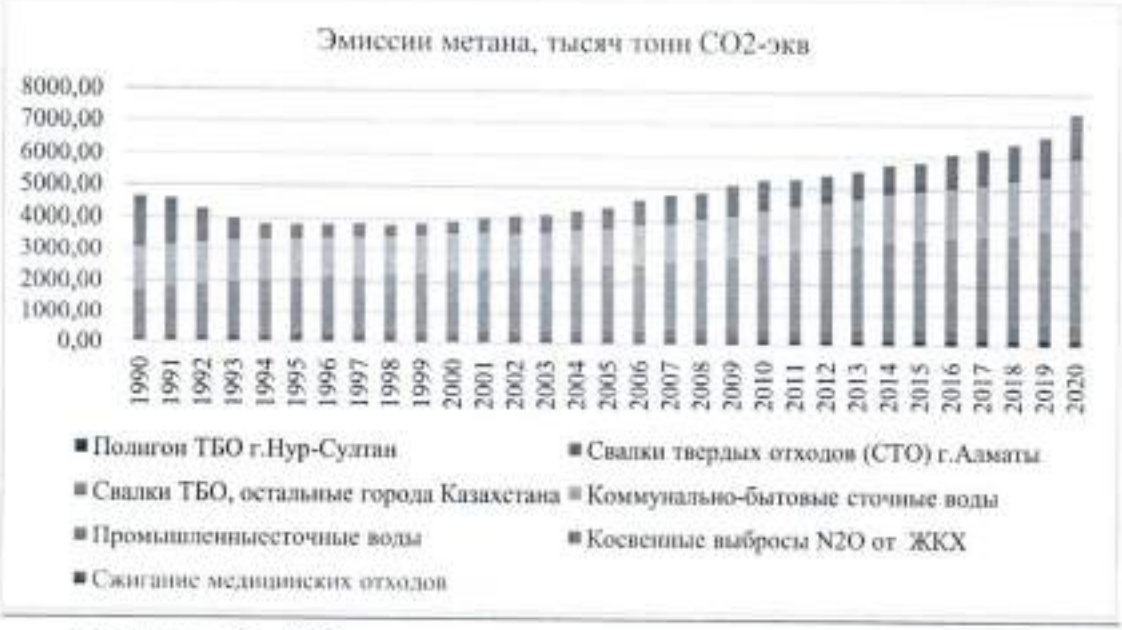


Рисунок 13 – Общая динамика эмиссии парниковых газов от сектора «Отходы» в Казахстане за 1990…2020 гг.

Улучшения национальной инвентаризации по сектору «Отходы» согласно рекомендациям международной группы экспертов

Был произведен пересчет эмиссий от категории 5А Неуправляемые полигоны отходов по всему временному ряду. В ходе пересчета были получены инные значения выбросов, отраженные в новом отчете.

Значения при расчетах выбросов от категории 5.А значение DOC использовалось по умолчанию – 0,5, в связи с чем значения с таблицах ОФО были заменены.

В соответствии с замечанием W.17 значение удаляемого осадка в сточных водах было заменено с IE на NO, поскольку для удаления осадка по умолчанию использовалось нулевое значение.

В соответствии с замечанием W.19 в категорию промышленных сточных вод 5.D.2. включены выбросы от целлюлозно-бумажного производства. В связи с этим был произведен пересчет выбросов от категории по всему временному ряду. Вместе с тем, в соответствии с рекомендациями ГЭР, в настоящее время уточняются данные по системе утилизации промышленных отходов, составе ТБО, складируемых на полигонах, рекуперации метана и компостированию отходов. Результаты проводимой работы будут направлены на использование более высокого метода для будущей инвентаризации.

ПРИЛОЖЕНИЕ К ОТЧЕТУ

Отчетные электронные таблицы в форматах CRF и SEF с учетом рекомендаций международной группы экспертов Секретариата РКИК ООН

TABLE 1 SECTORAL REPORT FOR ENERGY
(Sheet 1 of 2)

Inventory 1990
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2	CH_4	N_2O	NO_X	CO	NMVOC	SO_2
	(kt)						
Total Energy	261466,16	2211,05	6,04	58241,88	461762,12	55735,08	1083,83
A. Fuel combustion activities (sectoral approach)	245681,14	61,64	6,02	58241,88	461762,12	55735,08	1083,83
1. Energy industries	141770,89	2,28	1,81	423,94	32,68	8,29	711,54
a. Public electricity and heat production	112392,65	1,75	1,47	336,08	25,71	6,45	623,63
b. Petroleum refining	2877,37	0,12	0,02	7,87	0,59	0,19	7,91
c. Manufacture of solid fuels and other energy industries	26500,87	0,41	0,32	79,99	6,38	1,65	80,00
2. Manufacturing industries and construction	18950,88	1,42	0,22	57,69	20,14	2,96	106,11
a. Iron and steel	7939,37	0,68	0,11	25,21	9,55	1,39	45,83
b. Non-ferrous metals	2497,47	0,18	0,03	7,20	2,31	0,36	24,11
c. Chemicals	1904,10	0,06	0,01	5,23	1,11	0,19	3,07
d. Pulp, paper and print	39,02	0,00	0,00	0,11	0,03	0,01	0,17
e. Food processing, beverages and tobacco	772,08	0,05	0,01	2,19	0,87	0,09	4,51
f. Non-metallic minerals	4848,23	0,35	0,06	14,58	5,10	0,75	23,96
g. Other (*please specify*)	950,61	0,08	0,01	3,17	1,17	0,17	4,46
3. Transport	21245,19	6,41	3,06	57587,13	460677,64	55610,23	39,94
a. Domestic aviation	1083,55	0,01	0,03	1,90	8,26	0,11	0,29
b. Road transportation	14628,58	6,02	0,76	57585,15	460669,36	55610,11	39,65
c. Railways	4860,59	0,27	1,84	0,08	0,02	0,01	NE
d. Domestic navigation	122,74	0,03	0,00	NE	NE	NE	NE
e. Other transportation	549,74	0,08	0,42	NE	NE	NE	NE

TABLE 1 SECTORAL REPORT FOR ENERGY
(Sheet 2 of 2)

Inventory 1990
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2	CH_4	N_2O	NO_x	CO	NMVOC	SO_2
	(kt)						
4. Other sectors	54835,05	50,52	0,83	163,66	921,57	102,50	197,07
a. Commercial/institutional	28952,33	4,24	0,41	30,96	513,86	51,71	143,02
b. Residential	16963,36	42,63	0,24	18,57	298,53	20,42	49,72
c. Agriculture/forestry/fishing	8919,36	3,65	0,17	114,13	109,18	20,37	4,33
5. Other *(as specified in table 1.A(a) sheet 4)*	8879,13	1,02	0,10	9,46	110,08	11,10	29,17
a. Stationary	8879,13	1,02	0,10	9,46	110,08	11,10	29,17
b. Mobile	NO,IE	NO,IE	NO,IE	NO	NO	NO	NO
B. Fugitive emissions from fuels	15785,02	2149,41	0,02	NO,NA	NO,NA	NO,NA	NO,NA
1. Solid fuels	15709,91	1205,99	0,00	NO,NA	NO,NA	NO,NA	NO,NA
a. Coal mining and handling	277,07	1205,99	NA	NA	NA	NA	
b. Solid fuel transformation	9,93	0,00	0,00	NO	NO	NO	NO
c. Other *(as specified in table 1.B.1)*	15422,91	0,00	0,00	NA	NA	NA	NA
2. Oil and natural gas and other emissions from energy production	75,11	943,42	0,02	NA	NA	NA	NA
a. Oil	66,99	934,25	0,02	NA	NA	NA	NA
b. Natural gas	1,45	9,16				NA	NA
c. Venting and flaring	6,66	0,00	0,00	NA	NA	NA	NA
d. Other *(as specified in table 1.B.2)*	NA	NA	NA	NA	NA	NA	NA
C. CO_2 Transport and storage	NO,NA						
1. Transport of CO_2	NO						
2. Injection and storage	NA						
3. Other	NO						
Memo items: [(1)]							
International bunkers	666,08	0,01	0,02	NE,NA	NE,NA	NE,NA	NE,NA
Aviation	576,45	0,00	0,02	NE	NE	NE	NE
Navigation	89,63	0,01	0,00	NA	NA	NA	NA
Multilateral operations	NA	NA	NA	NA	NA	NA	NA
CO_2 emissions from biomass	1166,88						
CO_2 captured	NO,IE,NA						
For domestic storage	NA						
For storage in other countries	NA						

[(1)] Countries are asked to report emissions from international aviation and marine bunkers and multilateral operations, as well as carbon dioxide (CO_2) emissions from biomass, under Memo items. These emissions should not be included in the national total emissions from the energy sector. Amounts of biomass used as fuel are included in the national energy consumption but the corresponding CO_2 emissions are not included in the national total as it is assumed that the biomass is produced in a sustainable manner. If the biomass is harvested at an unsustainable rate, net CO_2 emissions are accounted for as a loss of biomass stocks in the land use, land-use change and forestry sector.

Documentation Box:
Parties should provide detailed explanations on the energy sector in chapter 3: energy (IPCC sector 1) of the national inventory report. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.

Documentation box	mous coal. Separate data for this type of coal were not provided by national statistics. 1.1/1990: The data for calculations are not available in the national statistics of Kazakhstan.

TABLE 2(I) SECTORAL REPORT FOR INDUSTRIAL PROCESSES AND PRODUCT USE
(Sheet 1 of 2)

Inventory 1990
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2	CH_4	N_2O	HFCs[1]	PFCs[1]	Unspecified mix of HFCs and PFCs[1]	SF_6	NF_3	NO_x	CO	NMVOC	SO_2
	(kt)			CO_2 equivalent (kt)			(kt)					
Total industrial processes	18835,55	1,29	1,43	NO,NA	NA,NO	NO,NA	NA,NO	NO,NA	0,46	0,05	205,92	0,00
A. Mineral industry	3876,59								NO	NO	NO	NO
1. Cement production	1015,08											NO
2. Lime production	1489,31											
3. Glass production	NO											
4. Other process uses of carbonates	1372,21											
B. Chemical industry	1234,17	NO	1,43	NO	NO	NO	NO	NO	NO	NO	NO	NO
1. Ammonia production	959,21	NO	NO						0,46	0,05	NO	0,00
2. Nitric acid production			1,43						0,46	0,05	NO	0,00
3. Adipic acid production	NO		NO						NO			
4. Caprolactam, glyoxal and glyoxylic acid production	NO		NO						NO	NO	NO	
5. Carbide production	274,96	NO									NO	NO
6. Titanium dioxide production	NO								NO	NO	NO	NO
7. Soda ash production	NO											
8. Petrochemical and carbon black production	NO	NO										
9. Fluorochemical production				NO	NO	NO	NO	NO	NO	NO	NO	NO
10. Other *(as specified in table 2(I).A-H)*	NO	NO	NO	NO	NO	NO	NO	NO				
C. Metal industry	13722,42	1,29	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
1. Iron and steel production	11496,54	0,68							NO,NA	NO,NA	3,26	NO,NA
2. Ferroalloys production	1958,73	0,61							NA	NA	3,26	NA
3. Aluminium production	NO				NO		NO		NO	NO	NO	NO
4. Magnesium production	NO			NO	NO	NO	NO		NO	NO	NO	NO
5. Lead production	150,96								NO	NO	NO	NO
6. Zinc production	116,19								NO	NO	NO	NO
7. Other *(as specified in table 2(I).A-H)*	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

[1] The emissions of hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), unspecified mix of HFCs and PFCs, and other fluorinated gases are to be expressed as carbon dioxide equivalent emissions. Data on disaggregated emissions of HFCs and PFCs are to be provided in table 2(II).

TABLE 2(I) SECTORAL REPORT FOR INDUSTRIAL PROCESSES AND PRODUCT USE
(Sheet 2 of 2)

Inventory 1990
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2	CH_4	N_2O	HFCs[1]	PFCs[1]	Unspecified mix of HFCs and PFCs[1]	SF_6	NF_3	NO_x	CO	NMVOC	SO_2
	(kt)			CO_2 equivalent (kt)			(kt)					
D. Non-energy products from fuels and solvent use	2,36	NO,NA	NO,NA						NO,NA	NO,NA	202,66	NO,NA
1. Lubricant use	2,36	NA	NA						NA	NA	NA	NA
2. Paraffin wax use	NA	NA	NA						NA	NA	NA	NA
3. Other	NO	NO	NO						NO	NO	202,66	NO
E. Electronics industry				NO	NO	NO	NO	NO				
1. Integrated circuit or semiconductor				NO	NO	NO	NO	NO				
2. TFT flat panel display				NO	NO	NO	NO	NO				
3. Photovoltaics				NO	NO	NO	NO	NO				
4. Heat transfer fluid				NO	NO	NO	NO	NO				
5. Other *(as specified in table 2(I))*				NO	NO	NO	NO	NO				
F. Product uses as substitutes for ODS[2]				NO,NA	NO,NA	NO,NA	NO,NA	NO,NA				
1. Refrigeration and air conditioning				NO								
2. Foam blowing agents				NO	NO	NO	NO	NO				
3. Fire protection				NO	NO	NO	NO	NO				
4. Aerosols				NO,NA	NO,NA	NO,NA	NO,NA	NO,NA				
5. Solvents				NO	NO	NO	NO	NO				
6. Other applications				NO	NO	NO	NO	NO				
G. Other product manufacture and use	NO	NO	NO,NE	NO	NO	NO	NO	NO	NO	NO	NO	NO
1. Electrical equipment				NO	NO	NO	NO	NO				
2. SF_6 and PFCs from other product use					NO		NO					
3. N_2O from product uses			NO,NE									
4. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
H. Other (as specified in tables 2(I).A-H and 2(II))[3]	NA	NA	NA	NO,NA	NO,NA	NA	NA	NA	NA	NA	NA	NA

(1) The emissions of hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), unspecified mix of HFCs and PFCs, and other fluorinated gases are to be expressed as carbon dioxide equivalent emissions. Data on disaggregated emissions of HFCs and PFCs are to be provided in table
(2) ODS ozone-depleting substances.
(3) Carbon dioxide (CO_2) from food and drink production (e.g. gasification of water) can be of biogenic or non-biogenic origin. Only information on CO_2 emissions of non-biogenic origin should be reported.

Documentation box:
Parties should provide detailed explanations on the industrial processes sector in chapter 4: industrial processes (CRF sector 2) of the national inventory report (NIR). Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.

Documentation box	Head of the ecology department. For other years recalculation will be made in case of data availability on the carbon balance in the period 1990-2013.

TABLE 3 SECTORAL REPORT FOR AGRICULTURE
(Sheet 1 of 2)

Inventory 1990
Submission 2022 v3
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2	CH_4	N_2O	NO_x	CO	NMVOC
	(kt)					
3. Total agriculture	104,40	1121,66	55,69	58,28	NO	149,07
I. Livestock		1095,62	13,87			118,81
A. Enteric fermentation		1049,82				
1. Cattle[1]		747,75				
Option A:						
Dairy cattle		330,74				
Non-dairy cattle		416,98				
Option B:						
Mature dairy cattle						
Other mature cattle						
Growing cattle						
Option C (country-specific):						
Other (as specified in table 3(I).A)						
2. Sheep		255,25				
3. Swine		4,03				
4. Other livestock		42,84				
Buffalo		0,06				
Camels		6,58				
Goats		5,88				
Horses		29,27				
Mules and Asses		0,45				
Other (please specify)		NO				
B. Manure management		45,80	13,87			118,81
1. Cattle[1]		22,90	6,19			92,21
Option A:						
Dairy cattle		14,99	2,25			43,76
Non-dairy cattle		7,91	3,93			48,45
Option B:						
Mature dairy cattle						
Other mature cattle						
Growing cattle						
Option C (country-specific):						
Other (as specified in table 3(I).B)						6,75
2. Sheep		3,99	1,72			2,22
3. Swine		16,12	2,30			17,69
4. Other livestock		2,79	1,43			0,05
Buffalo		0,06	0,02			0,04
Camels		0,18	NO			0,64
Goats		0,11	0,08			6,95
Horses		1,77	0,24			0,07
Mules and Asses		0,03	0,02			9,88
Poultry		0,68	1,02			NE
Other (please specify)		0,02	0,05			NE
Rabbit		0,02	0,05			
3. Indirect N_2O emissions			2,34			

Note: All footnotes for this table are given at the end of the table on Sheet 2.

TABLE 3 SECTORAL REPORT FOR AGRICULTURE
(Sheet 2 of 2)

Inventory 1990
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2	CH_4	N_2O	NO_x	CO	NMVOC
	(kt)					
C. Rice cultivation						
D. Agricultural soils (1) (2) (3) (4)		36,04				
E. Prescribed burning of savannas		NO	41,82	38,28	NO	NO
F. Field burning of agricultural residues		NO	NO	NO	NO	81,26
G. Liming		NO	NO	NO	NO	NO
H. Urea application	NO					NO
I. Other carbon-containing fertilisers	104,40					
J. Other (please specify)	NO					
	NO	NO	NO	NO	NO	NO

(1) The sum for cattle would be calculated on the basis of entries made under either option A (dairy and non-dairy cattle), option B (mature dairy cattle, other mature cattle and growing cattle) or option C (other disaggregation of cattle categories).
(2) Categories reported under "Agricultural soils" are those reported under table 3.D.
(3) Direct nitrous oxide (N_2O) emissions generated by manure in the system "Pasture, range and paddock" are to be reported under the category "Direct N_2O emissions from managed soils". See also section 10.5 of Volume 4 of the 2006 IPCC Guidelines.
(4) Indirect N_2O emissions generated by manure in the system "Pasture, range and paddock" are to be reported under the category "Indirect N_2O emissions from managed soils". See also section 10.5 of Volume 4 of the 2006 IPCC Guidelines.

Note: The 2006 IPCC Guidelines do not provide methodologies for the calculation of methane (CH_4) emissions and CH_4 and N_2O removals from agricultural soils, or carbon dioxide (CO_2) emissions from prescribed burning of savannas and field burning of agricultural residues. Parties that have estimated such emissions should provide, in the national inventory report (NIR), additional information (activity data and emission factors) used to derive these estimates and include a reference to the section of the NIR in the documentation box of the corresponding Sectoral background data tables.

Documentation box:	
• Parties should provide detailed explanations on the agriculture sector in chapter 5: Agriculture (CRF sector 3) of the NIR. Use this documentation box to provide references to relevant sections of the NIR, if any additional information and/or further details are needed to understand the context of this table.	
• If estimates are reported under category 3(B)1H.Other, use this documentation box to provide information regarding activities covered under this category and to provide reference to the section in the NIR where background information can be found.	
Documentation box	Note: Average annual population of livestock was used, explanation is shown in section 5.5 of the NIR3 A 4 Goats Goats: Average annual population of livestock was used, explanation is shown in section 5.5 of the NIR.

TABLE 4 SECTORAL REPORT FOR LAND USE, LAND-USE CHANGE AND FORESTRY
(Sheet 1 of 1)

Inventory 1990
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Net CO_2 emissions/removals[1],[2]	CH_4[2]	N_2O[2]	NO_x	CO	NMVOC
	(kt)					
4. Total LULUCF	-3952,45	0,23	0,02	0,32	6,17	2,90
A. Forest land	-1478,03	0,06	0,00	0,04	1,42	0,43
1. Forest land remaining forest land	-1478,03	0,06	0,00	0,04	1,42	0,43
2. Land converted to forest land	NO,IE	NO,IE	NO,IE	NO	NO	NO
B. Cropland	5599,00	NO,IE	NO,IE	NO	NO	NO
1. Cropland remaining cropland	5599,00	NO,IE	NO,IE	NO	NO	NO
2. Land converted to cropland	NO	NO	NO	NO	NO	NO
C. Grassland	-6911,67	0,17	0,02	0,29	4,75	2,48
1. Grassland remaining grassland	-6911,67	0,17	0,02	0,29	4,75	2,48
2. Land converted to grassland	NO	NO	NO	NO	NO	NO
D. Wetlands[3]	4,25	NO,IE,NA	NO,IE,NA	NO	NO	NO
1. Wetlands remaining wetlands	NO,NE	NO,IE	NO,IE	NO	NO	NO
2. Land converted to wetlands	4,25	NO	NO	NO	NO	NO
E. Settlements	-1166,00	NO	NO	NO	NO	NO
1. Settlements remaining settlements	NO	NO	NO	NO	NO	NO
2. Land converted to settlements	-1166,00	NO	NO	NO	NO	NO
F. Other land [4]	NO	NO	NO	NO	NO	NO
1. Other land remaining other land						
2. Land converted to other land	NO	NO	NO	NO	NO	NO
G. Harvested wood products [5]	NO,IE					
H. Other *(please specify)*	NO	NO	NO	NO	NO	NO

[1] For the purposes of reporting, the signs for removals are always negative (–) and for emissions positive (+).
[2] For each land-use category and subcategory, this table sums the net carbon dioxide (CO_2, emissions and removals shown in tables 4.A to 4.F, and the CO_2, methane (CH_4) and nitrous oxide (N_2O) emissions shown in
[3] Parties may decide not to prepare estimates for CH4 emissions from flooded land contained in Appendix 3 of volume 4 of the 2006 IPCC Guidelines, although they may do so if they wish.
[4] This category includes bare soil, rock, ice, and all land areas that do not fall into any of the other five categories. It allows the total of identified land areas to match the national area.
[5] Non-CO_2 emissions from HWP are covered in the energy sector or waste sector.

Documentation box:

• Parties should provide detailed explanations on the land use, land-use change and forestry sector in chapter 6: Land Use, Land-Use Change and Forestry (CRF sector 4) of the national inventory report (NIR). Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.

• If estimates are reported under the category 4.H. Other, use this documentation box to provide information regarding activities covered under this category and to provide a reference to the section in the NIR where background information can be found.

Documentation box	per and Paperboard: 4.G.A HWP in SWDS: Carbon stock change not include in CRF tables. Comment is shown in ch. 7 of NIR

TABLE 5 SECTORAL REPORT FOR WASTE
(Sheet 1 of 1)

Inventory 1990
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	NO_x	CO	NMVOC	SO_2
	(kt)						
Total waste	NO	175,37	0,89	NO,NE	NO,NE	0,09	NO,NE
A. Solid waste disposal	NO	68,64		NO,NE	NO,NE	NO,NE	
1. Managed waste disposal sites	NO	7,58		NE	NE	NE	
2. Unmanaged waste disposal sites	NO	61,06		NE	NE	NE	
3. Uncategorized waste disposal sites	NO	NO		NO	NO	NO	
B. Biological treatment of solid waste		NO	NO	NE,NO	NE,NO	NE,NO	
1. Composting		NO	NO	NO	NO	NO	
2. Anaerobic digestion at biogas facilities		NO	NO	NE	NE	NE	
C. Incineration and open burning of waste	NO	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE
1. Waste incineration	NO	NO	NO	NO	NO	NO	NO
2. Open burning of waste	NO	NO,NE	NO,NE	NE	NE	NE	NE
D. Wastewater treatment and discharge		106,73	0,89	NO	NO	0,09	
1. Domestic wastewater		53,77	0,89	NO	NO	0,09	
2. Industrial wastewater		52,96	NE	NO	NO	NO	
3. Other *(as specified in table 5.D)*		NO	NO	NO	NO	NO	
E. Other *(please specify)*	NO	NO	NO	NO	NO	NO	NO
Memo item: [2]							
Long-term storage of C in waste disposal sites	NO						
Annual change in total long-term C storage	NO						
Annual change in total long-term C storage in HWP waste [3]	NO						

[1] CO_2 emissions from the categories solid waste disposal on land and waste incineration should only be included if they derive from non-biological or inorganic waste sources.

[2] Long-term storage of carbon in waste disposal sites, Annual change in total long-term storage of carbon stored and Annual change in long-term storage of carbon in HWP waste should be entered as carbon dioxide (CO_2)

[3] Carbon stored in wood, paper, cardboard, garden and park waste (equals to the annual change in stocks of harvested wood products in solid waste disposal sites from consumption, second activity data in the table for harvested wood products)

Documentation box:	
• If estimates are reported under 5.E Other, use this documentation box to provide information regarding activities covered under this category and to provide reference to the section in the NIR where background information can be found.	
Documentation box	...age system. According to IPCC 2006, Volume 5, p 6.11, CH4 emissions from industrial wastewater and sludge are estimated together

SUMMARY 1.A SUMMARY REPORT FOR NATIONAL GREENHOUSE GAS INVENTORIES
(Sheet 1 of 3)

Inventory 1990
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Net CO_2 emissions/removals	CH_4	N_2O	HFCs[1]	PFCs[1]	Unspecified mix of HFCs and PFCs[1]	SF_6	NF_3	NO_x	CO	NMVOC	SO_2
	(kt)			(kt CO_2 equivalent)			(kt)					
Total national emissions and removals	276453,67	3509,60	64,07	NO,NA	NA,NO	NO,NA	NA,NO	NO,NA	58300,94	461768,33	56093,06	1083,83
1. Energy	261466,16	2211,05	6,04						58241,88	461762,12	55735,08	1083,83
A. Fuel combustion Reference approach(2)	267942,57											
Sectoral approach(2)	245681,14	61,64	6,02						58241,88	461762,12	55735,08	1083,83
1. Energy industries	141770,89	2,28	1,81						423,94	32,68	8,29	711,54
2. Manufacturing industries and construction	18950,88	1,42	0,22						57,69	20,14	2,96	106,11
3. Transport	21245,19	6,41	3,06						57587,13	460677,64	55610,23	39,94
4. Other sectors	54835,05	50,52	0,83						163,66	921,57	102,50	197,07
5. Other	8879,13	1,02	0,10						9,46	110,08	11,10	29,17
B. Fugitive emissions from fuels	15785,02	2149,41	0,02						NO,NA	NO,NA	NO,NA	NO,NA
1. Solid fuels	15709,91	1205,99	0,00						NO,NA	NO,NA	NO,NA	NO,NA
2. Oil and natural gas and other emissions from energy production	75,11	943,42	0,02						NA	NA	NA	NA
C. CO_2 Transport and storage	NO,NA											
2. Industrial processes and product use	18835,55	1,29	1,43	NO,NA	NA,NO	NO,NA	NA,NO	NO,NA	0,46	0,05	205,92	0,00
A. Mineral industry	3876,59								NO	NO	NO	NO
B. Chemical industry	1234,17	NO	1,43	NO	NO	NO	NO	NO	0,46	0,05	NO	0,00
C. Metal industry	13722,42	1,29	NO	NO	NO	NO	NO	NO	NO,NA	NO,NA	3,26	NO,NA
D. Non-energy products from fuels and solvent use	2,36	NO,NA	NO,NA						NO,NA	NO,NA	202,66	NO,NA
E. Electronic industry				NO	NO	NO	NO	NO				
F. Product uses as substitutes for ODS				NO,NA	NO,NA	NO,NA	NO,NA	NO,NA				
G. Other product manufacture and use	NO	NO	NO,NE	NO	NO	NO	NO	NO	NO	NO	NO	NO
H. Other[3]	NA	NA	NA	NO,NA	NO,NA	NA	NA	NA	NA	NA	NA	NA

Note: All footnotes for this table are given at the end of the table on sheet 3.

SUMMARY 1.A SUMMARY REPORT FOR NATIONAL GREENHOUSE GAS INVENTORIES
(Sheet 2 of 3)

Inventory 1990
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2	CH_4	N_2O	HFCs [1]	PFCs [1]	Unspecified mix of HFCs	SF_6	NF_3	NO_x	CO	NMVOC	SO_2
	(kt)			(kt CO_2 equivalent)			(kt)					
3. Agriculture	104,40	1121,66	55,69						58,28	NO	149,07	NO
A. Enteric fermentation		1049,82										
B. Manure management		45,80	13,87								118,81	
C. Rice cultivation		26,04									NO	
D. Agricultural soils		NO	41,82						58,28	NO	30,26	
E. Prescribed burning of savannas		NO	NO						NO	NO	NO	
F. Field burning of agricultural residues		NO	NO						NO	NO	NO	
G. Liming	NO											
H. Urea application	104,40											
I. Other carbon-contining fertilizers	NO											
J. Other	NO	NO	NO						NO	NO	NO	NO
4. Land use, land-use change and forestry [4]	-3952,45	0,23	0,02						0,32	6,17	2,90	NO
A. Forest land [4]	-1478,03	0,06	0,00						0,04	1,42	0,43	
B. Cropland [4]	5599,00	NO,IE	NO,IE						NO	NO	NO	
C. Grassland [4]	-6911,67	0,17	0,02						0,29	4,75	2,48	
D. Wetlands [4]	4,25	NO,IE,NA	NO,IE,NA						NO	NO	NO	
E. Settlements [4]	-1166,00	NO	NO						NO	NO	NO	
F. Other land [4]	NO	NO	NO						NO	NO	NO	
G. Harvested wood products	NO,IE											
H. Other [4]	NO	NO	NO						NO	NO	NO	NO
5. Waste	NO	175,37	0,89						NO,NE	NO,NE	0,09	NO,NE
A. Solid waste disposal [5]	NO	68,64							NO,NE	NO,NE	NO,NE	
B. Biological treatment of solid waste [5]		NO	NO						NE,NO	NE,NO	NE,NO	
C. Incineration and open burning of waste [5]	NO	NO,NE	NO,NE						NO,NE	NO,NE	NO,NE	NO,NE
D. Wastewater treatment and discharge		106,73	0,89						NO	NO	0,09	
E. Other [5]	NO	NO	NO						NO	NO	NO	NO
6. Other *(please specify)* [6]	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

Note: All footnotes for this table are given at the end of the table on sheet 3.

SUMMARY 1.A SUMMARY REPORT FOR NATIONAL GREENHOUSE GAS INVENTORIES (IPCC TABLE 7A)
(Sheet 3 of 3)

Inventory 1990
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Net CO_2 emissions/removals	CH_4	N_2O	HFCs[1]	PFCs[1]	Unspecified mix of HFCs and PFCs[1]	SF_6	NF_3	NO_x	CO	NMVOC	SO_2
	(kt)			(kt CO_2 equivalent)					(kt)			
Memo items:[7]												
International bunkers	666,08	0,01	0,02						NE,NA	NE,NA	NE,NA	NE,NA
Aviation	576,45	0,00	0,02						NE	NE	NE	NE
Navigation	89,63	0,01	0,00						NA	NA	NA	NA
Multilateral operations	NA	NA	NA						NA	NA	NA	NA
CO_2 emissions from biomass	1166,88											
CO_2 captured	NO,IE,NA											
Long-term storage of C in waste disposal sites	NO											
Indirect N_2O			NA,NO									
Indirect CO_2	NA,NO											

(1) The emissions of hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), unspecified mix of HFCs and PFCs and other fluorinated gases are to be expressed as carbon dioxide (CO_2) equivalent emissions. Data on disaggregated emissions of

(2) For verification purposes, Parties are requested to report the results of their calculations using the Reference approach and to explain any differences with the Sectoral approach in the documentation box to table 1.A(c). For estimating national

(3) 2.H. Other includes pulp and paper and food and beverages industry.

(4) For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

(5) CO_2 from categories solid waste disposal on land and waste incineration should only be included if it stems from non-biogenic or inorganic waste streams. Only emissions from waste incineration without energy recovery are to be reported in the waste sector, whereas emissions from incineration with energy recovery are to be reported in the energy sector.

(6) If reporting any country-specific category under sector "6. Other", detailed explanations should be provided in Chapter 8: Other (CRF sector 6) of the national inventory report (NIR).

(7) Parties are asked to report emissions from international aviation and international navigation and multilateral operations, as well as CO_2 emissions from biomass and CO_2 captured, under Memo Items. These emissions should not be included in the national total emissions from the energy sector. Amounts of biomass used as fuel are included in the national energy consumption but the corresponding CO_2 emissions are not included in the national total as it is assumed that the biomass is produced in a sustainable manner. If the biomass is harvested at an unsustainable rate, net CO_2 emissions are accounted for as a loss of biomass stocks in the Land Use, Land-use Change and Forestry sector.

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [(1)]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total
	CO_2 equivalent (kt)								
Total (net emissions)[(1)]	276453,67	87739,97	19092,49	NO,NA	NA,NO	NA,NO	NO,NA	NO,NA	383286,13
1. Energy	261466,16	55276,20	1800,51						318542,88
A. Fuel combustion (sectoral approach)	245681,14	1541,06	1795,07						249017,28
1. Energy industries	141770,89	56,93	540,80						142368,62
2. Manufacturing industries and construction	18950,88	35,42	65,66						19051,95
3. Transport	21245,19	160,17	912,38						22317,74
4. Other sectors	54835,05	1262,94	247,30						56345,29
5. Other	8879,13	25,61	28,94						8933,67
B. Fugitive emissions from fuels	15785,02	53735,14	5,44						69525,60
1. Solid fuels	15709,91	30149,68	0,05						45859,64
2. Oil and natural gas	75,11	23585,46	5,39						23665,97
C. CO_2 transport and storage	NO,NA								NO,NA
2. Industrial processes and product use	18835,55	32,35	424,95	NO,NA	NA,NO	NA,NO	NO,NA	NO,NA	19292,85
A. Mineral industry	3876,59								3876,59
B. Chemical industry	1234,17	NO	424,95	NO	NO	NO	NO	NO	1659,12
C. Metal industry	13722,42	32,35	NO	NO	NO	NO	NO	NO	13754,78
D. Non-energy products from fuels and solvent use	2,36	NO,NA	NO,NA						2,36
E. Electronic Industry				NO	NO	NO	NO	NO	NO
F. Product uses as ODS substitutes				NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
G. Other product manufacture and use	NO	NO	NO,NE	NO	NO	NO	NO	NO	NO,NE
H. Other	NA	NA	NA	NO,NA	NO,NA	NA	NA	NA	NO,NA
3. Agriculture	104,40	28041,41	16596,33						44742,14
A. Enteric fermentation		26245,50							26245,50
B. Manure management		1144,91	4133,97						5278,88
C. Rice cultivation		651,00							651,00
D. Agricultural soils		NO	12462,36						12462,36
E. Prescribed burning of savannas		NO	NO						NO
F. Field burning of agricultural residues		NO	NO						NO
G. Liming	NO								NO
H. Urea application	104,40								104,40
I. Other carbon-containing fertilizers	NO								NO
J. Other	NO	NO	NO						NO
4. Land use, land-use change and forestry[(1)]	-3952,45	5,75	5,48						-3941,21
A. Forest land	-1478,03	1,50	1,01						-1475,52
B. Cropland	5599,00	NO,IE	NO,IE						5599,00
C. Grassland	-6911,67	4,25	4,47						-6902,95
D. Wetlands	4,25	NO,IE,NA	NO,IE,NA						4,25
E. Settlements	-1166,00	NO	NO						-1166,00

F. Other land	NO	NO	NO						NO
G. Harvested wood products	NO,IE								NO,IE
H. Other	NO	NO	NO						NO
5. Waste	NO	4384,25	265,22						4649,47
A. Solid waste disposal	NO	1716,00							1716,00
B. Biological treatment of solid waste		NO	NO						NO
C. Incineration and open burning of waste	NO	NO,NE	NO,NE						NO,NE
D. Waste water treatment and discharge		2668,25	265,22						2933,47
E. Other	NO	NO	NO						NO
6. Other *(as specified in summary 1.A)*	NO	NO	NO	NO	NO	NO	NO	NO	NO

Memo items:[2]									
International bunkers	666,08	0,31	5,53						671,92
Aviation	576,45	0,10	4,81						581,36
Navigation	89,63	0,21	0,72						90,56
Multilateral operations	NA	NA	NA						NA
CO_2 emissions from biomass	1166,88								1166,88
CO_2 captured	NO,IE,NA								NO,IE,NA
Long-term storage of C in waste disposal sites	NO								NO
Indirect N_2O			NA,NO						
Indirect CO_2[3]	NA,NO								
Total CO_2 equivalent emissions without land use, land-use change and forestry									387227,34
Total CO_2 equivalent emissions with land use, land-use change and forestry									383286,13
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry									NA
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry									NA

(1) For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

(2) See footnote 7 to table Summary 1.A.

(3) In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2 the national totals shall be provided with and without indirect CO_2.

SUMMARY 3 SUMMARY REPORT FOR METHODS AND EMISSION FACTORS USED
(Sheet 1 of 2)

Inventory 1990
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2		CH_4		N_2O		HFCs		PFCs		SF_6		Unspecified mix of HFCs and PFCs		NF_3	
	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor
1. Energy	T1,T2	CS,D	T1,T2	CS,D	T1,T2	CS,D										
A. Fuel combustion	T1,T2	CS,D	T1,T2	CS,D	T1,T2	CS,D										
1. Energy industries	T1	D	T1	D	T1	D										
2. Manufacturing industries and construction	T1	D	T1	D	T1	D										
3. Transport	T1,T2	CS,D	T1,T2	CS,D	T1,T2	CS,D										
4. Other sectors	T1	D	T1	D	T1	D										
5. Other	T1	D	T1	D	T1	D										
B. Fugitive emissions from fuels	T1	D	T1	CS,D	T1	D										
1. Solid fuels	T1	D	T1	D	T1	D										
2. Oil and natural gas	T1	D	T1	CS,D	T1	D										
C. CO_2 transport and storage																
2. Industrial processes	T1,T2	CS,D	D	D	T1	D										
A. Mineral industry	T1,T2	CS,D														
B. Chemical industry	T1,T2	CS,D			T1	D										
C. Metal industry	T1,T2	CS,D	D	D												
D. Non-energy products from fuels and solvent use	T1	D														
E. Electronic industry																
F. Product uses as ODS substitutes																
G. Other product manufacture and use																
H. Other																

Use the following notation keys to specify the method applied:

D (IPCC default) **T1a, T1b, T1c** (IPCC Tier 1a, Tier 1b and Tier 1c, respectively) **CR** (CORINAIR) **M** (model)
RA (Reference Approach) **T2** (IPCC Tier 2) **CS** (Country Specific)
T1 (IPCC Tier 1) **T3** (IPCC Tier 3) **OTH** (Other)

If using more than one method within one source category, list all the relevant methods. Explanations regarding country-specific methods, other methods or any modifications to the default IPCC methods, as well as information regarding the use of different methods per source category where more than one method is indicated, should be provided in the documentation box. Also use the documentation box to explain the use of notation OTH.

Use the following notation keys to specify the emission factor used:

D (IPCC default) **CS** (Country Specific) **OTH** (Other)
CR (CORINAIR) **PS** (Plant Specific) **M** (model)

Where a mix of emission factors has been used, list all the methods in the relevant cells and give further explanations in the documentation box. Also use the documentation box to explain the use of notation OTH.

SUMMARY 3 SUMMARY REPORT FOR METHODS AND EMISSION FACTORS USED
(Sheet 2 of 2)

Inventory 1990
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2		CH_4		N_2O		HFCs		PFCs		SF_6		Unspecified mix of HFCs and PFCs		NF_3	
	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor
3. Agriculture	T1	D	T1,T2	CS,D	T1,T2	CS,D										
A. Enteric fermentation			T1,T2	CS,D												
B. Manure management			T1,T2	CS,D	T1,T2	CS,D										
C. Rice cultivation			T1	D												
D. Agricultural soils[5]					T1,T2	CS,D										
E. Prescribed burning of savannas																
F. Field burning of agricultural residues																
G. Liming																
H. Urea application	T1	D														
I. Other carbon-containing fertilizers																
J. Other																
4. Land use, land use change and forestry	T1,T2	CS	T1,T2	D	T1,T2	D										
A. Forest land	T2	CS	T2	D	T2	D										
B. Cropland	T2	CS														
C. Grassland	T2	CS	T1	D	T1	D										
D. Wetlands	T1	CS														
E. Settlements	T1	CS														
F. Other land																
G. Harvested wood products																
H. Other																
5. Waste			M,T1	CS,D,M	T1	D										
A. Solid waste disposal			M	CS,M												
B. Biological treatment of solid waste																
C. Incineration and open burning of waste																
D. Waste water treatment and discharge			T1	D	T1	D										
E. Other																
6. Other (as specified in summary 1.A)																

Use the following notation keys to specify the method applied:

D (IPCC default)
RA (Reference Approach)
T1 (IPCC Tier 1)
T1a, T1b, T1c (IPCC Tier 1a, Tier 1b and Tier 1c, respectively)
T2 (IPCC Tier 2)
T3 (IPCC Tier 3)
CR (CORINAIR)
CS (Country Specific)
OTH (Other)
M (model)

If using more than one method within one source category, list all the relevant methods. Explanations regarding country-specific methods, other methods or any modifications to the default IPCC methods, as well as information regarding the use of different methods per source category where more than one method is indicated, should be provided in the documentation box. Also use the documentation box to explain the use of notation OTH.

Use the following notation keys to specify the emission factor used:

D (IPCC default)
CR (CORINAIR)
CS (Country Specific)
PS (Plant Specific)
OTH (Other)
M (model)

Where a mix of emission factors has been used, list all the methods in the relevant cells and give further explanations in the documentation box. Also use the documentation box to explain the use of notation OTH.

Documentation box:	
• Parties should provide the full information on methodological issues, such as methods and emission factors used, in the relevant sections of chapters 3 to 8 (see section 2.2 of each of Chapters 3 - 8) of the national inventory report (NIR). Use this documentation box to provide references to relevant sections of the NIR if any additional information and further details are needed to understand the content of this table. • Where a mix of methods/emission factors has been used within one source category, use this documentation box to specify those methods/emission factors for the various sub-sources where they have been applied. • Where the notation OTH (Other) has been entered in this table, use this documentation box to specify those other methods/emission factors.	
Documentation box	

TABLE 6 CROSS-SECTORAL REPORT: Indirect emissions of N_2O and CO_2
(Sheet 1 of 1)

Inventory 1990
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	SOURCE EMISSIONS					INDIRECT EMISSIONS	
	CH_4	CO	NMVOC	NOx	NH_3	CO_2 [1]	N_2O [2]
	(kt)					(kt)	
Total	3509,60	461768,33	56093,06	58300,94	NO,NA	NA,NO	NA,NO
1. Energy	2211,05	461762,12	55735,08	58241,88	NO	NO	NO
2. Industrial processes and product use	1,29	0,05	205,92	0,46	NA	NA	NA
3. Agriculture [3]	1121,66	NO	149,07	58,28		NO	NO
4. LULUCF [3]	0,23	6,17	2,90	0,32		NO	NO
5. Waste	175,37	NO,NE	0,09	NO,NE	NO	NA	NA
6. Other *(please specify)*	NO	NO	NO	NO	NO	NO	NO

[1] Parties may report indirect CO_2 from the atmospheric oxidation of CH_4, CO and NMVOCs.

[2] Parties may report indirect emissions of N_2O from sources other than agriculture and LULUCF.

[3] Indirect emissions of N_2O resulting from ammonia emissions are covered in the sectoral tables for agriculture and LULUCF. In this table, only indirect N_2O emissions

TABLE 7 SUMMARY OVERVIEW FOR KEY CATEGORIES [illegible]
(Sheet 1 of 1)

KEY CATEGORIES OF EMISSIONS AND REMOVALS	Gas	Criteria used for key source identification		Net emissions (excluding LULUCF)	Net emissions (including LULUCF)
		1	2		
[illegible]	[illegible]				
[illegible]	[illegible]				
[illegible]	[illegible]	

[illegible]	[illegible]				
[illegible]	[illegible]				
[illegible]	[illegible]				

TABLE 8 RECALCULATION - RECALCULATED DATA
(Sheet 1 of 4)

Recalculated year: [illegible]
[illegible]
[illegible]

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2						CH_4						N_2O					
	Previous submission	Latest submission	Difference	Difference[1]	Impact of recalculation on total emissions excluding LULUCF[2]	Impact of recalculation on total emissions including LULUCF[3]	Previous submission	Latest submission	Difference	Difference[1]	Impact of recalculation on total emissions excluding LULUCF[2]	Impact of recalculation on total emissions including LULUCF[3]	Previous submission	Latest submission	Difference	Difference[1]	Impact of recalculation on total emissions excluding LULUCF[2]	Impact of recalculation on total emissions including LULUCF[3]
	CO_2 equivalent (kt)			(%)			CO_2 equivalent (kt)			(%)			CO_2 equivalent (kt)			(%)		
Total national emissions and removals	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1. Energy	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
A. Fuel combustion activities	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1. Energy industries	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2. Manufacturing industries and construction	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3. Transport	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4. Other sectors	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5. Other	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
B. Fugitive emissions from fuels	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1. Solid fuels	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2. Oil and natural gas	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
C. CO_2 Transport and storage	[illegible]	[illegible]																
2. Industrial processes and product use	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
A. Mineral industry	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]												
B. Chemical industry	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]												
C. Metal industry	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
D. Non-energy products from fuels and solvent use	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
G. Other product manufacture and use	[illegible]	[illegible]					[illegible]	[illegible]					[illegible]	[illegible]				
H. Other	[illegible]	[illegible]					[illegible]	[illegible]					[illegible]	[illegible]				

Note: All footnotes for this table are given at the end of the table on sheet 4.

TABLE 8 RECALCULATION - RECALCULATED DATA
(Sheet 2 of 4)

Recalculated year: Inventory 1990
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2						CH_4						N_2O					
	Previous submission	Latest submission	Difference	Difference[1]	Impact of recalculation on total emissions excluding LULUCF[2]	Impact of recalculation on total emissions including LULUCF[2]	Previous submission	Latest submission	Difference	Difference[1]	Impact of recalculation on total emissions excluding LULUCF[2]	Impact of recalculation on total emissions including LULUCF[2]	Previous submission	Latest submission	Difference	Difference[1]	Impact of recalculation on total emissions excluding LULUCF[2]	Impact of recalculation on total emissions including LULUCF[2]
	CO_2 equivalent (kt)			(%)			CO_2 equivalent (kt)			(%)			CO_2 equivalent (kt)			(%)		
3. Agriculture	164.40	164.40	0.00	0.00	0.00	0.00	28041.61	28041.61	0.00	0.00	0.00	0.00	13721.35	16796.11	873.14	5.73	0.29	0.21
A. Enteric fermentation							20242.20	20242.20	0.00	0.00	0.00	0.00						
B. Manure management							1144.91	1144.91	0.00	0.00	0.00	0.00	4133.07	4133.07	0.00	0.00	0.00	0.00
C. Rice cultivation							651.00	651.00	0.00	0.00	0.00	0.00						
D. Agricultural soils[3]							NO	NO					11589.22	12462.36	873.14	7.53	0.29	0.21
E. Prescribed burning of savannas							NO	NO					NO	NO				
F. Field burning of agricultural residues							NO	NO					NO	NO				
G. Liming	NO	NO																
H. Urea application	164.40	164.40	0.00	0.00	0.00	0.00												
I. Other carbon-containing fertilizers	NO	NO																
J. Other	NO	NO					NO	NO					NO	NO				
4. Land use, land use change and forestry (net)[4]	-12641.08	-5572.01	7069.07	-56.07		2.01	4.71	4.71	0.00	0.00		0.00	5.48	5.48	0.00	0.00		0.00
A. Forest land	-1070.33	-1478.03	-408.30	-38.15		0.13	1.30	1.30	0.00	0.00		0.00	1.03	1.03	0.00	0.00		0.00
B. Cropland	-3391.93	9999.06	13390.11	-457.84		1.86	NO,IE	NO,IE					NO,IE	NO,IE				
C. Grassland	-6911.07	-6911.07	0.00	0.00		0.00	4.41	4.41	0.00	0.00		0.00	4.47	4.47	0.00	0.00		0.00
D. Wetlands	4.27	4.27	0.00	0.00		0.00	NO,IE,NA	NO,IE,NA					NO,IE,NA	NO,IE,NA				
E. Settlements	-1166.00	-1166.00	0.00	0.00		0.00	NO	NO					NO	NO				
F. Other land	NO	NO					NO	NO					NO	NO				
G. Harvested wood products	NO,IE	NO,IE																
H. Other	NO	NO					NO	NO					NO	NO				

Note: All footnotes for this table are given at the end of the table on sheet 4.

TABLE 5 RECALCULATION - RECALCULATED DATA
(Sheet 3 of 4)

Recalculated year: [illegible]
[illegible]
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2						CH_4						N_2O					
	Previous submission	Latest submission	Difference	Difference[1]	Impact of recalculation on total emissions excluding LULUCF[2]	Impact of recalculation on total emissions including LULUCF[3]	Previous submission	Latest submission	Difference	Difference[1]	Impact of recalculation on total emissions excluding LULUCF[2]	Impact of recalculation on total emissions including LULUCF[3]	Previous submission	Latest submission	Difference	Difference[1]	Impact of recalculation on total emissions excluding LULUCF[2]	Impact of recalculation on total emissions including LULUCF[3]
	CO_2 equivalent (kt)			(%)			CO_2 equivalent (kt)			(%)			CO_2 equivalent (kt)			(%)		
5. Waste	NO	NO					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
A. Solid waste disposal	NO	NO					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]						
B. Biological treatment of solid waste							NO	NO					NO	NO				
C. Incineration and open burning of waste	NO	NO					NO,NE	NO,NE					NO,NE	NO,NE				
D. Wastewater treatment and discharge							[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
E. Other	NO	NO					NO	NO					NO	NO				
6. Other (as specified in summary 1.A)	NO	NO					NO	NO					NO	NO				
Other items																		
International bunkers	[illegible]	[illegible]	0.00	0.00	0.00	0.00	[illegible]	[illegible]	0.00	0.00	0.00	0.00	[illegible]	[illegible]	0.00	-0.00	0.00	0.00
Aviation	[illegible]	[illegible]	0.00	0.00	0.00	0.00	[illegible]	[illegible]	0.00	0.00	0.00	0.00	[illegible]	[illegible]	0.00	-0.00	0.00	0.00
Navigation	[illegible]	[illegible]	0.00	0.00	0.00	0.00	[illegible]	[illegible]	0.00	0.00	0.00	0.00	[illegible]	[illegible]	0.00	-0.00	0.00	0.00
Multilateral operations	[illegible]	[illegible]					[illegible]	[illegible]					[illegible]	[illegible]				
CO_2 emissions from biomass	[illegible]	[illegible]	0.00	0.00	0.00	0.00												
CO_2 captured	[illegible]	[illegible]																
Long-term storage of C in waste disposal sites	NO	NO																
Indirect N_2O																		
Indirect CO_2	NA,NO	NA,NO											NA,NO	NA,NO				

Note: All footnotes for this table are given at the end of the table on sheet 4.

TABLE 9 COMPLETENESS - INFORMATION ON NOTATION KEYS
(Sheet 1 of 1)

Sources and sinks not estimated ("NE")[1]			
GHG	Sector[2]	Source/sink category[3]	Explanation
CH4	Industrial Processes and Product Use	2.C Metal Industry/2.C.1 Iron and Steel Production/2.C.1.b Pig Iron	CH4 emissions were not estimated due to the lack of methodology in the IPCC Guidelines
CH4	Waste	5.C Incineration and Open Burning of Waste/5.C.2 Open Burning of Waste/5.C.2.1 Biogenic/5.C.2.1.a Municipal Solid Waste	Emissions from the incineration of solid waste were not estimated, since they are not significant in accordance with paragraph 37 b) of annex I to decision 24/CP.19. A detailed explanation is shown in the NIR
CO2	LULUCF	4.B Cropland/4.B.1 Cropland Remaining Cropland/4(V) Biomass Burning/Wildfires	via photosynthetic activity, within weeks to few years after burning (IPCC GLS, 2006)
CO2	LULUCF	4.C Grassland/4.C.1 Grassland Remaining Grassland/4(V) Biomass Burning/Wildfires	via photosynthetic activity, within weeks to few years after burning (IPCC GLS, 2006)
CO2	LULUCF	4.D Wetlands/4.D.1 Wetlands Remaining Wetlands/4(V) Biomass Burning/Wildfires	via photosynthetic activity, within weeks to few years after burning (IPCC GLS, 2006)
CO2	Waste	5.C Incineration and Open Burning of Waste/5.C.2 Open Burning of Waste/5.C.2.1 Biogenic/5.C.2.1.a Municipal Solid Waste	Emissions from the incineration of solid waste were not estimated, since they are not significant in accordance with paragraph 37 b) of annex I to decision 24/CP.19. A detailed explanation is shown in the NIR
N2O	Agriculture	3.D Agricultural Soils/3.D.1 Direct N2O Emissions From Managed Soils/3.D.1.2 Organic N Fertilizers/3.D.1.2.b Sewage Sludge Applied to Soils	Emissions from "Sewage Sludge Applied to Soils" are not significant in accordance with paragraph 37(b) of the annex to decision 24/CP.19, therefore, are not included in the CRF. Potential emissions estimates are shown in section 5.5 of the NIR
N2O	Industrial Processes and Product Use	2.G Other Product Manufacture and Use/2.G.3 N2O from Product Uses/2.G.3.a Medical Applications	The party provided preliminary estimates of N2O emissions from the use of anesthesia based on data from countries with similar conditions. This category is not significant in accordance with decision 24/CP.19, Annex 1, paragraph 37(b). Preliminary emission estimates are shown in the
N2O	Waste	5.C Incineration and Open Burning of Waste/5.C.2 Open Burning of Waste/5.C.2.1 Biogenic/5.C.2.1.a Municipal Solid Waste	Emissions from the incineration of solid waste were not estimated, since they are not significant in accordance with paragraph 37 b) of annex I to decision 24/CP.19. A detailed explanation is shown in the NIR
so pm	LULUCF	Converted to Settlements	Soil carbon changes were taken as a constant value (Tier 1 method, IPCC GLs, 2006) for the Settlements

Sources and sinks reported elsewhere ("IE")[4]				
GHG	Source/sink category	Allocation as per IPCC Guidelines	Allocation used by the Party	Explanation
CH4	Biomass Burning/Wildfires		Included in 4.A.1. 4(V)	Emissions CH4 accounted in the category 4.A.1. 4(V) Biomass Burning (Wildfires)
CH4	4.B Cropland/4.B.1 Cropland Remaining Cropland/4(V) Biomass Burning/Wildfires		Included in 4.C.1. 4(V)	Emissions CH4 accounted in the category 4.C.1. 4(V) Biomass Burning (Wildfires)
CH4	4.D Wetlands/4.D.1 Wetlands Remaining Wetlands/4(V) Biomass Burning/Wildfires		Included in 4.C.1 4(V)	Emissions CH4 accounted in the category 4.C.1 Grassland Remaining Grassland. 4(V) Biomass Burning (Wildfires)
CO2	1.AA Fuel Combustion - Sectoral approach/1.A.5 Other (Not specified elsewhere)/1.A.5.b Mobile (please specify)		Included in 1.A.3	The fuel used by mobile transport is included in the category 1.A.3 "Transport"
CO2	1.AB Fuel Combustion - Reference Approach/Biomass/Gas Biomass		1.AB	Gas biomass values are included in Solid biomass
CO2	1.AB Fuel Combustion - Reference Approach/Biomass/Liquid Biomass		Included in 1.AB	CO2 emissions and consumption of liquid biomass are included in the total of solid biomass
CO2	1.AB Fuel Combustion - Reference Approach/Liquid Fuels/Other Kerosene		1.1.1.00	CO2 emissions and consumption of other kerosene in category 1.AB are aggregated with jet kerosene as there are no separate data, national statistics did not provide
CO2	1.AB Fuel Combustion - Reference Approach/Solid Fuels/Coking Coal	1.00	Included in 1.AB	CO2 emissions and consumption of coking coal in category 1.AB are aggregated with sub-bituminous coal as there are no separate data, national statistics did not provide
CO2	1.AB Fuel Combustion - Reference Approach/Solid Fuels/Other Solid Fossil/Coal concentrate		1.AB	CO2 emissions and consumption of coal concentrate are included in the total of CO2 emissions and consumption of subbituminous coal. Separate data for this type of coal were not provided by national statistics
CO2	1.AB Fuel Combustion - Reference Approach/Solid Fuels/Other Solid Fossil/Energy coal		Included in 1.AB	CO2 emissions and consumption of coal with a calorific value of more than 23.865 MJ / kg on ash-free but moist basis are included in the total of CO2 emissions and consumption of subbituminous coal. Separate data for this type of coal were not provided by national statistics
CO2	1.AB Fuel Combustion - Reference Approach/Solid Fuels/Other Solid Fossil/High ash coal		Included in 1.AB	CO2 emissions and consumption of high ash coal are included in the total of CO2 emissions and consumption of subbituminous coal. Separate data for this type of coal were not provided by national statistics
CO2	1.AB Fuel Combustion - Reference Approach/Solid Fuels/Other Solid Fossil/Other coal		Included in 1.AB	CO2 emissions and consumption of other coal are included in the total of CO2 emissions and consumption of subbituminous coal. Separate data for this type of coal were not provided by national statistics
CO2	1.AD Feedstocks, reductants and other non-energy use of fuels/Liquid Fuels/Other Kerosene		1.AD	
CO2	1.AD Feedstocks, reductants and other non-energy use of fuels/Solid Fuels/Coking Coal		1.AD	CO2 emissions and consumption of coking coal in category 1.AD are aggregated with sub-bituminous coal as there are no separate data, national statistics did not provide
CO2	2.C Metal Industry/2.C.1 Iron and Steel Production/2.C.1.f Other (please specify)	According to IPCC GLs, 2006, volume 3, ch. 4.2, CO2 emission from coke production are presented in the Energy sector	Included in 1.A.2.a	According to IPCC GLs, 2006, volume 3, ch. 4.2, CO2 emissions from coke production are presented in the Energy sector
CO2	4.A Forest Land/4.A.1 Forest Land Remaining Forest Land/4(V) Biomass Burning/Wildfires		Included in 4.A.1 Carbon stock change	CO2 emissions indirectly accounted in the Carbon stock change
CO2	4.A Forest Land/4.A.2 Land Converted to Forest Land/4(V) Biomass Burning/Wildfires		Included in 4.A.1	Emissions CO2 accounted indirectly in the carbon stock change of biomass in the category 4.A.1 Carbon stock change
CO2	4.G Harvested Wood Products/Approach A/Total HWP Consumed Domestically/Paper and Paperboard		Included in 4.A.1	CO2 emissions indirectly accounted in 4.A.1 Carbon stock change. Explanation provided in the NIR
N2O	4(IV) Indirect N2O Emissions from Managed Soils/Atmospheric Deposition		Included in 3.D.2.1	N2O emissions from Atmospheric Deposition from Managed Soils are presented in 3.D.2.1
N2O	4(IV) Indirect N2O Emissions from Managed Soils/Nitrogen Leaching and Run-off		Included in 3.D.2.2	The N2O emissions from Nitrogen Leaching and Run-off are presented in 3.D.2.2
N2O	4.A Forest Land/4.A.2 Land Converted to Forest Land/4(V) Biomass Burning/Wildfires		Included in 4.A.1. 4(V)	Emissions N2O accounted in the category 4.A.1 Forest Land Remaining Forest Land (Biomass Burning, Wildfires)

N2O	4.B Cropland/4.B.1 Cropland Remaining Cropland/4(V) Biomass Burning/Wildfires		Included in 4.C.1. 4(V)	Emissions N2O accounted in the category 4.C.1. 4(V) Biomass Burning (Wildfires)
N2O	4.D Wetlands/4.D.1 Wetlands Remaining Wetlands/4(V) Biomass Burning/Wildfires		Included in 4.C.1.4(V)	Emissions N2O accounted in the category 4.C.1 Grassland Remaining Grassland. 4(V) Biomass Burning (Wildfires)

(6) Clearly indicate sources and sinks which are considered in the 2006 IPCC Guidelines but are not considered in the submitted inventory. Explain the reason for not reporting these sources and sinks, in order to avoid arbitrary interpretations. An entry should be made for each source/sink category for which the notation key "NE" (not

(7) Indicate omitted source/sink category

(8) Clearly indicate sources and sinks in the submitted inventory that are allocated to a sector other than that indicated by the 2006 IPCC Guidelines. Show the sector indicated in the 2006 IPCC Guidelines and the sector to which the source or sink is allocated in the submitted inventory. Explain the reason for reporting these sources and

TABLE 10 EMISSION TRENDS
GHG CO_2 eq emissions
(Sheet 1 of 6)

Inventory 1990
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[1]	1990	Change from base to latest reported year
	(kt CO_2 eq)		%
Total (net emissions)[2]	383286,13	383286,13	0,00
1. Energy	318542,88	318542,88	0,00
A. Fuel combustion (sectoral approach)	249017,28	249017,28	0,00
1. Energy industries	142368,62	142368,62	0,00
2. Manufacturing industries and construction	19051,95	19051,95	0,00
3. Transport	22317,74	22317,74	0,00
4. Other sectors	56345,29	56345,29	0,00
5. Other	8933,67	8933,67	0,00
B. Fugitive emissions from fuels	69525,60	69525,60	0,00
1. Solid fuels	45859,64	45859,64	0,00
2. Oil and natural gas and other emissions from energy production	23665,97	23665,97	0,00
C. CO_2 transport and storage	NO,NA	NO,NA	0,00
2. Industrial Processes	19292,85	19292,85	0,00
A. Mineral industry	3876,59	3876,59	0,00
B. Chemical industry	1659,12	1659,12	0,00
C. Metal industry	13754,78	13754,78	0,00
D. Non-energy products from fuels and solvent use	2,36	2,36	0,00
E. Electronic industry	NO	NO	0,00
F. Product uses as ODS substitutes	NO,NA	NO,NA	0,00
G. Other product manufacture and use	NO,NE	NO,NE	0,00
H. Other	NO,NA	NO,NA	0,00
3. Agriculture	44742,14	44742,14	0,00
A. Enteric fermentation	26245,50	26245,50	0,00
B. Manure management	5278,88	5278,88	0,00
C. Rice cultivation	651,00	651,00	0,00
D. Agricultural soils	12462,36	12462,36	0,00
E. Prescribed burning of savannas	NO	NO	0,00
F. Field burning of agricultural residues	NO	NO	0,00
G. Liming	NO	NO	0,00
H. Urea application	104,40	104,40	0,00
I. Other carbon-containing fertilizers	NO	NO	0,00
J. Other	NO	NO	0,00
4. Land use, land-use change and forestry[3]	-3941,21	-3941,21	0,00
A. Forest land	-1475,52	-1475,52	0,00
B. Cropland	5599,00	5599,00	0,00
C. Grassland	-6902,95	-6902,95	0,00
D. Wetlands	4,25	4,25	0,00
E. Settlements	-1166,00	-1166,00	0,00
F. Other land	NO	NO	0,00
G. Harvested wood products	NO,IE	NO,IE	0,00
H. Other	NO	NO	0,00
5. Waste	4649,47	4649,47	0,00
A. Solid waste disposal	1716,00	1716,00	0,00
B. Biological treatment of solid waste	NO	NO	0,00
C. Incineration and open burning of waste	NO,NE	NO,NE	0,00

D. Waste water treatment and discharge	2933,47	2933,47	0,00
E. Other	NO	NO	0,00
6. Other ***(as specified in summary 1.A)***	NO	NO	0,00
Memo items:			
International bunkers	671,92	671,92	0,00
Aviation	581,36	581,36	0,00
Navigation	90,56	90,56	0,00
Multilateral operations	NA	NA	0,00
CO_2 emissions from biomass	1166,88	1166,88	0,00
CO_2 captured	NO,IE,NA	NO,IE,NA	0,00
Long-term storage of C in waste disposal sites	NO	NO	0,00
Indirect N_2O	NA,NO	NA,NO	0,00
Indirect CO_2 (3)	NA,NO	NA,NO	0,00
Total CO_2 equivalent emissions without land use, land-use change and forestry	387227,34	387227,34	0,00
Total CO_2 equivalent emissions with land use, land-use change and forestry	383286,13	383286,13	0,00
Total CO_2 equivalent emissions, including indirect CO2, without land use, land-use change and forestry	NA	NA	0,00
Total CO_2 equivalent emissions, including indirect CO2, with land use, land-use change and forestry	NA	NA	0,00

Note: All footnotes for this table are given at the end of the table on sheet 6.

TABLE 10 EMISSION TRENDS
CO_2
(Sheet 2 of 6)

Inventory 1990
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[1]	1990	Change from base to latest reported year
	(kt)		%
1. Energy	261466,16	261466,16	0,00
A. Fuel combustion (sectoral approach)	245681,14	245681,14	0,00
1. Energy industries	141770,89	141770,89	0,00
2. Manufacturing industries and construction	18950,88	18950,88	0,00
3. Transport	21245,19	21245,19	0,00
4. Other sectors	54835,05	54835,05	0,00
5. Other	8879,13	8879,13	0,00
B. Fugitive emissions from fuels	15785,02	15785,02	0,00
1. Solid fuels	15709,91	15709,91	0,00
2. Oil and natural gas and other emissions from energy production	75,11	75,11	0,00
C. CO_2 transport and storage	NO,NA	NO,NA	0,00
2. Industrial processes	18835,55	18835,55	0,00
A. Mineral industry	3876,59	3876,59	0,00
B. Chemical industry	1234,17	1234,17	0,00
C. Metal industry	13722,42	13722,42	0,00
D. Non-energy products from fuels and solvent use	2,36	2,36	0,00
E. Electronic industry			
F. Product uses as ODS substitutes			
G. Other product manufacture and use	NO	NO	0,00
H. Other	NA	NA	0,00
3. Agriculture	104,40	104,40	0,00
A. Enteric fermentation			
B. Manure management			
C. Rice cultivation			
D. Agricultural soils			
E. Prescribed burning of savannas			
F. Field burning of agricultural residues			
G. Liming	NO	NO	0,00
H. Urea application	104,40	104,40	0,00
I. Other carbon-containing fertilizers	NO	NO	0,00
J. Other	NO	NO	0,00
4. Land use, land-use change and forestry [2]	-3952,45	-3952,45	0,00
A. Forest land	-1478,03	-1478,03	0,00
B. Cropland	5599,00	5599,00	0,00

C. Grassland	-6911,67	-6911,67	0,00
D. Wetlands	4,25	4,25	0,00
E. Settlements	-1166,00	-1166,00	0,00
F. Other land	NO	NO	0,00
G. Harvested wood products	NO,IE	NO,IE	0,00
H. Other	NO	NO	0,00
5. Waste	NO	NO	0,00
A. Solid waste disposal	NO	NO	0,00
B. Biological treatment of solid waste			
C. Incineration and open burning of waste	NO	NO	0,00
D. Waste water treatment and discharge			
E. Other	NO	NO	0,00
6. Other *(as specified in summary 1.A)*	NO	NO	0,00
Memo items:			
International bunkers	666,08	666,08	0,00
Aviation	576,45	576,45	0,00
Navigation	89,63	89,63	0,00
Multilateral operations	NA	NA	0,00
CO_2 emissions from biomass	1166,88	1166,88	0,00
CO_2 captured	NO,IE,NA	NO,IE,NA	0,00
Long-term storage of C in waste disposal sites	NO	NO	0,00
Indirect N_2O			
Indirect CO_2 (3)	NA,NO	NA,NO	0,00
Total CO_2 equivalent emissions without land use, land-use change and forestry	280406,11	280406,11	0,00
Total CO_2 equivalent emissions with land use, land-use change and forestry	276453,67	276453,67	0,00
Total CO_2 equivalent emissions, including indirect CO2, without land use, land-use change and forestry	NA	NA	0,00
Total CO_2 equivalent emissions, including indirect CO2, with land use, land-use change and forestry	NA	NA	0,00

Note: All footnotes for this table are given at the end of the table on sheet 6.

TABLE 10 EMISSION TRENDS
CH_4
(Sheet 3 of 6)

Inventory 1990
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[1]	1990	Change from base to latest reported year
	(kt)		%
1. Energy	2211,05	2211,05	0,00
A. Fuel combustion (sectoral approach)	61,64	61,64	0,00
1. Energy industries	2,28	2,28	0,00
2. Manufacturing industries and construction	1,42	1,42	0,00
3. Transport	6,41	6,41	0,00
4. Other sectors	50,52	50,52	0,00
5. Other	1,02	1,02	0,00
B. Fugitive emissions from fuels	2149,41	2149,41	0,00
1. Solid fuels	1205,99	1205,99	0,00
2. Oil and natural gas and other emissions from energy production	943,42	943,42	0,00
C. CO_2 transport and storage			
2. Industrial processes	1,29	1,29	0,00
A. Mineral industry			
B. Chemical industry	NO	NO	0,00
C. Metal industry	1,29	1,29	0,00
D. Non-energy products from fuels and solvent use	NO,NA	NO,NA	0,00
E. Electronic industry			
F. Product uses as ODS substitutes			
G. Other product manufacture and use	NO	NO	0,00
H. Other	NA	NA	0,00
3. Agriculture	1121,66	1121,66	0,00
A. Enteric fermentation	1049,82	1049,82	0,00
B. Manure management	45,80	45,80	0,00
C. Rice cultivation	26,04	26,04	0,00
D. Agricultural soils	NO	NO	0,00
E. Prescribed burning of savannas	NO	NO	0,00
F. Field burning of agricultural residues	NO	NO	0,00
G. Liming			
H. Urea application			
I. Other carbon-containing fertilizers			
J. Other	NO	NO	0,00
4. Land use, land-use change and forestry	0,23	0,23	0,00
A. Forest land	0,06	0,06	0,00
B. Cropland	NO,IE	NO,IE	0,00

C. Grassland	0,17	0,17	0,00
D. Wetlands	NO,IE,NA	NO,IE,NA	0,00
E. Settlements	NO	NO	0,00
F. Other land	NO	NO	0,00
G. Harvested wood products			
H. Other	NO	NO	0,00
5. Waste	175,37	175,37	0,00
A. Solid waste disposal	68,64	68,64	0,00
B. Biological treatment of solid waste	NO	NO	0,00
C. Incineration and open burning of waste	NO,NE	NO,NE	0,00
D. Waste water treatment and discharge	106,73	106,73	0,00
E. Other	NO	NO	0,00
6. Other *(as specified in summary 1.A)*	NO	NO	0,00
Total CH_4 emissions without CH_4 from LULUCF	3509,37	3509,37	0,00
Total CH_4 emissions with CH_4 from LULUCF	3509,60	3509,60	0,00
Memo items:			
International bunkers	0,01	0,01	0,00
Aviation	0,00	0,00	0,00
Navigation	0,01	0,01	0,00
Multilateral operations	NA	NA	0,00
CO_2 emissions from biomass			
CO_2 captured			
Long-term storage of C in waste disposal sites			
Indirect N_2O			
Indirect CO_2 (b)			

Note: All footnotes for this table are given at the end of the table on sheet 6.

TABLE 10: ENERGY FACTOR

[illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

TABLE 10 EMISSION TRENDS
HFCs, PFCs, SF_6, and NF_3
(Sheet 5 of 6)

Inventory 1990
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[1]	1990	Change from base to latest reported year
	(kt)		%
Emissions of HFCs and PFCs - (kt CO_2 equivalent)	NO,NA	NO,NA	0,00
Emissions of HFCs - (kt CO_2 equivalent)	NO,NA	NO,NA	0,00
HFC-23	NO	NO	0,00
HFC-32	NO	NO	0,00
HFC-41	NO	NO	0,00
HFC-43-10mee	NO	NO	0,00
HFC-125	NO	NO	0,00
HFC-134	NO	NO	0,00
HFC-134a	NO	NO	0,00
HFC-143	NO	NO	0,00
HFC-143a	NO	NO	0,00
HFC-152	NO	NO	0,00
HFC-152a	NO	NO	0,00
HFC-161	NO	NO	0,00
HFC-227ea	NO	NO	0,00
HFC-236cb	NO	NO	0,00
HFC-236ea	NO	NO	0,00
HFC-236fa	NO	NO	0,00
HFC-245ca	NO	NO	0,00
HFC-245fa	NO	NO	0,00
HFC-365mfc	NO	NO	0,00
Unspecified mix of HFCs[4] - (kt CO_2 equivalent)	NO,NA	NO,NA	0,00
Emissions of PFCs - (kt CO_2 equivalent)	NA,NO	NA,NO	0,00
CF_4	NO	NO	0,00
C_2F_6	NO	NO	0,00
C_3F_8	NO	NO	0,00
C_4F_{10}	NO	NO	0,00
c-C_4F_8	NO	NO	0,00
C_5F_{12}	NO	NO	0,00
C_6F_{14}	NO	NO	0,00
$C_{10}F_{18}$	NO	NO	0,00
c-C_3F_6	NO	NO	0,00

Unspecified mix of PFCs[4] - (kt CO_2 equivalent)	NA,NO	NA,NO	0,00
Unspecified mix of HFCs and PFCs - (kt CO_2 equivalent)	NO,NA	NO,NA	0,00
Emissions of SF_6 - (kt CO_2 equivalent)	NA,NO	NA,NO	0,00
SF_6	NA,NO	NA,NO	0,00
Emissions of NF_3 - (kt CO_2 equivalent)	NO,NA	NO,NA	0,00
NF_3	NO,NA	NO,NA	0,00

Note: All footnotes for this table are given at the end of the table on sheet 6.

TABLE 10 EMISSION TRENDS
SUMMARY
(Sheet 6 of 6)

Inventory 1990
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS EMISSIONS	Base year[1]	1990	Change from base to latest reported year
	CO_2 equivalent (kt)		(%)
CO_2 emissions without net CO_2 from LULUCF	280406,11	280406,11	0,00
CO_2 emissions with net CO_2 from LULUCF	276453,67	276453,67	0,00
CH_4 emissions without CH_4 from LULUCF	87734,22	87734,22	0,00
CH_4 emissions with CH_4 from LULUCF	87739,97	87739,97	0,00
N_2O emissions without N_2O from LULUCF	19087,01	19087,01	0,00
N_2O emissions with N_2O from LULUCF	19092,49	19092,49	0,00
HFCs	NO,NA	NO,NA	0,00
PFCs	NA,NO	NA,NO	0,00
Unspecified mix of HFCs and PFCs	NO,NA	NO,NA	0,00
SF_6	NA,NO	NA,NO	0,00
NF_3	NO,NA	NO,NA	0,00
Total (without LULUCF)	387227,34	387227,34	0,00
Total (with LULUCF)	383286,13	383286,13	0,00
Total (without LULUCF, with indirect)	NA	NA	0,00
Total (with LULUCF, with indirect)	NA	NA	0,00

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[1]	1990	Change from base to latest reported year
	CO_2 equivalent (kt)		(%)
1. Energy	318542,88	318542,88	0,00
2. Industrial processes and product use	19292,85	19292,85	0,00
3. Agriculture	44742,14	44742,14	0,00
4. Land use, land-use change and forestry[5]	-3941,21	-3941,21	0,00
5. Waste	4649,47	4649,47	0,00
6. Other	NO	NO	0,00
Total (including LULUCF)[6]	383286,13	383286,13	0,00

[1] The column "Base year" should be filled in only by those Parties with economies in transition that use a base year different from 1990
[2] Fill in net emissions/removals as reported in table Summary 1.A. For the purposes of reporting, the signs for removals are always
[3] In accordance with the UNFCCC reporting guidelines, for Parties that decide to report indirect CO2 the national totals shall be
[4] In accordance with the UNFCCC reporting guidelines, HFC and PFC emissions should be reported for each relevant chemical.
[5] Includes net CO_2, CH_4 and N_2O from LULUCF.

Documentation box: • Parties should provide detailed explanations on emissions trends in chapter 2: Trends in Greenhouse Gas Emissions and, as appropriate, in the corresponding Chapters 3 - 8 of the national inventory report (NIR). Use this documentation box to provide references to relevant • Use the documentation box to provide explanations if potential emissions are reported.	
Documentation box	

TABLE 1 SECTORAL REPORT FOR ENERGY
(Sheet 1 of 2)

Inventory 2020
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GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2	CH_4	N_2O	NO_X	CO	NMVOC	SO_2
	(kt)						
Total Energy	259331,29	534,91	4,35	70597,69	471815,41	51065,41	636,22
A. Fuel combustion activities (sectoral approach)	242487,38	66,65	4,34	70597,69	471815,41	51065,41	636,22
1. Energy industries	143762,48	1,89	1,92	427,81	32,13	8,10	416,10
a. Public electricity and heat production	110429,08	1,28	1,53	338,45	24,98	6,26	357,29
b. Petroleum refining	3712,42	0,15	0,03				
c. Manufacture of solid fuels and other energy industries	29620,98	0,46	0,36	89,36	7,15	1,84	58,81
2. Manufacturing industries and construction	26461,69	2,30	0,38	35,22	12,65	1,81	51,32
a. Iron and steel	10771,40	1,12	0,17				
b. Non-ferrous metals	7744,31	0,75	0,11	23,75	10,92	1,50	41,42
c. Chemicals	517,30	0,01	0,00	1,39	0,28	0,05	
d. Pulp, paper and print	42,88	0,00	0,00				
e. Food processing, beverages and tobacco	720,98	0,03	0,00				
f. Non-metallic minerals	3282,66	0,31	0,05				
g. Other (*please specify*)	3382,17	0,09	0,04	10,08	1,45	0,27	9,90
3. Transport	18164,13	7,17	1,28	70078,80	471072,06	50985,07	41,75
a. Domestic aviation	111,19	0,00	0,00	0,39	0,19	0,00	0,03
b. Road transportation	15704,23	6,57	0,84	70078,39	471071,83	50985,06	41,72
c. Railways	1001,41	0,06	0,39	0,02	0,03	0,00	NE
d. Domestic navigation	3,02	0,00	0,00	NE	NE	NE	NE
e. Other transportation	1344,28	0,53	0,06	NE	NE	NE	NE

TABLE 1 SECTORAL REPORT FOR ENERGY
(Sheet 2 of 2)

Inventory 2020
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GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2	CH_4	N_2O	NO_X	CO	NMVOC	SO_2
	(kt)						
4. Other sectors	31970,65	52,73	0,47	30,44	391,85	39,46	73,34
a. Commercial/institutional	4087,69	0,51	0,05	4,22	53,68	5,39	12,12
b. Residential	25031,10	49,97	0,28	26,22	338,17	34,07	61,22
c. Agriculture/forestry/fishing	2851,86	2,25	0,14				
5. Other *(as specified in table 1.A(a) sheet 4)*	22128,44	2,56	0,29	25,43	306,71	30,98	53,72
a. Stationary	22128,44	2,56	0,29	25,43	306,71	30,98	53,72
b. Mobile	NO,IE	NO,IE	NO,IE	NO	NO	NO	NO
B. Fugitive emissions from fuels	16843,90	468,26	0,01	NO,NA	NO,NA	NO,NA	NO,NA
1. Solid fuels	16829,18	275,13	0,00	NO,NA	NO,NA	NO,NA	NO,NA
a. Coal mining and handling	108,12	275,13	NA	NA	NA	NA	
b. Solid fuel transformation	10,66	0,00	0,00	NO	NO	NO	NO
c. Other *(as specified in table 1.B.1)*	16710,40	0,00	0,00	NA	NA	NA	NA
2. Oil and natural gas and other emissions from energy production	14,73	193,12	0,01	NA	NA	NA	NA
a. Oil	11,71	160,61	0,01	NA	NA	NA	NA
b. Natural gas	1,33	32,51				NA	NA
c. Venting and flaring	1,69	0,00	0,00	NA	NA	NA	NA
d. Other *(as specified in table 1.B.2)*	NA	NA	NA	NA	NA	NA	NA
C. CO_2 Transport and storage	NO,NA						
1. Transport of CO_2	NO						
2. Injection and storage	NA						
3. Other	NO						
Memo items: [1]							
International bunkers	380,63	0,00	0,01	NE,NA	NE,NA	NE,NA	NE,NA
Aviation	369,71	0,00	0,01	NE	NE	NE	NE
Navigation	10,92	0,00	0,00	NA	NA	NA	NA
Multilateral operations	NA	NA	NA	NA	NA	NA	NA
CO_2 emissions from biomass	178,92						
CO_2 captured	NO,IE,NA						
For domestic storage	NA						
For storage in other countries	NA						

[1] Countries are asked to report emissions from international aviation and marine bunkers and multilateral operations, as well as carbon dioxide (CO_2) emissions from biomass, under Memo items. These emissions should not be included in the national total emissions from the energy sector. Amounts of biomass used as fuel are included in the national energy consumption but the corresponding CO_2 emissions are not included in the national total as it is assumed that the biomass is produced in a sustainable manner. If the biomass is harvested at an unsustainable rate, net CO_2 emissions are accounted for as a loss of biomass stocks in the land use, land-use change and forestry sector.

Documentation Box:	
Parties should provide detailed explanations on the energy sector in chapter 3: energy (IPCC sector 1) of the national inventory report. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.	
Documentation box	he, Jet kerosene, Other kerosene, Gas/Diesel Oil, LPG ther Liquid Fuels. in the subcategory 1.A.4c.ii Off road vehicles and other machinery includes Gasoline, Jet kerosene, Other k

TABLE 1.A(a) SECTORAL BACKGROUND DATA FOR ENERGY
Fuel combustion activities - sectoral approach
(Sheet 1 of 4)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	AGGREGATE ACTIVITY DATA		IMPLIED EMISSION FACTORS			EMISSIONS			
	Consumption		CO_2[1]	CH_4	N_2O	CO_2[1]	CH_4	N_2O	CO_2 Amount captured
	(TJ)	NCV/GCV[2]	(t/TJ)	(kg/TJ)		(kt)			
1.A. Fuel combustion	2502711,55	NCV							
Liquid fuels	559013,42	NCV	70,85	17,57	2,84	242487,38	66,65	4,34	NO,NA
Solid fuels	1789669,45	NCV	95,79	30,65	1,50	39537,49	9,81	1,59	NA
Gaseous fuels	583262,39	NCV	55,56	2,57	0,50	170542,64	54,85	2,69	NA
Other fossil fuels[4]	NO,NA	NCV	NO,NA	NO,NA	NO,NA	32407,25	1,38	0,06	NA
Peat[5]	NO,NA	NCV	NO,NA	NO	NO	NO,NA	NO,NA	NO,NA	NA
Biomass[6]	2415,80	NCV	24,06	252,91	4,03	NO	NO	NO	NO,NA
1.A.1. Energy Industries	1676567,30	NCV					0,61	0,01	NA
Liquid fuels	102532,85	NCV	70,64	3,00	0,59	143762,48	1,89	1,92	NO,NA
Solid fuels	1224475,20	NCV	95,82	1,50	1,50	7243,34	0,31	0,06	NA
Gaseous fuels	359198,02	NCV	56,10	1,00	0,10	116368,12	1,21	1,82	NA
Other fossil fuels[4]	NA	NCV	NA	NA	NA	20151,01	0,36	0,04	NA
Peat[5]	NO,NA	NCV	NO,NA	NO	NO	NA	NA	NA	NA
Biomass[6]	360,94	NCV	73,33	29,92	3,88	NO	NO	NO	NO,NA
a. Public electricity and heat production[7]	1251513,22	NCV				26,47	0,01	0,00	NA
Liquid fuels	7900,47	NCV	76,94	3,04	0,63	110439,08	1,29	1,53	NA
Solid fuels	1002517,66	NCV	96,07	1,00	1,50	607,88	0,02	0,01	NA
Gaseous fuels	240714,15	NCV	56,10	1,00	0,10	96317,14	1,06	1,50	NA
Other fossil fuels[4]	NA	NCV	NA	NA	NA	13504,06	0,24	0,02	NA
Peat[5]	NO	NCV	NO,NA	NO	NO	NA	NA	NA	NA
Biomass[6]	360,94	NCV	73,33	29,92	3,88	NO	NO	NO	NA
b. Petroleum refining	56385,84	NCV				26,47	0,01	0,00	NA
Liquid fuels	48970,13	NCV	67,23	3,00	0,59	3312,40	0,15	0,03	NO,NA
Solid fuels	93,96	NCV	98,12	0,96	1,50	3292,45	0,15	0,03	NA
Gaseous fuels	7321,74	NCV	56,10	1,00	0,10	0,22	0,00	0,00	NA
Other fossil fuels[4]	NA	NCV	NA	NA	NA	410,75	0,01	0,00	NA
Peat[5]	NO	NCV	NO	NO	NO	NA	NA	NA	NA
Biomass[6]	NA	NCV	NA	NA	NA	NO	NO	NO	NO
c. Manufacture of solid fuels and other energy industries[8]	368668,24	NCV				NA	NA	NA	NA
Liquid fuels	45962,84	NCV	73,21	3,00	0,59	29820,98	0,46	0,36	NA
Solid fuels	211844,07	NCV	94,61	0,99	1,51	3343,92	0,14	0,03	NA
Gaseous fuels	111162,14	NCV	56,10	1,00	0,10	20061,76	0,21	0,32	NA
Other fossil fuels[4]	NA	NCV	NA	NA	NA	6236,20	0,11	0,01	NA
Peat[5]	NA	NCV	NO,NA	NO	NO	NA	NA	NA	NA
Biomass[6]	NA	NCV	NA	NA	NA	NO	NO	NO	NA
						NA	NA	NA	NA

Note: All footnotes for this table are given at the end of the table on sheet 4.

Note: For the coverage of fuel categories, refer to the 2006 IPCC Guidelines (chapter 1 of energy volume, section 1.4.1.1, page 1.111). If some derived gases (e.g. gas works, gas, coke oven gas, blast furnace gas) are considered, Parties should provide information on the allocation of these derived gases under the above fuel categories (liquid, solid, gaseous, biomass and other fuels) in the NIR (see also documentation box at the end of sheet 4 of this table).

TABLE 1.A(a) SECTORAL BACKGROUND DATA FOR ENERGY
Fuel combustion activities - sectoral approach
(Sheet 2 of 4)

Inventory 2020
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	AGGREGATE ACTIVITY DATA		IMPLIED EMISSION FACTORS			EMISSIONS			
	Consumption		CO_2[(1)]	CH_4	N_2O	CO_2[(2)]	CH_4	N_2O	CO_2 Amount captured
	(TJ)	NCV/GCV[(3)]	(t/TJ)	(kg/TJ)		(kt)			
1.A.2 Manufacturing industries and construction	320267,71	NCV				26461,69	2,30	0,38	NO,NA
Liquid fuels	39539,58	NCV	74,94	3,00	0,59	2963,12	0,12	0,02	NA
Solid fuels	231062,04	NCV	90,93	9,23	1,50	21010,62	2,13	0,35	NA
Gaseous fuels	49604,70	NCV	50,16	1,02	0,10	2487,95	0,05	0,00	NA
Other fossil fuels[(4)]	NA	NCV	NA	NA	NA	NA	NA	NA	NA
Peat[(5)]	NO	NCV	NO,NA	NO	NO	NO	NO	NO	NO,NA
Biomass[(6)]	61,41	NCV	73,32	30,47	3,95	4,50	0,00	0,00	NA
a. Iron and steel	136692,80	NCV				10771,40	1,12	0,17	NA
Liquid fuels	21656,33	NCV	74,23	3,00	0,60	1607,65	0,07	0,01	NA
Solid fuels	104606,06	NCV	84,83	10,00	1,50	8873,45	1,05	0,16	NA
Gaseous fuels	10430,41	NCV	27,83	1,00	0,10	290,30	0,01	0,00	NA
Other fossil fuels[(4)]	NA	NCV	NA	NA	NA	NA	NA	NA	NA
Peat[(5)]	NO	NCV	NO,NA	NO	NO	NO	NO	NO	NA
Biomass[(6)]	NA	NCV	NA	NA	NA	NA	NA	NA	NA
b. Non-ferrous metals	82703,90	NCV				7744,51	0,75	0,11	NO,NA
Liquid fuels	10562,97	NCV	77,56	3,03	0,57	819,03	0,03	0,01	NA
Solid fuels	72091,19	NCV	96,02	10,00	1,50	6922,49	0,72	0,11	NA
Gaseous fuels	49,74	NCV	56,10	1,01	0,10	2,79	0,00	0,00	NA
Other fossil fuels[(4)]	NA	NCV	NA	NA	NA	NA	NA	NA	NA
Peat[(5)]	NO	NCV	NO	NO	NO	NO	NO	NO	NO
Biomass[(6)]	NA	NCV	NA	NA	NA	NA	NA	NA	NA
c. Chemicals	9063,56	NCV				537,30	0,03	0,00	NO,NA
Liquid fuels	225,36	NCV	74,28	2,97	0,60	16,74	0,00	0,00	NA
Solid fuels	118,46	NCV	96,14	9,96	1,50	11,39	0,00	0,00	NA
Gaseous fuels	8719,57	NCV	56,10	1,00	0,10	489,17	0,01	0,00	NA
Other fossil fuels[(4)]	NA	NCV	NA	NA	NA	NA	NA	NA	NA
Peat[(5)]	NO	NCV	NO	NO	NO	NO	NO	NO	NO
Biomass[(6)]	0,17	NCV	73,30	28,90	4,05	0,01	0,00	0,00	NA
d. Pulp, paper and print	721,61	NCV				42,88	0,00	0,00	NO,NA
Liquid fuels	86,63	NCV	76,30	3,00	0,60	6,61	0,00	0,00	NA
Solid fuels	16,09	NCV	96,06	10,01	1,49	1,55	0,00	0,00	NA
Gaseous fuels	618,89	NCV	56,10	1,00	0,10	34,72	0,00	0,00	NA
Other fossil fuels[(4)]	NA	NCV	NA	NA	NA	NA	NA	NA	NA
Peat[(5)]	NO	NCV	NO	NO	NO	NO	NO	NO	NO
Biomass[(6)]	NA	NCV	NA	NA	NA	NA	NA	NA	NO
e. Food processing, beverages and tobacco	11374,38	NCV				720,98	0,03	0,00	NO,NA
Liquid fuels	2333,63	NCV	70,98	3,00	0,60	165,63	0,01	0,00	NA
Solid fuels	1377,55	NCV	97,02	9,94	1,50	114,25	0,01	0,00	NA
Gaseous fuels	7662,73	NCV	56,10	1,00	0,10	441,10	0,01	0,00	NA
Other fossil fuels[(4)]	NA	NCV	NA	NA	NA	NA	NA	NA	NA
Peat[(5)]	NO	NCV	NO	NO	NO	NO	NO	NO	NO
Biomass[(6)]	0,47	NCV	73,22	30,06	4,05	0,03	0,00	0,00	NA
f. Non-metallic minerals	57121,61	NCV				3282,66	0,31	0,05	NO,NA
Liquid fuels	968,49	NCV	70,34	3,10	0,60	68,13	0,00	0,00	NA
Solid fuels	29628,54	NCV	96,15	10,00	1,50	2848,78	0,30	0,04	NA
Gaseous fuels	6519,59	NCV	56,10	1,00	0,10	365,75	0,01	0,00	NA
Other fossil fuels[(4)]	NA	NCV	NA	NA	NA	NA	NA	NA	NA
Peat[(5)]	NO	NCV	NO	NO	NO	NO	NO	NO	NO
Biomass[(6)]	4,98	NCV	73,33	30,00	4,01	0,37	0,00	0,00	NA
g. Other (please specify)[(7)]	42589,88	NCV				3182,17	0,09	0,04	NA

Note: All footnotes for this table are given at the end of the table on sheet 4.

TABLE 1.A(a) SECTORAL BACKGROUND DATA FOR ENERGY

Fuel combustion activities - sectoral approach

(Sheet 3 of 4)

Inventory 2020

Submission 2022 v1

KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	AGGREGATE ACTIVITY DATA		IMPLIED EMISSION FACTORS			EMISSIONS		
	Consumption		CO_2 [1]	CH_4	N_2O	CO_2 [1]	CH_4	N_2O
	(TJ)	NCV/GCV [2]	(t/TJ)	(kg/TJ)		(kt)		
1.A.3 Transport	260467,52	NCV				18164,13	7,17	1,28
Liquid fuels	241301,10	NCV	70,75	28,88	5,31	17071,35	6,97	1,28
Solid fuels	NO,NA	NCV	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
Gaseous fuels	19815,92	NCV	55,15	10,00	0,10	1092,78	0,20	0,00
Other fossil fuels [4]	NO,NA	NCV	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
Biomass [5]	NO,NA	NCV	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
a. Domestic aviation [10]	1576,32	NCV				111,19	0,00	0,00
Aviation gasoline	688,31	NCV	69,30	0,50	2,00	47,70	0,00	0,00
Jet kerosene	888,01	NCV	71,50	0,50	2,00	63,49	0,00	0,00
Biomass	NO		NO	NO	NO	NO	NO	NO
b. Road transportation [11]	223818,31	NCV				15704,23	6,57	0,84
Gasoline	134802,98	NCV	69,30	33,00	3,20	9341,84	4,45	0,43
Diesel oil	67571,63	NCV	74,13	3,90	5,20	5009,29	0,26	0,35
Liquefied petroleum gases (LPG)	21443,71	NCV	63,10	86,84	2,52	1353,10	1,86	0,05
Other liquid fuels (*please specify*)	NO,NA	NCV				NO,NA	NO,NA	NO,NA
Gaseous fuels	NO,NA	NCV	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
Biomass [5]	NO,NA	NCV	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
Other fossil fuels (*please specify*) [4]	NO,NA	NCV				NO,NA	NO,NA	NO,NA
i. Cars	149051,25	NCV				10309,97	5,42	0,49
Gasoline	112373,13	NCV	69,30	33,00	3,20	7787,46	3,71	0,36
Diesel oil	18920,05	NCV	74,10	3,90	3,90	1401,98	0,07	0,07
Liquefied petroleum gases (LPG)	17758,07	NCV	63,10	92,00	3,00	1120,53	1,63	0,05
Other liquid fuels (*please specify*)	NA					NA	NA	NA
Gaseous fuels	NA		NA	NA	NA	NA	NA	NA
Biomass [5]	NA		NA	NA	NA	NA	NA	NA
Other fossil fuels (*please specify*) [4]	NA					NA	NA	NA
ii. Light duty trucks	25891,22	NCV				1834,31	0,61	0,10
Gasoline	14940,80	NCV	69,30	33,00	3,20	1035,39	0,49	0,05
Diesel oil	9610,19	NCV	74,33	3,90	5,70	714,34	0,04	0,05
Liquefied petroleum gases (LPG)	1340,23	NCV	63,10	62,00	0,20	84,57	0,08	0,00
Other liquid fuels (*please specify*)	NA					NA	NA	NA
Gaseous fuels	NA		NA	NA	NA	NA	NA	NA
Biomass [5]	NA		NA	NA	NA	NA	NA	NA
Other fossil fuels (*please specify*) [4]	NA					NA	NA	NA
iii. Heavy duty trucks and buses	48483,68	NCV				3532,77	0,53	0,25
Gasoline	7096,86	NCV	69,30	33,00	3,20	491,81	0,23	0,02
Diesel oil	39041,38	NCV	74,10	3,90	5,70	2892,97	0,15	0,22
Liquefied petroleum gases (LPG)	2345,41	NCV	63,10	62,00	0,20	148,00	0,15	0,00
Other liquid fuels (*please specify*)	NA					NA	NA	NA
Gaseous fuels	NA		NA	NA	NA	NA	NA	NA
Biomass [5]	NA		NA	NA	NA	NA	NA	NA
Other fossil fuels (*please specify*) [4]	NA					NA	NA	NA
iv. Motorcycles	392,20	NCV				27,18	0,01	0,00
Gasoline	392,20	NCV	69,30	33,00	3,20	27,18	0,01	0,00
Diesel oil	NA		NA	NA	NA	NA	NA	NA

Liquefied petroleum gases (LPG)	NA		NA	NA	NA	NA	NA	NA
Other liquid fuels *(please specify)*	NA					NA	NA	NA
Gaseous fuels	NA		NA	NA	NA	NA	NA	NA
Biomass[8]	NA		NA	NA	NA	NA	NA	NA
Other fossil fuels *(please specify)*[9]	NA					NA	NA	NA
v. Other (please specify)	NO	NCV				NO	NO	NO
c. Railways	13514,32	NCV				1001,41	0,06	0,39
Liquid fuels	13514,32	NCV	74,10	4,15	28,60	1001,41	0,06	0,39
Solid fuels	NO		NO	NO	NO	NO	NO	NO
Gaseous fuels	NO		NO	NO	NO	NO	NO	NO
Biomass[8]	NO		NO	NO	NO	NO	NO	NO
Other fossil fuels *(please specify)*	NO					NO	NO	NO
d. Domestic Navigation[10]	40,97	NCV				3,02	0,00	0,00
Residual fuel oil	NO		NO	NO	NO	NO	NO	NO
Gas/diesel oil	37,99	NCV	74,10	7,00	2,00	2,81	0,00	0,00
Gasoline	2,99	NCV	69,30	33,00	32,00	0,21	0,00	0,00
Other liquid fuels *(please specify)*	NO					NO	NO	NO
Gaseous fuels	NO		NO	NO	NO	NO	NO	NO
Biomass[8]	NO		NO	NO	NO	NO	NO	NO
Other fossil fuels *(please specify)*[9]	NO					NO	NO	NO
e. Other transportation *(please specify)*	21517,59	NCV				1344,28	0,53	0,06
Liquid fuels	2351,17	NCV	106,97	143,05	23,47	251,49	0,34	0,06
Solid fuels	NO,NA	NCV	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
Gaseous fuels	19815,92	NCV	55,15	10,00	0,10	1092,78	0,20	0,00
Other fossil fuels[9]	NO,NA	NCV	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
Biomass[8]	NO,NA	NCV	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
i. Pipeline transport	21517,59	NCV				1219,25	0,29	0,06
Liquid fuels	1701,68	NCV	74,32	56,69	0,65	126,47	0,10	0,00
Solid fuels	NO	NCV	NO	NO	NO	NO	NO	NO
Gaseous fuels	19815,92	NCV	55,15	10,00	0,10	1092,78	0,20	0,00
Other fossil fuels[9]	NO		NO	NO	NO	NO	NO	NO
Biomass[8]	NO		NO	NO	NO	NO	NO	NO
ii. Other *(please specify)*	NO	NCV				125,02	0,24	0,05

Note: All footnotes for this table are given at the end of the table on sheet 4.

TABLE 1.A(a) SECTORAL BACKGROUND DATA FOR ENERGY
Fuel combustion activities - sectoral approach
(Sheet 4 of 4)

Inventory 2020
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	AGGREGATE ACTIVITY DATA		IMPLIED EMISSION FACTORS			EMISSIONS			
	Consumption		CO_2 [1]	CH_4	N_2O	CO_2 [2]	CH_4	N_2O	CO_2 Amount captured
	(TJ)	NCV/GCV [3]	(t/TJ)	(kg/TJ)		(kt)			
1.A.4 Other sectors	420075,89	NCV							
Liquid fuels	73539,99	NCV	66,56	19,83	2,17	3197,65	52,73	0,47	NO,NA
Solid fuels	192014,82	NCV	86,39	268,32	1,50	8962,47	1,40	0,18	NA
Gaseous fuels	152948,99	NCV	56,10	5,00	0,10	18507,40	49,99	0,29	NA
Other fossil fuels [4]	NO,NA	NCV	NO,NA	NO,NA	NO,NA	8560,78	0,76	0,02	NA
Peat [5]	NO	NCV	NO,NA	NO	NO	NO,NA	NO,NA	NO,NA	NA
Biomass [6]	1922,49	NCV	74,25	300,13	4,86	NO	NO	NO	NO,NA
a. Commercial/institutional [7]	52677,66	NCV				142,75	0,58	0,01	NA
Liquid fuels	5644,32	NCV	72,81	9,82	0,55	4087,69	0,51	0,05	NA
Solid fuels	26771,84	NCV	96,22	10,01	1,50	4103,95	0,06	0,00	NA
Gaseous fuels	20478,02	NCV	56,10	4,98	0,10	2527,93	0,26	0,04	NA
Other fossil fuels [4]	NA	NCV	NA	NA	NA	1148,82	0,10	0,00	NA
Peat [5]	NO	NCV	NO,NA	NO	NO	NA	NA	NA	NA
Biomass [6]	278,48	NCV	78,39	301,63	3,95	NO	NO	NO	NA
b. Residential [7]	127103,85	NCV				23,28	0,08	0,00	NA
Liquid fuels	34109,63	NCV	85,16	39,90	0,59	29031,10	49,97	0,78	NA
Solid fuels	161800,27	NCV	96,41	300,08	1,50	2154,32	0,24	0,02	NA
Gaseous fuels	129713,11	NCV	56,10	5,00	0,10	15599,83	48,54	0,24	NA
Other fossil fuels [4]	NA	NCV	NA	NA	NA	7276,91	0,65	0,01	NA
Peat [5]	NO	NCV	NO,NA	NO	NO	NA	NA	NA	NA
Biomass [6]	1480,82	NCV	73,61	299,83	4,05	NO	NO	NO	NA
1.A.4 b.ii. Other (please specify)	227103,85	NCV				109,01	0,44	0,01	NA
c. Agriculture/forestry/fishing	40598,60	NCV				29331,18	49,33	0,28	NA
Liquid fuels	15786,04	NCV	69,19	29,61	4,84	2951,86	2,25	0,14	NO,NA
Solid fuels	394,171	NCV	96,30	300,12	1,50	2337,29	1,20	0,14	NA
Gaseous fuels	2407,47	NCV	56,10	4,98	0,10	379,60	1,18	0,01	NA
Other fossil fuels [4]	NO,NA	NCV	NO,NA	NO,NA	NO,NA	135,06	0,01	0,00	NA
Peat [5]	NO	NCV	NO	NO	NO	NO,NA	NO,NA	NO,NA	NA
Biomass [6]	163,18	NCV	73,34	300,28	4,29	NO	NO	NO	NO
i. Stationary	6701,26	NCV				11,97	0,05	0,00	NA
Liquid fuels	189,00	NCV	73,54	10,05	0,60	538,58	1,75	0,01	NO,NA
Solid fuels	394,171	NCV	96,30	300,12	1,50	13,90	0,00	0,00	NA
Gaseous fuels	2407,47	NCV	56,10	4,98	0,10	379,60	1,18	0,01	NA
Other fossil fuels [4]	NA	NCV	NA	NA	NA	135,06	0,01	0,00	NA
Peat [5]	NO	NCV	NO	NO	NO	NA	NA	NA	NA
Biomass [6]	163,18	NCV	73,34	300,28	4,29	NO	NO	NO	NO
ii. Off-road vehicles and other machinery	26609,41	NCV				11,97	0,05	0,00	NA
Gasoline	8026,72	NCV	69,10	80,00	2,00	1824,36	0,63	0,04	
Diesel oil	6126,49	NCV	74,10	4,15	2,86	556,25	0,64	0,02	
Liquefied petroleum gases (LPG)	NO	NCV	NO	NO	NO	455,97	0,03	0,02	
Other liquid fuels (please specify)	12456,20	NCV				NO	NO	NO	
Gaseous fuels	NA	NCV	NA	NA	NA	816,13	0,01	0,01	
Biomass [6]	NA		NA	NA	NA	NA	NA	NA	
Other fossil fuels (please specify) [4]	NA					NA	NA	NA	
iii. Fishing	6987,62	NCV				498,95	0,33	0,01	
Residual fuel oil	NO		NO	NO	NO	NO	NO	NO	
Gas/diesel oil	3063,75	NCV	74,10	4,15	28,60	226,99	0,01	0,09	
Gasoline	3924,18	NCV	69,20	80,00	2,00	271,96	0,31	0,01	
Other liquid fuels (please specify)	NO	NCV				NO	NO	NO	
Gaseous fuels	NO		NO	NO	NO	NO	NO	NO	
Biomass [6]	NO		NO	NO	NO	NO	NO	NO	
Other fossil fuels (please specify) [4]	NO					NO	NO	NO	
1.A.5 Other (Not specified elsewhere) [8]	255313,11	NCV				22128,44	2,56	0,29	NA
a. Stationary (please specify)	255313,11	NCV				22128,44	2,56	0,29	NA
b. Mobile (please specify)	NO,IE	NCV				NO,IE	NO,IE	NO,IE	
Information item [10]									
Waste incineration with energy recovery included as:									
Biomass [6]	NO		NO	NO	NO	NO	NO	NO	NO
Fossil fuels [4]	NO		NO	NO	NO	NO	NO	NO	NO

[1] The implied emission factors (IEFs) for carbon dioxide (CO2) are estimated on the basis of gross emissions, i.e. CO2 emissions + amount captured.

[2] Total CO2 emissions after subtracting the amounts of CO2 captured.

[3] If activity data are calculated using net calorific values (NCVs) specified by the IPCC Guidelines, write NCV in this column. If gross calorific values (GCVs) are used, write GCV in this column.

[4] Include information in the documentation box on which fuels are included and provide a reference to the section in the national inventory report (NIR) where further information is provided.

TABLE 1.A(b) SECTORAL BACKGROUND DATA FOR ENERGY

CO_2 from fuel combustion activities - reference approach (IPCC worksheet fuel combustion activities)

(Sheet 1 of 1)

Submission 2020

Submission 2022 v1

KAZAKHSTAN

FUEL TYPES			Units	Production	Imports	Exports	International bunkers	Stock change	Apparent consumption	Conversion factor (TJ/Unit)	NCV/GCV [a]	Apparent consumption (TJ)	Carbon emission factor (t C/TJ)	Carbon content (kt)	Carbon stored(C excluded) (kt C)	Net carbon emissions (kt C)	Fraction of carbon oxidized	Actual CO_2 emissions (kt) CO_2
Liquid fossil	Primary fuels	Crude oil	kt	7906.71	11.42	7620.46		-315.13	661.95	42.6	NCV	28163.34	20.00	563.27	NE	563.27	1.00	2066.79
		Natural gas liquids	kt	NO	NO	NO		NO	NO	NA	NCV	NO,NA	NA	NO,NA	NE	NO,NA	NA	NO,NA
		Other oil and gas liquids	kt	12649.96	0.72	231.08		34.64	12453.01	44.20	NCV	550663.81	17.50	9636.09	NA	9636.09	1.00	35332.31
	Secondary fuels	Gasoline	kt		2.76	566.83	NO	266.72	466.79	44.30	NCV	20675.03	18.90	390.82	0.25	390.57	1.00	1431.77
		Jet kerosene	kt		20.04	6.39	NO	-8.41	22.05	44.10	NCV	972.40	19.50	18.97	NA	18.97	1.00	69.56
		Other kerosene	kt		0.87	NO	NO	-1.42	2.29	43.80	NCV	100.31	19.60	1.94	0.00	1.94	1.00	7.11
		Diesel oil	kt		NO	NO		NO	NO	NA	NCV	NO,NA	19.60	NO,NA	NE	NO,NA	NA	NO,NA
		Residual fuel oil	kt		666.11	130.48	NO	91.42	476.16	41.60	NCV	19810.56	21.10	418.00	0.00	418.00	1.00	1532.33
		Liquefied petroleum gases (LPG)	kt		7.30	1551.09	NO	-8.19	1567.01	46.40	NCV	72695.83	17.20	1250.00	14.61	1235.39	1.00	4529.77
		Ethane	kt		0.04	2895.46		25.41	2870.49	47.50	NCV	136293.83	20.00	2725.87	2.29	2723.58	1.00	9986.81
		Naphtha	kt		NO	NO		NO	NO	NA	NCV	NO,NA	NA	NO,NA	NE	NO,NA	NA	NO,NA
		Bitumen	kt		NO	NO		NO	NO	NA	NCV	NO,NA	NA	NO,NA	NE	NO,NA	NA	NO,NA
		Lubricants	kt		67.29	56.26		3.23	47.77	40.20	NCV	1920.77	20.00	38.42	18.40	20.02	1.00	73.41
		Petroleum coke	kt		167.11	2.30	NO	-3.78	165.11	40.20	NCV	6636.67	27.50	182.52	2.20	180.32	1.00	661.17
		Refinery feedstocks	kt		180.11	44.59		-0.98	136.50	40.20	NCV	5488.50	20.00	109.77	32.14	77.63	1.00	284.79
		Other oil	kt		NA	NA		NA	NO	35.00	NCV	NO	20.00	NO,NA	NE	NO,NA	1.00	NO,NA
			kt		91.54	6.11		0.01	91.23	40.20	NCV	3666.95	19.70	72.23	NA	72.23	1.00	264.83
Other liquid fossil													20.00	-73.33	NA	-73.33	1.00	-268.89
		Tar	kt	NO	NO	NO	NO	NO	NO	NA	NCV	NO,NA		NO,NA	NA	NO,NA		NO,NA
		Other	kt	NO	NO	NO	NO	NO	NO	NA	NCV	NO,NA	NA	NO,NA	NA	NO,NA	NA	NO,NA
Liquid fossil totals												NO,NA	NA	NO,NA	NA	NO,NA	NA	NO,NA
Solid fossil	Primary fuels	Anthracite[b]	kt	NO	NO	NO						419410.83		8032.90	465.58	7567.32		27758.96
		Coking coal	kt	10072.40	NA	NA		NO	NO	NA	NCV	NO,NA	NA	NO,NA	NA	NO,NA	NA	NO,NA
		Other bituminous coal	kt	340	0.0	NO	NO	-277.26	6116.35	28.20	NCV	251126.50	25.80	7112.81	85.98	7026.83	1.00	25762.72
		Sub-bituminous coal	kt	NO	NO	NO	NO	NO	NO	NA	NCV	NO,NA	NA	NO,NA	NA	NO,NA	NA	NO,NA
		Lignite	kt	9422.10	NO	3564.07	NO	NO	NO	NA	NCV	NO	NA	NO,NA	NA	NO,NA	NA	NO,NA
		Oil shale and tar sand	kt	NA	NA	NA		3564.07	2786.04	31.90	NCV	88910.88	27.00	2400.57	1.29	2400.28	1.00	8798.14
	Secondary fuels	BKB[c] and patent fuel	kt		NA	NA		NA	NA	8.90	NCV	NA	25.80	NA	NA	NA	1.00	NA
		Other manufactured fuels	kt		0.04	0.0		0.04	0.04	20.70	NCV	0.83	20.00	0.02	NA	0.02	1.00	0.06
		Coal tar	kt		994.44	9.93		-44.49	1028.92	28.70	NCV	29605.90	20.20	598.03	92.42	505.61	1.00	1854.56
			kt		0.00	28.26		3.31	40.78	28.00	NCV	1142.17	22.00	25.13	0.00	25.13	1.00	92.15
Other solid fossil												1997867.18		36595.72	238.85	36356.87		133320.79
		Energy coal	kt	13611.80	3.12	4516.95	NO	84.04	9910.42	35.90	NCV	356081.66	26.20	9404.26	207.93	9232.29	1.00	33849.84
		High ash coal	kt	7277.96	NA	14993.77	NO	22.67	16255.86	35.90	NCV	583900.93	26.20	15974.40	27.36	15947.04	1.00	58505.85
		Other coal	kt	9143.30	15.75	4423.04	NO	-28.36	4765.57	35.90	NCV	171128.57	26.20	4682.57	0.00	4682.57	1.00	17167.77
		Coal concentrate	kt	1842.90	278.00	1627.58	NO	-64.77	569.04	28.20	NCV	16044.20	25.80	439.00	NA	439.00	1.00	1609.67
Solid fossil totals												1997867.18		36595.72	238.85	36356.87		133320.79
Gaseous fossil		Natural gas (dry)	$10^6 m^3$	29862.71	12032.11	19984.77		-990.04	22721.05	34.70	NCV	788232.03	15.30	12060.86	499.11	11561.75	1.00	42386.07
Other gaseous fossil												788232.03		12060.86	499.11	11561.75		42386.07
Gaseous fossil totals												NO		NO	NO	NO		NO
Peat (sup-bituminous)												788232.03		12060.86	499.11	11561.75		42386.07
Other fossil fuels			kt	NO	NO	NO	NO	NO	NO	NA	NCV	NO,NA	NA	NO,NA	NE	NO,NA	NA	NO,NA
Waste												NO		NO	NO	NO		NO
			kt	NO	NO	NO	NO	NO	NO	NA	NCV	NO,NA	NA	NO,NA	NE	NO,NA	NA	NO,NA
Total												NO,NA	NA	NO,NA	NE	NO,NA	NA	NO,NA
Biomass total												2946715.47		64502.10	2261.28	62208.84		229429.31
		Solid biomass	TJ	55.19	403.41	2.41		-4.36	472.14	1.00	NCV	472.14		34.40	0.01	34.39		32.76
		Liquid biomass	TJ	0	0	0		0	0	NA	NCV	472.14	30.30	34.40	0.01	34.39	1.00	32.76
		Gas biomass	TJ	0	0	0		0	0	NA	NCV	0 NA	NA	0 NA	0	0 NA	NA	0 NA
		Other non-fossil fuels (biogenic waste)	TJ	NO	NO	NO		0	0	NA	NCV	0 NA	NA	0 NA	0	0 NA	NA	0 NA
								NO	NO	NA	NCV	NO,NA	NA	NO,NA	NO	NO,NA	NA	NO,NA

[a] If consumption data are not reported in physical units, please report net calorific values in a similar level of disaggregation as fuel types in the national inventory report (NIR) and indicate in the documentation box where this information is reported.

[b] In correct quantities in previous columns in energy units, use net calorific values (NCVs) and write NCV in this column. If gross calorific values (GCVs) are used, write GCV in this column.

[c] If data for anthracite are not available separately, include with Other Bituminous Coal.

[d] BKB: Brown coal briquettes.

[e] Although peat is not strictly speaking a fossil fuel, the carbon dioxide (CO_2) emissions from combustion of peat are included in the national emissions as for fossil fuels. See the 2006 IPCC Guidelines, chapter 1 of energy volume, page 1.11.

[f] Include peat briquettes here.

Documentation Box:

Parties should provide detailed explanation in the fuel combustion sub-sector, including information relating to CO_2 from the Reference approach, in the corresponding part of Chapter 3: Energy (CRF sub-sector 1.A) of the NIR. Use this documentation box to provide information to national experts of the NIR. If any additional information and/or further details are needed to understand the content of this table.

Documentation box	Fuel consumption of the Territory include the total of liquid, solid and gaseous biomass 1.A(b)(iii). Made oil not used in Kazakhstan 1.A(b)(iii). Tar is not used in Kazakhstan 1.A(b)(iii). Oil Tar is not used in Kazakhstan 1.A(b)(iii). CO2 emissions and consumption include

TABLE 1.A(c) COMPARISON OF CO_2 EMISSIONS FROM FUEL COMBUSTION

Comparison of CO_2 emissions from fuel combustion

(Sheet 1 of 1)

Inventory 2020

Submission 2022 v1

KAZAKHSTAN

FUEL TYPES	REFERENCE APPROACH			SECTORAL APPROACH[1]		DIFFERENCE[2]	
	Apparent energy consumption[3] (PJ)	Apparent energy consumption (excluding non-energy use, reductants and feedstocks)[4] (PJ)	CO_2 emissions (kt)	Energy consumption (PJ)	CO_2 emissions[5] (kt)	Energy consumption (%)	CO_2 emissions[6] (%)
Liquid fuels (excluding international bunkers)	459,44	459,44	27738,06	558,01	39537,49	-16,62	-29,84
Solid fuels (excluding international bunkers)	1697,04	1631,20	158155,18	1789,67	170542,64	-8,85	-7,26
Gaseous fuels	790,25	790,26	42536,07	583,26	32407,25	35,49	31,25
Other fossil fuels	NO,NA	NO	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
Peat	NO,NA	NO	NO,NA	NO,NA	NO	NO,NA	NO,NA
Total[5]	2946,74	2880,89	228429,31	2930,95	242487,38	-1,71	-5,80

(1) "Sectoral approach" is used to indicate the approach (if different from the reference approach) used by the Party to estimate carbon dioxide (CO_2) emissions from fuel combustion as reported in table 1.A(a), sheets 1-4.

(2) Difference in CO_2 emissions estimated by the reference approach (RA) and the sectoral approach (SA) (difference = 100% x ((RA-SA)/SA)). For calculating the difference in energy consumption between the two approaches, data as reported in the column "Apparent energy consumption (excluding non-energy use, reductants and feedstocks)" are used for the reference approach.

(3) Apparent energy consumption data shown in this column are as in table 1.A(b).

(4) For the purposes of comparing apparent energy consumption in the reference approach with energy consumption in the sectoral approach, data in this column come from table 1.A(d).

(5) For the sectoral approach gross emissions (without accounting for CO_2 captured) are included in the comparison.

(6) In the case of discrepancies between the approaches (of more than 2 per cent), investigate and document the reasons for such discrepancies.

Documentation Box:

• Parties should provide detailed explanations on the fuel combustion subsector, including information related to the comparison of CO_2 emissions calculated using the sectoral approach with those calculated using the reference approach, in the corresponding part of chapter 3: energy (CRF subsector 1.A) of the national inventory report (NIR). Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.

Documentation box	

TABLE 1.A(d) SECTORAL BACKGROUND DATA FOR ENERGY
Feedstocks, reductants and other non-energy use of fuels
(Sheet 1 of 1)

FUEL TYPE			ACTIVITY DATA AND RELATED INFORMATION	IMPLIED EMISSION FACTOR	CARBON EXCLUDED FROM REFERENCE APPROACH		IMPLIED CARBON EXCLUDED FRACTION	REPORTED CO_2 EMISSIONS[1]	
			Fuel quantity for NEU	Carbon emission factor	Carbon excluded	CO_2 excluded	Carbon fraction excluded from reference approach[2]	CO_2 emissions from the NEU reported in the inventory	Reported under: Select category(ies) from the category tree[3]
			(TJ)	(t C/TJ)	((kt) C)	((kt) CO_2)	(%)	((kt) CO_2)	
Liquid fossil fossil	Primary fuels	Crude oil	NO	NO	NO	NO	NO	NO	
		Orimulsion	NO	NO	NO	NO	NO,NA	NO	
		Natural gas liquids	NA	NA	NO	NO	NO	NA	Petrochemical Production - Other
	Secondary fuels	Gasoline	13,62	18,86	0,26	0,94	-0,04	0,94	roducts from Fuels and Solvent Use
		Jet kerosene	NA	NA	NA	NA	NA	NA	roducts from Fuels and Solvent Use
		Other kerosene[4]	430,87	19,59	8,44	30,95	156,26	30,95	roducts from Fuels and Solvent Use
		Shale oil	NO	NO	NO	NO	NO,NA	NO	
		Gas/diesel oil[5]	1407,51	20,20	28,43	104,24	-8,70	104,24	roducts from Fuels and Solvent Use
		Residual fuel oil	664,72	21,09	14,02	51,41	-1,04	51,41	roducts from Fuels and Solvent Use
		Liquefied petroleum gases (LPG)[6]	179,42	17,18	3,08	11,29	-0,18	11,29	roducts from Fuels and Solvent Use
		Ethane[7]	NO	NO	NO	NO	NO,NA	NO	
		Naphtha[8]	NO	NO	NO	NO	NO,NA	NO	
		Bitumen	14472,96	22,00	318,41	1167,50	-873,45	1167,50	roducts from Fuels and Solvent Use
		Lubricants[9]	119,91	20,02	2,40	8,80	1,85	8,80	roducts from Fuels and Solvent Use
		Petroleum coke[10]	3479,28	26,60	92,55	339,35	-68,38	339,35	al Industry - Other (please specify)
		Refinery feedstocks	11,93	15,55	NO	NO	NO,NA	0,68	Petrochemical Production - Other
		Other oil[11]	NA	NA	NA	NA	NA	NA	
Other liquid fossil			NO	NO	NO	NO	NO,NA	NO	
		Tar	NO	NO	NO	NO	NO,NA	NO	
Liquid fossil totals			20780,22	22,51	467,59	1714,49	5,82	1715,16	
Solid fossil	Primary fuels	Anthracite	NO	NO	NO	NO	NO,NA	NO	
		Coking coal	3332,43	25,86	85,98	315,26	1,14	315,26	Ferroalloys Production
		Other bituminous coal	NO	NO	NO	NO	NO,NA	NO	
		Sub-bituminous Coal	NO	NO	NO	NO	NO,NA	NO	
		Lignite	45,76	27,54	1,26	4,62	-0,22	4,62	al Industry - Other (please specify)
		Oil shale and tar sand	NA	NA	NA	NA	NA	NA	
	Secondary fuels	BKB and patent fuel	NA	NA	NA	NA	NA	NA	
		Coke oven/gas coke	31625,44	29,20	923,46	3386,03	109,04	3386,03	Ferroalloys Production
		Coal tar[7]	0,06	21,43	0,00	0,00	-0,01	0,00	y Products - Other (please specify)
Other solid fossil			8965,26	26,20	234,88	861,23	0,64	861,23	
		Energy coal	7901,77	26,20	207,02	759,07	4,64	759,07	y Products - Other (please specify)
		High ash coal	1044,40	26,20	27,36	100,32	0,10	100,32	roducts from Fuels and Solvent Use
		Other coal	19,09	26,14	0,50	1,83	0,02	1,83	roducts from Fuels and Solvent Use
		Coal concentrate	NA	NA	NA	NA	NA	NA	
Solid fossil totals			41968,94	28,33	1245,58	4567,14	2,81	4567,13	
Gaseous fossil		Natural gas (dry)[12]	32033,26	15,30	490,11	1797,07	4,05	1797,07	Chemical Industry
Other gaseous fossil			NO	NO	NO	NO	NO	NO	
Gaseous fossil totals			32033,26	15,30	490,11	1797,07	4,05	1797,07	
Waste (non-biomass fraction)			NO	NO	NO	NO	NO,NA	NO	
Other fossil fuels			NO	NO	NO	NO	NO	NO	
Other fossil fuels totals			NO	NO	NO	NO	NO	NO	

[12] Carbon excluded from fuel combustion is either emitted in another sector of the inventory (for example as industrial process emissions) or is stored for long periods of time in a product manufactured from the fuel and therefore no emissions occur (for example, bitumen/asphalt used for road paving). Column I includes carbon dioxide (CO_2) emissions from non-energy use and column J documents where in the inventory these emissions are reported.

[13] The fraction of carbon excluded from reference approach relates CO_2 from carbon excluded to CO_2 reported in the reference approach.

[14] If the emissions from the fuel are reported in more than one category, list them in the table and provide further details in the documentation box and in the national inventory report (NIR). For the different NEU of fuels see also table 1.A, page 1.26, chapter 1, volume 3 of the 2006 IPCC

[15] Enter data for those fuels that are used as feedstocks (fuel used as raw materials for manufacture of products such as plastics or fertilisers), reductant or for other non-energy use (fuels not used as fuel or transformed into another fuel (e.g. bitumen for road construction, lubricants)). For other fuels, use notation key "NO" (not occurring).

[16] Total deliveries.

[a] Refinery gas, paraffin waxes and white spirit are included under "other oil" in table 1A(b).

[b] Deliveries to petrochemical feedstock and blast furnaces.

[c] Deliveries to chemical industry and construction.

Documentation box:	
Parties should provide detailed explanations on the fuel consumption for non-energy uses, in the corresponding part of chapter 3.2.3. Feedstocks and non-energy use of fuels of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.	
Documentation box	Sur 2, p 6-9). 1.AD/2020: National statistics do not provide data on the total consumption of sub-bituminous coal since 2015. Provides segregated by type of sub bituminous coal 1.AD/2020: Anthracite is not used in Kazakhstan.

TABLE 1.B.1 SECTORAL BACKGROUND DATA FOR ENERGY
Solid fuels
(Sheet 1 of 1)

Inventory 2020
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA	IMPLIED EMISSION FACTORS		EMISSIONS		
				CH_4		CO_2
	Amount of fuel produced	CH_4[1]	CO_2	Recovery/Flaring[2]	Emissions[3]	Emissions
	(Mt)	(kg/t)		(kt)		
1. B. 1. a. Coal mining and handling	98,83			NO,NE	275,13	108,12
i. Underground mines[4]	10,05	19,68	3,60	NO,NE	197,81	36,19
Mining activities		16,75	3,56	NE	168,39	35,83
Post-mining activities		2,68	0,04	NO	26,94	0,36
Abandoned underground mines		0,25	NA	NO	2,48	NA
ii. Surface mines[4]	88,78	0,87	0,81	NO	77,33	71,93
Mining activities		0,80	0,81	NO	71,38	71,91
Post-mining activities		0,07	0,00	NO	5,95	0,02
1. B. 1. b. Solid fuel transformation[5]	4,00	0,00	2,67	NO	0,00	10,66
1. B. 1. c. Other *(please specify)*[6]				NO	0,00	16710,40
Flaring of coke oven gas	2528,95	0,00	6,61	NO	0,00	16710,40

(1) The implied emission factors (IEFs) for methane (CH_4) are estimated on the basis of gross emissions as follows: (CH_4 emissions + amounts of CH_4 flared/recovered) / activity data.

(2) Amounts of CH_4 drained (recovered), utilized or flared. If CH_4 is recovered and flared the associated emissions should be included under 1.B.1.c.

(3) Final CH_4 emissions after subtracting the amounts of CH_4 utilized or recovered.

(4) In accordance with the IPCC Guidelines, emissions from Mining activities and Post-mining activities are calculated using the raw coal production for Underground mines and Surface mines.

(5) Include fugitive emissions from coke and charcoal production under this category, recognizing that there are no methods for estimating fugitive emissions from coke and charcoal production in the 2006 IPCC Guidelines.

(6) This category is to be used for reporting any other solid fuel related activities resulting in fugitive emissions, such as emissions from waste piles.

Note: There are no clear references to the coverage of subcategories 1.B.1.b. and 1.B.1.c. in the IPCC Guidelines. Make sure that the emissions entered here are not reported elsewhere. If they are reported under another category, indicate this by using the

Documentation box:

- Parties should provide detailed explanations on the fugitive emissions from source category 1.B.1 Solid Fuels in the corresponding part of chapter 3: energy (CRF category 1.B.1) of the NIR. Use this documentation box to provide references to relevant sections of the national inventory report (NIR) if any additional information and/or further details are needed to understand the content of this table.
- Regarding data on the amount of fuel produced entered in the above table, specify in this documentation box whether the fuel amount is based on the run-of-mine production or on the saleable production.
- If entries are made for Recovery/flaring, indicate in this documentation box whether CH_4 is flared or recovered and provide a reference to the section in the NIR where further details on recovery/flaring can be found.
- If estimates are reported under 1.B.1.b. and 1.B.1.c., use this documentation box to provide information regarding activities covered under these categories and to provide a reference to the section in the NIR where the background information can be found.

Documentation box	

TABLE 1.B.2 SECTORAL BACKGROUND DATA FOR ENERGY
Oil, natural gas and other emissions from energy production
(Sheet 1 of 1)

Inventory 2020
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA[1]			IMPLIED EMISSION FACTORS			EMISSIONS			
	Description[1]	Unit[1]	Value	CO_2[2]	CH_4	N_2O	CO_2 Emissions[3]	CO_2 Amount captured	CH_4[4]	N_2O
				(kg/unit)[5]			(kt)			
1. B. 2. a. Oil[6]										
1. Exploration	Oil produced	t	73006,20	0,11	0,23	0,00	11,71	NA	160,61	0,00
2. Production[7]	Oil produced	t	73006,20	156,69	2169,58		0,01	NA	0,02	0,01
3. Transport	Oil produced	t	173200,00	0,83	9,08		11,44	NA	158,59	
4. Refining/storage	(Oil produced)	t	16812,20	7,05	36,15	0,11	0,15	NA	1,59	
5. Distribution of oil products	(Oil produced)	t	NA	NA	NA		0,12	NA	0,61	0,00
6. Other	(Oil produced)	NA	NA	NA	NA		NA	NA	NA	
1. B. 2. b. Natural gas							NA	NA	NA	
1. Exploration	(Gas produced)	10^6M^3	11438,00	9,10	19,41		1,33	NA	22,21	
2. Production[7]	(Gas produce	10^6m^3	11438,00	48,00	134,00		0,10	NA	0,22	
3. Processing	(Gas produced)	10^6 m^3	31542,00	0,17	0,39		0,55	NA	1,53	
4. Transmission and storage	(Gas produced)	bln m3	102745,10	0,99	297,96		0,01	NA	0,02	
5. Distribution	(Gas produced)	Bln m3	11111,02	51,00	11,00		0,10	NA	30,62	
6. Other	(Gas produced)		NA	NA	NA		0,57	NA	0,12	
1. B. 2. c. Venting and flaring							NA	NA	NA	
Venting							1,69	IE,NA	0,00	0,00
i. Oil	(Gas produced)	NA	NA	NA	NA		NA	NA	NA	
ii. Gas	(Gas produced)	NA	NA	NA	NA		NA	NA	NA	
iii. Combined		NA	NA	NA	NA		NA	NA	NA	
Flaring[8]							NA	NA	NA	
i. Oil		IE	IE	IE	IE	IE	1,69	IE,NA	0,00	0,00
ii. Gas	(Gas produced)	IE	IE	IE	IE	IE	IE	IE	IE	IE
iii. Combined	(Gas produced)	mln m^3	786,00	2148,85	1,14	0,03	IE	IE	IE	IE
1.B.2.d. Other (please specify)[9]							1,69	NA	0,00	0,00
							NA	NA	NA	NA

(1) Specify the activity data (AD) used in the description column (see examples). Specify the unit of the AD in the unit column in either energy units or volume units (e.g. PJ, 10^6 m^3 and 10^6 bbl/yr).
(2) The implied emission factors (IEFs) for carbon dioxide (CO_2) are estimated on the basis of gross emissions, i.e. CO_2 emissions + amount captured.
(3) Net CO_2 emissions after subtracting the amounts of CO_2 captured.
(4) In this table, fugitive CH_4 emissions should also be reported for the transmission/distribution of biogas. Emissions associated with the biogas production without energy production should be included in the waste sector under biological treatment of waste (CRF Table 5.B).
(5) The unit of the IEF will depend on the unit of the AD used, and is therefore not specified in this column.
(6) Use the category also to cover emissions from combined oil and gas production fields. Natural gas processing and distribution from these fields should be included under subcategories 1.B.2.b.iii and 1.B.2.b.v, respectively.
(7) If using default emission factors, these categories will include emissions from production other than venting and flaring.
(8) For emissions from flaring, this table should only be used for reporting of flaring emissions associated with oil/gas extraction and refining.
(9) For example, fugitive CO_2 emissions from production of geothermal power could be reported here.

Documentation box:
- Parties should provide detailed explanations on the fugitive emissions from category 1.B.2 Oil and Natural gas in the corresponding part of chapter 3: energy (CRF category 1.B.2) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.
- Regarding data on the amount of fuel produced entered in this table, specify in this documentation box whether the fuel amount is based on the raw material production or on the saleable production. Note cases where more than one type of AD is used to estimate emissions.
- Venting and Flaring. Parties using the IPCC software could report venting and flaring emissions together, indicating this in this documentation box.
- If estimates are reported under 1.B.2.d. Other, use this documentation box to provide information regarding activities covered under this category and to provide a reference to the section in the NIR where background information can be found.

Documentation box	pipeline and railway transport 1.B.2/2020. Emissions are accounted for in category 1?2?2 III to avoid double counting. See the explanations in the report 1.B.2/2020. Amount captured for ?2 is taken into account when calculating ?2 emissions in this category.

TABLE 1.C SECTORAL BACKGROUND DATA FOR ENERGY
CO_2 Transport and storage
(Sheet 1 of 1)

Inventory 2020

Submission 2022 v1

KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA	IMPLIED EMISSION FACTORS	EMISSIONS
	CO_2 transported or injected[1]	CO_2	CO_2[2]
	(kt)	(kg/kt)	(kt)
1. Transport of CO_2			
a. Pipelines	NO	NO	NO
b. Ships	NO	NO	NO
c. Other	NO	NO	NO
2. Injection and storage[3]	NO	NO	NO
a. Injection	NA	NA	NA
b. Storage	NA	NA	NA
3. Other	NA	NA	NA
Information item[4, 5]	NO	NO	NO
Total amount captured for storage			
Total amount of imports for storage			NA
Total A			NA
Total amount of exports for storage			NA
Total amount of CO_2 injected at storage sites			NA
Total leakage from transport, injection and storage			NA
Total B			NA
Difference (A-B)[6]			NA
			NA

[1] Excluding recycled carbon dioxide (CO_2) for enhanced recovery.

[2] Corrected for baseline background fluxes.

[3] Fugitive emissions during above-ground operations such as processing and CO_2 recycling during enhanced oil and gas recovery operations should be reported as fugitive emissions from oil and

[4] Once captured, there is no differentiated treatment between biogenic carbon and fossil carbon. Emissions and storage of both biogenic and fossil carbon will be estimated and reported.

[5] It should be checked that the mass of CO_2 captured does no exceed the mass of CO_2 stored plus the fugitive emissions (leakage) reported for the inventory year.

[6] Ideally the value should be zero (see page 5.19, volume 2 of the 2006 IPCC guidelines).

Documentation box:	
Parties should provide detailed explanations on CO2 transport and storage in the corresponding part of chapter 3: energy (CRF subsector 1.C) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.	
Documentation box	1.C/2020: This process is not carried out. Extended comment in chapter 3.5.4.1

TABLE 1.D SECTORAL BACKGROUND DATA FOR ENERGY

International aviation and international navigation (international bunkers) and multilateral operations

(Sheet 1 of 1)

Inventory 2020
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA	IMPLIED EMISSION FACTORS			EMISSIONS		
	Consumption	CO_2	CH_4	N_2O	CO_2	CH_4	N_2O
	(TJ)	(t/TJ)	(kg/TJ)		(kt)		
International aviation (aviation bunkers)	5170,71				369,71	0,00	0,01
Jet kerosene	5170,71	71,50	0,50	2,00	369,71	0,00	0,01
Aviation gasoline	NO	NO	NO	NO	NO	NO	NO
Biomass	NO	NO	NO	NO	NO	NO	NO
International navigation (marine bunkers)	144,01				10,92	0,00	0,00
Residual fuel oil	75,59	77,40	7,00	7,00	5,85	0,00	0,00
Gas/diesel oil	68,42	74,10	6,99	2,00	5,07	0,00	0,00
Gasoline	NO	NO	NO	NO	NO	NO	NO
Other liquid fuels *(please specify)*	NO				NO	NO	NO
Gaseous fuels	NO	NO	NO	NO	NO	NO	NO
Biomass	NO	NO	NO	NO	NO	NO	NO
Other fossil fuels *(please specify)* [1]	NO				NO	NO	NO
Multilateral operations [2]	NA	NA	NA	NA	NA	NA	NA

[1] Include information in the documentation box on which fuels are included and provide a reference to the section in the national inventory report (NIR) where further information is provided.
[2] Parties may choose to report or not report the activity data and implied emission factors for multilateral operations, consistent with the principle of confidentiality stated in the UNFCCC reporting

Note: In accordance with the IPCC Guidelines, international aviation and international navigation emissions from fuel sold to ships or aircraft engaged in international transport should be excluded from

Additional information

Fuel consumption	Distribution [a] (per cent)	
	Domestic	International
Aviation	23,36	76,64
Marine	22,15	77,85

[a] For calculating the allocation of fuel consumption, the sums of fuel consumption for domestic navigation and aviation (table 1.A(a)) and for international bunkers (table 1.D) are used.

Documentation Box:	
• Parties should provide detailed explanations on the fuel combustion subsector, including international aviation and international navigation, in the corresponding part of chapter 3: energy (CRF subsector • Provide in this documentation box a brief explanation of how the consumption of international aviation and international navigation fuels was estimated and separated from domestic consumption, and	
Documentation box	
Documentation box	

TABLE 2(I) SECTORAL REPORT FOR INDUSTRIAL PROCESSES AND PRODUCT USE
(Sheet 1 of 2)

Inventory 2020
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2	CH_4	N_2O	HFCs[1]	PFCs[1]	Unspecified mix of HFCs and PFCs[1]	SF_6	NF_3	NO_x	CO	NMVOC	SO_2
	(kt)			CO_2 equivalent (kt)			(kt)					
Total industrial processes	21499,55	0,46	0,66	1135,44	665,50	NO,NA	0,00	NO,NA	0,48	31,83	263,05	0,00
A. Mineral industry	8273,27								NO	NO	NO	NO
1. Cement production	4448,14											NO
2. Lime production	636,89											
3. Glass production	11,70											
4. Other process uses of carbonates	3176,54								NO	NO	NO	NO
B. Chemical industry	483,50	NO	0,66	NO	NO	NO	NO	NO	0,22	0,02	NO	0,00
1. Ammonia production	458,57	NO	NO						0,22	0,02	NO	0,00
2. Nitric acid production			0,66						NO			
3. Adipic acid production	NO		NO						NO	NO	NO	
4. Caprolactam, glyoxal and glyoxylic acid production	NO		NO									
5. Carbide production	24,93	NO							NO	NO	NO	NO
6. Titanium dioxide production	NO											
7. Soda ash production	NO											
8. Petrochemical and carbon black production	NO	NO							NO	NO	NO	NO
9. Fluorochemical production				NO	NO	NO	NO	NO				
10. Other *(as specified in table 2(I).A-H)*	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
C. Metal industry	12571,74	0,46	NO	NO	665,50	NO	NO	NO	0,27	31,81	1,07	NO,NA
1. Iron and steel production	7070,25	0,40							NA	NA	1,07	NA
2. Ferroalloys production	3794,98	0,05							NO	NO	NO	NO
3. Aluminium production	1362,45				665,50		NO		0,27	31,81	NO	NO
4. Magnesium production	NO			NO	NO	NO	NO		NO	NO	NO	NO
5. Lead production	66,57								NO	NO	NO	NO
6. Zinc production	277,49								NO	NO	NO	NO
7. Other *(as specified in table 2(I).A-H)*	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

[1] The emissions of hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), unspecified mix of HFCs and PFCs, and other fluorinated gases are to be expressed as carbon dioxide equivalent emissions. Data on disaggregated emissions of HFCs and PFCs are to be provided in table 2(II).

TABLE 2(I) SECTORAL REPORT FOR INDUSTRIAL PROCESSES AND PRODUCT USE
(Sheet 2 of 2)

Inventory 2020
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2	CH_4	N_2O	HFCs[1]	PFCs[1]	Unspecified mix of HFCs and PFCs[1]	SF_6	NF_3	NO_x	CO	NMVOC	SO_2
	(kt)			CO_2 equivalent (kt)			(kt)					
D. Non-energy products from fuels and solvent use	171,04	NO,NA	NO,NA						NO,NA	NO,NA	261,98	NO,NA
1. Lubricant use	30,49	NA	NA						NA	NA	NA	NA
2. Paraffin wax use	NA	NA	NA						NA	NA	NA	NA
3. Other	140,56	NO	NO						NO	NO	261,98	NO
E. Electronics industry				NO	NO	NO	NO	NO				
1. Integrated circuit or semiconductor				NO	NO	NO	NO	NO				
2. TFT flat panel display				NO	NO	NO	NO	NO				
3. Photovoltaics				NO	NO	NO	NO	NO				
4. Heat transfer fluid				NO	NO	NO	NO	NO				
5. Other *(as specified in table 2(II))*				NO	NO	NO	NO	NO				
F. Product uses as substitutes for ODS[2]				1135,44	NO,NA	NO,NA	NO,NA	NO,NA				
1. Refrigeration and air conditioning				1130,52								
2. Foam blowing agents				NO	NO	NO	NO	NO				
3. Fire protection				NO	NO	NO	NO	NO				
4. Aerosols				4,92	NO,NA	NO,NA	NO,NA	NO,NA				
5. Solvents				NO	NO	NO	NO	NO				
6. Other applications				NO	NO	NO	NO	NO				
G. Other product manufacture and use	NO	NO	NO,NE	NO	NO	NO	0,00	NO	NO	NO	NO	NO
1. Electrical equipment				NO	NO	NO	0,00	NO				
2. SF_6 and PFCs from other product use					NO		NO					
3. N_2O from product uses			NO,NE									
4. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
H. Other (as specified in tables 2(I).A-H and 2(II))[3]	NA	NA	NA	NO,NA	NO,NA	NA	NA	NA	NA	NA	NA	NA

(1) The emissions of hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), unspecified mix of HFCs and PFCs, and other fluorinated gases are to be expressed as carbon dioxide equivalent emissions. Data on disaggregated emissions of HFCs and PFCs are to be provided in table

(2) ODS ozone-depleting substances.

(3) Carbon dioxide (CO_2) from food and drink production (e.g. gasification of water) can be of biogenic or non-biogenic origin. Only information on CO_2 emissions of non-biogenic origin should be reported.

Documentation box:	
Parties should provide detailed explanations on the industrial processes sector in chapter 4: industrial processes (CRF sector 2) of the national inventory report (NIR). Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.	
Documentation box	artas" provided by Head of the ecology department. For other years recalculation will be made in case of data availability on the carbon balance in the period 1990-2013.

TABLE 2(I).A-H SECTORAL BACKGROUND DATA FOR INDUSTRIAL PROCESSES AND PRODUCT USE
Emissions of CO_2, CH_4 and N_2O
(Sheet 1 of 2)

Inventory 2020
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA		IMPLIED EMISSION FACTORS[2]			EMISSIONS					
	Production/Consumption quantity		CO_2	CH_4	N_2O	CO_2		CH_4		N_2O	
	Description[1]	(kt)	(kt)			Emission[3]	Recovery[4]	Emission[3]	Recovery[4]	Emission[3]	Recovery[4]
A. Mineral industry						(kt)					
1. Cement production	clinker production	8453,00	0,53			4473,27	NO				
2. Lime production	(lime production)	860,90	0,74			4448,14	NO				
3. Glass production	glass production	117,00	0,10			636,89	NO				
4. Other process uses of carbonates						11,70	NO				
a. Ceramics	production of ceramics and ceramic products	593,47	0,11			3176,54	NO				
b. Other uses of soda ash	using soda ash	147,74	0,44			65,28	NO				
c. Non-metallurgical magnesium production		NO	NO			61,31	NO				
d. Other	limestone and dolomite production	6819,46	0,45			NO	NO				
B. Chemical industry						3049,95	NO				
1. Ammonia production[5]	ammonia production	217,95	2,10	NO	NO	488,50	NO	NO	NO	0,66	NO
2. Nitric acid production	nitric acid production	285,78			0,00	458,57	NO	NO	NO	NO	NO
3. Adipic acid production		NO	NO		NO					0,66	NO
4. Caprolactam, glyoxal and glyoxylic acid production						NO	NO			NO	NO
a. Caprolactam		NO	NO		NO	NO	NO			NO	NO
b. Glyoxal		NO	NO		NO	NO	NO			NO	NO
c. Glyoxylic acid		NO	NO		NO	NO	NO			NO	NO
5. Carbide production		26,08	0,96	NO		24,93	NO	NO	NO		
a. Silicon carbide		NO	NO	NO		NO	NO	NO	NO		
b. Calcium carbide	production of calcium carbide	26,08	0,96	NO		24,93	NO	NO	NO		
6. Titanium dioxide production		NO	NO			NO	NO				
7. Soda ash production		NO	NO			NO	NO				
8. Petrochemical and carbon black production						NO	NO	NO	NO		
a. Methanol		NO	NO	NO		NO	NO	NO	NO		
b. Ethylene		NO	NO	NO		NO	NO	NO	NO		
c. Ethylene dichloride and vinyl chloride monomer		NO	NO	NO		NO	NO	NO	NO		
d. Ethylene oxide		NO	NO	NO		NO	NO	NO	NO		
e. Acrylonitrile		NO	NO	NO		NO	NO	NO	NO		
f. Carbon black		NO	NO	NO		NO	NO	NO	NO		
g. Other[6]						NO	NO	NO	NO		
10. Other (please specify)						NO	NO	NO	NO	NO	NO

(1) Where the IPCC Guidelines provide options for activity data (AD), e.g. cement production or clinker production for estimating the emissions from cement production, specify the activity data used (as shown in the example in parentheses) in order to make the choice of emission factor more transparent and to

(2) The IEFs are estimated on the basis of gross emissions as follows: IEF = (emissions plus amounts recovered, oxidized, destroyed or transformed) / AD

(3) Final emissions are to be reported (after subtracting the amounts of emission recovery, oxidation, destruction or transformation).

(4) Amounts of emission recovery, oxidation, destruction or transformation

(5) To ensure that double counting does not occur, fuel consumption (e.g. natural gas) in ammonia production should not be included in the energy sector. Should CO2 from ammonia production be recovered for downstream use and be excluded from the reporting in category 2.B.1., the products and the purposes for which the CO2 is used should be clearly explained in the NIR for the most recent inventory year. The related CO2 emissions from these products and significant uses shall be reported in the relevant source categories in the inventory if these emissions occur within the borders of the Party concerned. Parties shall provide an overview in the NIR in which other source categories of the GHG inventory CO2 emissions from significant uses of urea are reported.

(6) If data are available, Parties are encouraged to report at the disaggregated level available from the pre-defined drop-down menu. Furthermore, Parties are encouraged to the extent possible to use the pre-defined category definitions rather than to create similar categories. This ensures the highest possible degree of comparability of the reporting. If detailed data are not available, Parties should include all emissions from petrochemical and carbon black production not included in subcategories 2.B.8.a-2.B.8.f here.

TABLE 2(I).A-H SECTORAL BACKGROUND DATA FOR INDUSTRIAL PROCESSES AND PRODUCT USE
Emissions of CO_2, CH_4 and N_2O
(Sheet 2 of 2)

Inventory 2020
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA		IMPLIED EMISSION FACTORS [1]			EMISSIONS					
	Production/Consumption quantity		CO_2	CH_4	N_2O	CO_2		CH_4		N_2O	
	Description [1]	(kt)	(kt)			Emissions [2]	Recovery [3]	Emissions [2]	Recovery [3]	Emissions [2]	Recovery [3]
C. Metal industry						(kt)					
1. Iron and steel production						12571,24	NO	0,46	NO	NO	NO
a. Steel	steel production	4009,40	0,12	NO		7070,23	NO	0,40	NO		
b. Pig iron	pig iron production	1101,63	1,72	NO,NE		481,83	NO	NO	NO		
c. Direct reduced iron		NO	NO	NO		5332,07	NO	NE	NO		
d. Sinter	production of agglomerates	5391,10	0,17	0,00		NO	NO	NO	NO		
e. Pellet	pellet production	4748,32	0,06	NO		901,48	NO	0,40	NO		
f. Other *(please specify)*						294,85	NO	NO	NO		
2. Ferroalloys production	production of ferroalloys	2214,65	1,71	0,00		IE	NO	NA	NO		
3. Aluminium production	aluminum production	265,10	5,14			3794,08	NO	0,05	NO		
4. Magnesium production		NO	NO			1362,45	NO				
5. Lead production	lead production	128,01	0,52			NO	NO				
6. Zinc production	duction of zinc from wetle calcin	75,83	3,66			66,57	NO				
7. Other *(please specify)*						277,49	NO				
D. Non-energy products from fuels and solvent use						NO	NO	NO	NO	NO	NO
1. Lubricant use		51,80	6,59	NA	NA	171,04	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
2. Paraffin wax use		NA	NA	NA	NA	30,49	NA	NA	NA	NA	NA
3. Other *(please specify)* [Text]						NA	NA	NA	NA	NA	NA
G. Other product manufacture and use						140,36	NO	NO	NO	NO	NO
1. N_2O from product uses						NO	NO	NO	NO	NO,NE	NO,NE
a. Medical applications		NE			NE					NO,NE	NO,NE
b. Other [5]										NE	NE
4. Other										NO	NO
H. Other *(please specify)* [6]						NO	NO	NO	NO	NO	NO
2.H.2 Food and beverages industry		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
						NA	NA	NA	NA	NA	NA

[1] Where the IPCC Guidelines provide options for activity data (AD), e.g. cement production or clinker production for estimating the emissions from cement production, specify the activity data used (as shown in the example in parentheses) in order to make the choice of emission factor more transparent and to

[2] The IEFs are estimated on the basis of gross emissions as follows: IEF = (emissions + amounts recovered, oxidized, destroyed or transformed) / AD.

[3] Final emissions are to be reported (after subtracting the amounts of emission recovery, oxidation, destruction or transformation).

[4] Amounts of emission recovery, oxidation, destruction or transformation.

[5] If data are available, Parties are encouraged to report at the disaggregated level available from the pre-defined drop-down menu. Furthermore, Parties are encouraged to the extent possible to use the pre-defined category definitions rather than to create similar categories. This ensures the highest possible degree of comparability of the reporting. If detailed data are not available, Parties should include all emissions from non-energy products from fuels and solvent use not included in subcategories 2.D.1-2.D.2 here.

[6] Emissions from urea used as a catalyst should be reported here.

[7] If data are available, Parties are encouraged to report at the disaggregated level available from the pre-defined drop-down menu. Furthermore, Parties are encouraged to the extent possible to use the pre-defined category definitions rather than to create similar categories. This ensures the highest possible degree of comparability of the reporting. If detailed data are not available, Parties should include all emissions from N2O from product uses not included in subcategory G.3.a here.

[8] If data are available, Parties are encouraged to report at the disaggregated level available from the pre-defined drop-down menu. Furthermore, Parties are encouraged to the extent possible to use the pre-defined category definitions rather than to create similar categories. This ensures the highest possible degree of comparability of the reporting. If detailed data are not available Parties should include all emissions from industrial processes not included in subcategories 2.A-2.G here.

Documentation Box:
• Parties should provide detailed explanations on the industrial processes sector in chapter 4: industrial processes (CRF sector 2) of the national inventory report (NIR). Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.
• In relation to metal production, more specific information (e.g. data on virgin and recycled steel production) could be provided in the documentation box, or in the NIR, together with a reference to the relevant section of the NIR.
• Confidentiality: Where only aggregate figures for activity data are provided, e.g. due to reasons of confidentiality, a note indicating this should be provided in this documentation box.
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Documentation box	the company of JSC "ArcelorMittal Steel Temirtau" provided by Head of the ecology department. For other years recalculation will be made in case of data availability on the carbon balance in the period 1990-2011
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TABLE 3(II) SECTORAL REPORT FOR INDUSTRIAL PROCESSES AND PRODUCT USE – EMISSIONS OF HFCs, PFCs, SF_6 AND NF3
(Sheet 1 of 1)

[illegible]

GHG SOURCE AND SINK CATEGORIES	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	(t)																																									
Total actual emissions of halocarbons (by chemical) and SF_6																																										
A. Chemical industry																																										
1. Manufacture of production																																										
2. Product processing																																										
Fugitive emissions																																										
3. Other																																										
C. Metal industry																																										
1. Aluminum production																																										
2. Magnesium production																																										
3. Other																																										
D. Electronics industry																																										
1. Integrated circuit or semiconductor																																										
2. TFT flat panel display																																										
3. Photovoltaics																																										
4. Heat transfer fluid																																										
5. Other (as specified in table 2(II))																																										
E. Product uses as substitutes for ODS[a]																																										
1. Refrigeration and air conditioning																																										
2. Foam blowing agents																																										
3. Fire protection																																										
4. Aerosols																																										
5. Solvents																																										
6. Other applications																																										
G. Other product manufacture and use																																										
1. Electrical equipment																																										
2. SF_6 and PFCs from other product use																																										
3. Other																																										
H. Other (please specify)																																										
2.H.1. Food and beverage industry																																										
Total emissions[b]																																										

[illegible]

Documentation box:
Parties should provide detailed explanations on the industrial processes sector in chapter 4, industrial processes, CRF sector 2 of the NIR. Use the documentation box to provide references to relevant sections of the NIR if no additional information and/or further details are needed to understand the content of the table.
If estimates are reported under 2.H.1 Other, use this documentation box to provide information regarding activities covered under this category and to provide a reference to the section of the NIR where background information can be found.

Documentation box	
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[illegible]	
[illegible]	
[illegible]	

TABLE 2(II).B-H SECTORAL BACKGROUND DATA FOR INDUSTRIAL PROCESSES AND PRODUCT USE

Sources of fluorinated substances

(Sheet 1 of 2)

Inventory 2020

Submission 2022 v1

KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Gas (please specify) One row per substance	ACTIVITY DATA		IMPLIED EMISSION FACTORS[1]	EMISSIONS	
		Description	(t)	(kg/t)	Emissions[2] (t)	Recovery[3] (t)
B. Chemical industry						
9. Fluorochemical production						
By-product emissions						
Production of HCFC-22						
HFC-23	HFC-23	Production of HCFC-22				
HFC-32	HFC-32	Production of HCFC-22	NO	NO	NO	NO
HFC-41	HFC-41	Production of HCFC-22	NO	NO	NO	NO
HFC-43-10mee	HFC-43-10mee	Production of HCFC-22	NO	NO	NO	NO
HFC-125	HFC-125	Production of HCFC-22	NO	NO	NO	NO
HFC-134	HFC-134	Production of HCFC-22	NO	NO	NO	NO
HFC-134a	HFC-134a	Production of HCFC-22	NO	NO	NO	NO
HFC-143	HFC-143	Production of HCFC-22	NO	NO	NO	NO
HFC-143a	HFC-143a	Production of HCFC-22	NO	NO	NO	NO
HFC-152	HFC-152	Production of HCFC-22	NO	NO	NO	NO
HFC-152a	HFC-152a	Production of HCFC-22	NO	NO	NO	NO
HFC-161	HFC-161	Production of HCFC-22	NO	NO	NO	NO
HFC-227ea	HFC-227ea	Production of HCFC-22	NO	NO	NO	NO
HFC-236cb	HFC-236cb	Production of HCFC-22	NO	NO	NO	NO
HFC-236ea	HFC-236ea	Production of HCFC-22	NO	NO	NO	NO
HFC-236fa	HFC-236fa	Production of HCFC-22	NO	NO	NO	NO
HFC-245ca	HFC-245ca	Production of HCFC-22	NO	NO	NO	NO
HFC-245fa	HFC-245fa	Production of HCFC-22	NO	NO	NO	NO
HFC-365mfc	HFC-365mfc	Production of HCFC-22	NO	NO	NO	NO
Unspecified mix of HFCs	Unspecified mix of HFCs	Production of HCFC-22	NO	NO	NO	NO
CF4	CF4	Production of HCFC-22	NO	NO	NO	NO
C2F6	C2F6	Production of HCFC-22	NO	NO	NO	NO
C3F8	C3F8	Production of HCFC-22	NO	NO	NO	NO
C4F10	C4F10	Production of HCFC-22	NO	NO	NO	NO
c-C4F8	c-C4F8	Production of HCFC-22	NO	NO	NO	NO
C5F12	C5F12	Production of HCFC-22	NO	NO	NO	NO
C6F14	C6F14	Production of HCFC-22	NO	NO	NO	NO
C10F18	C10F18	Production of HCFC-22	NO	NO	NO	NO
c-C3F6	c-C3F6	Production of HCFC-22	NO	NO	NO	NO
Unspecified mix of PFCs	Unspecified mix of PFCs	Production of HCFC-22	NO	NO	NO	NO
Unspecified mix of HFCs and PFCs	fied mix of HFCs and PFCs	Production of HCFC-22	NO	NO	NO	NO
SF6	SF6	Production of HCFC-22	NO	NO	NO	NO
NF3	NF3	Production of HCFC-22	NO	NO	NO	NO
Other *(please specify - one row per substance)*		Production				
Fugitive emissions[4]						
Production of HFC-134a		Production of HFC-134a				
Unspecified mix of HFCs	Unspecified mix of HFCs	Production of HFC-134a	NO	NO	NO	NO
Unspecified mix of PFCs	Unspecified mix of PFCs	Production of HFC-134a	NO	NO	NO	NO
Unspecified mix of HFCs and PFCs	fied mix of HFCs and PFCs	Production of HFC-134a	NO	NO	NO	NO

SF6	SF6	Production of HFC-134a	NO	NO	NO	NO
NF3	NF3	Production of HFC-134a	NO	NO	NO	NO
Production of SF_6		Production of SF6				
Unspecified mix of HFCs	Unspecified mix of HFCs	Production of SF6	NO	NO	NO	NO
Unspecified mix of PFCs	Unspecified mix of PFCs	Production of SF6	NO	NO	NO	NO
Unspecified mix of HFCs and PFCs	fied mix of HFCs and PFCs	Production of SF6	NO	NO	NO	NO
SF6	SF6	Production of SF6	NO	NO	NO	NO
NF3	NF3	Production of SF6	NO	NO	NO	NO
Other *(please specify - one row per substance)*		Production				
C. Metal production						
3. Production of aluminium						
By-product emissions		Production of primary aluminium				
CF4	CF4	Production of primary aluminium	265103,00	0,28	75,06	NO
C2F6	C2F6	Production of primary aluminium	265103,00	0,03	9,08	NO
C3F8	C3F8	Production of primary aluminium	NO	NO	NO	NO
C4F10	C4F10	Production of primary aluminium	NO	NO	NO	NO
c-C4F8	c-C4F8	Production of primary aluminium	NO	NO	NO	NO
C5F12	C5F12	Production of primary aluminium	NO	NO	NO	NO
C6F14	C6F14	Production of primary aluminium	NO	NO	NO	NO
C10F18	C10F18	Production of primary aluminium	NO	NO	NO	NO
c-C3F6	c-C3F6	Production of primary aluminium	NO	NO	NO	NO
Unspecified mix of PFCs	Unspecified mix of PFCs	Production of primary aluminium	NO	NO	NO	NO
Unspecified mix of HFCs and PFCs	fied mix of HFCs and PFCs	Production of primary aluminium	NO	NO	NO	NO
SF6	SF6	Production of primary aluminium	NO	NO	NO	NO
F-gases used in foundries[(5)]		Amount of aluminium casted				
Unspecified mix of PFCs	Unspecified mix of PFCs	Amount of aluminium casted	NO	NO	NO	NO
Unspecified mix of HFCs and PFCs	fied mix of HFCs and PFCs	Amount of aluminium casted	NO	NO	NO	NO
SF6	SF6	Amount of aluminium casted	NO	NO	NO	NO
4. Magnesium production[(6)]		Amount of magnesium casted				
Unspecified mix of HFCs	Unspecified mix of HFCs	Amount of magnesium casted	NO	NO	NO	NO
Unspecified mix of PFCs	Unspecified mix of PFCs	Amount of magnesium casted	NO	NO	NO	NO
Unspecified mix of HFCs and PFCs	fied mix of HFCs and PFCs	Amount of magnesium casted	NO	NO	NO	NO
SF6	SF6	Amount of magnesium casted	NO	NO	NO	NO
7. Other *(please specify - one row per substance)*						
E. Electronics industry[(7)]						
1. Integrated circuit or semiconductor		Consumption				
Unspecified mix of HFCs	Unspecified mix of HFCs	Consumption	NO	NO	NO	NO
Unspecified mix of PFCs	Unspecified mix of PFCs	Consumption	NO	NO	NO	NO
Unspecified mix of HFCs and PFCs	fied mix of HFCs and PFCs	Consumption	NO	NO	NO	NO
SF6	SF6	Consumption	NO	NO	NO	NO
NF3	NF3	Consumption	NO	NO	NO	NO
2. TFT flat panel display		Consumption				
Unspecified mix of HFCs	Unspecified mix of HFCs	Consumption	NO	NO	NO	NO
Unspecified mix of PFCs	Unspecified mix of PFCs	Consumption	NO	NO	NO	NO
Unspecified mix of HFCs and PFCs	fied mix of HFCs and PFCs	Consumption	NO	NO	NO	NO
SF6	SF6	Consumption	NO	NO	NO	NO
NF3	NF3	Consumption	NO	NO	NO	NO
3. Photovoltaics		Consumption				
Unspecified mix of HFCs	Unspecified mix of HFCs	Consumption	NO	NO	NO	NO
Unspecified mix of PFCs	Unspecified mix of PFCs	Consumption	NO	NO	NO	NO
Unspecified mix of HFCs and PFCs	fied mix of HFCs and PFCs	Consumption	NO	NO	NO	NO
SF6	SF6	Consumption	NO	NO	NO	NO

NF3	NF3	Consumption	NO	NO	NO	NO
4. Heat transfer fluid		Consumption				
Unspecified mix of HFCs	Unspecified mix of HFCs	Consumption	NO	NO	NO	NO
Unspecified mix of PFCs	Unspecified mix of PFCs	Consumption	NO	NO	NO	NO
Unspecified mix of HFCs and PFCs	fied mix of HFCs and PFCs	Consumption	NO	NO	NO	NO
SF6	SF6	Consumption	NO	NO	NO	NO
NF3	NF3	Consumption	NO	NO	NO	NO
5. Other *(please specify - one row per substance)* [8]		Consumption				

Note: All footnotes for this table are given at the end of the table on sheet 2.

TABLE 2(II).B-H SECTORAL BACKGROUND DATA FOR INDUSTRIAL PROCESSES AND PRODUCT USE
Sources of fluorinated substances
(Sheet 2 of 2)

Inventory 2020
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Gas (please specify)	ACTIVITY DATA			IMPLIED EMISSION FACTORS[1]			EMISSIONS[2]			
		Amount									
	One row per substance	Filled into new manufactured products	In operating systems (average annual stocks)	Remaining in products at decommissioning	Product manufacturing factor	Product life factor	Disposal loss factor	From manufacturing	From stocks	From disposal	Recovery[3]
		(t)			%			(t)			
F. Product uses as substitutes for ODS											
1. Refrigeration and airconditioning											
Commercial refrigeration											
HFC-125	HFC-125	NO	NO	NO	NO	NO	NO	NO	6,57	NO	NO
HFC-134a	HFC-134a	NO	NO	NO	NO	NO	NO	NO	28,30	NO	NO
HFC-143a	HFC-143a	NO	NO	NO	NO	NO	NO	NO	7,53	NO	NO
Domestic refrigeration											
HFC-32	HFC-32	NO	NO	NO	NO	NO	NO	NO	32,62	NO	NO
HFC-125	HFC-125	NO	NO	NO	NO	NO	NO	NO	36,85	NO	NO
HFC-134a	HFC-134a	NO	NO	NO	NO	NO	NO	NO	21,18	NO	NO
HFC-143a	HFC-143a	NO	NO	NO	NO	NO	NO	NO	5,02	NO	NO
Industrial refrigeration											
HFC-32	HFC-32	NO	NO	NO	NO	NO	NO	NO	24,45	NO	NO
HFC-125	HFC-125	NO	NO	NO	NO	NO	NO	NO	60,56	NO	NO
HFC-134a	HFC-134a	NO	NO	NO	NO	NO	NO	NO	3,28	NO	NO
HFC-143a	HFC-143a	NO	NO	NO	NO	NO	NO	NO	42,68	NO	NO
Transport refrigeration											
HFC-125	HFC-125	NO	NO	NO	NO	NO	NO	NO	1,55	NO	NO
HFC-134a	HFC-134a	NO	NO	NO	NO	NO	NO	NO	1,49	NO	NO
HFC-143a	HFC-143a	NO	NO	NO	NO	NO	NO	NO	1,83	NO	NO
Mobile air-conditioning											
HFC-134a	HFC-134a	NO	NO	NO	NO	NO	NO	NO	12,31	NO	NO
Stationary air-conditioning											
HFC-32	HFC-32	NO	NO	NO	NO	NO	NO	NO	36,68	NO	NO
HFC-125	HFC-125	NO	NO	NO	NO	NO	NO	NO	81,17	NO	NO
HFC-134a	HFC-134a	NO	NO	NO	NO	NO	NO	NO	21,37	NO	NO
HFC-143a	HFC-143a	NO	NO	NO	NO	NO	NO	NO	7,53	NO	NO
2. Foam blowing agents											
Closed cells											
Unspecified mix of HFCs	Unspecified mix of HFCs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Unspecified mix of PFCs	Unspecified mix of PFCs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Unspecified mix of HFCs and PFCs	fied mix of HFCs and PFCs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
SF6	SF6	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
NF3	NF3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Open cells											
Unspecified mix of HFCs	Unspecified mix of HFCs	NO	NO		NO	NO		NO	NO		NO
Unspecified mix of PFCs	Unspecified mix of PFCs	NO	NO		NO	NO		NO	NO		NO
Unspecified mix of HFCs and PFCs	fied mix of HFCs and PFCs	NO	NO		NO	NO		NO	NO		NO
SF6	SF6	NO	NO		NO	NO		NO	NO		NO
NF3	NF3	NO	NO		NO	NO		NO	NO		NO
3. Fire protection											
Unspecified mix of HFCs	Unspecified mix of HFCs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Unspecified mix of PFCs	Unspecified mix of PFCs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Unspecified mix of HFCs and PFCs	fied mix of HFCs and PFCs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
SF6	SF6	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
NF3	NF3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
4. Aerosols											
Metered dose inhalers											
HFC-134a	HFC-134a	NO	NO		NO	NO		NO	3,44		NO
Unspecified mix of HFCs	Unspecified mix of HFCs	NA	NA		NA	NA		NA	NA		NA
Unspecified mix of PFCs	Unspecified mix of PFCs	NA	NA		NA	NA		NA	NA		NA

Unspecified mix of HFCs and PFCs	fied mix of HFCs and PFCs	NA	NA		NA	NA		NA	NA		NA
SF6	SF6	NA	NA		NA	NA		NA	NA		NA
NF3	NF3	NA	NA		NA	NA		NA	NA		NA
Other (please specify - one row per substance)											
5. Solvents											
Unspecified mix of HFCs	Unspecified mix of HFCs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Unspecified mix of PFCs	Unspecified mix of PFCs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Unspecified mix of HFCs and PFCs	fied mix of HFCs and PFCs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
SF6	SF6	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
NF3	NF3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6. Other applications[19]											
Emissive											
Unspecified mix of HFCs	Unspecified mix of HFCs	NO	NO		NO	NO		NO	NO		NO
Unspecified mix of PFCs	Unspecified mix of PFCs	NO	NO		NO	NO		NO	NO		NO
Unspecified mix of HFCs and PFCs	fied mix of HFCs and PFCs	NO	NO		NO	NO		NO	NO		NO
SF6	SF6	NO	NO		NO	NO		NO	NO		NO
NF3	NF3	NO	NO		NO	NO		NO	NO		NO
Contained											
Unspecified mix of HFCs	Unspecified mix of HFCs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Unspecified mix of PFCs	Unspecified mix of PFCs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Unspecified mix of HFCs and PFCs	fied mix of HFCs and PFCs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
SF6	SF6	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
NF3	NF3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
G. Other product manufacture and use											
1. Electrical equipment[20]											
Unspecified mix of HFCs	Unspecified mix of HFCs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Unspecified mix of PFCs	Unspecified mix of PFCs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Unspecified mix of HFCs and PFCs	fied mix of HFCs and PFCs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
SF6	SF6	NO	50,54	NO	NO	0,20	NO	NO	0,10	NO	NO
NF3	NF3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2. SF_6 and PFCs from other product use[21]											
Military applications											
Unspecified mix of PFCs	Unspecified mix of PFCs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
SF6	SF6	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Accelerators											
CF4	CF4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
C2F6	C2F6	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
C3F8	C3F8	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
C4F10	C4F10	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
c-C4F8	c-C4F8	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
C5F12	C5F12	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
C6F14	C6F14	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
C10F18	C10F18	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
c-C3F6	c-C3F6	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Unspecified mix of PFCs	Unspecified mix of PFCs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
SF6	SF6	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Soundproof windows											
Adiabatic properties, shoes and tyres											
Other (please specify - one row per substance)											
4. Other											
H. Other *(please specify) (one row per activity/substance)*											
2.H.2 Food and beverages industry											
HFC-23	HFC-23	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
HFC-32	HFC-32	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
HFC-41	HFC-41	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
HFC-43-10mee	HFC-43-10mee	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
HFC-125	HFC-125	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
HFC-134	HFC-134	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
HFC-134a	HFC-134a	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
HFC-143	HFC-143	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
HFC-143a	HFC-143a	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
HFC-152	HFC-152	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
HFC-152a	HFC-152a	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
HFC-161	HFC-161	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
HFC-227ea	HFC-227ea	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

HFC-236cb	HFC-236cb	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
HFC-236ea	HFC-236ea	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
HFC-236fa	HFC-236fa	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
HFC-245ca	HFC-245ca	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
HFC-245fa	HFC-245fa	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
HFC-365mfc	HFC-365mfc	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Unspecified mix of HFCs	Unspecified mix of HFCs	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CF4	CF4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
C2F6	C2F6	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
C3F8	C3F8	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
C4F10	C4F10	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
c-C4F8	c-C4F8	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
C5F12	C5F12	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
C6F14	C6F14	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
C10F18	C10F18	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
c-C3F6	c-C3F6	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Unspecified mix of PFCs	Unspecified mix of PFCs	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Unspecified mix of HFCs and PFCs	fied mix of HFCs and PFCs	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SF6	SF6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NF3	NF3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

NOTE: In the case of prompt emissions (such as from aerosols, open cells, and some of the solvents), the consumption in the same year should be reported as consumption in new manufactured products and consumption in the previous year - as in operational stock. Use column for emissions from manufacturing to also report installation emissions. Use the column for emissions from stock to report emissions from use, leakage, servicing and maintenance. Disposal emissions could also include emissions from recycling and destruction.

(i) The implied emission factors (IEFs) are estimated on the basis of gross emissions as follows: IEF = emissions / activity data (AD).

(ii) Final emissions are to be reported (after subtracting the amounts of emission recovery, oxidation, destruction or transformation).

(iii) Amounts of emission recovery, oxidation, destruction or transformation, including from disposal emissions, where applicable.

(iv) Fugitive emissions include emissions from fluorinated gas (F-gas) production. Some of the possible activities include the telomerization process used in the production of fluorochemicals fluids and polymers, photo oxidation of tetrafluoroethylene to make fluorochemical fluids, sulphur hexafluoride (SF_6) production, halogen exchange processes to make low-boiling PFCs like C_3F_8 and CF_4, HFC 134a and 245fa, NF_3 manufacturing, and production of uranium hexafluoride, of fluorinated monomers (e.g. tetrafluoroethylene and hexafluoropropylene), and of fluorochemical agrochemicals and/or anesthetics. Both

(v) According to the 2006 IPCC Guidelines possible SF_6 from casting are to be included under Mg production. However, in the current CRF a separate subcategory exists and is reported by Parties.

(vi) Include emissions from cover gases and generated secondary compounds in the Mg foundries.

(vii) Include data for the consumption of the F-gases in the process, i.e. use (filling) during manufacture. The emissions include evaporative losses and by-product emissions. In the case of by-product emissions, include a separate row and include the information on the relevant AD in the documentation box of

(viii) Could include emissions from micro-electromechanical systems, hard disk drive manufacturing, device testing, and vapour phase reflow soldering.

(ix) Emissions may include HFCs and PFCs used in sterilization equipment, for tobacco expansion applications, as solvents in the manufacture of adhesives, coating and inks.

(x) Include data on electrical switchgear gas, gas circuit breakers, high voltage gas-insulated lines, outdoor gas-insulated instrument transformers and other equipment. Emissions and AD from equipment installation onsite should be reported under manufacturing for equipment installed within the country (also if

(xi) Category includes SF_6 and PFCs used in military applications (e.g. in airborne radar systems and heat transfer fluids in high-powered electronic applications), SF_6 used in university and research, and PFCs used as heat transfer fluids in commercial and consumer applications, used in cosmetics and in medical

Documentation box:	
• Parties should provide detailed explanations on the industrial processes sector in chapter 4: industrial processes (CRF sector 2) of the national inventory report (NIR). Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table. • Where only aggregate figures for activity data are provided, e.g. due to reasons of confidentiality (see footnote 1 to table 2(II)), a note indicating this should be provided in this documentation box. • Where applying tier 2 and country-specific methods, specify any other relevant activity data used in this documentation box, including a reference to the section of the NIR where more detailed information can be found. • Use this documentation box for providing clarification on emission recovery, oxidation, destruction and/or transformation, and provide a reference to the section of the NIR where more detailed information can be found.	
Documentation box	
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TABLE 3 SECTORAL REPORT FOR AGRICULTURE
(Sheet 1 of 2)

Inventory 2020
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2	CH_4	N_2O	NO_x	CO	NMVOC
	(kt)					
3. Total agriculture	3,67	929,85	58,68	14,39	NO	126,85
I. Livestock		907,95	9,16			107,43
A. Enteric fermentation		874,14				
1. Cattle[1]		652,65				
Option A:						
Dairy cattle		409,44				
Non-dairy cattle		243,21				
Option B:						
Mature dairy cattle						
Other mature cattle						
Growing cattle						
Option C (country-specific):						
Other (as specified in table 3(I).A)						
2. Sheep		138,84				
3. Swine		1,02				
4. Other livestock		81,63				
Buffalo		0,57				
Camels		10,47				
Goats		13,77				
Horses		56,52				
Mules and Asses		0,30				
Other (please specify)		NO				
B. Manure management		33,81	9,16			107,43
1. Cattle[1]		23,17	4,89			85,21
Option A:						
Dairy cattle		18,56	2,64			52,08
Non-dairy cattle		4,61	2,21			29,13
Option B:						
Mature dairy cattle						
Other mature cattle						
Growing cattle						
Option C (country-specific):						
Other (as specified in table 3(I).B)						
2. Sheep		2,04	0,88			3,46
3. Swine		4,08	0,58			0,56
4. Other livestock		4,52	1,43			22,20
Buffalo		0,05	0,01			0,04
Camels		0,29	NO			0,06
Goats		0,30	0,18			1,49
Horses		3,42	0,46			13,42
Mules and Asses		0,02	0,01			0,04
Poultry		0,43	0,74			7,15
Other (please specify)		0,01	0,03			NE
Rabbit		0,01	0,03			NE
5. Indirect N_2O emissions			1,38			

Note: All footnotes for this table are given at the end of the table on sheet 2.

TABLE 3 SECTORAL REPORT FOR AGRICULTURE
(Sheet 2 of 2)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2	CH_4	N_2O	NO_x	CO	NMVOC
	(kt)					
C. Rice cultivation						
D. Agricultural soils[(2)(3)(4)]		71,49				
E. Prescribed burning of savannas		NO	49,52	34,39	NO	NO
F. Field burning of agricultural residues		NO	NO	NO	NO	19,42
G. Liming		NO	NO	NO	NO	NO
H. Urea application	NO					NO
I. Other carbon-containing fertilizers	1,63					
J. Other (please specify)	NO					
	NO	NO	NO	NO	NO	NO

(1) The sum for cattle would be calculated on the basis of entries made under either option A (dairy and non-dairy cattle), option B (mature dairy cattle, other mature cattle and growing cattle) or option C (other disaggregation of cattle categories).

(2) Categories reported under "Agricultural soils" are those reported under table 3.D.

(3) Direct nitrous oxide (N_2O) emissions generated by manure in the system "Pasture, range and paddock" are to be reported under the category "Direct N_2O emissions from managed soils". See also section 10.5 of Volume 4 of the 2006 IPCC Guidelines.

(4) Indirect N_2O emissions generated by manure in the system "Pasture, range and paddock" are to be reported under the category "Indirect N_2O emissions from managed soils". See also section 10.5 of Volume 4 of the 2006 IPCC Guidelines.

Note: The 2006 IPCC Guidelines do not provide methodologies for the calculation of methane (CH_4) emissions and CH_4 and N_2O removals from agricultural soils, or carbon dioxide (CO_2) emissions from prescribed burning of savannas and field burning of agricultural residues. Parties that have estimated such emissions should provide, in the national inventory report (NIR), additional information (activity data and emission factors) used to derive these estimates and include a reference to the section of the NIR in the documentation box of the corresponding Sectoral background data tables.

Documentation box:	
- Parties should provide detailed explanations on the agriculture sector in chapter 5 Agriculture (CRF sector 3) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.	
- If emissions are reported under category 3.H) 6 Other, use this documentation box to provide information regarding activities covered under this category and to provide reference to the section in the NIR where background information can be found.	
Documentation box	***: Average annual population of livestock was used, explanation is shown in section 5.5 of the NIR3 A.4 Goats Goats. Average annual population of livestock was used, explanation is shown in section 5.5 of the NIR

TABLE 3.A SECTORAL BACKGROUND DATA FOR AGRICULTURE

Enteric Fermentation

(Sheet 1 of 2)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA AND OTHER RELATED INFORMATION			IMPLIED EMISSION FACTORS	EMISSIONS
	Population size[1] (1000s)	Average gross energy intake (GE) (MJ/head/day)	Average CH_4 conversion rate (Y_m)[2] (%)	CH_4 (kg CH_4/head/yr)	CH_4 (kt)
1. Cattle	8668,34			75,29	652,65
Option A:					
Dairy cattle[3]	4008,27	239,62	6,50	102,15	409,44
Non-dairy cattle	4660,07	122,42	6,50	52,19	243,21
Option B:					
Mature dairy cattle					
Other mature cattle					
Growing cattle					
Option C (country-specific[4]):					
Other *(please specify)*					
2. Sheep	20447,54			6,79	138,84
Other *(please specify)*	20447,54			6,79	138,84
Sheep	20447,54	23,01	6,50	6,79	138,84
3. Swine	1020,92			1,00	1,02
Other *(please specify)*	1020,92			1,00	1,02
Swine	1020,92	NE	NE	1,00	1,02
4. Other livestock[5]	6160,90			13,25	81,63
Buffalo	10,39	NE	NE	54,85	0,57
Camels	227,70	NE	NE	45,98	10,47
Goats	2753,41	NE	NE	5,00	13,77
Horses	3139,83	NE	NE	18,00	56,52
Mules and Asses	29,56	NE	NE	10,15	0,30
Other (please specify)	NO			NO	NO

[1] Parties are encouraged to provide detailed livestock population data by animal type and region, if available, in the national inventory report (NIR), and provide in the documentation box below a reference to the relevant section. Parties should use the same animal

[2] Y_m refers to the fraction of gross energy in feed converted to CH_4 and should be given in per cent in this table.

[3] Including data on dairy heifers, if available.

[4] Option C should be used when Parties want to report a more disaggregate livestock categorization compared with option A and option B.

[5] If data are available, Parties are encouraged to report at the disaggregated level available from the pre-defined drop-down menu. Furthermore, Parties are encouraged to the extent possible to use the pre-defined category definitions rather than to create similar categories. This ensures the highest possible degree of comparability of the reporting. If detailed data are not available, Parties should include all emissions from other livestock not included in subcategories 3.A.1-3.A.3 under other (please specify).

[6] This could include fox and raccoon and mink and polecat.

Documentation box:

- Parties should provide detailed explanations on the agriculture sector, including information from the additional information box, in chapter 5: Agriculture (CRF sector 3) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.
- Provide a reference to the relevant section in the NIR, in particular with regard to:
  (a) Disaggregation of livestock population (e.g. according to the classification recommended in the 2006 IPCC guidelines;
  (b) Parameters relevant to the application of the 2006 IPCC Guidelines.

Documentation box	is shown in section 5.5 of the NIR3.A.4 Goats Goats: Average annual population of livestock was used, explanation is shown in section 5.5 of the NIR

TABLE 3.A SECTORAL BACKGROUND DATA FOR AGRICULTURE
Enteric Fermentation
(Sheet 2 of 2)

Inventory 2010
Submission 2012 v1
Kazakhstan

Additional information - units for those livestock types for which tier 2 was used: **

Disaggregation for of indicator * / Indicators		Dairy Cattle	Non-Dairy Cattle	Growing Cattle	Mature Dairy Cattle	Other Mature Cattle	Other Cattle	Other Sheep	Camels	Other Camels	Mules	Other Mules	Buffalo	Llamas	Goats	Horses	Mules and Asses	Other (please specify)
Weight	kg	[illegible]	[illegible]						[illegible]		[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
Growing Duration **		[illegible]	[illegible]						[illegible]		[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
Milk yield	kg/head	[illegible]	[illegible]						[illegible]		[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
Work	h/day	[illegible]	[illegible]						[illegible]		[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
Pregnant	%	[illegible]	[illegible]						[illegible]		[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
Organic excretion of dung	kg	[illegible]	[illegible]						[illegible]		[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
Dung energy	GJ/head	[illegible]	[illegible]						[illegible]		[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	

* See the tables 3.4.1, 3.4.2 and 3.4.3 of volume 4 of the 2006 IPCC Guidelines. These data are relevant if Tiers do not have data on average feed intake.
** Disaggregate to the split actually used. Add columns to the table if necessary.
*** For cattle, buffalo and sheep specify feeding situation in accordance with table 10.5 of volume 4 of the 2006 IPCC Guidelines.

TABLE 3.B(a) SECTORAL BACKGROUND DATA FOR AGRICULTURE
CH_4 Emissions from Manure Management
(Sheet 1 of 2)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA AND OTHER RELATED INFORMATION							IMPLIED EMISSION FACTORS	EMISSIONS
	Population size	Allocation by climate region[1]			Typical animal mass (average)	VS[2] daily excretion (average)	CH_4 producing potential (Bo)[2] (average)	CH_4	CH_4
		Cool	Temperate	Warm					
	(1000s)	(%)			(kg)	(kg dm/head/day)	(m^3 CH_4/kg VS)	(kg CH_4/head/yr)	(kt)
1. Cattle	8668,54							2,67	23,17
Option A:									
Dairy cattle[3]	4008,27	100,00	NO	NO	475,00	5,26	0,24	4,63	18,56
Non-dairy cattle	4660,07	100,00	NO	NO	338,00	2,69	0,10	0,99	4,61
Option B:									
Mature dairy cattle									
Other mature cattle									
Growing cattle									
Option C (country-specific)[4]:									
Other (please specify)									
2. Sheep	20447,54							0,10	2,04
Other (please specify)	20447,54							0,10	2,04
Sheep	20447,54	100,00	NO	NO	38,00	NE	NE	0,10	2,04
3. Swine	1020,92							4,00	4,08
Other (please specify)	1020,92							4,00	4,08
Swine	1020,92	100,00	NO	NO	96,00	NE	NE	4,00	4,08
4. Other livestock[5]	49599,50							0,09	4,52
Buffalo	10,39	100,00	NO	NO	380,00	NE	NE	5,00	0,05
Camels	227,30	100,00	NO	NO	217,00	NE	NE	1,27	0,29
Goats	2753,41	100,00	NO	NO	38,00	NE	NE	0,11	0,30
Horses	3139,83	100,00	NO	NO	238,00	NE	NE	1,09	3,42
Mules and Asses	29,56	100,00	NO	NO	130,00	NE	NE	0,68	0,02
Poultry	43335,00	100,00	NO	NO	1,80	NE	NE	0,01	0,43
Other (please specify)	NO							0,08	0,01
Rabbit	103,61	100,00	NO	NO	NE	NE	NE	0,08	0,01

[1] Climate regions are defined in terms of annual average temperature as follows: cool = less than 15 °C, temperate = 15–25 °C inclusive, and warm = greater than 25 °C (see table 10.17 of chapter 10, volume 4 of the 2006 IPCC Guidelines).

[2] VS = volatile solids. Bo = maximum methane producing capacity for manure (see 10.42 and 10.43 of chapter 10, volume 4 of the 2006 IPCC Guidelines), dm = dry matter. Provide average values for VS and Bo where original calculations were made at a more disaggregated level of these livestock categories.

[3] Including data on dairy heifers, if available.

[4] Option C should be used when Parties want to report a more disaggregated livestock categorization compared with option A and option B.

[5] If data are available, Parties are encouraged to report at the disaggregated level available from the pre-defined drop-down menu. Furthermore, Parties are encouraged to the extent possible to use the pre-defined category definitions rather than to create similar categories. This ensures the highest possible degree of comparability of the reporting. If detailed data are not available, Parties should include all emissions from other livestock not included in subcategories 3.B.1-3.B.3 under other (please specify).

[6] This could include fox and raccoon and mink and polecat.

Documentation box:

• Parties should provide detailed explanations on the agriculture sector in chapter 5: Agriculture (UNF sector 4) of the national inventory report (NIR). Use the documentation box to provide references to relevant sections of the NIR if any additional information and further details are needed to understand the content of this table. • Provide a reference to the relevant section in the NIR, in particular with regard to: (a) Disaggregation of livestock population (e.g. according to the classification recommended in the 2006 IPCC Guidelines); (b) Parameters relevant to the application of the 2006 IPCC Guidelines; (c) Information on how the MCFs are derived, if relevant data could not be provided in the additional information box.	
Documentation box	

TABLE 3.B(a) SECTORAL BACKGROUND DATA FOR AGRICULTURE
CH_4 Emissions from Manure Management
(Sheet 2 of 2)

Additional information (for Tier 2) [a]

Animal category		Indicator	Climate region	Manure Management Systems [b]								
				Anaerobic lagoon	Liquid system	Daily spread	Solid storage and dry lot	Pasture, range, and paddock	Composting	Digesters	Burned for fuel or as waste	Other
Option A	Dairy cattle	Allocation (%)	Cool	NO	NO	NO	35,00	65,00	NO	NO	NO	NO
			Temperate	NO	NO	NO	NO	NO	NO	NO	NO	NO
			Warm	NO	NO	NO	NO	NO	NO	NO	NO	NO
		MCF [c]	Cool	NO	NO	NO	2,00	1,00	NO	NO	NO	NO
			Temperate	NO	NO	NO	NO	NO	NO	NO	NO	NO
			Warm	NO	NO	NO	NO	NO	NO	NO	NO	NO
	Non-dairy cattle	Allocation (%)	Cool	NO	NO	NO	35,00	65,00	NO	NO	NO	NO
			Temperate	NO	NO	NO	NO	NO	NO	NO	NO	NO
			Warm	NO	NO	NO	NO	NO	NO	NO	NO	NO
		MCF [c]	Cool	NO	NO	NO	2,00	1,00	NO	NO	NO	NO
			Temperate	NO	NO	NO	NO	NO	NO	NO	NO	NO
			Warm	NO	NO	NO	NO	NO	NO	NO	NO	NO
Option B	Mature dairy cattle	Allocation (%)	Cool									
			Temperate									
			Warm									
		MCF [c]	Cool									
			Temperate									
			Warm									
	Other mature cattle	Allocation (%)	Cool									
			Temperate									
			Warm									
		MCF [c]	Cool									
			Temperate									
			Warm									
	Growing cattle	Allocation (%)	Cool									
			Temperate									
			Warm									
		MCF [c]	Cool									
			Temperate									
			Warm									
			Sheep - Sh	NO	NO	NO	11,00	89,00	NO	NO	NO	NO
			Sheep - Sh	NO	NO	NO	NO	NO	NO	NO	NO	NO
			Sheep - Sh	NO	NO	NO	NO	NO	NO	NO	NO	NO
			Sheep - Sh	NO	NO	NO	NE	NE	NO	NO	NO	NO
			Sheep - Sh	NO	NO	NO	NO	NO	NO	NO	NO	NO
			Sheep - Sh	NO	NO	NO	NO	NO	NO	NO	NO	NO
			Swine - Sw	NO	30,00	NO	70,00	NO	NO	NO	NO	NO
			Swine - Sw	NO	NO	NO	NO	NO	NO	NO	NO	NO

Swine - Sv	NO	NO	NO	NO	NO	NO	NO	NO	NO
Swine - Sv	NO	NE	NO	NE	NO	NO	NO	NO	NO
Swine - Sv	NO	NO	NO	NO	NO	NO	NO	NO	NO
Swine - Sv	NO	NO	NO	NO	NO	NO	NO	NO	NO
Rabbit - A	NO	NO	NO	100,00	NO	NO	NO	NO	NO
Rabbit - A	NO	NO	NO	NO	NO	NO	NO	NO	NO
Rabbit - A	NO	NO	NO	NO	NO	NO	NO	NO	NO
Rabbit - M	NO	NO	NO	NE		NO	NO	NO	NO
Rabbit - M	NO	NO	NO	NO	NO	NO	NO	NO	NO
Rabbit - M	NO	NO	NO	NO	NO	NO	NO	NO	NO
Buffalo - A	NA	NA	NA	100,00	NA	NA	NA	NA	NA
Buffalo - A	NA	NA	NA	NA	NA	NA	NA	NA	NA
Buffalo - A	NA	NA	NA	NA	NA	NA	NA	NA	NA
Buffalo - N	NA	NA	NA	NE	NA	NA	NA	NA	NA
Buffalo - N	NA	NA	NA	NA	NA	NA	NA	NA	NA
Buffalo - N	NA	NA	NA	NA	NA	NA	NA	NA	NA
Camels - A	NA	NA	NA	NA	100,00	NA	NA	NA	NA
Camels - A	NA	NA	NA	NA	NA	NA	NA	NA	NA
Camels - A	NA	NA	NA	NA	NA	NA	NA	NA	NA
Camels - N	NA	NA	NA	NA	NE	NA	NA	NA	NA
Camels - N	NA	NA	NA	NA	NA	NA	NA	NA	NA
Camels - N	NA	NA	NA	NA	NA	NA	NA	NA	NA
Goats - All	NA	NA	NA	12,00	88,00	NA	NA	NA	NA
Goats - All	NA	NA	NA	NA	NA	NA	NA	NA	NA
Goats - All	NA	NA	NA	NA	NA	NA	NA	NA	NA
Goats - Mi	NA	NA	NA	NE	NE	NA	NA	NA	NA
Goats - Mi	NA	NA	NA	NA	NA	NA	NA	NA	NA
Goats - Mi	NA	NA	NA	NA	NA	NA	NA	NA	NA
Horses - A	NA	NA	NA	18,00	82,00	NA	NA	NA	NA
Horses - A	NA	NA	NA	NA	NA	NA	NA	NA	NA
Horses - A	NA	NA	NA	NA	NA	NA	NA	NA	NA
Horses - M	NA	NA	NA	NE	NE	NA	NA	NA	NA
Horses - M	NA	NA	NA	NA	NA	NA	NA	NA	NA
Horses - M	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mules and	NO	NA	NA	100,00	NA	NA	NA	NA	NA
Mules and	NO	NA	NA	NA	NA	NA	NA	NA	NA
Mules and	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mules and	NA	NA	NA	NE	NA	NA	NA	NA	NA
Mules and	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mules and	NA	NA	NA	NA	NA	NA	NA	NA	NA
Poultry - A	NA	NA	NA	100,00	NA	NA	NA	NA	NA
Poultry - A	NA	NA	NA	NA	NA	NA	NA	NA	NA
Poultry - A	NA	NA	NA	NA	NA	NA	NA	NA	NA
Poultry - N	NA	NA	NA	NE	NA	NA	NA		NA
Poultry - N	NA	NA	NA	NA	NA	NA	NA	NA	NA
Poultry - N	NA	NA	NA	NA	NA	NA	NA	NA	NA

[10] The information required in this table may not be directly applicable to country-specific methods developed for MCF calculations. In such cases, information on MCF derivation should be described in the NIR and references to the relevant sections of the NIR should be provided in the documentation box.

(b) Animal waste management systems not included in the columns of this table should be reported under "Other".

[(c)] MCF = Methane Conversion Factor (p. 10.43 of chapter 10, volume 4 of the 2006 IPCC Guidelines).

TABLE 3.B(b) SECTORAL BACKGROUND DATA FOR AGRICULTURE
N_2O Emissions from Manure Management
(Sheet 1 of 1)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA AND OTHER RELATED INFORMATION															IMPLIED EMISSION FACTORS (IEF)			EMISSIONS		
	Population size	Nitrogen excretion rate	Typical animal mass (average)	Nitrogen excretion per manure management system (MMS) (kg N/yr)									Total N excreted	Total N volatilized as NH_3 and NO_x[1,2]	N lost through leaching and run-off	Emission factor per animals			N_2O		
																Direct	Indirect		Direct	Indirect	
	(1000s)	(kg N/ head/yr)	(kg/ animal)	Anaerobic lagoon	Liquid system	Daily spread	Solid storage and dry lot	Pasture range and paddock[3]	Composting	Digesters	Burned for fuel or as waste[4]	Other[5]	(kg N/yr)	(kg N/yr)	(kg N/yr)	(kg N_2O/ head/yr)	(kg N_2O-N/kg N)		(kt)		
1. Cattle	8668.34			NO	NO	NO	########	########	NO	NO	NO	NO	444443775.00			0.56			4.89		
Option A:																					
Dairy cattle[6]	4008.27	60.60	479.00	NO	NO	NO	########	########	NO	NO	NO	NO	243321825.00			0.67			2.68		
Non-dairy cattle	4660.07	47.10	338.00	NO	NO	NO	########	########	NO	NO	NO	NO	201221951.00			0.47			2.21		
Option B:																					
Mature dairy cattle																					
Other mature cattle																					
Growing cattle																					
Option C (country-specific)[7]:																					
Other (please specify)																					
2. Sheep	20447.54			NO	NO	NO	########	########	NO	NO	NO	NO	2551852620.00			0.04			0.88		
Other (please specify)	20447.54			NO	NO	NO	########	########	NO	NO	NO	NO	2551852620.00			0.04			0.88		
Sheep	20447.54	17.48	38.00	NO	NO	NO	########	########	NO	NO	NO	NO	2551852620.00			0.04			0.88		
3. Swine	1020.92			NO	########	NO	########	NO	NO	NO	NO	NO	264724560.00			0.57			0.58		
Other (please specify)	1020.92			NO	########	NO	########	NO	NO	NO	NO	NO	264724560.00			0.57			0.58		
Swine	1020.92	25.97	96.00	NO	########	NO	########	NO	NO	NO	NO	NO	264724560.00			0.57			0.58		
4. Other livestock[8]	########			NO	NO	NO	########	########	NO	NO	NO	NO	1626731115.00			0.01			1.61		
Buffalo	10.39	44.70	300.00	NO	NO	NO	461197.00	NO	NO	NO	NO	NO	461197.00			0.96			0.01		
Camels	227.70	36.20	217.00	NO	NO	NO	NO	########	NO	NO	NO	NO	6851860.00			NO			NO		
Goats	2753.41	17.75	38.00	NO	NO	NO	########	########	NO	NO	NO	NO	48872974.00			0.07			0.18		
Horses	3138.81	26.06	238.00	NO	NO	NO	########	########	NO	NO	NO	NO	81817996.00			0.13			0.46		
Mules and Asses	29.56	14.24	150.00	NO	NO	NO	62096.00	NO	NO	NO	NO	NO	62096.00			0.34			0.01		
Poultry	43519.00	0.54	1.80	NO	NO	NO	########	NO	NO	NO	NO	NO	23460900.00			0.00			0.74		
Other (please specify)	NO			NO	NO	NO	839225.00	NO	NO	NO	NO	NO	839225.00			0.25			0.03		
Rabbit	185.61	8.10	5.00	NO	NO	NO	839225.00	NO	NO	NO	NO	NO	839225.00			0.25			0.03		
5. Indirect N_2O emissions																					
Total N handled per MMS (kg N/year)				NO	########	NO	########		NO	NO		NO		88187575.00	NE		0.02	NE		1.18	NE
IEF direct N_2O (kg N_2O-N/kg N handled)				NO	0.05	NO	0.02		NO	NO		NO									
Direct N_2O emissions per MMS (Gg/kt) N_2O				NO	0.38	NO	7.30		NO	NO		NO				0.01			7.78		

[1] Direct and indirect nitrous oxide (N_2O) emissions associated with the manure deposited on agricultural soils and pasture, range and paddock systems are included under N_2O emissions from managed soils (see table 3.(B).D-E).

[2] The emissions associated with the burning of dung are to be reported under fuel combustion, if used as fuel and under waste incineration, if burned without energy recovery.

[3] This could include pit storage, deep bedding, poultry manure with and without litter, anaerobic treatment.

[4] Total nitrogen (N) volatilized does not include N volatilized from manure deposited in pasture, range and paddock systems.

[5] Option C should be used when Parties want to report a more disaggregated livestock categorization compared with option A and option B.

[6] If data are available, Parties are encouraged to report at the disaggregated level available from the pre-defined drop-down menu. Furthermore, Parties are encouraged to the extent possible to use the pre-defined category definitions rather than to create similar categories. This ensures the highest possible degree of comparability of the reporting. If

[7] This could include fox and raccoon and mink and polecat.

Documentation box:

- Parties should provide detailed explanations on the agriculture sector in chapter 5, Agriculture (CRF sector 3) of the national inventory report (NIR). Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.
- Provide a reference to the relevant section in the NIR, in particular with regard to:
  (a) Disaggregation of livestock populations (e.g. according to the classification recommended in the 2006 IPCC Guidelines);
  (b) Information on other MMS, if reported.

Documentation box:	

TABLE 3.C SECTORAL BACKGROUND DATA FOR AGRICULTURE
Rice Cultivation
(Sheet 1 of 1)

Inventory 2020
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA AND OTHER RELATED INFORMATION			IMPLIED EMISSION FACTOR [1]	EMISSIONS
	Harvested area[2]	Organic amendments added[3]		CH_4	CH_4
	(10^9 m^2/yr)	type	(t/ha)	(g/m^2)	(kt)
1. Irrigated					21,48
Continuously flooded	NO	NO	NO	NO	NO
Intermittently flooded Single aeration	NO	NO	NO	NO	NO
Intermittently flooded Multiple aeration	1,02	NO	NO	21,00	21,48
2. Rainfed					NO
Flood prone	NO	NO	NO	NO	NO
Drought prone	NO	NO	NO	NO	NO
3. Deep water					NO
Water depth 50–100 cm	NO	NO	NO	NO	NO
Water depth > 100 cm	NO	NO	NO	NO	NO
4. Other *(please specify)*					NO
Upland rice(4)	NO				
Total(4)	1,02				

[1] The implied emission factor implicitly takes account of all relevant corrections for continuously flooded fields without organic amendment, the correction for the organic amendments and the effect of different soil characteristics, if considered in the calculation of methane (CH_4) emissions.

[2] Harvested area is the cultivated area multiplied by the number of cropping seasons per year.

[3] Specify dry weight or wet weight for organic amendments in the documentation box.

[4] These rows are included to allow comparison with international statistics. CH_4 emissions from upland rice are assumed to be zero.

Documentation box:	
• Parties should provide detailed explanations on the agriculture sector in chapter 5: Agriculture (CRF sector 3) of the national inventory report (NIR). Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.	
• When disaggregating by more than one region within a country, and/or by growing season, provide additional information on disaggregation and related data in the NIR and provide a reference to the relevant section in the NIR.	
• Where available, provide activity data and scaling factors by soil type and rice cultivar in the NIR.	
Documentation box	

TABLE 3.D SECTORAL BACKGROUND DATA FOR AGRICULTURE
Direct and indirect N_2O emissions from agricultural soils
(Sheet 1 of 1)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA AND OTHER RELATED INFORMATION		IMPLIED EMISSION FACTORS	EMISSIONS
	Description	Value kg N/yr	kg N_2O-N/kg N[1,2,3]	N_2O (kt)
a. Direct N_2O emissions from managed soils				43,99
1. Inorganic N fertilizers[3]	N input from application of inorganic fertilizers to cropland and grassland	56798510,00	0,01	1,04
2. Organic N fertilizers[3]	N input from organic N fertilizers to cropland and grassland	152329665,00	0,01	2,39
a. Animal manure applied to soils	N input from manure applied to soils	152329665,00	0,01	2,39
b. Sewage sludge applied to soils	N input from sewage sludge applied to soils	NE	NE	NE
c. Other organic fertilizers applied to soils	N input from application of other organic fertilizers	NO	NO	NO
3. Urine and dung deposited by grazing animals	N excretion on pasture, range and paddock	632961091,00	0,01	14,49
4. Crop residues	N in crop residues returned to soils	210250000,00	0,01	3,26
5. Mineralization/immobilization associated with loss/gain of soil organic matter[4,5]	N in mineral soils that is mineralized in association with loss of soil C	1452800000,00	0,01	22,81
6. Cultivation of organic soils (i.e. histosols)[2]	Area of cultivated organic soils	NO	NO	NO
7. Other		NO	NO	NO
b. Indirect N_2O Emissions from managed soils				5,53
1. Atmospheric deposition[6]	Volatilized N from agricultural inputs of N	162738002,20	0,01	2,58
2. Nitrogen leaching and run-off	N from fertilizers and other agricultural inputs that is lost through leaching and run-off	250037210,00	0,01	2,95

(1) To convert from N_2O-N to N_2O emissions, multiply by 44/28.

(2) For cultivation of histosols the unit of the IEF is kg N_2O-N/ha. The emissions from cultivation/management of croplands and grasslands are to be included. For a definition of organic soils, see footnote 4, page 11.6 of chapter 11 of volume 4 of

(3) Include the application of fertilizers on cropland and grassland. If the application of fertilizers to other land categories cannot be separately identified, this application should be included here.

(4) Emissions from management changes in cropland remaining cropland would be reported in this table.

(5) Methodologies for N_2O emissions from N mineralization/immobilization associated with loss/gain of soil organic matter resulting management of mineral soils are based on equations 11.1, 11.2 and 11.8 of the 2006 IPCC Guidelines. N_2O

(6) Only atmospheric deposition of nitrogen (N) volatilised from agricultural inputs of N are to be reported here, not including NOx associated with the burning of savannahs and crop residues.

Additional information

Fraction[10]	Description	Value
$Frac_{GASF}$	Fraction of synthetic fertilizer N applied to soils that volatilises as NH_3 and NO_x	0,10
$Frac_{GASM}$	Fraction of livestock N excretion that volatilises as NH_3 and NO_x	0,20
$Frac_{LEACH-(H)}$	Fraction of N input to managed soils that is lost through leaching and run-off	0,10

Other fractions *(please specify)*		

[a] Use the definitions for fractions as specified in the 2006 IPCC Guidelines (pp. 11.13-11.22 of chapter 11 of volume 4)

Documentation box:
• Parties should provide detailed explanations on the agriculture sector in chapter 5: Agriculture (CRF sector 3) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table. • Provide a reference to the relevant section in the NIR, in particular with regard to (a) Background information on methane (CH_4) emissions from agricultural soils, if accounted for under the agriculture sector; (b) Full list of assumptions and fractions used.
Documentation box

TABLE 3.E SECTORAL BACKGROUND DATA FOR AGRICULTURE
Prescribed burning of savannas
(Sheet 1 of 1)

Inventory 2020
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA AND OTHER RELATED INFORMATION					IMPLIED EMISSION FACTORS		EMISSIONS [2]	
	Area of savanna burned (k ha/yr)	Average above-ground biomass density (t dm/ha)	Fraction of savanna burned	Biomass burned (kt dm)	Nitrogen fraction in biomass	CH_4 (kg/t dm)	N_2O (kg/t dm)	CH_4 (kt)	N_2O (kt)
Forest land (specify ecological zone) [1]								NO	NO
Grassland *(specify ecological zone)* [1]								NO	NO

[1] If possible, fires on forest land and grassland defined as savannah should be separately identified and reported here. If it is not possible to separate those fires from other forest and grassland fires reported under category
[2] Parties who wish to do so could report CH_4 and N_2O emissions from burning of organic soils here. N2O emissions from burning of organic soils could be included when higher tier methods are used.

Documentation box:	
Parties should provide detailed explanations on the agriculture sector in chapter 5: Agriculture (CRF sector 3) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.	
Documentation box	

TABLE 3.F SECTORAL BACKGROUND DATA FOR AGRICULTURE

Field burning of agricultural residues[1]

(Sheet 1 of 1)

Inventory 2020

Submission 2022 v1

KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA AND OTHER RELATED INFORMATION				IMPLIED EMISSION FACTORS		EMISSIONS	
	Area burned (k ha/yr)	Biomass available[1] (t dm/ha)	Combustion factor	Total biomass burned[2] (kt dm)	CH_4	N_2O	CH_4	N_2O
					(kg/t dm)		(kt)	
1. Cereals				NO	NO	NO	NO	NO
Wheat	NO	NO	NO	NO	NO	NO	NO	NO
Barley	NO	NO	NO	NO	NO	NO	NO	NO
Maize	NO	NO	NO	NO	NO	NO	NO	NO
Other *(please specify)*				NO	NO	NO	NO	NO
2. Pulses				NO	NO	NO	NO	NO
Other *(please specify)*				NO	NO	NO	NO	NO
3. Tubers and roots				NO	NO	NO	NO	NO
Other *(please specify)*				NO	NO	NO	NO	NO
4. Sugar cane	NO	NO	NO	NO	NO	NO	NO	NO
5. Other *(please specify)*				NO	NO	NO	NO	NO

[1] Mass of fuel available for combustion

[2] If Parties use a different methodology than the IPCC default, e.g. based on crop production, the estimate for total biomass burned can be reported without data on area, fuel available and combustion factor. In this case the additional information table should be used to report the parameters used to derive the total biomass burned.

Additional information

	Wheat	Barley	Maize	Other *(please specify)*
Crop production (t)	NO	NO	NO	
Residue/ Crop ratio	NO	NO	NO	
Dry matter (dm) fraction of residue	NO	NO	NO	
Fraction burned in fields	NO	NO	NO	
Fraction oxidized	NO	NO	NO	

Note: Parties are encouraged to supply the additional information regardless of the methodology applied.

Documentation box:	
Parties should provide detailed explanations on the agriculture sector in chapter 5: Agriculture (CRF sector 3) of the national inventory report (NIR). Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.	
Documentation box	

TABLE 3.G-I SECTORAL BACKGROUND DATA FOR AGRICULTURE
CO_2 emissions from liming, urea application and other carbon-containing fertilizers
(Sheet 1 of 1)

Inventory 2020
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA	IMPLIED EMISSION FACTORS	EMISSIONS
	Amount applied	CO_2-C per unit	CO_2
	(t/yr)	(t CO_2-C /t)	(kt)
G. Liming[1]			NO
Limestone $CaCO_3$	NO	NO	NO
Dolomite $CaMg(CO_3)_2$	NO	NO	NO
H. Urea application	5005,52	0,20	3,67
I. Other carbon-containing fertlizers	NO	NO	NO
J. Other (please specify)	NO	NO	NO

[1] Emissions should include all national liming regardless of land use. A Party should report total estimates for total lime application.

Documentation box:	
Parties should provide detailed,explanations on the agriculture sector in chapter 5: Agriculture (CRF sector 3) of the national inventory report (NIR). Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.	
Documentation box	
Documentation box	
Documentation box	
Documentation box	

TABLE 4 SECTORAL REPORT FOR LAND USE, LAND-USE CHANGE AND FORESTRY
(Sheet 1 of 1)

Inventory 2020
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Net CO_2 emissions/removals[1,2]	CH_4[2]	N_2O[2]	NO_x	CO	NMVOC
	(kt)					
4. Total LULUCF	7908,63	2,29	0,15	NO	NO	NO
A. Forest land	-10335,60	1,66	0,09	NO	NO	NO
1. Forest land remaining forest land	-10335,60	1,66	0,09			
2. Land converted to forest land	NO,IE	NO,IE	NO,IE	NO	NO	NO
B. Cropland	31905,13	NO,IE	NO,IE	NO	NO	NO
1. Cropland remaining cropland	31905,13	NO,IE	NO,IE	NO	NO	NO
2. Land converted to cropland	NO	NO	NO	NO	NO	NO
C. Grassland	-10120,00	0,63	0,06			
1. Grassland remaining grassland	-10120,00	0,63	0,06			
2. Land converted to grassland	NO	NO	NO			
D. Wetlands[3]	NO,NE,NA	NO,IE,NA	NO,IE,NA	NO	NO	NO
1. Wetlands remaining wetlands	NO,NE	NO,IE	NO,IE	NO	NO	NO
2. Land converted to wetlands	NO	NO	NO	NO	NO	NO
E. Settlements	-3540,90	NO	NO	NO	NO	NO
1. Settlements remaining settlements	NO	NO	NO	NO	NO	NO
2. Land converted to settlements	-3540,90	NO	NO	NO	NO	NO
F. Other land [4]	NO	NO	NO	NO	NO	NO
1. Other land remaining other land						
2. Land converted to other land	NO	NO	NO	NO	NO	NO
G. Harvested wood products [5]	NO,IE					
H. Other ***(please specify)***	NO	NO	NO	NO	NO	NO

[1] For the purposes of reporting, the signs for removals are always negative (–) and for emissions positive (+).

[2] For each land-use category and subcategory, this table sums the net carbon dioxide (CO_2, emissions and removals shown in tables 4.A to 4.F, and the CO_2, methane (CH_4) and nitrous oxide (N_2O) emissions shown in

[3] Parties may decide not to prepare estimates for CH4 emissions from flooded land contained in Appendix 3 of volume 4 of the 2006 IPCC Guidelines, although they may do so if they wish.

[4] This category includes bare soil, rock, ice, and all land areas that do not fall into any of the other five categories. It allows the total of identified land areas to match the national area.

[5] Non-CO_2 emissions from HWP are covered in the energy sector or waste sector.

Documentation box:

• Parties should provide detailed explanations on the land use, land-use change and forestry sector in chapter 6: Land Use, Land-Use Change and Forestry (CRF sector 4) of the national inventory report (NIR). Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.

• If estimates are reported under the category 4.H. Other, use this documentation box to provide information regarding activities covered under this category and to provide a reference to the section in the NIR where background information can be found.

Documentation box	ber and Paperboard: 4.G.A HWP in SWDS: Carbon stock change not include in CRF tables. Comment is shown in ch. 7 of NIR

Table 4.1 LAND TRANSITION MATRIX

Areas and changes in areas between the previous and the current inventory year[1]

TO: / FROM:	Forest land (managed)	Forest land (unmanaged)	Cropland	Grassland (managed)	Grassland (unmanaged)	Wetlands (managed)	Wetlands (unmanaged)	Settlements	Other land	Total unmanaged land	Initial area
	(kha)										
Forest land (managed)[2]	19086,90	NO	NO	NO	NO	NO	NO	NO	NO	NO	19086,90
Forest land (unmanaged)[2]	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Cropland[2]	NO	NO	35943,00	NO	NO	NO	NO	NO	NO	NO	35943,00
Grassland (managed)[2]	NO	NO	NO	183425,00	NO	NO	NO	332,70	NO	NO	183757,70
Grassland (unmanaged)[2]	NO		NO	NO	NO	NO	NO	NO	NO	NO	NO
Wetlands (managed)[2]	NO	NO	NO	NO	NO	800,90	NO	NO	NO	NO	800,90
Wetlands (unmanaged)[2]	NO	NO	NO	NO	NO	NO	7990,20	NO	NO	NO	7990,20
Settlements[2]	NO	NO	NO	NO	NO	NO	NO	1974,00	NO	NO	1974,00
Other land[2]	NO	NO	NO	NO	NO	NO	NO	NO	22937,50	NO	22937,50
Total unmanaged land [3]	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Final area	19086,90	NO	35943,00	183425,00	NO	800,90	7990,20	2306,70	22937,50	NO	272490,20
Net change[4]	0,00	NO	0,00	-332,70	NO	0,00	0,00	332,70	0,00	NO	0,00

[1] For Parties using reporting approach 1 to represent land areas, only data on the initial and final area per land use should be filled in. Notation key "NA" (not applicable) should be used in such cases for the specific land use transitions, allowing for the formulas in the cells for final and initial areas to be overwritten. Coastal wetlands areas which are not part of total land area should not be included in this land

[2] Definitions for the respective land use categories used by the Party should be provided in the NIR, in accordance with the definitions of land use categories in Volume 4, chapter 3, section 3.2 of the 2006

[3] Parties may report only the total area of unmanaged land area and enter the notation key IE under the individual unmanaged land uses categories.

[4] Net change is the final area minus the initial area for each of the conversion categories shown at the head of the corresponding row. In the final area row the net change equals zero.

TABLE 4.A SECTORAL BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY
Forest land
(Sheet 1 of 1)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		ACTIVITY DATA			IMPLIED CARBON-STOCK-CHANGE FACTORS							CHANGES IN CARBON STOCK AND NET CO_2 EMISSIONS/REMOVALS FROM SOILS							
Land-use category	Subdivision[(2)]	Total area[(2)] (kha)	Area of mineral soil (kha)	Area of organic soil (kha)	Carbon stock change in living biomass per area[(3)(4)]			Net carbon stock change in dead wood per area[(4)]	Net carbon stock change in litter per area[(4)]	Net carbon stock change in soils per area[(4)]		Carbon stock change in living biomass[(3)(4)]			Net carbon stock change in dead wood[(4)]	Net carbon stock change in litter[(4)]	Net carbon stock change in soils[(4)(6)]		Net CO_2 emissions/ removals[(7)]
					Gains	Losses	Net change			Mineral soils[(5)]	Organic soils	Gains	Losses	Net change			Mineral soils	Organic soils	
					(t C/ha)							(kt C)							(kt)
A. Total forest land		19086,90	19086,90	NO	0,11	NO	0,11	0,01	0,01	0,01	NO	2192,00	NO	2192,00	233,30	214,30	179,20	NO	-10335,60
1. Forest land remaining forest land		19086,90	19086,90	NO	0,11	NO	0,11	0,01	0,01	0,01	NO	2192,00	NO	2192,00	233,30	214,30	179,20	NO	-10335,60
2. Land converted to forest land[(8)]		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2.1 Cropland converted to forest land		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2.2 Grassland converted to forest land		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2.3 Wetlands converted to forest land		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2.4 Settlements converted to forest land		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2.5 Other land converted to forest land		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

(1) Land categories may be further divided according to climate zone, management system, soil type, including whether the soil is drained, rewetted or categorized as other, vegetation type, tree species, ecological zone or national land classification. When Parties estimate emissions and removals or carbon stock change on dry and wet soils separately, they are encouraged to use this column to provide this disaggregation. When a Party reports emissions and removals from coastal wetlands areas that are not part of the total land area of the country, a Party may use appropriate subcategories for indicating whether

(2) The total area of the subcategories, in accordance with the subdivision used, should be entered here. For lands converted to forest land report the cumulative area remaining in the category in the reporting year. The total area should equal the area of mineral soil plus the area of organic soil by subcategory.

(3) Carbon stock gains and losses should be listed separately except in cases where, due to the methods used, it is technically impossible to separate information on gains and losses.

(4) The sign for estimates of gains in carbon stocks are positive (+) and of losses in carbon stocks are negative (−).

(5) When Parties cannot estimate carbon stock changes for organic and mineral soil separately, these should be reported under mineral soils.

(6) Parties who wish to do so may report annual on-site CO2-C emissions/removals and off-site CO2-C emissions from drained and rewetted organic soils here.

(7) Where Parties directly estimate emissions and removals rather than carbon stock changes, they may report emissions/removals directly in this column and use notation keys in the stock change columns.

(8) A Party may report aggregated estimates for all conversions of land to forest land when data are not available to report them separately. A Party should specify in the documentation box which types of land conversion are included.

Documentation box:	
Parties should provide detailed explanations on the land use, land-use change and forestry sector in Chapter 6: Land Use, Land-Use Change and Forestry (CRF sector 4) of the national inventory report (NIR). Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.	
Documentation box	
Documentation box	

TABLE 4.B SECTORAL BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY
Cropland
(Sheet 1 of 1)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		ACTIVITY DATA			IMPLIED CARBON STOCK CHANGE FACTORS						CHANGES IN CARBON STOCK AND NET CO_2 EMISSIONS/REMOVALS FROM SOILS						
Land-use category	Subdivision[1]	Total area[2] (kha)	Area of mineral soil (kha)	Area of organic soil (kha)	Carbon stock change in living biomass per area[3] (t)			Net carbon stock change in dead organic matter per area[4]	Net carbon stock change in soils per area[5]		Carbon stock change in living biomass[6] (t C/ ha)			Net carbon stock change in dead organic matter[7] (t C)	Net carbon stock change in soils[8] (t C)		Net CO_2 emissions/ removals[9] (t)
					Gains	Losses	Net change		Mineral soils	Organic soils	Gains	Losses	Net change		Mineral soils	Organic soils	
					(t C/ha)						(kt C)						(kt)
B. Total Cropland		33943.00	33943.00	NO	0.11	NO	0.11	NO,D	42.36	NO	4004.00	NO	4004.00	NO,D	-1282.40	NO	11903.13
1. Cropland remaining cropland		33943.00	33943.00	NO	0.11	NO	0.11	D	42.36	NO	4004.00	NO	4004.00	D	-1282.40	NO	11903.13
2. Land converted to cropland[10]		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2.1 Forest land converted to cropland		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2.2 Grassland converted to cropland		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2.3 Wetlands converted to cropland		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2.4 Settlements converted to cropland		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2.5 Other land converted to cropland		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

[1] Land categories may be further divided according to climate zone, management system, soil type, including whether the soil is drained, rewetted or categorized as other, vegetation type, tree species, ecological zone or national land classifications. When Parties estimate emissions
[2] The total area of the subcategories, in accordance with the subdivisions used, should be entered here. For lands converted to cropland report the cumulative area remaining in the category on the reporting year. The total area should equal the area of mineral soil plus the area of organic soil by subcategory
[3] Carbon stock gains and losses should be listed separately except in cases where, due to the methods used, it is technically impossible to separate information on gains and losses
[4] The signs for estimates of gains in carbon stocks are positive (+) and for losses in carbon stocks are negative (−)
[5] Parties who wish to do so may report annual on-site CO2-C emissions/removals and off-site CO2-C emissions from drained and rewetted organic soils here
[6] For category 4.B.1 Cropland remaining cropland this column only includes changes in perennial woody biomass
[7] No reporting on dead organic matter pools is required for category 4.B.1. Cropland remaining cropland
[8] When Parties cannot estimate carbon stock changes for organic and mineral soil separately, these should be reported under mineral soils
[9] Where Parties directly estimate emissions and removals rather than carbon stock changes, they may report emissions/removals directly in this column and use notation keys in the stock change columns
[10] A Party may report aggregated estimates for all land conversions to cropland, when data are not available to report them separately. A Party should specify in the documentation box which types of land conversions are included.

Documentation box	
Parties should provide detailed explanations on the land use, land use change and forestry sector in Chapter 6: Land Use, Land-Use Change and Forestry (CRF sector 4) of the national inventory report (NIR). Use the documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table	
Documentation box	
Documentation box	4.D.1 Carbon stock change

TABLE 4.C SECTORAL BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY
Grassland
(Sheet 1 of 1)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		ACTIVITY DATA			IMPLIED CARBON-STOCK-CHANGE FACTORS						CHANGES IN CARBON STOCK AND NET CO_2 EMISSIONS/REMOVALS FROM SOILS						
Land-use category	Subdivision[11]	Total area[12] (kha)	Area of mineral soil (kha)	Area of organic soil (kha)	Carbon stock change in living biomass per area[13] [14]			Net carbon stock change in dead organic matter per area[15]	Net carbon stock change in soils per area[16]		Carbon stock change in living biomass[15] [16]			Net carbon stock change in dead organic matter[15] [16]	Net carbon stock change in soils[16] [18] [19]		Net CO_2 emissions/ removals[16] [19]
					Gains	Losses	Net change		Mineral soils	Organic soils	Gains	Losses	Net change		Mineral soils	Organic soils	
					(t C/ha)						(kt C)						(kt)
C. Total grassland		1834231.00	1834231.00	NO	0.0	0.00	0.00	0.58	0.02	NO	NO	-110.00	-110.00	-40.00	2990.00	NO	-3920.00
1. Grassland remaining grassland		1834231.00	1834231.00	NO	NO	0.00	0.00	0.58	0.02	NO	NO	-110.00	-110.00	-40.00	2990.00	NO	-3920.00
2. Land converted to grassland[17]		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2.1 Forest land converted to grassland		NO		NO	NO	NO	NO	NO		NO	NO	NO	NO	NO	NO	NO	NO
2.2 Cropland converted to grassland		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2.3 Wetlands converted to grassland		NO	NO		NO	NO	NO	NO	NO		NO	NO	NO	NO	NO	NO	NO
2.4 Settlements converted to grassland		NO		NO	NO	NO	NO	NO		NO	NO	NO	NO	NO	NO	NO	NO
2.5 Other Land converted to grassland		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

[11] Land categories may be further divided according to climate zone, management system, soil type, including whether the soil is drained, aerated or categorized as other, vegetation type, tree species, ecological zone or national land classification. When Parties estimate emissions and removals or carbon stock change on dry and wet soils

[12] The total area of the subcategories, in accordance with the sub-division used, should be entered here. For lands converted to grassland report the cumulative area remaining in the category in the reporting year. The total area should equal the area of mineral soil plus the area of organic soil by subcategory.

[13] Carbon stock gains and losses should be listed separately except in cases where, due to the methods used, it is technically impossible to separate information on gains and losses.

[14] The signs for estimates of gains in carbon stocks are positive (+) and of losses in carbon stocks are negative (–).

[15] Parties who wish to do so may report annual on-site CO2-C emissions/removals and off-site CO2-C emissions from drained and rewetted organic soils here.

[16] No reporting on dead organic matter pools is required for category 4.C.1 Grassland remaining grassland.

[17] When Parties cannot estimate carbon stock changes for organic and mineral soil separately, these should be reported under mineral soils.

[18] Where Parties directly estimate emissions and removals rather than carbon stock changes, they may report emissions/removals directly in this column and use notation keys in the stock change columns.

[19] A Party may report aggregated estimates for all land conversions to grassland, when data are not available to report them separately. A Party should specify in the documentation box which types of land conversions are included.

Documentation box:
Parties should provide detailed explanations on the land use, land-use change and forestry sector in Chapter 6: Land Use, Land-Use Change and Forestry (LULF sector 6) of the national inventory report (NIR). Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the contents of this table.
Documentation box
Documentation box

TABLE 4.D SECTORAL BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY
Wetlands
(Sheet 1 of 1)

Inventory 2020
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		ACTIVITY DATA			IMPLIED CARBON STOCK CHANGE FACTORS						CHANGES IN CARBON STOCK AND NET CO_2 EMISSIONS/REMOVALS FROM SOILS						
Land-use category	Subdivision[1]	Total area[2] (kha)	Area of mineral soil (kha)	Area of organic soil (kha)	Carbon stock change in living biomass per area[3,4,5]			Net carbon stock change in dead organic matter per area[6]	Net carbon stock change in soils per area[6]		Carbon stock change in living biomass[3,4,5]			Net carbon stock change in dead organic matter[6]	Net carbon stock change in soils[6]		Net CO_2 emissions/removals[7,8,9,10]
					Gains	Losses	Net change		Mineral soils	Organic soils	Gains	Losses	Net change		Mineral soils	Organic soils	
					t C/ha/a						Gg C						Gg
D. Total wetlands		8791.10	8791.10	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
1. Wetlands remaining wetlands		8791.10	8791.10	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
1.1. Peat extraction remaining peat extraction		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
1.2 Flooded land remaining flooded land		800.90	800.90	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
1.3 Other wetlands remaining other wetlands[11]		7990.20	7990.20	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2. Land converted to wetlands[12]		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2.1 Land converted to peat extraction		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2.2 Land converted to flooded land		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2.3 Land converted to other wetlands		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

[1] Land categories may be further divided according to climatic zone, management system, soil type, including whether the soil is drained, rewetted or categorized as other, vegetation type, tree species, ecological zone or national land classification. When Parties estimate emissions and removals or carbon stock change on dry and wet soils separately, they
[2] The total area of the subcategories, in accordance with the subdivision used, should be entered here. For lands converted to wetlands report the cumulative area remaining in the category in the reporting year. The total area should equal the area of mineral soil plus the area of organic soil by subcategory.
[3] Carbon stock gains and losses should be listed separately except in cases where, due to the methods used, it is technically impossible to separate information on gains and losses.
[4] The signs for estimates of gains in carbon stocks are positive (+) and of losses in carbon stocks are negative (–).
[5] Where Parties directly estimate emissions and removals rather than carbon stock changes, they may report emissions/removals directly in this column and use notation keys in the stock change columns.
[6] There is no default methodology for estimating CO2 emissions from flooded land remaining flooded land.
[7] Detailed information on Other wetlands should be included in the NIR.
[8] A Party may report aggregated estimates for all land conversions to wetlands, when data are not available to report them separately. A Party should specify in the documentation box which types of land conversions are included.

Documentation box:	
Parties should provide detailed explanations on the land use, land-use change and forestry sector in Chapter 6: Land Use, Land-Use Change and Forestry (CRF sector 4) of the national inventory report (NIR). Use this documentation box to provide references to relevant sections of the NIR if any added	
Documentation box	
Documentation box	

TABLE 4.E SECTORAL BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY

Settlements

(Sheet 1 of 1)

GRANTHAM GAS SINKS AND GHG CATEGORIES		ACTIVITY DATA			IMPLIED CARBON STOCK CHANGE FACTORS						STOCKS IN CARBON STOCK AND NET CO2 EMISSIONS/REMOVALS FROM SOILS						
Land use category	Subdivisions[1]	Total area[2] (kha)	Area of observed land (kha)	Area of organic soil (kha)	Carbon stock change in living biomass per area[3,4]			Net carbon stock change in dead organic matter per area[5]	Net carbon stock change in soils per area[6]		Carbon stock change in living biomass[3,4]			Net carbon stock change in dead organic matter[5]	Net carbon stock change in soils[6]		Net CO_2 emissions/removals[7,8,9]
					Fodder	Leaves	Net change		Mineral soils	Organic soils	Fodder	Leaves	Net change		Mineral soils	Organic soils	
					t C/ha						(kt C)						(Gg)
1. Settlements		174.76	174.76	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.1 Settlements remaining settlements		174.76	174.76	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.1.1 Land converted to settlements		12.76	12.76	0.0	1.46	0.0	1.46	0.0	0.0	0.0	18.6	0.0	18.6	0.0	0.0	0.0	0.0
1.1.1.1 Forest land converted to settlements																	
1.1.1.2 Cropland converted to settlements		10.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.1.1.3 Grassland converted to settlements		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.1.1.4 Wetlands converted to settlements		12.76	12.76	0.0	1.46	0.0	1.46	0.0	0.0	0.0	18.6	0.0	18.6	0.0	0.0	0.0	0.0
1.1.1.5 Other land converted to settlements		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.2 Other land converted to settlements		162	162	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

[1] Land categories may be further divided according to climate zone, management system, ecotype, including whether the soil is drained, irrigated or unmanaged, or other management zone, tree species, ecoregion zone or national land classification. When Parties estimate emissions and removals or carbon stock change in dead wood or litter separately, they are encouraged to use this column to provide the disaggregation. When a Party reports emissions and removals from coastal wetlands areas that are not part of the total land area of the country, a Party may use appropriate subcategories for indicating whether the emissions and removals from these areas included or excluded from the total land area of the country.

[2] The total area of the subcategories in accordance with the subdivisions used, should be stated here. For lands converted to settlements report the cumulative area existing in the category or the reporting year. The total area should equal the area of remaining and plus the area of organic soil by subcategory.

[3] Carbon stock gains and losses should be listed separately except in cases where, due to the methods used, it is technically impossible to separate information on gains and losses.

[4] The sign for emissions of gases or carbon dioxide are positive (+) and of losses or carbon dioxide are negative (-).

[5] When Parties choose to estimate emissions and removals other than carbon stock changes, they may report emissions/removals directly in this column and use comment lines in the stock change columns.

Documentation Box

Parties should provide detailed explanations in the land use, land-use change and forestry sector in chapter 3 Land Use Land Use Change and Forestry (LULUCF) sector of the national inventory report (NIR). Use this documentation box to provide references to relevant sections of the NIR, if any additional information and/or further details are needed to understand the content of the table.

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TABLE 4.F SECTORAL BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY
Other land
(Sheet 1 of 1)

Inventory 2020
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		ACTIVITY DATA			IMPLIED CARBON-STOCK-CHANGE FACTORS						CHANGES IN CARBON STOCK AND NET CO_2 EMISSIONS/REMOVALS FROM SOILS						
Land-use category	Subdivision[1]	Total area[2] (kha)	Area of mineral soil (kha)	Area of organic soil (kha)	Carbon stock change in living biomass per area[3][4]			Net carbon stock change in dead organic matter per area[4]	Net carbon stock change in soils per area[5]		Carbon stock change in living biomass[3][4]			Net carbon stock change in dead organic matter[4]	Net carbon stock change in soils[5]		Net CO_2 emissions/ removals[6][7]
					Gains	Losses	Net change		Mineral soils	Organic soils	Gains	Losses	Net change		Mineral soils	Organic soils	
					(t C/ha)						(kt C)						(kt)
F. Total other land		22937,50	22937,50	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
1. Other land remaining other land[8]		22937,50	22937,50	NO													
2. Land converted to other land[7]		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2.1 Forest land converted to other land		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2.2 Cropland converted to other land		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2.3 Grassland converted to other land		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2.4 Wetlands converted to other land		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2.5 Settlements converted to other land		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

[1] Land categories may be further divided according to climate zone, management system, soil type, including whether the soil is drained, rewetted or categorized as other, vegetation type, tree species, ecological zone or national land classification. When Parties estimate emissions and removals or carbon stock change on dry and wet soils separately, they are encouraged to use this column to provide this disaggregation.

[2] The total area of the subcategories, in accordance with the subdivision used, should be entered here. For lands converted to Other land report the cumulative area remaining in the category in the reporting year. The total area should equal the area of mineral soil plus the area of

[3] Carbon stock gains and losses should be listed separately except in cases where, due to the methods used, it is technically impossible to separate information on gains and losses.

[4] The signs for estimates of gains in carbon stocks are positive (+) and of losses in carbon stocks are negative (–).

[5] Where Parties directly estimate emissions and removals rather than carbon stock changes, they may report emissions/removals directly in this column and use notation keys in the stock change columns.

[6] This land-use category is to allow the total of identified land area to match the national area. It includes bare soil, rock, ice and all land areas that do not fall into any other of the other five land-use categories.

[7] A Party may report aggregated estimates for all land conversions to other land, when data are not available to report them separately. A Party should specify in the documentation box which types of land conversion are included.

Documentation box:	
Parties should provide detailed explanations on the land use, land-use change and forestry sector in chapter 6: Land Use, Land-Use Change and Forestry (CRF sector 4) of the national inventory report (NIR). Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.	
Documentation box	
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TABLE 4(I) SECTORAL BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTR

Direct nitrous oxide (N_2O) emissions from nitrogen (N) inputs[1] to managed soils

Inventory 2020
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA AND OTHER RELATED INFORMATION	IMPLIED EMISSION FACTORS	EMISSIONS[4]
Land-use category[2]	Value kg N/yr	N_2O–N emissions per unit of N input kg N_2O–N/kg N[3]	N_2O (kt)
Total for all land use categories	NO	NO	NO
A. Forest land[5]	NO	NO	NO
1. Forest land remaining forest land	NO	NO	NO
1. Inorganic N fertilizers[6]	NO	NO	NO
2. Organic N fertilizers[7]	NO	NO	NO
2. Land converted to forest land	NO	NO	NO
1. Inorganic N fertilizers[6]	NO	NO	NO
2. Organic N fertilizers[7]	NO	NO	NO
B. Wetlands[5]	NO	NO	NO
1. Wetlands remaining wetlands	NO	NO	NO
1. Inorganic N fertilizers[6]	NO	NO	NO
2. Organic N fertilizers[7]	NO		
2. Land converted to wetlands	NO	NO	NO
1. Inorganic N fertilizers[6]	NO	NO	NO
2. Organic N fertilizers[7]	NO	NO	NO
E. Settlements[5]	NO	NO	NO
1. Settlements remaining settlements	NO	NO	NO
1. Inorganic N fertilizers[6]	NO	NO	NO
2. Organic N fertilizers[7]	NO	NO	NO
2. Land converted to settlements	NO	NO	NO
1. Inorganic N fertilizers[6]	NO	NO	NO
2. Organic N fertilizers[7]	NO	NO	NO
H. Other (please specify)[5,8]	NO	NO	NO

[1] Direct N_2O emissions from N input to managed soils are estimated using equations 11.1, 11.2, 11.3, 11.4, 11.5 and 11.6 of the volume 4 of the 2006 IPCC Guidelines based on the amounts of N in

[2] N_2O emissions from N fertilization of cropland and grassland are reported in the agriculture sector.

[3] In the calculation of the implied emission factor, N_2O emissions are converted to N_2O–N by multiplying by 28/44.

[4] Emissions are reported with a positive sign.

[5] If a Party is not able to separate the N inputs applied to land-use categories, other than cropland and grasslands, it may report all N_2O emissions from N inputs to managed soils in the agriculture

[6] N input from application of inorganic fertilizers to land use categories other than cropland and grasslands.

[7] N input from organic N fertilizers to land use categories other than cropland and grassland.

[8] If a Party is not able to separate the N inputs applied to forest land and to other land-use categories, other than cropland and grasslands, it may report all N_2O emissions from N inputs to managed

Documentation box:	
Parties should provide detailed explanations on the land use, land-use change and forestry sector in Chapter 6: Land Use, Land-Use Change and Forestry (CRF sector 4) of the national inventory report (NIR). Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.	
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TABLE 4(II) SECTORAL BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY
Emissions and removals from drainage and rewetting and other management of organic
(Sheet 1 of 1)

Inventory 2020
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Subdivision[2]	ACTIVITY DATA	IMPLIED EMISSION FACTORS			EMISSIONS		
Land-use category[1]		Area (kha)	CO_2 per area (kg CO_2/ha)	N_2O–N per area[3] (kg N_2O–N/ha)	CH_4 per area (kg CH_4/ha)	CO_2[4]	N_2O (kt)	CH_4
Total for all land use categories						NO,NA	NO,NA	NO,NA
A. Forest land[5]						NO	NO	NO
Total organic soils		NO	NO	NO	NO	NO	NO	NO
Drained organic soils		NO	NO	NO	NO	NO	NO	NO
Rewetted organic soils		NO	NO	NO	NO	NO	NO	NO
Other *(please specify)*		NO	NO	NO	NO	NO	NO	NO
Total mineral soils		NO	NO	NO	NO	NO	NO	NO
Rewetted mineral soils		NO	NO	NO	NO	NO	NO	NO
Other *(please specify)*		NO	NO	NO	NO	NO	NO	NO
B. Cropland[6,8]						NO	NO	NO
Total organic soils		NO	NO		NO	NO		NO
Drained organic soils		NO	NO		NO	NO		NO
Rewetted organic soils		NO	NO		NO	NO		NO
Other *(please specify)*		NO	NO		NO	NO		NO
Total mineral soils		NO	NO	NO	NO	NO	NO	NO
Rewetted mineral soils		NO	NO		NO	NO		NO
Other *(please specify)*		NO	NO	NO	NO	NO	NO	NO
C. Grassland[6]						NO	NO	NO
Total organic soils		NO	NO		NO	NO		NO
Drained organic soils						NO		NO
Rewetted organic soils		NO	NO		NO	NO		NO
Other *(please specify)*		NO	NO		NO	NO		NO
Total mineral soils		NO	NO	NO	NO	NO	NO	NO
Rewetted mineral soils						NO		NO
Other *(please specify)*		NO	NO	NO	NO	NO	NO	NO
D. Wetlands[6]						NO,NA	NO,NA	NO,NA
D.1 Peat extraction lands						NO	NO	NO
Total organic soils		NO	NO	NO	NO	NO	NO	NO
Drained organic soils		NO	NO	NO	NO	NO	NO	NO
Rewetted organic soils		NO	NO	NO	NO	NO	NO	NO
Other *(please specify)*		NO	NO	NO	NO	NO	NO	NO
Total mineral soils		NO	NO	NO	NO	NO	NO	NO
Rewetted mineral soils		NO	NO	NO	NO	NO	NO	NO
Other *(please specify)*		NO	NO	NO	NO	NO	NO	NO
D.2 Flooded lands						NO,NA	NO,NA	NO,NA
Total organic soils		NO	NO	NO,NA	NO	NO	NO,NA	NO
Drained organic soils		NO	NO	NA	NO	NO	NA	NO
Rewetted organic soils		NO	NO	NO	NO	NO	NO	NO
Other *(please specify)*		NO	NO	NO	NO	NO	NO	NO
Total mineral soils		NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
Rewetted mineral soils		NA	NA	NA	NA	NA	NA	NA
Other *(please specify)*		NO	NO	NO	NO	NO	NO	NO
D.3 Other wetlands *(please specify)*						NO	NO	NO
E. Other *(please specify)* [9]						NO	NO	NO

[1] Nitrous oxide (N_2O) emissions from drained cropland and grassland soils are covered in the agriculture tables of the CRF under cultivation of organic soils.

[2] A Party should report further disaggregations of drained soils corresponding to the methods used. Tier 1 disaggregates soils into "nutrient rich" and "nutrient poor" areas, whereas higher-tier methods can further disaggregate soils into different peatland types, soil fertility or tree

[3] In the calculation of the implied emission factor, N_2O emissions are converted to N_2O-N by multiplying by 28/44.

[4] If CO_2 emissions or removals from drainage of wetland soils are not already included in tables 4.A to 4.F, they are to be reported here. Parties may also choose to report CO_2 emissions or removals from rewetting and other

[5] In table 4, these emissions will be added to the respective land-use category.

[6] On-site CH_4 emission /removals from rice cultivation are included in the agriculture sector.

Documentation box:

Parties should provide detailed explanations on the land use, land-use change and forestry sector in Chapter 6: Land Use, Land-Use Change and Forestry (CRF sector 4) of the national inventory report (NIR). Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.	
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TABLE 4(III) SECTORAL BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY

Direct nitrous oxide (N_2O) emissions from nitrogen (N) mineralization/immobilization associated with loss/gain of soil organic matter resulting from change of land use or management of mineral soils[1]

(Sheet 1 of 1)

Inventory 2020
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KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA	IMPLIED EMISSION FACTORS	EMISSIONS
Land-use category[2]	Area[3] (kha)	N_2O-N emissions per area[4] (kg N_2O-N/ha)	N_2O (kt)
Total all land-use categories	NO	NO	NO
A. Forest land	NO	NO	NO
1. Forest land remaining forest land	NO	NO	NO
2. Lands converted to forest land[5]	NO	NO	NO
B. Cropland[2]	NO	NO	NO
2. Lands converted to cropland[5]	NO	NO	NO
C. Grasslands	NO	NO	NO
1. Grasslands remaining grasslands	NO	NO	NO
2. Lands converted to grasslands[5]	NO	NO	NO
D. Wetlands	NO	NO	NO
1. Wetlands remaining wetlands	NO	NO	NO
2. Lands converted to wetlands[5]	NO	NO	NO
E. Settlements	NO	NO	NO
1. Settlements remaining settlements	NO	NO	NO
2. Lands converted to settlements[5]	NO	NO	NO
F. Other land	NO	NO	NO

[1] Methodologies for N2O emissions from N mineralization associated with loss of soil organic matter resulting from change of land use or management of mineral soils are based on equations 11.1, 11.2 and 11.8 of the 2006 IPCC Guidelines. N2O immobilization associated with gain of organic matter resulting from change of land use or management of mineral soils can be reported only when a Party applies a tier 3 approach in the relevant calculation.

[2] N_2O emissions from Cropland remaining cropland are included in the agriculture sector

[3] The total area of the subcategories, in accordance with the subdivision used, should be entered here. For lands remaining in the category, the area su

[4] In the calculation of the implied emission factor, N2O emissions are converted to N2O-N by multiplying by 28/44.

[5] If data are available, Parties are encouraged to report at the disaggregated level available from the pre-defined drop-down menu. Furthermore, Parties are encouraged to the extent possible to use the pre-defined category definitions rather than to create similar categories. This ensures the highest possible degree of comparability of the reporting. If detailed data are not available, Parties should include all emissions from land conversion here.

Documentation box:	
Parties should provide detailed explanations on the land use, land-use change and forestry sector in Chapter 6: Land Use, Land-Use Change and Forestry (CRF sector 4) of the national inventory report (NIR). Use this documentation box to provide	
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TABLE 4(IV) SECTORAL BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY

Indirect nitrous oxide (N_2O) emissions from managed soils[1][2]

Inventory 2020
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA AND OTHER RELATED INFORMATION		IMPLIED EMISSION FACTORS	EMISSIONS
	Description	Value kg N/yr	kg N_2O–N/kg N[3]	N_2O (kt)
1. Atmospheric deposition[4]	N volatilized from managed soils from inputs of N	IE	IE	IE
2. Nitrogen leaching and run-off[4]	N from fertilizers and other that is lost through leaching and run-off from managed soils	IE	IE	IE

[1] If the sources of nitrogen (N) cannot be separated other than between cropland and grasslands they should be included in the agriculture sector and reported in table 3 D(b). This should be explicitly indicated in the documentation box.

[2] Methodologies for indirect N_2O emissions are based on equations 11.9, 11.10 and 11.11 of the 2006 IPCC Guidelines.

[3] To convert from N_2O–N to N_2O emissions, multiply by 44/28.

[4] Report atmospheric deposition and leaching and runoff of N from the following sources of N inputs: synthetic and organic N fertilizer from land use categories, other than cropland and grassland (these emissions are reported in the agriculture sector), and N mineralization associated with loss of soil organic matter resulting from change of land use or management on mineral soils in all land use categories except for cropland remaining cropland.

Documentation box:	
Parties should provide detailed explanations on the land use, land-use change and forestry sector in Chapter 6: Land Use, Land-Use Change and Forestry (CRF sector 4) of the national inventory report (NIR). Use this documentation box to provide information to relevant sections of the NIR if any additional information and/or further details are needed to understand the sources of this table.	
Documentation box	

TABLE 4(V) SECTORAL BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY

Biomass Burning[1]

(Sheet 1 of 1)

Inventory 2020

Submission 2022 v1

KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		ACTIVITY DATA			IMPLIED EMISSION FACTOR			EMISSIONS		
		Description[2]	Unit	Values	CO_2	CH_4	N_2O	CO_2 (net)	CH_4	N_2O
Land-use category[3]	Subdivision[4]		(ha or kg dm)		(t/activity data unit)			(kt)		
Total for land-use categories			ha	187037,66	NO,NE,IE	0,01	0,00	NO,NE,IE	2,29	0,15
A. Forest land			ha	27,66	NO,IE	60,01	3,33	NO,IE	1,66	0,09
1. Forest land remaining forest land[5]			ha	27,66	NO,IE	60,01	3,33	NO,IE	1,66	0,09
Controlled burning			ha	NO	NO	NO	NO	NO	NO	NO
Wildfires			ha	27,66	IE	60,01	3,33	IE	1,66	0,09
2. Land converted to forest land			ha	NO	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE
Controlled burning			ha	NO	NO	NO	NO	NO	NO	NO
Wildfires			ha					IE	IE	IE
B. Cropland			ha	NO,IE	NO,NE	NO,IE	NO,IE	NO,NE	NO,IE	NO,IE
1. Cropland remaining cropland[5]			ha	NO,IE	NO,NE	NO,IE	NO,IE	NO,NE	NO,IE	NO,IE
Controlled burning			ha	NO	NO	NO	NO	NO	NO	NO
Wildfires			ha	IE	NE	IE	IE	NE	IE	IE
2. Land converted to cropland			ha	NO	NO	NO	NO	NO	NO	NO
Controlled burning			ha	NO	NO	NO	NO	NO	NO	NO
Wildfires			ha	NO	NO	NO	NO	NO	NO	NO
C. Grassland			ha	187010,00	NO,NE	0,00	0,00	NO,NE	0,63	0,06
1. Grassland remaining grassland[5]			ha	187010,00	NO,NE	0,00	0,00	NO,NE	0,63	0,06
Controlled burning			ha					NO	NO	NO
Wildfires			ha	187010,00	NE	0,00	0,00	NE	0,63	0,06
2. Land converted to grassland			ha	NO	NO	NO	NO	NO	NO	NO
Controlled burning			ha	NO	NO	NO	NO	NO	NO	NO
Wildfires			ha	NO	NO	NO	NO	NO	NO	NO
D. Wetlands			ha	NO,IE	NO,NE	NO,IE	NO,IE	NO,NE	NO,IE	NO,IE
1. Wetlands remaining wetlands			ha	NO,IE	NO,NE	NO,IE	NO,IE	NO,NE	NO,IE	NO,IE
Controlled burning			ha	NO	NO	NO	NO	NO	NO	NO
Wildfires			ha	IE	NE	IE	IE	NE	IE	IE
2. Land converted to wetlands			ha	NO	NO	NO	NO	NO	NO	NO
Controlled burning			ha	NO	NO	NO	NO	NO	NO	NO
Wildfires			ha	NO	NO	NO	NO	NO	NO	NO
E. Settlements			ha	NO	NO	NO	NO	NO	NO	NO
F. Other land			ha	NO	NO	NO	NO	NO	NO	NO
H. Other (please specify)	*			*						*

[1] The methodology for estimating non-CO_2 emissions from biomass burning is described in section 2.4 of chapter 2 of volume 4 of the 2006 IPCC Guidelines.

[2] Parties should report both controlled/prescribed burning and wildfires emissions, where appropriate, in a separate manner.

[3] When Parties estimate emissions from biomass burning on mineral and organic soils separately they are encouraged to use this column to provide this disaggregation.

[4] For each category, activity data should be selected between area burned or biomass burned. The units for area will be ha and for biomass burned will be kg dm. The implied emission factor will refer to the selected activity data with an automatic change documentation box and in the national inventory report (NIR). Double counting should be avoided. Parties that include all carbon stock changes in the carbon stock tables (4.A-F), should report "IE" (included elsewhere) in this column.

[5] Parties who wish to do so may report CO2 emissions from burning of organic soils here.

[6] CH_4 and N_2O emissions associated with the burning of forest land and grassland defined as savannah should be reported under the agriculture sector. CO2 emissions/removals associated

[7] In situ above-ground woody biomass burning is reported here. Agricultural residue burning is reported in the agriculture

Documentation box: Parties should provide detailed explanations on the land use, land-use change and forestry sector in Chapter 6: Land Use, Land-Use Change and Forestry (CRF sector 4) of the NIR. Use this documentation box to provide references to relevant sections of	
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TABLE 4.G SECTORAL BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY

Harvested wood products (HWP)[1]

(Sheet 1 of 2)

APPROACH A[2]

GREENHOUSE GAS SOURCE AND SINK CATEGORIES[3]	HWP in use (IU) from domestic consumption				Net emissions/ removals from HWP in use[6]
	Gains[4]	Losses[4]	Half-life[5]	Annual change in stock (ΔC HWP IU DC)	
	(t C)		(yr)	(kt C)	(kt CO_2)
TOTAL HWP consumed domestically (ΔC HWPdom IU DC)					
	NO	NO,IE		NO	NO,IE
1. Solid wood[7]	NO	NO		NO	NO
2. Paper and paperboard	NO	IE	2,00	NO	IE
3. Other *(please specify)*	NO	NO		NO	NO

Information item:[8]

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	HWP in solid waste disposal sites (SWDS) from domestic consumption[9]				Net CO_2 emissions/ removals from HWP in SWDS	Net CO_2 emissions/ removals from HWP from domestic consumption (IU+SWDS)
	Gains[4]	Losses[4]	Half-life[10]	Annual change in stock (ΔC HWP SWDS DC)		
	(t C)		(yr)	(kt C)	(kt CO_2)	(kt CO_2)
HWP in SWDS[11]	NO	NO	NO	NO	NO	NO

APPROACH B[12]

GREENHOUSE GAS SOURCE AND SINK CATEGORIES[3]	HWP in use from domestic harvest				Net emissions/ removals from HWP in use[6]
	Gains[4]	Losses[4]	Half-life[5]	Annual Change in stock (ΔC HWP IU DH)	
	(t C)		(yr)	(kt C)	(kt CO_2)
TOTAL HWP from domestic harvest (ΔC HWP IU DH)					
1. Solid wood[7]					
2. Paper and paperboard					
3. Other *(please specify)*					
HWP produced and consumed domestically (ΔC HWPdom IU DH)[13]					
Total					
1. Solid wood[7]					
2. Paper and paperboard					
3. Other *(please specify)*					

HWP produced and exported (ΔC HWPexp IU DH)[13]					
Total					
1. Solid wood[7]					
2. Paper and paperboard					
3. Other *(please specify)*					

Information item:[8]

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	HWP in solid waste disposal sites (SWDS) produced from domestic harvest[9]				Net CO_2 emissions/ removals from HWP in SWDS	Net CO_2 emissions/ removals from HWP from domestic harvest (IU + SWDS)
	Gains[4]	Losses[4]	Half-life[10]	Annual change in stock (ΔC HWP SWDS DH)		
	(t C)		(yr)	(kt C)	(kt CO_2)	(kt CO_2)
HWP in SWDS[11]						

APPROACH C[14]

GREENHOUSE GAS SOURCE AND SINK CATEGORIES[3]	HWP in use from domestic consumption			
	Gains[4]	Losses[4]	Half-life[5]	Annual change in stock (ΔC HWP IU DC)
	(t C)		(yr)	(kt C)
TOTAL				
1. Solid wood[7]				
2. Paper and paperboard				
3. Other *(please specify)*				

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Additional variables			Net CO_2 emissions/ removals from HWP in use[6]
	Annual domestic harvest (H)	Annual imports of wood, and paper products + wood fuel, pulp, recovered paper, roundwood/chips (Pim)	Annual exports of wood, and paper products + wood fuel, pulp, recovered paper, roundwood/chips (Pex)	
	(kt C)	(kt C)	(kt C)	(kt CO_2)
1. Solid wood				
2. Paper and paperboard				
3. Other *(please specify)*				

Information item:[8]

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	HWP in solid waste disposal sites (SWDS) from domestic consumption[9]				Net CO_2 emissions/ removals from HWP in SWDS	Net CO_2 emissions/ removals from HWP (IU+SWDS)[16]
	Gains[4]	Losses[4]	Half-life[10]	Annual change in stock (ΔC HWP SWSD DC)		
	(t C)		(yr)	(kt C)	(kt CO_2)	(kt CO_2)
HWP in SWDS[11]						

[1] A Party should only provide data for the approach it has chosen to use for reporting on harvested wood products.

[2] Stock change approach. Refer to equations 12.1, 12.2 and 12.A.2 of volume 4 of the 2006 IPCC Guidelines.

[3] Categories are defined in table 12.5 of volume 4 of the 2006 IPCC Guidelines. Countries may apply more detailed category breakdowns that better reflect their wood product industry.

[4] Gains refers to annual carbon inflow to HWP pool, losses refers to annual carbon outflow from HWP pool.

[5] Half-lives are needed when applying flux data methodology as suggested in equation 12.1 of volume 4 of the 2006 IPCC Guidelines. Following default half-lives may be used for HWP in use: sawnwood 35 years,

(5) For the purposes of reporting, the signs for removals are always negative (–) and for emissions positive (+).

(7) If data are available, Parties are encouraged to report at the disaggregated level available from the pre-defined drop-down menu. Furthermore, Parties are encouraged to the extent possible to use the pre-defined category definitions rather than to create similar categories. This ensures the highest possible degree of comparability of the reporting. If detailed data are not available, Parties should include all emissions from solid

(8) Information reported in this table as an information item should be used to check consistency with the estimation in the waste sector.

(9) Data on HWP in SWDS may be provided on a voluntary basis. It excludes the carbon in CH_4 emissions which is reported in the waste sector.

(10) See table 3.4 of volume 5 of the 2006 IPCC Guidelines.

(11) Waste subcategories as suggested in chapter 2.3.1 of volume 5 of the 2006 IPCC Guidelines may be used.

(12) Production approach. Refer to equations 12.1, 12.3 and 12.A.6 of volume 4 of the 2006 IPCC Guidelines or any other IPCC methodological guidance reflecting this approach.

(13) A Party may choose to separately report HWP for domestically produced and consumed, and domestically produced and exported HWP.

(14) Atmospheric flow approach. Refer to equations 12.1, 12.2 and 12.A.4 of volume 4 of the 2006 IPCC Guidelines.

Documentation box:	
Documentation box	G.A Solid Wood: 4.G.A Paper and Paperboard: 4.G.A HWP in SWDS: Carbon stock change not include in CRF tables. Comment is shown in ch. 7 of NIR

TABLE 4.G SECTORAL BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY
Harvested wood products (HWP)[1]
(Sheet 2 of 2)

Inventory 2020
Submission 2022 v1
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HWP activity data[2]

	Sawnwood			Wood panels			Paper and paperboard		
	Production	Imports	Exports	Production	Imports	Exports	Production	Imports	Exports
Inventory 2020	m^3	m^3	m^3	m^3	m^3	m^3	metric t	metric t	metric t
(1)									
1960									
1961									
1962									
1963									
1964									
1965									
1966									
1967									
1968									
1969									
1970									
1971									
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1979									
1980									
1981									
1982									
1983									
1984									
1985									
1986									
1987									
1988									
1989									
1990	NO	NO	NO	NO	NO	NO	NO	NO	NO
1991	NO	NO	NO	NO	NO	NO	NO	NO	NO
1992	NO	NO	NO	NO	NO	NO	NO	NO	NO
1993	NO	NO	NO	NO	NO	NO	NO	NO	NO
1994	NO	NO	NO	NO	NO	NO	NO	NO	NO
1995	NO	NO	NO	NO	NO	NO	NO	NO	NO
1996	NO	NO	NO	NO	NO	NO	NO	NO	NO
1997	NO	NO	NO	NO	NO	NO	NO	NO	NO
1998	NO	NO	NO	NO	NO	NO	NO	NO	NO
1999	NO	NO	NO	NO	NO	NO	NO	NO	NO
2000	NO	NO	NO	NO	NO	NO	NO	NO	NO
2001	NO	NO	NO	NO	NO	NO	NO	NO	NO
2002	NO	NO	NO	NO	NO	NO	NO	NO	NO
2003	NO	NO	NO	NO	NO	NO	NO	NO	NO
2004	NO	NO	NO	NO	NO	NO	NO	NO	NO
2005	NO	NO	NO	NO	NO	NO	NO	NO	NO
2006	NO	NO	NO	NO	NO	NO	NO	NO	NO
2007	NO	NO	NO	NO	NO	NO	NO	NO	NO
2008	NO	NO	NO	NO	NO	NO	NO	NO	NO
2009	NO	NO	NO	NO	NO	NO	NO	NO	NO
2010	NO	NO	NO	NO	NO	NO	NO	NO	NO

2011	NO	NO	NO	NO	NO	NO	NO	NO	NO
2012	NO	NO	NO	NO	NO	NO	NO	NO	NO
2013	NO	NO	NO	NO	NO	NO	NO	NO	NO
2014	NO	NO	NO	NO	NO	NO	NO	NO	NO
2015	NO	NO	NO	NO	NO	NO	NO	NO	NO
2016	NO	NO	NO	NO	NO	NO	NO	NO	NO
2017	NO	NO	NO	NO	NO	NO	NO	NO	NO
2018	NO	NO	NO	NO	NO	NO	NO	NO	NO
2019	NO	NO	NO	NO	NO	NO	NO	NO	NO
2020	NO	NO		NO	NO	NO	NO	NO	NO

(1) This table is only included for the latest reported inventory year in the CRF.

(2) Information should be provided on how activity data from the period from 1900 to the first year of the tabulated time series has been computed (equations 12.1 and 12.6 of volume 4 of the

(3) Provide activity data from the first year for which they are available.

Note: Information as outlined in the table above should be provided where tier 1 or tier 2 methods have been used (volume 4 of the 2006 IPCC Guidelines). Further information shall be

Additional information

Factors used to convert from product units to carbon

1. Solid wood[4]	
2. Paper and paperboard[4]	NO
3. Other (please specify)	

(4) A Party may apply different categories in case tier 3 methods are available.

Documentation box:	
Documentation box:	

TABLE 5 SECTORAL REPORT FOR WASTE
(Sheet 1 of 1)

Inventory 2020
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [(1)]	CH_4	N_2O	NO_x	CO	NMVOC	SO_2
	(kt)						
Total waste	25,34	277,22	1,34	NO,NE	NO,NE	NO,NE	NO,NE
A. Solid waste disposal	NO	153,42		NO,NE	NO,NE	NO,NE	
1. Managed waste disposal sites	NO	26,98		NE	NE	NE	
2. Unmanaged waste disposal sites	NO	126,44		NO	NO	NO	
3. Uncategorized waste disposal sites	NO	NO		NO	NO	NO	
B. Biological treatment of solid waste		NO	NO	NO	NO	NO	
1. Composting		NO	NO	NO	NO	NO	
2. Anaerobic digestion at biogas facilities		NO	NO				
C. Incineration and open burning of waste	25,34	0,02	0,02	NO,NE	NO,NE	NO,NE	NO,NE
1. Waste incineration	25,34	0,02	0,02	NO	NO	NO	NO
2. Open burning of waste	NO	NO,NE	NO,NE	NE	NE	NE	NE
D. Wastewater treatment and discharge		123,78	1,32	NO	NO	NO	
1. Domestic wastewater		87,41	1,32	NO	NO		
2. Industrial wastewater		36,37	NE	NO	NO	NO	
3. Other *(as specified in table 5.D)*		NO	NO				
E. Other *(please specify)*	NO	NO	NO	NO	NO	NO	NO
Memo item: [(2)]							
Long-term storage of C in waste disposal sites	NO						
Annual change in total long-term C storage							
Annual change in total long-term C storage in HWP waste [(3)]	NO						

(1) CO_2 emissions from the categories solid waste disposal on land and waste incineration should only be included if they derive from non-biological or inorganic waste sources.

(2) Long-term storage of carbon in waste disposal sites, Annual change in total long-term storage of carbon stored and Annual change in long-term storage of carbon in HWP waste should be entered as carbon dioxide (CO_2).

(3) Carbon stored in wood, paper, cardboard, garden and park waste (equals to the annual change in stocks of harvested wood products in solid waste disposal sites from consumption, second activity data in the table for harvested wood products).

Documentation box:	
• If estimates are reported under 5.E Other, use this documentation box to provide information regarding activities covered under this category and to provide reference to the section in the NIR where background information can be found.	
Documentation box	tage system. According to IPCC 2006, Volume 5, p 6.11, CH4 emissions from industrial wastewater and sludge are estimated together.

TABLE 5.A SECTORAL BACKGROUND DATA FOR WASTE
Solid waste disposal
(Sheet 1 of 1)

Inventory 2020
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA AND OTHER RELATED INFORMATION			IMPLIED EMISSION FACTOR		EMISSIONS			
				CH_4[1]	CO_2	CH_4			CO_2[4]
	Annual waste at the SWDS	MCF	DOC_F			Emissions[2]	Amount of CH_4 flared	Amount of CH_4 for energy recovery[3]	
	(kt)		%	(t/t waste)		(kt)			
1. Managed waste disposal sites	796.62			0,03	NO	26,98	NO	NO	NO
a. Anaerobic	381.89	1,00	0,50	0,02	NO	8,44	NO	NO	NO
b. Semi-aerobic	414.73	0,50	0,50	0,04	NO	18,54	NO	NO	NO
2. Unmanaged waste disposal sites	3708.00	0,40	0,50	0,03	NO	126,44	NO	NO	NO
3. Uncategorized waste disposal sites	NO	NO	NO	NO	NO	NO	NO	NO	NO

Note: SWDS = solid waste disposal site, MCF = methane correction factor, DOC_F = fraction of degradable organic carbon that decomposes, DOC = degradable organic carbon (IPCC Guidelines (Volume 5, section 3.2.3))
Note: Annual waste includes household waste, yard/garden waste, commercial/institutional waste, sludge, industrial and other waste.
Note: The is no methodology in the 2006 IPCC Guidelines to estimate emissions from flaring based on recovered biogas from solid waste disposal sites and wastewater handling. If data are available, Parties are encouraged to report emissions of methane (CH_4) and nitrous oxide (N_2O) under

[1] The CH_4 implied emission factor (IEF) is calculated on the basis of gross CH_4 emissions as follows: IEF = (CH_4 emissions + CH_4 recovered)/annual waste at the SWDS.
[2] Actual emissions (after flaring and recovery).
[3] When recovered CH_4 emissions are used for energy, the emissions from the combustion should be reported under category 1 A and are provided here for information only.
[4] Under solid waste disposal, CO_2 emissions should be reported only when the disposed waste is combusted at the disposal site as a management practice. CO_2 emissions from non-biogenic waste are included in the total emissions, whereas the CO_2 emissions from biogenic waste are not included in the total emissions.

Documentation box:
- Parties should provide detailed explanations on the waste sector in chapter 7: waste (CRF sector 5) of the national inventory report (NIR). Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.
- Parties that use country-specific models should provide a reference in the documentation box to the relevant section in the NIR where these models are described, and fill in only the relevant cells of table 5.A.
- Provide a reference to the relevant section in the NIR, in particular with regard to:
  (a) The population size (total or urban population) used in the calculations and the rationale for doing so;
  (b) The composition of landfilled waste.
- Parties should specify the category in the energy sector under which the emissions from energy recovery are reported.

Documentation box	

TABLE 5.B SECTORAL BACKGROUND DATA FOR WASTE

Biological Treatment of Solid Waste

(Sheet 1 of 1)

Inventory 2020
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA AND OTHER RELATED INFORMATION	IMPLIED EMISSION FACTOR		EMISSIONS			
		CH_4 [1]	N_2O	CH_4			N_2O
	Annual waste amount treated			Emissions [2]	Amount of CH_4 flared	Amount of CH_4 for energy recovery [3]	
	(kt dm)	(g/kg waste)		(kt)			
1. Composting	NO	NO	NO	NO	NO		NO
Municipal solid waste	NO	NO	NO	NO	NO		NO
Other (please specify) [4]	NO	NO	NO	NO	NO		NO
2. Anaerobic digestion at biogas facilities [1]	NO	NO	NO	NO	NO	NO	NO
Municipal solid waste	NO	NO	NO	NO	NO	NO	NO
Other (please specify) [4]	NO	NO	NO	NO	NO	NO	NO

[1] The CH_4 implied emission factor (IEF) is calculated on the basis of gross methane (CH_4) emissions as follows IEF = (CH_4 emissions + CH_4 recovered/flared)/annual waste at the solid waste disposal sites.
[2] Actual emissions (after recovery and flaring).
[3] When CH_4 emissions recovered are used for energy, the emissions from the combustion should be reported under category 1.A.
[4] This category should include all organic waste from sources not covered by municipal solid waste.

Documentation box:

• Parties should provide detailed explanations on the waste sector in chapter 7: waste (CRF sector 5) of the national inventory report (NIR). Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.

• Parties should specify the category in the energy sector under which the emissions from energy recovery are reported.

Documentation box	

TABLE 5.C SECTORAL BACKGROUND DATA FOR WASTE

Incineration and open burning of waste

(Sheet 1 of 1)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA Amount of wastes (incinerated/open burned) (kt wet weight)	IMPLIED EMISSION FACTOR			EMISSIONS		
		CO_2	CH_4	N_2O	CO_2	CH_4	N_2O
		(kg/t waste)			(kt)		
1. Waste Incineration	NO	NO	NO	NO	25,34	0,02	0,02
Biogenic [1]	NO	NO	NO	NO	NO	NO	NO
Municipal solid waste	NO	NO	NO	NO	NO	NO	NO
Other *(please specify)* [2]	NO	NO	NO	NO	NO	NO	NO
Non-biogenic	NO	NO	NO	NO	25,34	0,02	0,02
Municipal solid waste	NO	NO	NO	NO	NO	NO	NO
Other *(please specify)* [3]	NO	NO	NO	NO	25,34	0,02	0,02
2. Open burning of waste	NO,NE	NO	NO,NE	NO,NE	NO	NO,NE	NO,NE
Biogenic [1]	NE	NE	NE	NE	NE	NE	NE
Municipal solid waste	NE	NE	NE	NE	NE	NE	NE
Other *(please specify)*							
Non-biogenic	NO	NO	NO	NO	NO	NO	NO
Municipal solid waste	NO	NO	NO	NO	NO	NO	NO
Other *(please specify)*	NO	NO	NO	NO	NO	NO	NO

Note: Only emissions from waste incineration without energy recovery are to be reported under the waste sector. Emissions from incineration with energy recovery are to

[1] The CO_2 emissions from combustion of biomass materials (e.g. paper, food and wood waste) contained in the waste are biogenic emissions and should not be included in

[2] If data are available, Parties are encouraged to report at the disaggregated level available from the pre-defined drop-down menu. Furthermore, Parties are encouraged to the extent possible to use the pre-defined category definitions rather than to create similar categories. This ensures the highest possible degree of comparability of the

[3] If data are available, Parties are encouraged to report at the disaggregated level available from the pre-defined drop-down menu. Furthermore, Parties are encouraged to the extent possible to use the pre-defined category definitions rather than to create similar categories. This ensures the highest possible degree of comparability of the

[3] This category includes lubricants, solvents and waste oil. Unless fossil liquid waste is included in other types of waste (e.g. industrial or hazardous waste), the emissions need to be calculated separately.

Documentation box: • Parties should provide detailed explanations on the waste sector in Chapter 7: Waste (CRF sector 5) of the national inventory report (NIR). Use this documentation box • Parties that use country-specific models should provide a reference in the documentation box to the relevant section in the NIR where these models are described, and fill • Provide a reference to the relevant section of the NIR, in particular with regard to the amount of incinerated waste (specify whether the reported data relate to wet or dry	
Documentation box	5.C.1.1.b: 5.C.1.2.b: Clinical waste

TABLE 5.D SECTORAL BACKGROUND DATA FOR WASTE

Wastewater treatment and discharge

(Sheet 1 of 1)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA AND RELATED INFORMATION			IMPLIED EMISSION FACTOR		EMISSIONS			
						CH_4			N_2O[3]
	Total organic product	Sludge removed[1]	N in effluent	CH_4[2]	N_2O[3]	Emissions[4]	Amount of CH_4 flared	Amount of CH_4 for Energy Recovery[5]	
	(kt DC[6]/yr)		(kt N/yr)	(kg/kg DC)	kg N2O-N/kg N	(kt)			
1. Domestic wastewater	516,83	NO	148,63	0,17	0,00	87,41	NO	NO	1,32
2. Industrial wastewater	484,90	NO	NO	0,08	NE	36,17	NO	NO	NE
3. Other *(please specify)*	NO	NO	NO	NO	NO	NO	NO	NO	NO

[1] If sludge removal is reported in the wastewater inventory, it should be consistent with the estimates for sludge applied to agricultural soils, sludge incinerated and sludge deposited in solid waste disposal sites.
[2] The methane (CH_4) implied emission factor (IEF) is calculated on the basis of gross CH_4 emissions as follows: IEF = (CH_4 emissions + CH_4 recovered or flared) / total organic product.
[3] Parties using methods other than those from the IPCC for estimating nitrous oxide (N_2O) emissions from human sewage or wastewater treatment should provide aggregate data in this table.
[4] Actual emissions (after flaring and recovery).
[5] When CH_4 recovered is used for energy production, the emissions should be reported under category 1.A.
[6] DC = degradable organic component. DC indicators are COD (chemical oxygen demand) for industrial waste water and BOD (biochemical oxygen demand) for domestic/commercial wastewater/sludge (2006 IPCC Guidelines (Volume 5. Section

Additional information

Population (1000s)	18879,55
Protein consumption (kg/person/yr)	40,60
Fraction of nitrogen in protein	0,16
$F_{NON-CONS}$	1,10
$F_{INDUSTRIAL}$	1,25
T_{PLANT}	NO

Note: Parties are encouraged to supply the additional information regardless of the methodology applied
$F_{NON-CONS}$ = Fraction of non-consumed protein added to the wastewater
discharged protein into the sewer system
T_{PLANT} = Degree of utilization of modern, centralized WWT plants

Documentation box:	
• Regarding the estimates for N_2O from human sewage, specify whether rural or urban population is used in the calculations and the rationale for doing so. Provide an explanation in the documentation box.	
• Parties using methods other than those from the IPCC for estimating N_2O emissions from wastewater treatment should provide, in the national inventory report (NIR), corresponding information on methods, activity data and emission factors used, and	
Documentation box	Rural and commercial co-discharged protein into the sewage system. According to IPCC 2006, Volume 5, p.6.11, CH4 emissions from industrial wastewater and sludge are estimated together

SUMMARY 1.A SUMMARY REPORT FOR NATIONAL GREENHOUSE GAS INVENTORIES
(Sheet 1 of 3)

Inventory 2020
Submission 2022 v1
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GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Net CO_2 emissions/removals	CH_4	N_2O	HFCs[1]	PFCs[1]	Unspecified mix of HFCs and PFCs[1]	SF_6	NF_3	NO_x	CO	NMVOC	SO_2
	(kt)			(kt CO_2 equivalent)			(kt)					
Total national emissions and removals	288768,47	1744,30	65,17	1135,44	665,50	NO,NA	0,00	NO,NA	70632,57	471847,24	51455,30	636,22
1. Energy	259331,29	534,91	4,35						70597,69	471815,41	51065,41	636,22
A. Fuel combustion Reference approach(2)	228429,31											
Sectoral approach(2)	242487,38	66,65	4,34						70597,69	471815,41	51065,41	636,22
1. Energy industries	143762,48	1,89	1,92						427,81	32,13	8,10	416,10
2. Manufacturing industries and construction	26461,69	2,30	0,38						35,22	12,65	1,81	51,32
3. Transport	18164,13	7,17	1,28						70078,80	471072,06	50985,07	41,75
4. Other sectors	31970,65	52,73	0,47						30,44	391,85	39,46	73,34
5. Other	22128,44	2,56	0,29						25,43	306,71	30,98	53,72
B. Fugitive emissions from fuels	16843,90	468,26	0,01						NO,NA	NO,NA	NO,NA	NO,NA
1. Solid fuels	16829,18	275,13	0,00						NO,NA	NO,NA	NO,NA	NO,NA
2. Oil and natural gas and other emissions from energy production	14,73	193,12	0,01						NA	NA	NA	NA
C. CO_2 Transport and storage	NO,NA											
2. Industrial processes and product use	21499,55	0,46	0,66	1135,44	665,50	NO,NA	0,00	NO,NA	0,48	31,83	263,05	0,00
A. Mineral industry	8273,27								NO	NO	NO	NO
B. Chemical industry	483,50	NO	0,66	NO	NO	NO	NO	NO	0,22	0,02	NO	0,00
C. Metal industry	12571,74	0,46	NO	NO	665,50	NO	NO	NO	0,27	31,81	1,07	NO,NA
D. Non-energy products from fuels and solvent use	171,04	NO,NA	NO,NA						NO,NA	NO,NA	261,98	NO,NA
E. Electronic industry				NO	NO	NO	NO	NO				
F. Product uses as substitutes for ODS				1135,44	NO,NA	NO,NA	NO,NA	NO,NA				
G. Other product manufacture and use	NO	NO	NO,NE	NO	NO	NO	0,00	NO	NO	NO	NO	NO
H. Other[3]	NA	NA	NA	NO,NA	NO,NA	NA	NA	NA	NA	NA	NA	NA

Note: All footnotes for this table are given at the end of the table on sheet 3

SUMMARY 1.A SUMMARY REPORT FOR NATIONAL GREENHOUSE GAS INVENTORIES
(Sheet 2 of 3)

Inventory 2020
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2	CH_4	N_2O	HFCs [1]	PFCs [1]	Unspecified mix of HFCs	SF_6	NF_3	NO_x	CO	NMVOC	SO_2
	(kt)			(kt CO_2 equivalent)			(kt)					
3. Agriculture	3,67	929,43	58,68						34,39	NO	126,85	NO
A. Enteric fermentation		874,14										
B. Manure management		33,81	9,16								107,43	
C. Rice cultivation		21,48									NO	
D. Agricultural soils		NO	49,52						34,39	NO	19,42	
E. Prescribed burning of savannas		NO	NO						NO	NO	NO	
F. Field burning of agricultural residues		NO	NO						NO	NO	NO	
G. Liming	NO											
H. Urea application	3,67											
I. Other carbon-contining fertilizers	NO											
J. Other	NO	NO	NO						NO	NO	NO	NO
4. Land use, land-use change and forestry [3]	7908,63	2,29	0,15						NO	NO	NO	NO
A. Forest land [4]	-10335,60	1,66	0,09						NO	NO	NO	
B. Cropland [4]	31905,13	NO,IE	NO,IE						NO	NO	NO	
C. Grassland [4]	-10120,00	0,63	0,06									
D. Wetlands [4]	NO,NE,NA	NO,IE,NA	NO,IE,NA						NO	NO	NO	
E. Settlements [4]	-3540,90	NO	NO						NO	NO	NO	
F. Other land [4]	NO	NO	NO						NO	NO	NO	
G. Harvested wood products	NO,IE											
H. Other [4]	NO	NO	NO						NO	NO	NO	NO
5. Waste	25,34	277,22	1,34						NO,NE	NO,NE	NO,NE	NO,NE
A. Solid waste disposal [5]	NO	153,42							NO,NE	NO,NE	NO,NE	
B. Biological treatment of solid waste [5]		NO	NO						NO	NO	NO	
C. Incineration and open burning of waste [5]	25,34	0,02	0,02						NO,NE	NO,NE	NO,NE	NO,NE
D. Wastewater treatment and discharge		123,78	1,32						NO	NO	NO	
E. Other [5]	NO	NO	NO						NO	NO	NO	NO
6. Other *(please specify)* [6]	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

Note: All footnotes for this table are given at the end of the table on sheet 3.

SUMMARY 1.A SUMMARY REPORT FOR NATIONAL GREENHOUSE GAS INVENTORIES (IPCC TABLE 7A)
(Sheet 3 of 3)

Inventory 2020
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Net CO_2 emissions/removals	CH_4	N_2O	HFCs[1]	PFCs[1]	Unspecified mix of HFCs and PFCs[1]	SF_6	NF_3	NO_x	CO	NMVOC	SO_2
	(kt)			(kt CO_2 equivalent)					(kt)			
Memo items:[7]												
International bunkers	380,63	0,00	0,01						NE,NA	NE,NA	NE,NA	NE,NA
Aviation	369,71	0,00	0,01						NE	NE	NE	NE
Navigation	10,92	0,00	0,00						NA	NA	NA	NA
Multilateral operations	NA	NA	NA						NA	NA	NA	NA
CO_2 emissions from biomass	178,92											
CO_2 captured	NO,IE,NA											
Long-term storage of C in waste disposal sites	NO											
Indirect N_2O			NO,NA									
Indirect CO_2	NO,NA											

[1] The emissions of hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), unspecified mix of HFCs and PFCs and other fluorinated gases are to be expressed as carbon dioxide (CO_2) equivalent emissions. Data on disaggregated emissions of

[2] For verification purposes, Parties are requested to report the results of their calculations using the Reference approach and to explain any differences with the Sectoral approach in the documentation box to table 1.A(c). For estimating national

[3] 2.H. Other includes pulp and paper and food and beverages industry.

[4] For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

[5] CO_2 from categories solid waste disposal on land and waste incineration should only be included if it stems from non-biogenic or inorganic waste streams. Only emissions from waste incineration without energy recovery are to be reported in the waste sector, whereas emissions from incineration with energy recovery are to be reported in the energy sector.

[6] If reporting any country-specific category under sector "6. Other", detailed explanations should be provided in Chapter 8: Other (CRF sector 6) of the national inventory report (NIR).

[7] Parties are asked to report emissions from international aviation and international navigation and multilateral operations, as well as CO_2 emissions from biomass and CO_2 captured, under Memo Items. These emissions should not be included in the national total emissions from the energy sector. Amounts of biomass used as fuel are included in the national energy consumption but the corresponding CO_2 emissions are not included in the national total as it is assumed that the biomass is produced in a sustainable manner. If the biomass is harvested at an unsustainable rate, net CO_2 emissions are accounted for as a loss of biomass stocks in the Land Use, Land-use Change and Forestry sector.

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [(1)]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total
	CO_2 equivalent (kt)								
Total (net emissions)[(1)]	288768,47	43607,52	19420,26	1135,44	665,50	2,31	NO,NA	NO,NA	353599,49
1. Energy	259331,29	13372,71	1296,20						274000,19
A. Fuel combustion (sectoral approach)	242487,38	1666,27	1293,80						245447,46
1. Energy industries	143762,48	47,28	572,90						144382,66
2. Manufacturing industries and construction	26461,69	57,62	111,81						26631,13
3. Transport	18164,13	179,15	382,48						18725,75
4. Other sectors	31970,65	1318,13	140,35						33429,13
5. Other	22128,44	64,08	86,27						22278,79
B. Fugitive emissions from fuels	16843,90	11706,44	2,40						28552,73
1. Solid fuels	16829,18	6878,36	0,08						23707,61
2. Oil and natural gas	14,73	4828,07	2,32						4845,12
C. CO_2 transport and storage	NO,NA								NO,NA
2. Industrial processes and product use	21499,55	11,42	195,88	1135,44	665,50	2,31	NO,NA	NO,NA	23510,09
A. Mineral industry	8273,27								8273,27
B. Chemical industry	483,50	NO	195,88	NO	NO	NO	NO	NO	679,38
C. Metal industry	12571,74	11,42	NO	NO	665,50	NO	NO	NO	13248,66
D. Non-energy products from fuels and solvent use	171,04	NO,NA	NO,NA						171,04
E. Electronic Industry				NO	NO	NO	NO	NO	NO
F. Product uses as ODS substitutes				1135,44	NO,NA	NO,NA	NO,NA	NO,NA	1135,44
G. Other product manufacture and use	NO	NO	NO,NE	NO	NO	2,31	NO	NO	2,31
H. Other	NA	NA	NA	NO,NA	NO,NA	NA	NA	NA	NO,NA
3. Agriculture	3,67	23235,76	17485,56						40724,99
A. Enteric fermentation		21853,50							21853,50
B. Manure management		845,26	2728,60						3573,86
C. Rice cultivation		537,00							537,00
D. Agricultural soils		NO	14756,96						14756,96
E. Prescribed burning of savannas		NO	NO						NO
F. Field burning of agricultural residues		NO	NO						NO
G. Liming	NO								NO
H. Urea application	3,67								3,67
I. Other carbon-containing fertilizers	NO								NO
J. Other	NO	NO	NO						NO
4. Land use, land-use change and forestry[(1)]	7908,63	57,20	44,10						8009,94
A. Forest land	-10335,60	41,50	27,42						-10266,68
B. Cropland	31905,13	NO,IE	NO,IE						31905,13
C. Grassland	-10120,00	15,70	16,69						-10087,61
D. Wetlands	NO,NE,NA	NO,IE,NA	NO,IE,NA						NO,NE,IE,NA
E. Settlements	-3540,90	NO	NO						-3540,90

F. Other land	NO	NO	NO						NO
G. Harvested wood products	NO,IE								NO,IE
H. Other	NO	NO	NO						NO
5. Waste	25,34	6930,43	398,52						7354,28
A. Solid waste disposal	NO	3835,50							3835,50
B. Biological treatment of solid waste		NO	NO						NO
C. Incineration and open burning of waste	25,34	0,43	5,16						30,92
D. Waste water treatment and discharge		3094,50	393,36						3487,86
E. Other	NO	NO	NO						NO
6. Other *(as specified in summary 1.A)*	NO	NO	NO	NO	NO	NO	NO	NO	NO

Memo items:[2]									
International bunkers	380,63	0,09	3,28						384,00
Aviation	369,71	0,06	3,08						372,85
Navigation	10,92	0,03	0,20						11,14
Multilateral operations	NA	NA	NA						NA
CO_2 emissions from biomass	178,92								178,92
CO_2 captured	NO,IE,NA								NO,IE,NA
Long-term storage of C in waste disposal sites	NO								NO
Indirect N_2O			NO,NA						
Indirect CO_2 [3]	NO,NA								
Total CO_2 equivalent emissions without land use, land-use change and forestry									345589,56
Total CO_2 equivalent emissions with land use, land-use change and forestry									353599,49
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry									NA
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry									NA

(1) For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

(2) See footnote 7 to table Summary 1.A.

(3) In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2 the national totals shall be provided with and without indirect CO_2.

SUMMARY 3 SUMMARY REPORT FOR METHODS AND EMISSION FACTORS USED
(Sheet 1 of 2)

Inventory 2020
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2		CH_4		N_2O		HFCs		PFCs		SF_6		Unspecified mix of HFCs and PFCs		NF_3	
	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor
1. Energy	T1,T2	CS,D	T1,T2	CR,CS,D	T1,T2	CS,D										
A. Fuel combustion	T1,T2	CS,D	T1,T2	CS,D	T1,T2	CS,D										
1. Energy industries	T1	D	T1	D	T1	D										
2. Manufacturing industries and construction	T1	D	T1	D	T1	D										
3. Transport	T1,T2	CS,D	T1,T2	CS,D	T1,T2	CS,D										
4. Other sectors	T1	D	T1	D	T1	D										
5. Other	T1	D	T1	D	T1	D										
B. Fugitive emissions from fuels	T1	D	T1	CR,D	T1	D										
1. Solid fuels	T1	D	T1	D	T1	D										
2. Oil and natural gas	T1	D	T1	CR,D	T1	D										
C. CO_2 transport and storage																
2. Industrial processes	T1,T2	CS,D	D	D	T1	D	T2	D	T1	D	T1	D				
A. Mineral industry	T1,T2	CS,D														
B. Chemical industry	T1,T2	CS,D			T1	D										
C. Metal industry	T1,T2	CS,D	D	D					T1	D						
D. Non-energy products from fuels and solvent use	T1	D														
E. Electronic industry																
F. Product uses as ODS substitutes							T2	D								
G. Other product manufacture and use											T1	D				
H. Other																

Use the following notation keys to specify the method applied:

D (IPCC default)
RA (Reference Approach)
T1 (IPCC Tier 1)
T1a, T1b, T1c (IPCC Tier 1a, Tier 1b and Tier 1c, respectively)
T2 (IPCC Tier 2)
T3 (IPCC Tier 3)
CR (CORINAIR)
CS (Country Specific)
OTH (Other)
M (model)

If using more than one method within one source category, list all the relevant methods. Explanations regarding country-specific methods, other methods or any modifications to the default IPCC methods, as well as information regarding the use of different methods per source category where more than one method is indicated, should be provided in the documentation box. Also use the documentation box to explain the use of notation OTH.

Use the following notation keys to specify the emission factor used:

D (IPCC default)
CR (CORINAIR)
CS (Country Specific)
PS (Plant Specific)
OTH (Other)
M (model)

Where a mix of emission factors has been used, list all the methods in the relevant cells and give further explanations in the documentation box. Also use the documentation box to explain the use of notation OTH.

SUMMARY 3 SUMMARY REPORT FOR METHODS AND EMISSION FACTORS USED
(Sheet 2 of 2)

Inventory 2020
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2		CH_4		N_2O		HFCs		PFCs		SF_6		Unspecified mix of HFCs and PFCs		NF_3	
	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor
3. Agriculture	T1	D	T1,T2	CS,D	T1,T2	CS,D										
A. Enteric fermentation			T1,T2	CS,D												
B. Manure management			T1,T2	CS,D	T1,T2	CS,D										
C. Rice cultivation			T1	D												
D. Agricultural soils[11]					T1,T2	CS,D										
E. Prescribed burning of savannas																
F. Field burning of agricultural residues																
G. Liming																
H. Urea application	T1	D														
I. Other carbon-containing fertilizers																
J. Other																
4. Land use, land-use change and forestry	T1,T2	CS	T1,T2	D	T1,T2	D										
A. Forest land	T2	CS	T2	D	T2	D										
B. Cropland	T2	CS														
C. Grassland	T2	CS	T1	D	T1	D										
D. Wetlands																
E. Settlements	T1	CS														
F. Other land																
G. Harvested wood products																
H. Other																
5. Waste	T1	D	M,T1	CS,D,M	T1	D										
A. Solid waste disposal			M	CS,M												
B. Biological treatment of solid waste																
C. Incineration and open burning of waste	T1	D	T1	D	T1	D										
D. Waste water treatment and discharge			T1	D	T1	D										
E. Other																
6. Other (as specified in summary 1.A)																

Use the following notation keys to specify the method applied:

D (IPCC default) **T1a, T1b, T1c** (IPCC Tier 1a, Tier 1b and Tier 1c, respectively) **CR** (CORINAIR) **M** (model)
RA (Reference Approach) **T2** (IPCC Tier 2) **CS** (Country Specific)
T1 (IPCC Tier 1) **T3** (IPCC Tier 3) **OTH** (Other)

If using more than one method within one source category, list all the relevant methods. Explanations regarding country-specific methods, other methods or any modifications to the default IPCC methods, as well as information regarding the use of different methods per source category where more than one method is indicated, should be provided in the documentation box. Also use the documentation box to explain the use of notation OTH.

Use the following notation keys to specify the emission factor used:

D (IPCC default) **CS** (Country Specific) **OTH** (Other)
CR (CORINAIR) **PS** (Plant Specific) **M** (model)

Where a mix of emission factors has been used, list all the methods in the relevant cells and give further explanations in the documentation box. Also use the documentation box to explain the use of notation OTH.

Documentation box:

- Parties should provide the full information on methodological issues, such as methods and emission factors used, in the relevant sections of chapters 3 to 8 (see section 2.2 of each of Chapters 3 – 8) of the national inventory report (NIR). Use this documentation box to provide references to relevant sections of the NIR if any additional information and further details are needed to understand the content of this table.
- Where a mix of methods/emission factors has been used within one source category, use this documentation box to specify those methods/emission factors for the various sub-sources where they have been applied.
- Where the notation OTH (Other) has been entered in this table, use this documentation box to specify those other methods/emission factors.

Documentation box	

TABLE 6 CROSS-SECTORAL REPORT: Indirect emissions of N_2O and CO_2
(Sheet 1 of 1)

Inventory 2020
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	SOURCE EMISSIONS					INDIRECT EMISSIONS	
	CH_4	CO	NMVOC	NOx	NH_3	CO_2 [1]	N_2O [2]
	(kt)					(kt)	
Total	1744,30	471847,24	51455,30	70632,57	NO,NA	NO,NA	NO,NA
1. Energy	534,91	471815,41	51065,41	70597,69			
2. Industrial processes and product use	0,46	31,83	263,05	0,48	NA	NA	NA
3. Agriculture [3]	929,43	NO	126,85	34,39		NO	NO
4. LULUCF [3]	2,29	NO	NO	NO		NO	NO
5. Waste	277,22	NO,NE	NO,NE	NO,NE	NO	NA	NA
6. Other *(please specify)*	NO	NO	NO	NO	NO	NO	NO

[1] Parties may report indirect CO_2 from the atmospheric oxidation of CH_4, CO and NMVOCs.

[2] Parties may report indirect emissions of N_2O from sources other than agriculture and LULUCF.

[3] Indirect emissions of N_2O resulting from ammonia emissions are covered in the sectoral tables for agriculture and LULUCF. In this table, only indirect N_2O emissions

TABLE 7 SUMMARY OVERVIEW FOR KEY CATEGORIES[1]
(Sheet 1 of 1)

KEY CATEGORIES OF EMISSIONS AND REMOVALS	Gas	Criteria used for key source identification		Key category including LULUCF
		L	T	
1.A.1 Fuel combustion - Energy Industries - Liquid Fuels	CO2	X	X	X
1.A.1 Fuel combustion - Energy Industries - Liquid Fuels	CH4			
1.A.1 Fuel combustion - Energy Industries - Liquid Fuels	N2O			
1.A.1 Fuel combustion - Energy Industries - Solid Fuels	CO2	X	X	X
1.A.1 Fuel combustion - Energy Industries - Solid Fuels	CH4			
1.A.1 Fuel combustion - Energy Industries - Solid Fuels	N2O			
1.A.1 Fuel combustion - Energy Industries - Gaseous Fuels	CO2	X	X	X
1.A.1 Fuel combustion - Energy Industries - Gaseous Fuels	CH4			
1.A.1 Fuel combustion - Energy Industries - Gaseous Fuels	N2O			
1.A.1 Fuel combustion - Energy Industries - Other Fossil Fuels	CO2	X	X	X
1.A.1 Fuel combustion - Energy Industries - Other Fossil Fuels	CH4			
1.A.1 Fuel combustion - Energy Industries - Other Fossil Fuels	N2O			
1.A.1 Fuel combustion - Energy Industries - Peat	CO2			
1.A.1 Fuel combustion - Energy Industries - Peat	CH4			
1.A.1 Fuel combustion - Energy Industries - Peat	N2O			
1.A.1 Fuel combustion - Energy Industries - Biomass	CO2			
1.A.1 Fuel combustion - Energy Industries - Biomass	CH4			
1.A.1 Fuel combustion - Energy Industries - Biomass	N2O			
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Liquid Fuels	CO2	X	X	X
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Liquid Fuels	CH4			
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Liquid Fuels	N2O			
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Solid Fuels	CO2	X	X	X
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Solid Fuels	CH4			
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Solid Fuels	N2O			
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Gaseous Fuels	CO2	X		X
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Gaseous Fuels	CH4			
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Gaseous Fuels	N2O			
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Other Fossil Fuels	CO2			
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Other Fossil Fuels	CH4			
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Other Fossil Fuels	N2O			
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Peat	CO2			
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Peat	CH4			
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Peat	N2O			
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Biomass	CO2			
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Biomass	CH4			
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Biomass	N2O			
1.A.3.a Domestic Aviation	CO2			
1.A.3.a Domestic Aviation	CH4			
1.A.3.a Domestic Aviation	N2O			
1.A.3.b Road Transportation	CO2	X	X	X
1.A.3.b Road Transportation	CH4			
1.A.3.b Road Transportation	N2O			
1.A.3.c Railways	CO2			
1.A.3.c Railways	CH4			
1.A.3.c Railways	N2O			
1.A.3.d Domestic Navigation - Liquid Fuels	CO2			
1.A.3.d Domestic Navigation - Liquid Fuels	CH4			
1.A.3.d Domestic Navigation - Liquid Fuels	N2O			
1.A.3.d Domestic Navigation - Solid Fuels	CO2			
1.A.3.d Domestic Navigation - Solid Fuels	CH4			
1.A.3.d Domestic Navigation - Solid Fuels	N2O			
1.A.3.d Domestic Navigation - Gaseous Fuels	CO2			
1.A.3.d Domestic Navigation - Gaseous Fuels	CH4			
1.A.3.d Domestic Navigation - Gaseous Fuels	N2O			
1.A.3.d Domestic Navigation - Other Fossil Fuels	CO2			
1.A.3.d Domestic Navigation - Other Fossil Fuels	CH4			
1.A.3.d Domestic Navigation - Other Fossil Fuels	N2O			
1.A.3.d Domestic Navigation - Biomass Fuels	CO2			
1.A.3.d Domestic Navigation - Biomass Fuels	CH4			
1.A.3.d Domestic Navigation - Biomass Fuels	N2O			
1.A.3.e Other Transportation	CO2			
1.A.3.e Other Transportation	CH4			
1.A.3.e Other Transportation	N2O			
1.A.4.a Other Sectors - Liquid Fuels	CO2	X	X	X
1.A.4.a Other Sectors - Liquid Fuels	CH4			
1.A.4.a Other Sectors - Liquid Fuels	N2O			
1.A.4.b Other Sectors - Solid Fuels	CO2	X	X	X
1.A.4.b Other Sectors - Solid Fuels	CH4			
1.A.4.b Other Sectors - Solid Fuels	N2O			
1.A.4.c Other Sectors - Gaseous Fuels	CO2	X	X	X
1.A.4.c Other Sectors - Gaseous Fuels	CH4			
1.A.4.c Other Sectors - Gaseous Fuels	N2O			
1.A.4.c Other Sectors - Other Fossil Fuels	CO2			
1.A.4.c Other Sectors - Other Fossil Fuels	CH4			
1.A.4.c Other Sectors - Other Fossil Fuels	N2O			
1.A.4.c Other Sectors - Peat	CO2			
1.A.4.c Other Sectors - Peat	CH4			
1.A.4.c Other Sectors - Peat	N2O			
1.A.4.c Other Sectors - Biomass	CO2			
1.A.4.c Other Sectors - Biomass	CH4			
1.A.4.c Other Sectors - Biomass	N2O			
1.A.5 Other (not specified elsewhere) - Liquid Fuels	CO2	X	X	X
1.A.5 Other (not specified elsewhere) - Liquid Fuels	CH4			
1.A.5 Other (not specified elsewhere) - Liquid Fuels	N2O			
1.A.5 Other (not specified elsewhere) - Solid Fuels	CO2	X	X	X
1.A.5 Other (not specified elsewhere) - Solid Fuels	CH4			
1.A.5 Other (not specified elsewhere) - Solid Fuels	N2O			
1.A.5 Other (not specified elsewhere) - Gaseous Fuels	CO2	X	X	X
1.A.5 Other (not specified elsewhere) - Gaseous Fuels	CH4			
1.A.5 Other (not specified elsewhere) - Gaseous Fuels	N2O			
1.A.5 Other (not specified elsewhere) - Other Fossil Fuels	CO2			
1.A.5 Other (not specified elsewhere) - Other Fossil Fuels	CH4			
1.A.5 Other (not specified elsewhere) - Other Fossil Fuels	N2O			
1.A.5 Other (not specified elsewhere) - Peat	CO2			
1.A.5 Other (not specified elsewhere) - Peat	CH4			
1.A.5 Other (not specified elsewhere) - Peat	N2O			
1.A.5 Other (not specified elsewhere) - Biomass	CO2			
1.A.5 Other (not specified elsewhere) - Biomass	CH4			
1.A.5 Other (not specified elsewhere) - Biomass	N2O			
1.B.1 Fugitive emissions from fuels - Solid Fuels	CO2			
1.B.1.a Fugitive Emissions from Fuels - Coal Mining and Handling	CH4	X	X	X
1.B.1.a Fugitive Emissions from Fuels - Oil and Natural Gas - Oil	CO2			
1.B.1.a Fugitive Emissions from Fuels - Oil and Natural Gas - Oil	CH4	X	X	X
1.B.1.b Fugitive Emissions from Fuels - Oil and Natural Gas - Natural Gas	CO2			
1.B.1.b Fugitive Emissions from Fuels - Oil and Natural Gas - Natural Gas	CH4			
1.B.1.c Fugitive Emissions from Fuels - Venting and Flaring	CO2			
1.B.1.c Fugitive Emissions from Fuels - Venting and Flaring	CH4			
1.B.1.c Fugitive Emissions from Fuels - Venting and Flaring	N2O			
1.B.2.1 Fugitive Emissions from Fuels - Other	CO2			
1.B.2.1 Fugitive Emissions from Fuels - Other	CH4			
1.B.2.1 Fugitive Emissions from Fuels - Other	N2O			
2.A.1 Cement and Storage	CO2			
2.A.2 Lime Production	CO2			
2.A.3 Glass Production	CO2	X	X	X
2.A.4 Other Process Uses of Carbonates	CO2			
2.B.1 Ammonia Production	CO2	X	X	X
2.B.2 Nitric Acid Production	N2O			
2.B.3 Adipic Acid Production	N2O			
2.B.4 Caprolactam, Glyoxal and Glyoxylic Acid Production	N2O			
2.B.5 Carbide Production	CO2			
2.B.5 Carbide Production	CH4			
2.B.5 Carbide Production	N2O			
2.C.1 Iron and Steel Production	CO2			
2.C.1 Iron and Steel Production	CH4			
2.C.1 Iron and Steel Production	N2O			
2.C.2 Ferroalloys Production	CO2			
2.C.2 Ferroalloys Production	CH4			
2.C.2 Ferroalloys Production	N2O			
2.C.3 Aluminium Production	CO2			
2.C.3 Aluminium Production	CH4			
2.C.3 Aluminium Production	N2O			
2.C.4 SF6 and PFCs from Other Production	CO2			
2.C.4 SF6 and PFCs from Other Production	CH4			
2.C.4 SF6 and PFCs from Other Production	N2O			

[illegible]	[illegible]				
[illegible]	[illegible]				
[illegible]	[illegible]				

TABLE 8 RECALCULATION - RECALCULATED DATA
(Sheet 1 of 4)

Recalculated year: Inventory 2020
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2						CH_4						N_2O					
	Previous submission	Latest submission	Difference	Difference[1]	Impact of recalculation on total emissions excluding LULUCF[2]	Impact of recalculation on total emissions including LULUCF[3]	Previous submission	Latest submission	Difference	Difference[1]	Impact of recalculation on total emissions excluding LULUCF[2]	Impact of recalculation on total emissions including LULUCF[3]	Previous submission	Latest submission	Difference	Difference[1]	Impact of recalculation on total emissions excluding LULUCF[2]	Impact of recalculation on total emissions including LULUCF[3]
	CO_2 equivalent (kt)			(%)			CO_2 equivalent (kt)			(%)			CO_2 equivalent (kt)			(%)		
Total national emissions and removals		288 508.47						43667.32						19410.36				
1. Energy		259 131.29						13172.74						1296.28				
A. Fuel combustion activities		242497.38						1866.27						1293.80				
1. Energy Industries		145762.48						47.28						172.49				
2. Manufacturing industries and construction		26481.69						57.62						111.84				
3. Transport		18164.13						170.15						382.48				
4. Other sectors		51970.07						1238.13						146.15				
5. Other		22.28.10						64.08						86.77				
B. Fugitive emissions from fuels		16634.90						11306.47						2.48				
1. Solid fuels		16029.18						6876.34						0.08				
2. Oil and natural gas		14.73						4429.07						2.12				
C. CO_2 Transport and storage		561.54																
2. Industrial processes and product use		21109.11						11.4						195.88				
A. Mineral industry		8271.17																
B. Chemical industry		483.30						9.6						195.88				
C. Metal industry		12171.34						11.42						96.1				
D. Non-energy products from fuels and solvent use		173.44						361.9.9						99.19.9				
G. Other product manufacture and use		NA						9.93						93.3.97				
H. Other		NA						NA						NA				

Note: All footnotes for this table are given at the end of the table on sheet 4.

TABLE1 RECALCULATION - RECALCULATED DATA
(Sheet 2 of 4)

Recalculated year: Inventory 2020
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2						CH_4						N_2O					
	Previous submission	Latest submission	Difference	Difference[1]	Impact of recalculation on total emissions excluding LULUCF[2]	Impact of recalculation on total emissions including LULUCF[2]	Previous submission	Latest submission	Difference	Difference[1]	Impact of recalculation on total emissions excluding LULUCF[2]	Impact of recalculation on total emissions including LULUCF[2]	Previous submission	Latest submission	Difference	Difference[1]	Impact of recalculation on total emissions excluding LULUCF[2]	Impact of recalculation on total emissions including LULUCF[2]
	CO_2 equivalent (kt)			(%)			CO_2 equivalent (kt)			(%)			CO_2 equivalent (kt)			(%)		
3. Agriculture																		
A. Enteric fermentation		3.67						23111.76						11441.36				
B. Manure management								21493.56										
C. Rice cultivation								845.24						2728.69				
D. Agricultural soils[3]								537.00										
E. Prescribed burning of savannas								NO						14756.46				
F. Field burning of agricultural residues								NO						NO				
G. Liming		NO						NO						NO				
H. Urea application		2.67																
I. Other carbon-containing fertilizers		NO																
J. Other		NO																
4. Land use, land-use change and forestry (net)[4]								NO						NO				
A. Forest land		7908.11						77.20						46.31				
B. Cropland		-16337.40						41.30						37.42				
C. Grassland		31865.11						NO,E						NO,E				
D. Wetlands		-19120.46						15.76						10.69				
E. Settlements		NO,NE,NA						NO,E,NA						NO,E,NA				
F. Other land		-2348.90						NO						NO				
G. Harvested wood products		NO						NO						NO				
H. Other		NO,E																
		NO						NO						NO				

Note: All footnotes for this table are given at the end of the table on sheet 4.

TABLE 9 RECALCULATION - RECALCULATED DATA
(Sheet 3 of 4)

Recalculated year: Inventory 2020
Submission 2022 v1
KAZAKHSTAN

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2						CH_4						N_2O					
	Previous submission	Latest submission	Difference	Difference[(1)]	Impact of recalculation on total emissions excluding LULUCF[(2)]	Impact of recalculation on total emissions including LULUCF[(3)]	Previous submission	Latest submission	Difference	Difference[(1)]	Impact of recalculation on total emissions excluding LULUCF[(2)]	Impact of recalculation on total emissions including LULUCF[(3)]	Previous submission	Latest submission	Difference	Difference[(1)]	Impact of recalculation on total emissions excluding LULUCF[(2)]	Impact of recalculation on total emissions including LULUCF[(3)]
	CO_2 equivalent (kt)			(%)			CO_2 equivalent (kt)			(%)			CO_2 equivalent (kt)			(%)		
5. Waste																		
A. Solid waste disposal		21.34						[illegible]						[illegible]				
B. Biological treatment of solid waste		[illegible]						[illegible]										
C. Incineration and open burning of waste		29.34						[illegible]						[illegible]				
D. Wastewater treatment and discharge								[illegible]						[illegible]				
E. Other								[illegible]						[illegible]				
6. Other (as specified in summary 1.A)		[illegible]						[illegible]						[illegible]				
		[illegible]						[illegible]						[illegible]				
Memo Items:																		
International bunkers																		
Aviation		[illegible]																
Navigation		[illegible]						[illegible]						[illegible]				
Multilateral operations		[illegible]						[illegible]						[illegible]				
CO_2 emissions from biomass		NA						[illegible]						[illegible]				
CO_2 captured		[illegible]																
Long-term storage of C in waste disposal sites		[illegible]																
Indirect N_2O																		
Indirect CO_2		NE,NA												NE,NA				

Note: All footnotes for this table are given at the end of the table on sheet 4.

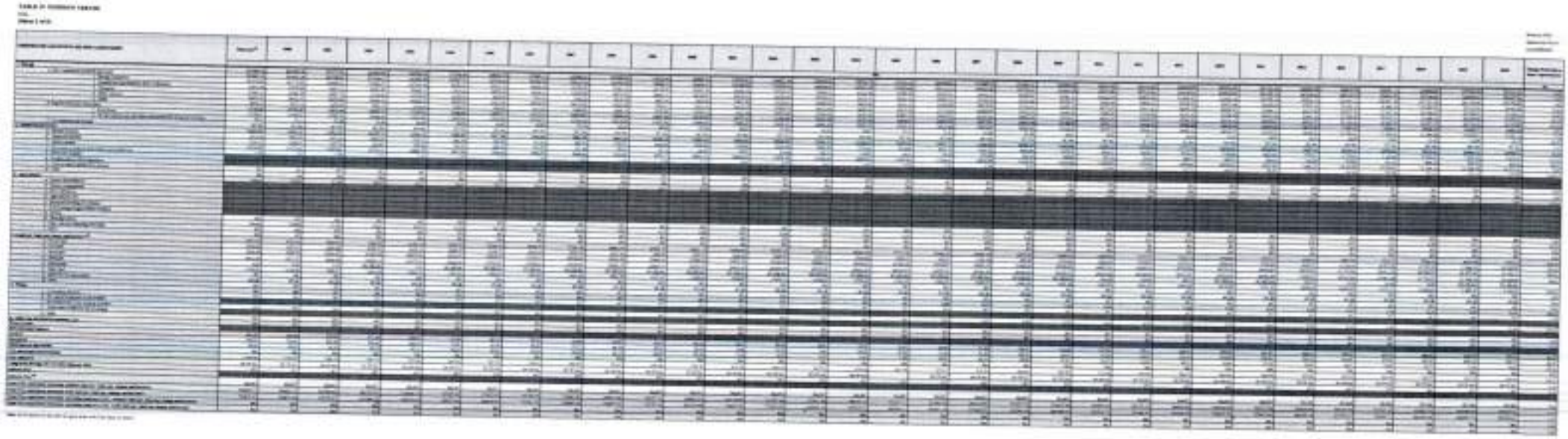
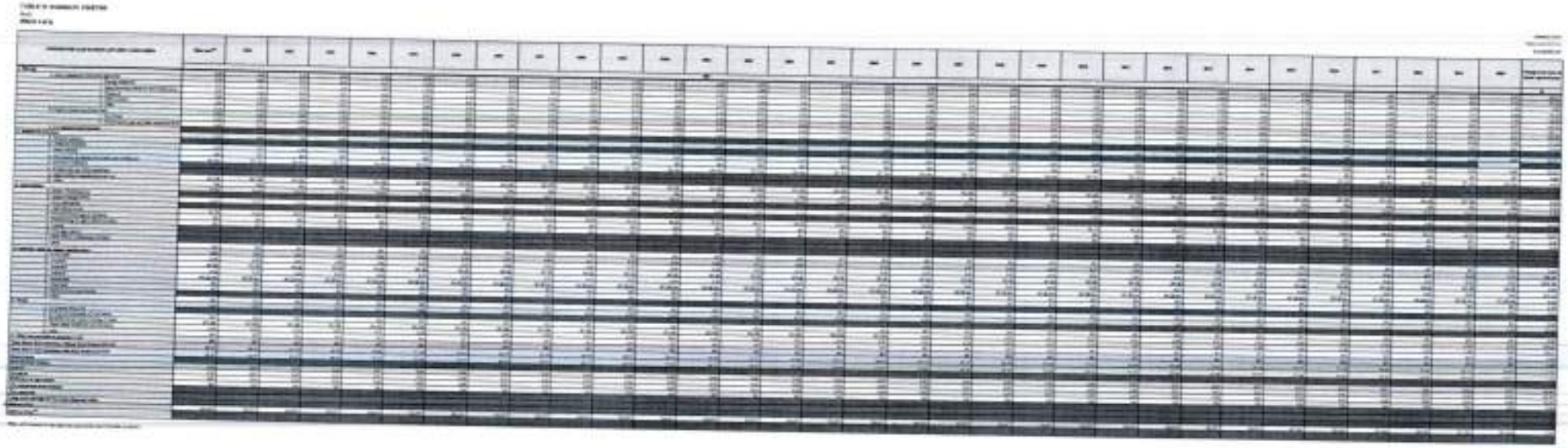
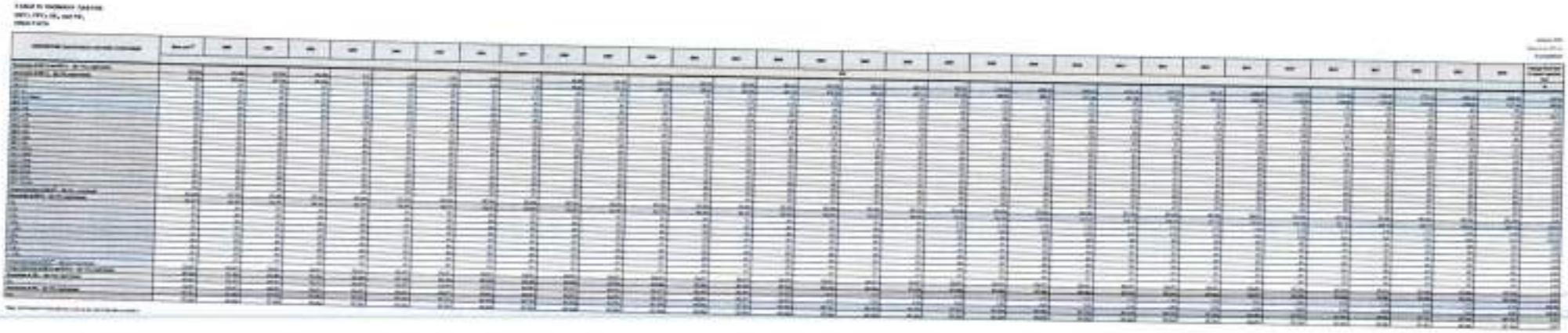
TABLE 9 COMPLETENESS - INFORMATION ON NOTATION KEYS
(Sheet 1 of 1)

Inventory 2020
Submission 2022 v1
KAZAKHSTAN

GHG	Sector[1]	Sources and sinks not estimated ("NE")[1]	
		Source/sink category[2]	Explanation
CH4	Industrial Processes and Product Use	2.C Metal Industry/2.C.1 Iron and Steel Production/2.C.1.b Pig Iron	CH4 emissions were not estimated due to the lack of methodology in the IPCC Guidelines
CH4	Waste	5.C Incineration and Open Burning of Waste/5.C.2 Open Burning of Waste/5.C.2.1 Biogenic/5.C.2.1.a Municipal Solid Waste	Emissions from the incineration of solid waste were not estimated, since they are not significant in accordance with paragraph 37 b) of annex I to decision 24/CP.19. A detailed explanation is shown in the NIR
CO2	LULUCF	4.B Cropland/4.B.1 Cropland Remaining Cropland/4(V) Biomass Burning/Wildfires	via photosynthetic activity, within weeks to few years after burning (IPCC GLS, 2006)
CO2	LULUCF	4.C Grassland/4.C.1 Grassland Remaining Grassland/4(V) Biomass Burning/Wildfires	via photosynthetic activity, within weeks to few years after burning (IPCC GLS, 2006)
CO2	LULUCF	4.D Wetlands/4.D.1 Wetlands Remaining Wetlands/4(V) Biomass Burning/Wildfires	via photosynthetic activity, within weeks to few years after burning (IPCC GLS, 2006)
CO2	Waste	5.C Incineration and Open Burning of Waste/5.C.2 Open Burning of Waste/5.C.2.1 Biogenic/5.C.2.1.a Municipal Solid Waste	Emissions from the incineration of solid waste were not estimated, since they are not significant in accordance with paragraph 37 b) of annex I to decision 24/CP.19. A detailed explanation is shown in the NIR
N2O	Agriculture	3.D Agricultural Soils/3.D.1 Direct N2O Emissions From Managed Soils/3.D.1.2 Organic N Fertilizers/3.D.1.2.b Sewage Sludge Applied to Soils	Emissions from "Sewage Sludge Applied to Soils" are not significant in accordance with paragraph 37(b) of the annex to decision 24/CP.19, therefore, are not included in the CRF. Potential emissions estimates are shown in section 5.5 of the NIR
N2O	Industrial Processes and Product Use	2.G Other Product Manufacture and Use/2.G.3 N2O from Product Uses/2.G.3.a Medical Applications	The party provided preliminary estimates of N2O emissions from the use of anesthesia based on data from countries with similar conditions. This category is not significant in accordance with decision 24/CP.19, Annex I, paragraph 37(b). Preliminary emission estimates are shown in the
N2O	Waste	5.C Incineration and Open Burning of Waste/5.C.2 Open Burning of Waste/5.C.2.1 Biogenic/5.C.2.1.a Municipal Solid Waste	Emissions from the incineration of solid waste were not estimated, since they are not significant in accordance with paragraph 37 b) of annex I to decision 24/CP.19. A detailed explanation is shown in the NIR
CO2	LULUCF	Converted to Settlements	Soil carbon changes were taken as a constant value (Tier 1 method, IPCC GLs, 2006) for the Settlements

GHG	Source/sink category	Sources and sinks reported elsewhere ("IE")[3]		
		Allocation as per IPCC Guidelines	Allocation used by the Party	Explanation
CH4	Biomass Burning/Wildfires		Included in 4.A.1. 4(V)	Emissions CH4 accounted in the category 4.A.1. 4(V) Biomass Burning (Wildfires)
CH4	4.B Cropland/4.B.1 Cropland Remaining Cropland/4(V) Biomass Burning/Wildfires		Included in 4.C.1. 4(V)	Emissions CH4 accounted in the category 4.C.1. 4(V) Biomass Burning (Wildfires)
CH4	4.D Wetlands/4.D.1 Wetlands Remaining Wetlands/4(V) Biomass Burning/Wildfires		Included in 4.C.1 4(V)	Emissions CH4 accounted in the category 4.C.1 Grassland Remaining Grassland. 4(V) Biomass Burning (Wildfires)
CO2	1.AA Fuel Combustion - Sectoral approach/1.A.5 Other (Not specified elsewhere)/1.A.5.b Mobile (please specify)		Included in 1.A.3	The fuel used by mobile transport is included in the category 1.A.3 "Transport"
CO2	1.AB Fuel Combustion - Reference Approach/Biomass/Gas Biomass		1 AB	Gas biomass values are included in Solid biomass
CO2	1.AB Fuel Combustion - Reference Approach/Biomass/Liquid Biomass		Included in 1 AB	CO2 emissions and consumption of liquid biomass are included in the total of solid biomass
CO2	2.C Metal Industry/2.C.1 Iron and Steel Production/2.C.1.f Other (please specify)	According to IPCC GLs, 2006, volume 3, ch. 4.2, CO2 emissions from coke production are presented in the Energy sector	Included in 1.A.2.a	According to IPCC GLs, 2006, volume 3, ch. 4.2, CO2 emissions from coke production are presented in the Energy sector
CO2	4.A Forest Land/4.A.1 Forest Land Remaining Forest Land/4(V) Biomass Burning/Wildfires		Included in 4.A.1 Carbon stock change	CO2 emissions indirectly accounted in the Carbon stock change
CO2	4.A Forest Land/4.A.2 Land Converted to Forest Land/4(V) Biomass Burning/Wildfires		Included in 4.A.1	Emissions CO2 accounted indirectly in the carbon stock change of biomass in the category 4.A.1 Carbon stock change
CO2	4.G Harvested Wood Products/Approach A/Total HWP Consumed Domestically/Paper and Paperboard		Included in 4.A.1	CO2 emissions indirectly accounted in 4.A.1 Carbon stock change. Explanation provided in the NIR
N2O	4(IV) Indirect N2O Emissions from Managed Soils/Atmospheric Deposition		Included in 3.D.2.1	N2O emissions from Atmospheric Deposition from Managed Soils are presented in 3.D.2.1
N2O	4(IV) Indirect N2O Emissions from Managed Soils/Nitrogen Leaching and Run-off		Included in 3.D.2.2	The N2O emissions from Nitrogen Leaching and Run-off are presented in 3.D.2.2
N2O	4.A Forest Land/4.A.2 Land Converted to Forest Land/4(V) Biomass Burning/Wildfires		Included in 4.A.1. 4(V)	Emissions NO2 accounted in the category 4.A.1 Forest Land Remaining Forest Land (Biomass Burning, Wildfires)
N2O	4.B Cropland/4.B.1 Cropland Remaining Cropland/4(V) Biomass Burning/Wildfires		Included in 4.C.1. 4(V)	Emissions N2O accounted in the category 4.C.1. 4(V) Biomass Burning (Wildfires)
N2O	4.D Wetlands/4.D.1 Wetlands Remaining Wetlands/4(V) Biomass Burning/Wildfires		Included in 4.C.1 4(V)	Emissions N2O accounted in the category 4.C.1 Grassland Remaining Grassland. 4(V) Biomass Burning (Wildfires)

(1) Clearly indicate sources and sinks which are considered in the 2006 IPCC Guidelines but are not considered in the submitted inventory. Explain the reason for not reporting these sources and sinks, in order to avoid arbitrary interpretations. An entry should be made for each source/sink category for which the notation key "NE" (not

(2) Indicate omitted source/sink category.

(3) Clearly indicate sources and sinks in the submitted inventory that are allocated to a sector other than that indicated by the 2006 IPCC Guidelines. Show the sector indicated in the 2006 IPCC Guidelines and the sector to which the source or sink is allocated in the submitted inventory. Explain the reason for reporting these sources and