

The shares of oblasts in the total GHGs from agriculture with direct effect varies insignificantly (see Figure 3.9).

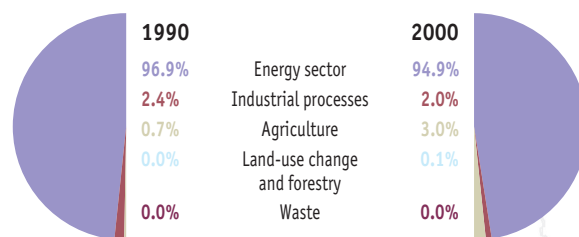
The allocation of methane emissions from industrial and household wastes, in essence, corresponds to allocation of urban population. Bishkek makes the largest contribution to total methane emission from waste; Naryn and Batken oblasts make the least contribution (Figure 3.10).

3.2.3. Carbon dioxide emissions

3.2.3.1. Total emissions

The contribution of different economic sectors to total CO₂ emissions is shown in Figure 3.11. The main source of carbon dioxide emission in Kyrgyzstan, as in many other countries, is the energy sector (96.9% in 1990 and 94.9% in 2000); more precisely, the burning of various kinds of fossil fuel, such as coal, natural gas and oil products.

Figure 3.11. Contribution to the national CO₂ emission by sectors



3.2.3.2. Energy sector

In the Kyrgyz Republic, CO₂ emissions from burning various kinds of fuel have comparable shares (Figure 3.12). Distribution of CO₂ emissions from different kinds of fuel reflects the structure of fuel and energy consumption, which considerably changed within 10 years (see Table 3.2).

Figure 3.12. CO₂ emissions from various kinds of fuel in 1990 and 2000

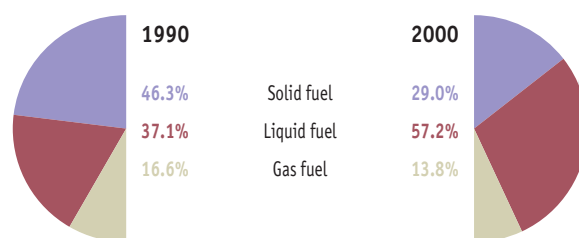


Table 3.2. Comparative data on consumption of different kinds of fuel in the energy sector

Fuel	Units	Consumption	
		1990	2000
Solid fuel	thousand tons	4,809	1,171
Liquid fuel	thousand tons	3,394	1,996
Gas fuel	million m ³	2,076	679

In the context of the overall reduction in fuel and energy consumption, the decrease in coal use was more significant than that of other kinds of fuel, which led to a reduction in the share of coal in the balance of consumption, and an increase of liquid fuel share. The proportions of CO₂ emissions from burning local and imported coal remained almost stable and are equal to approximately 1:2.

The structure of CO₂ emissions from burning liquid fuels is shown in Figure 3.13.

The structure of CO₂ emission by categories of sources is shown in Figure 3.14.

Figure 3.13. CO₂ emissions from liquid fuels in 1990 and 2000

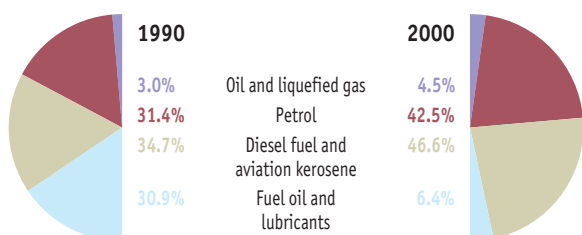
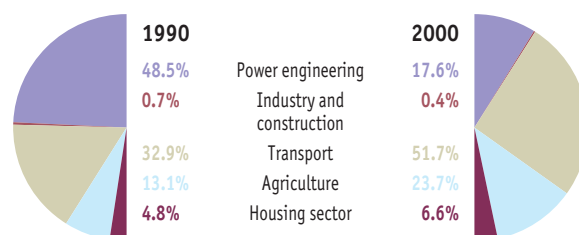


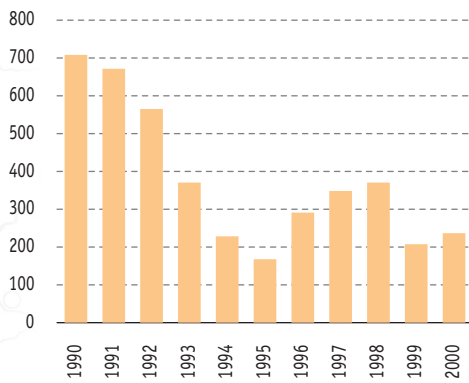
Figure 3.14. Structure of CO₂ emission by categories of the energy sector



3.2.3.3. Industrial processes

The dynamics of CO₂ emissions in the industrial sector is shown in Figure 3.15. The dynamics of CO₂ emissions from industrial processes in general reflects the condition of the industrial sector – steady reduction until 1995 and a relatively stable condition since 1996, without trends for either clear and stable growth or stagnation.

Figure 3.15. Dynamics of CO₂ emissions from industrial processes (in Gg)



The production of minerals contributes a major share of CO₂ emission from industrial processes in Kyrgyzstan. In 1990, this share amounted to 98%, in 2000 to 95%. In this category CO₂ emission occurs owing to the production of cement, lime, and the manufacture and use of soda ash. The main contribution to total emissions is made by cement production; it exceeded 99% both in 1990 and in 2000. The rest of emission accounts for the production of lime, production and usage of soda.

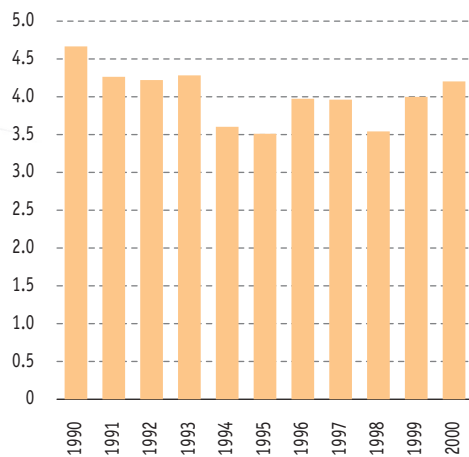
CO₂ emissions from metal production amounted to 2% of total emission in 1990 and 5% in 2000. Cast iron and steel production abruptly fell between 1990 and 1994, mercury production

remained stable from 1993 to 2000 (apart from a slight reduction in 1994 and 1995), stibium production was fairly stable until 1998, but in 2000 underwent a 5-fold reduction. Within the total CO₂ emissions from metal production in 1990, the emissions from metal re-melting amounted to just under 81%, and those from stibium production to 19% (in 1990 no mercury was produced). In 2000, CO₂ emissions from mercury production constituted up to 94% of total emissions from metal production. Emissions from stibium and ferrous metals were 4% and 2% respectively.

3.2.3.4. Land-use change and forestry

The dynamics of CO₂ emissions from forest and grassland conversion are shown in Figure 3.16. On the whole, the land-use change and forestry sector reflects natural carbon cycle trends. CO₂ removals in forests and other woody bio-mass stocks increase slowly but surely, while emissions from conversion have no clear trend. At the same time removal exceeds emission more than two times, but is more than 30 times less than national CO₂ emission (in 1990).

Figure 3.16. Dynamics of CO₂ emissions from forest and grassland conversion (in Gg)



emissions from conversion have no clear trend. At the same time removal exceeds emission more than two times, but is more than 30 times less than national CO₂ emission (in 1990).

3.2.4. Methane emissions

3.2.4.1. Total emissions

Owing to its high global warming potential, methane is the second important greenhouse gas after carbon dioxide. The dynamics of total CH₄ emissions in Kyrgyzstan are shown in Figure 3.17. Distribution of emissions over economic sectors is shown in Figure 3.18. Methane emissions do not take place from industrial processes and solvent use.

Figure 3.17. Dynamics of CH₄ emissions (in Gg)

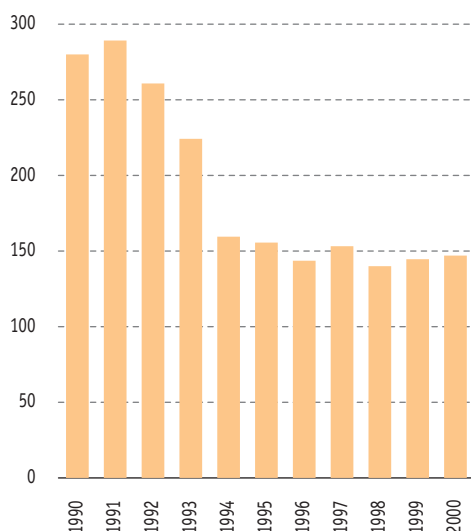
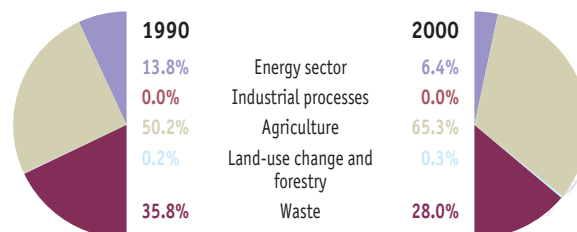


Figure 3.18. Allocation of methane emissions by economic sectors

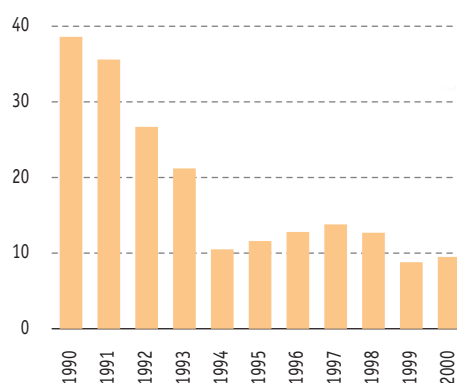


3.2.4.2. Energy sector

Total annual methane emissions in Kyrgyzstan's energy sector steadily decreased in the course of the 1990s (Figure 3.19), which is related first of all to the reduction in economic indicators in this sector.

In the energy sector methane is released at fuel combustion and at coal, oil and gas extraction, processing, transportation and storage. The main sources in the energy sector are activities related to coal, oil, oil products and gas extraction, processing, and storage. Such activities made up about 95% (36.65 Gg) of total emissions in the energy sector in 1990. Methane emissions from fuel combustion were approximately 5% (1.98 Gg). The biggest contribution (about 60%) to methane emissions in the energy sector is made by natural gas extraction, transportation, and storage. Most of the remainder comprises extraction, transportation, and processing of coal. The share of oil and oil products extraction, transportation, and storage amounts to less than 0.1%.

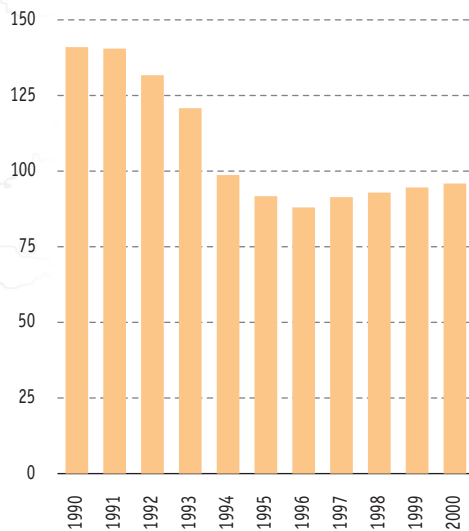
Figure 3.19. CH₄ emissions in the energy sector (in Gg)



3.2.4.3. Agriculture

Sources of methane in agriculture are animal husbandry, poultry farming, rice cultivation, on-the-field burning of agricultural (stubble) residues, natural forest fires. In turn, in animal husbandry and poultry farming enteric fermentation and manure are taken into consideration. The dynamics of methane emissions from agriculture in 1990-2000 are shown in Figure 3.20. Most part (about 85%) of total methane emission in the sector falls at animal enteric fermentation. The share of emissions from systems of manure and guano collection, storage and usage makes up 12-13%, the share of emission from rice cultivation is small – 0.35 to 2.67%. About 0.875 to 2.033% of the total methane

Figure 3.20. CH₄ emission in agriculture (in Gg)

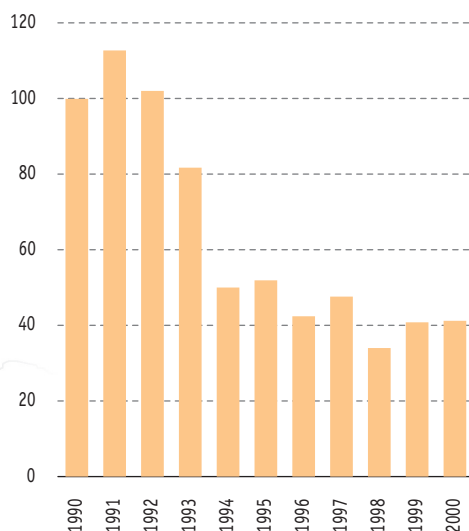


emissions from agriculture falls at methane emissions from field burning of agricultural residues. The share of methane emissions from natural forest fires is negligible.

Methane emissions from animal husbandry make up about 95% of total emissions in the agricultural sector. Most part of methane emission falls at enteric fermentation of cattle – 53 to 66%, while 24 to 41% is from sheep and goats, and 5-8% from horses.

The maximum contribution to emissions from systems of manure and guano collection, storage and usage falls at cattle, namely 86-90%; the other shares are: sheep and goats 4-7%, horses 2-3%, pigs 1-2%, and poultry 0-1%.

Figure 3.21. CH₄ emissions from waste (in Gg)



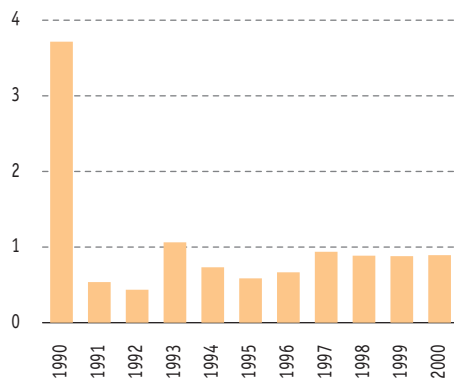
3.2.4.4. Waste

The dynamics of methane emissions from industrial and household waste is shown in Figure 3.21. The share of emissions from solid domestic waste amounts to 78-90% of the total emission in the sector, the share of methane emissions from industrial sewage fell from 18% in 1990 to 2% in 2000, while the share of emissions from domestic sewage rose from 2 to 8%. The reduction in methane emissions is related to the deterioration of the waste collection system.

3.2.5. Nitrous oxide emission

The dynamics of total nitrous oxide emission is shown in Figure 3.22. Within the whole, observed period the total annual N_2O emissions remained relatively stable, with insignificant growth since 1997. Sources of N_2O emissions are power engineering, agriculture, waste, land-use change and forestry. A major contribution to the total nitrous oxide emission comes from agriculture and waste (waste water purification).

Figure 3.22. Dynamics of N_2O emissions (in Gg)



The relatively high 1990 emissions of nitrous oxide are explained by the intensive use of mineral fertilisers in that year.

3.2.6. Halogen emissions

Halogens have a high GWP, and even with low absolute emissions their emissions in CO_2 equivalent may prove to be notable. Unfortunately, only general data on halogen usage are available in the Republic, and then without allocation by substances. Moreover, those data have only been registered since 1995. Halogen emission dynamics are shown in Figure 3.24.

3.2.7. Emissions of other gases

Other gases causing indirect greenhouse effects are NO_x , CO, NMVOC, and SO_2 . Emission of some or all of these gases occurs in almost all sectors. Emission dynamics of gases causing indirect greenhouse effects are shown in Figure 3.25. 80-90% of total emission of other gases falls at the energy sector, while the rest falls at industrial processes.

Figure 3.23. Break-down of nitrous oxide emission from agriculture by categories of sources in 1999-2000

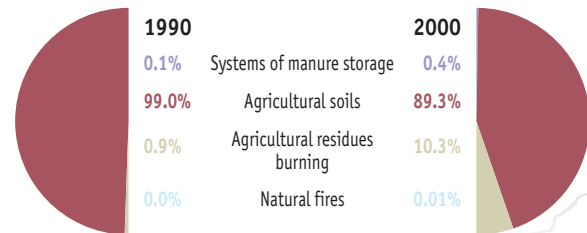


Figure 3.24. Dynamics of halogen emissions (in Gg)

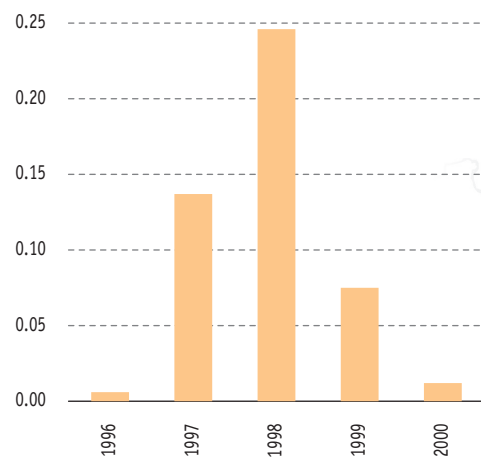


Figure 3.25. Emission dynamics of gases causing indirect greenhouse effects

