



Summary note: Climate intensities of public procurements

Quantification of life cycle emissions from public procurements in Norway

Direktoratet for forvaltning og økonomistyring (DFØ)

(The Norwegian Agency for Public and Financial Management)

Date: 10 December 2021

1 Introduction

There is an increasing focus on the carbon footprint of the public sector in Norway, i.e. the total greenhouse gas (GHG) emissions they are contributing to. The Norwegian Government highlights more green public procurements as a crucial instrument to reduce the footprint and stimulate the green market. The Norwegian Agency for Public and Financial Management (DFØ) plays an important role in the work to escalate the use of green procurement strategies.

DFØ and procuring agencies need good data sets on the life cycle emissions associated with public procurements. The climate impacts should be quantified per spent monetary unit (NOK) in different purchase categories – so called climate intensities. NIRAS, with subconsultants Richard Wood and Menon Economics, were assigned the task of developing robust, updated and representative climate intensity tables using transparent methodology and including all relevant purchase categories as defined in the standard chart of accounts (“standard kontoplan”).

2 Method

The climate intensities developed in this project are consumption based, meaning that they include emissions in the whole value chain of purchases in the respective purchase categories. This implies that emissions in all *Scopes*, as defined by the GHG Protocol, are included. The three *Scopes* are explained in the below info box.

Scope 1	Direct GHG emissions occurring from sources that are owned or controlled by the public institutions. An example is GHG emissions from vehicles owned by the entity.
Scope 2	GHG emissions from the generation of purchased electricity and district heating consumed. Scope 2 emissions physically occur at the facility where electricity and district heating is generated.
Scope 3	All other indirect GHG emissions, associated with the purchase of goods and services by the entity. Some examples of Scope 3 activities are extraction and production of purchased materials and fuels, transport-related activities in vehicles not owned or controlled by the reporting entity, air travels, outsourced activities, and waste disposal.

The emission intensities account for emissions of the most important GHGs, which are aggregated in carbon dioxide equivalents (CO₂e). LULUCF and biogenic CO₂ emissions are not included.

The approach used in the project is an *environmentally extended multiregional input-output (EE-MRIO)* model. Multi-regional input-output (MRIO) analysis is an economic analysis method used to investigate the interdependencies between sectors in a multi-regional economy and the relationship between final demand and production. In EE-MRIO analysis, the MRIO tables are extended with environmental data to provide information on emissions associated with the economic transactions. In this project, the model uses Norwegian data for the Norwegian input-output tables and Scope 2 and 3 environmental pressures, while import related Scope 2 and 3 emissions are calculated using an EE-MRIO database (EXIOBASE). The Scope 1 emissions are calculated separately using average prices of fuels and emission factors on a per physical unit basis. The general approach to calculate the climate intensities, including the data sources used for the different scopes, is schematized in Figure 2.1.

The intensities were calculated using Excel and MATLAB. An important part of the work was the matching of DFØ’s purchase categories with the Norwegian input-output (IO) sectors. This was done based on a matching matrix provided by DFØ, on which NIRAS performed several manual adjustments to correct doubtful matches.

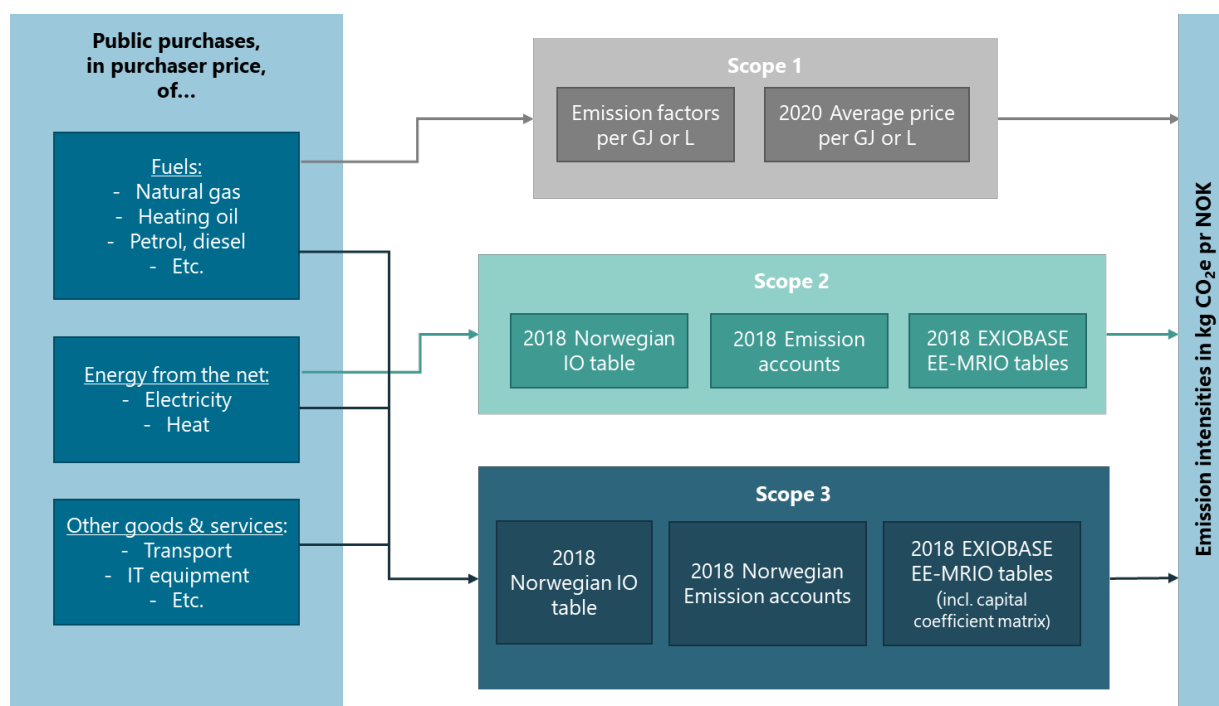


Figure 2.1: Illustration of the general approach to calculate the climate intensities of public procurements

3 Results

Table 3.1 shows the climate intensities in tonnes CO₂e/MNOK for the 20 most climate intensive purchase categories.

Table 3.1: Climate intensities of public procurements in three-digit purchase categories ("artskontoer") in tonnes CO₂e per MNOK for the 20 most climate intensive categories.

Climate intensities in scopes [t CO ₂ e/MNOK]		Scope 1			Scope 2		Scope 3		Sum
#	Name of GL account ("artskonto")	Norway	Norway	RoW	Norway	RoW	Norway	RoW	
621	Gass	375	14	0	6	20			415
629	Annet brensel	235	-	-	20	44			299
625	Bensin, diesel	176	-	-	20	44			239
700	Drivstoff	176	-	-	20	44			239
619	Annen frakt- og transportkostnad ved salg	-	-	-	114	41			155
632	Renovasjon, vann, avløp o.l.	-	-	-	44	25			69
400	Innkjøp av råvarer og halvfabrikater	-	-	-	20	45			65
403	Innkjøp av råvarer og halvfabrikater, fortsettelse	-	-	-	20	45			65
622	Fyringsolje	2	-	-	20	44			65
658	Annet driftsmateriale	-	-	-	15	47			62
659	Annet driftsmateriale, fortsettelse	-	-	-	15	47			62
610	Frakt, transport og forsikring ved vareforsendelse	-	-	-	33	25			58
146	Innkjøpte varer (ferdigvarer) og driftsmateriell	-	-	-	14	39			53
147	Innkjøpte varer (ferdigvarer) og driftsmateriell, fortsettelse	-	-	-	14	39			53

122	Skip, rigger, fly	-	-	-	3	49	52
492	Skip, rigger, fly	-	-	-	3	49	52
657	Arbeidsklær og verneutstyr	-	-	-	1	47	48
124	Andre transportmidler	-	-	-	2	40	43
494	Andre transportmidler	-	-	-	2	40	43
710	Bilgodtgjørelse	-	0	0	26	15	41

The results show that fossil fuels are among the purchases with the highest emission intensities, due to the high releases of greenhouse gases through combustion, mostly categorized as Scope 1 emissions.

4 Discussion and conclusion

The results show which purchase categories are the most and least climate intensive per NOK spent, which purchase categories are dominated by Scope 1, Scope 2 and Scope 3 emissions, respectively, as well as which categories cause emissions mainly abroad or in Norway. When applied to public purchases the intensities may be used by public institutions to identify climate intensive purchase categories and to calculate the carbon footprint of public procurements. These results may then again be applied to identify and efficient measures and policies to reduce GHG emissions.

The calculation of climate intensities using EE-MRIO analysis requires some assumptions to be made, which give rise to uncertainties in the results. Examples of assumptions are that three sectors in the Norwegian IO tables are assigned the same scope 2 and 3 emissions multipliers for both domestic purchases and imports because they are aggregated in the IO tables (concerns sectors 19 *Manufacture of coke and refined petroleum products*, 20 *Manufacture of chemicals and chemical products* and 21 *Manufacture of basic pharmaceutical products and pharmaceutical preparations*), and that capital goods are assumed produced the same year as the final demand. The robustness of the emissions intensities in Scope 2 and Scope 3 also depend on the quality of the matching, which for some purchase categories proved quite challenging.

Further, the Scope 2 intensities include manufactured gases (not natural gas) and heating/cooling (due to aggregation of these sectors in the IO tables), while the Scope 1 emissions depend on their assigned prices, which may not correspond to the actual prices paid by the public institutions.

Some assumptions are inevitable in EE-MRIOA, and the results are still considered to give good representations of the emissions associated with each purchase category. Nevertheless, it is recommended to regularly update the underlying data, whenever improved input can be retrieved. Here it is NIRAS' recommendation to prioritise purchase categories which have high climate intensities, and/or have high purchase volumes (in monetary terms), thus contributing to a large share of the final carbon footprint when applying the intensities to the public purchases. Further, the Norwegian IO tables and emissions data are updated yearly, and EXIOBASE is also updated regularly, so the climate intensities should be continuously updated using the newest versions of these sources to best reflect the current situation.

In conclusion, the results show that purchases in the categories 621: *Gas* ("Gass"), 629: *Other fuels* ("Annet brensel"), 625: *Petrol, diesel* ("Bensin, diesel") and 700: *Fuel* ("Drivstoff") are the most climate intensive, with total intensities of 415, 299, 239 and 239 t CO₂e/MNOK, respectively. The climate intensities can be used to calculate carbon footprints of public procurements and identify important emissions drivers among the procurements, but they are not suited for analysing details of specific goods or services within the purchase categories due to the fact that they are sector averages.