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Book

Energy in the SNOW model : description of production and consumption of energy in Norway in the base year 2013

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Energy in the SNOW model

Description of production and consumption of energy in Norway in the base year 2013

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Lars Lindholt

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Preface

SNOW-NO (Statistics Norway's World model – Norway) is a numerical general equilibrium model where Norway is modelled as a small, open economy, while the rest of the world is exogenous. While the model covers all goods and services in the economy in the calibration year 2013, in this document we focus on the supply and demand of the various energy goods. The project is financed by Ministry of Petroleum and Energy and The Norwegian Water Resources and Energy Directorate. Thanks to Taran Fæhn and Hidemich Yonezawa for valuable comments.

Statistics Norway, 8 June 2019

Brita Bye

Abstract

We present an input – output analysis of the various energy goods in the Norwegian economy in 2013 as it is classified in the SNOW-NO model. The report describes inter-industry relationships between energy industries and other sectors, showing how energy output from one industrial sector may become an input to another industrial sector, energy related or not. The energy output may also be a delivery to final end use, e.g. as household consumption. Likewise, non-energy sectors can deliver inputs both to energy-producing sectors and final energy use. In the SNOW-NO model the deliveries and receipts are in value terms taken from the National Accounts (2013-NOK). We separate these values into volume and price terms, when we manage finding reliable data from the Energy Accounts and other sources. By doing that we can follow physical energy flows in simulations of the model. Besides being a tool for operators of the model, this report will give insight to stakeholders of how the SNOW model reflects production and consumption of energy in the base year.

Sammendrag

Vi presenterer en kryssløpsanalyse av de ulike energivarene i norsk økonomi i 2013, slik de er klassifisert i SNOW-NO-modellen. Rapporten beskriver sammenhengene mellom energisektorer og andre sektorer, og viser hvordan energiproduksjon fra en sektor kan bli en leveranse til en annen industrisektor, som kan være energiproduserende eller ikke. Energiproduksjon kan også være en leveranse til sluttbruk, f.eks. som husholdningsforbruk. På samme måte kan sektorer som ikke produserer energi levere goder til både energisektorer og til sluttbruk av energi. I SNOW-NO-modellen er leveranser og mottak målt i verdi som er hentet fra nasjonalregnskapet (2013-NOK). Vi splitter verdiene i volum- og pristall når vi klarer å finne pålitelige data fra energiregnskapet eller andre kilder. Slik kan vi følge fysiske energistrømmer når vi simulerer modellen. I tillegg til å være et verktøy for operatører av modellen, vil denne rapporten gi innsikt i hvordan SNOW-modellen behandler produksjon og forbruk av energi i basisåret.

Contents

1. Overview of the input – output energy analysis

The base year of the SNOW model is 2013 and the model has 46 producing sectors[1], of which 5 are energy producing industries. For a description of the model, see Rosnes et al (2019). Table 1.1 shows the use value of these 5 energy sectors (which generally consist of more than one production activity). These and the subsequent values are all from the National Accounts (Statistics Norway, 2015), unless otherwise stated. In the following we will also add volume figures from the Energy Accounts and other sources (if possible).

Table 1.1. Total use value (=production value) at basic prices. 2013 million NOK

Coal production	1 312
-mining of hard coal and lignite	
Oil and gas extraction	805 736
-extraction of crude oil and natural gas	
-services related to crude oil and natural gas	
Petroleum and coal products (refined petroleum products incl. chemicals etc.[1])	157 875
-production of coal and refined petroleum products	
-production of chemical and chemical products	
-production of plastics and synthetical rubber	
-production of pharmaceutical products	
-production of rubber and plastic products	
Electricity	68 656
-production of electricity	
-transmission, distribution and trade with electricity	
Gas manufacturing and distribution (district heating supply)	3 433
-production and distribution of gas through pipeline network	
-steam and hot water supply	

[1] Although Statistics Norway has the detailed data, the data for these industries are presented in an aggregated manner for confidentiality reasons.

Because coal production is and probably will be of minor importance in Norway, we disregard this sector in the following. For the same reason we rather use the phrase refined petroleum products (incl. chemicals etc.) instead of petroleum and coal products. As there is only a marginal domestic distribution of gas through pipelines in Norway, we use the term district heating supply instead of gas manufacturing and distribution.

We see from Table 1.1 that the production value in 2013 varies greatly over sectors from 805.7 billion (bn) NOK in oil and gas extraction and 157.9 bn in refined petroleum products (incl. chemicals etc.) to 68.7 bn in electricity and 3.4 bn in district heating supply.

The 46 producing sectors deliver products to other industries, as is shown in the upper part of the first two columns in Table 1.2 below. We will refer to Table 1.2 throughout the whole report. In addition to the intermediate supplies, each sector is also delivering to 25 final use sectors (22 final household consumption sectors, 2 final governmental consumption sectors, and one non-profit consumption sector), three classes of gross fixed capital formation and one group of changes in inventories. Adding export and final use deliveries to intermediate supply, we get total use. Hence, total use value of an energy producing industry shown in Table 1.1 is placed in the column furthest to the right in Table 1.2. We see that the intermediate deliveries from sector 1 are $a+...j...+k$, export is l and final uses are $m+n+o+p+q$. Total use value is the sum of these deliveries, e.g. for the electricity sector it is 68.7 bn as is shown in Table 1.1. We will return to the distribution of these deliveries in Section 2.

[1] See Table A.1.1 in Appendix A for all industries.

Of the 25 final use sectors[2] 6 are household use of energy products. The value of supply at basic prices in the lowest row of Table 1.2 for final household use includes receipts from producing sectors (intermediate consumption), and taxes less subsidies on products and imports. Table 1.2 also shows the supply value for the producing sectors. The value of output at basic prices is the sum of compensation of employees, taxes less subsidies on products, other net taxes on production, consumption of fixed capital and the operating surplus. Adding import to output at basic prices, we get total supply value of sector 1. For sector 1 this supply value ($a+b+c+d+e+f+g+h+i$) must be equal to the total use value ($a+j+k+l+\ldots+q$). This is in line with the equation (or identity) in macro which says that the supply value (gross national product + import) must be equal to the use value (consumption + investment + export). We will study the supply value of the deliveries to the energy producing sectors in Section 4.

Note that Table 1.2 is a simplification of the input-output tables used in the SNOW model. This is done for ease of exposition. Let us say that sector 1 in column 2 is electricity supply. Let us say this sector import electricity of value *i*. However, in addition to domestic deliveries from sector 1 to sector 46 (in the upper part of the first two columns in Table 1.2) electricity supply also receives intermediate import deliveries from these sectors. From Table 1.2 you can get the impression that the deliveries from these 46 sectors are all domestic.

Let us take a look at the supply value of the household energy consumption sectors, which is the sum of intermediate consumption, taxes less subsidies on products and import.

Table 1.2. Input-output table at basic prices

						Relevant energy industry/product final use of these 25: Electricity, Gas, Kerosene (Paraffin) and heating oil, Fuel wood, District heating and Petrol/diesel						
Receiving Sector / Delivering Sector	Sector 1	…	Sector 46	Total	Exports	FINAL USES: Final consumption expenditure by		Final consumption expenditure by government etc.	Gross fixed capital formation	Changes in inventories	Final uses	Total use
						End use sector 1	…	Sector 23-25	Three users			
Sector 1	a	j	k	a+j+k	l	m	n	o	p	q	m+…+q	a+j+k+l+…+q
…	b	x	x	x	x	x	x	x	x	x	x	x
Sector 46	c	x	x	x	x	x	x	x	x	x	x	x
Total intermediate consumption	a+b+c	x	x	x	x	x	x	x	x	x	x	x
Compensation of employees	d	x	x	x								
Taxes less subsidies on products	e	x	x	x		x	x	x	x	x	x	x
Other net taxes on production	f	x	x	x								
Consumption of fixed capital	g	x	x	x								
Operating surplus, gross	h	x	x	x								
Output at basic prices	a+b+c+d+e+f+g+h	x	x	x	x	x	x	x	x	x	x	x
Value added	d+e+f+g+h	x	x	x	x	x	x	x	x	x	x	x
Imports	i	x	x	x	x	x	x	x	x	x	x	x
Supply at basic prices	a+b+c+d+e+f+g+h+i	x	x	x	x	x	x	x	x	x	x	Supply=Total use
Note: x means value exists												
Notice also that for each sector Supply at basic prices (a+b+c+d+e-f+g+h+i) = Total use (a+j+k+l+…+q)												
Relevant energy producing sectors of these 46: (Coal), Oil & gas, Refined petroleum products, Electricity and District heating.												

Table 1.3 shows an overview of the supply value of the deliveries to the six final household energy consumption sectors (these rows are final use columns in Table 1.2). The supply value of the deliveries is equal to the household consumption value, which will be discussed further in Section 3.

[2] See overview of sectors in Table A1.2 in Appendix A.

Table 1.3. Total supply value (= household consumption value) at basic prices. 2013 million NOK

Electricity	36 570
-electric power beyond network loss	
Gas	231
-propane, butane, liquefied petroleum gas (LPG)	
-tanks, cisterns and containers of metal	
Kerosene and heating oil etc.	1400
-kerosene including heating kerosene	
-middle distillates, including fuel oils	
-heavy fuel oil, including marine diesel, bunker oil	
-lubricating oils extracted from crude oil	
-heavy distillates not mentioned elsewhere	
Fuel wood, coal etc.	3 773
-wood	
-wood, own use	
-coke, tar and briquettes	
District heating	644
-district heating (steam and hot water supply)	
Petrol, diesel	34 592
-petrol for piston-driven combustion engines including aviation gasoline	
-gas oils, including diesel and marine gas oils	
-lubricating oils extracted from earth oil, heavy distillates not mentioned elsewhere	
-soap and detergents	
-antifreeze solution and such	

We see from Table 1.3 that the supply value of the deliveries to household consumption of electricity is 36.6 bn NOK and that the value of petrol/diesel is 34.6 bn. Even if the latter group contains other fractions than transport fuels, petrol (gasoline) and diesel is by far the most important[3].

Fuel wood has a value of 3.8 bn NOK. Practically all consumption in the fuel wood/coal sector is fuel wood. This includes own use of fuel wood, where we apply the same price as the price of commercial deliveries. Further, kerosene (paraffin) and heating oil has a value of 1.4 bn. The two groups with the smallest values are district heating and gas with a value of 0.6 bn and 0.2 bn, respectively. We will return to the distribution of these energy supply values into final domestic household end use, import and taxes less subsidies on products in Section 3.

In the nest section we look at deliveries from the four energy producing sectors (as we disregard the coal sector) to producing sectors and final uses. In Section 3 we study the deliveries from producing sectors to the six final energy household sectors. Section 4 focuses on the intermediate deliveries from the producing sectors and the corresponding import goods to the four energy producing industries.

[3] Statistics Norway has data for all subgroups of the six energy consumption sectors, but are not allowed to present the data due to confidentiality reasons.

2. Energy deliveries to producing sectors and final uses

In the following we study the deliveries from the four energy producing industries (see Table 1.1; ignoring coal supply). For simplicity of exposition, we aggregate the 46 producing industries to 22 sectors as is shown in Table A2.1 in Appendix A.

We are now focusing on the rows in Table 1.2 which show the energy deliveries to producing sectors, export and final uses.

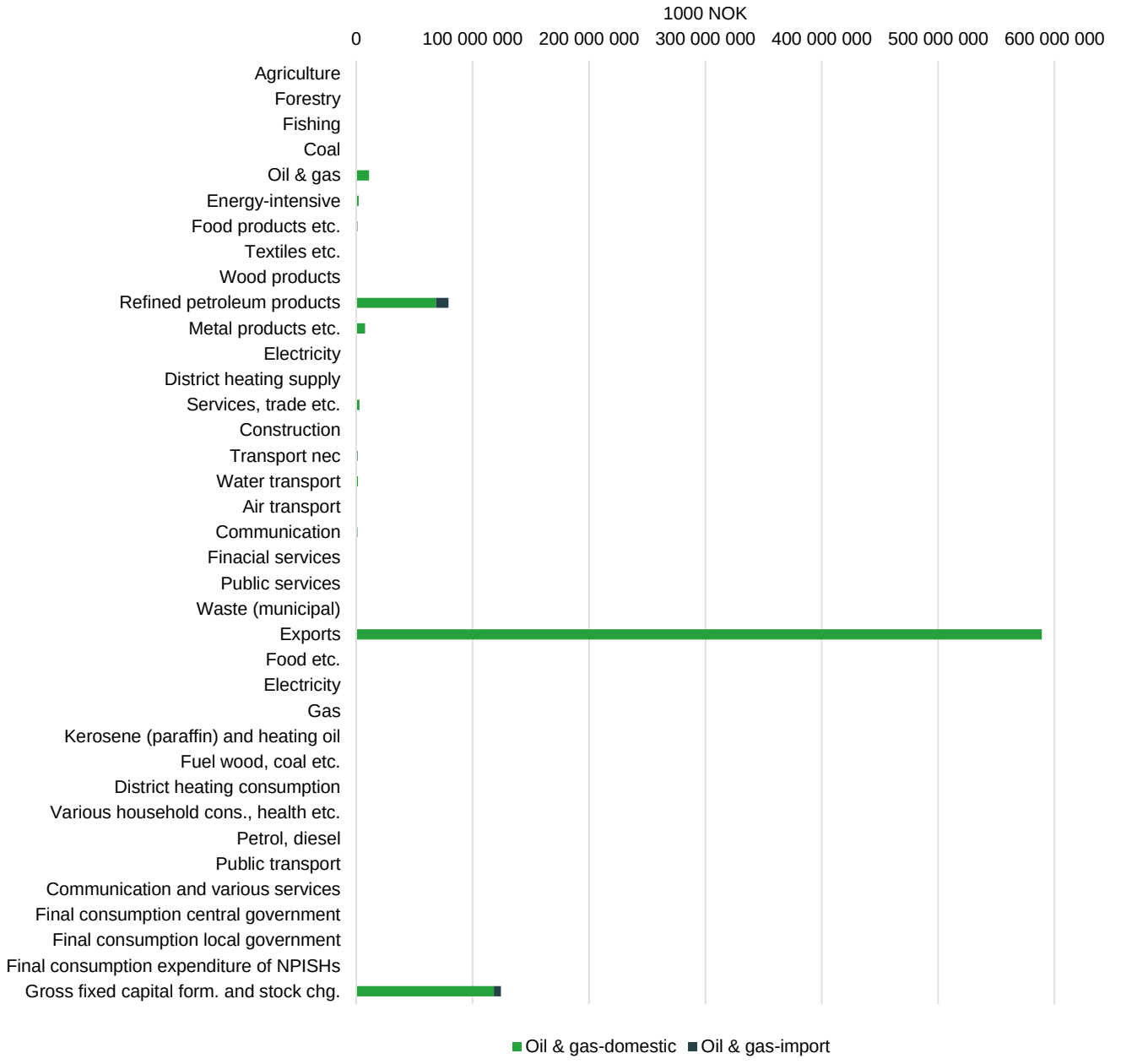
Final energy use goes to various household consumption sectors. Only tiny amounts of energy are treated as end use consumption of central and local government (and NPISH- Non-profit institutions serving households), as the energy deliveries to the government are treated as intermediate consumption in the two public producing sectors (governmental and municipality). E.g. electricity production goes to household consumption of electricity. In addition, electricity is (intermediately) delivered to the (two) public producing sectors, which supplies e.g. education or health services which is consumed by the household sector. The last four groups consist of gross fixed capital formation in the private, central governmental and local governmental sector, as well as changes in inventories/ statistical discrepancies (as is listed in Table A1.2 in Appendix A). For simplicity of exposition, we aggregate the 29 consuming industries to 14 sectors as is shown in Table A2.2 in Appendix A. In the following we also show the amount of the energy good that is imported to the producing and consuming sectors. See Appendix B for a complete list of values of import and domestic energy deliveries to producing sectors and final uses.

2.1. Oil and gas deliveries to producing sectors and final uses

We see from Figure 2.1 that the oil and gas sector delivers above all to export valued at almost 600 bn NOK and to a smaller extent to the refined petroleum products sector (incl. chemicals etc.) of almost 80 bn NOK (which includes import of around 11 bn)[4]. There are also internal deliveries of around 11 bn NOK. Oil and gas also delivers to final consumption as changes in stocks and gross fixed capital formation (of which a small amount is imported). The capital formation is due to exploration for oil and gas as this activity is regarded as investment in intangible fixed assets (as is also computer software). The sum over all domestic deliveries to producing and consuming sectors (see the upper rows in Table 1.2) is the total use value. We see from Table 1.1 that this amounts to 805.7 bn for the oil and gas sector. This is shown in Table B2.1 together with the import of oil and gas of 16.8 bn NOK.

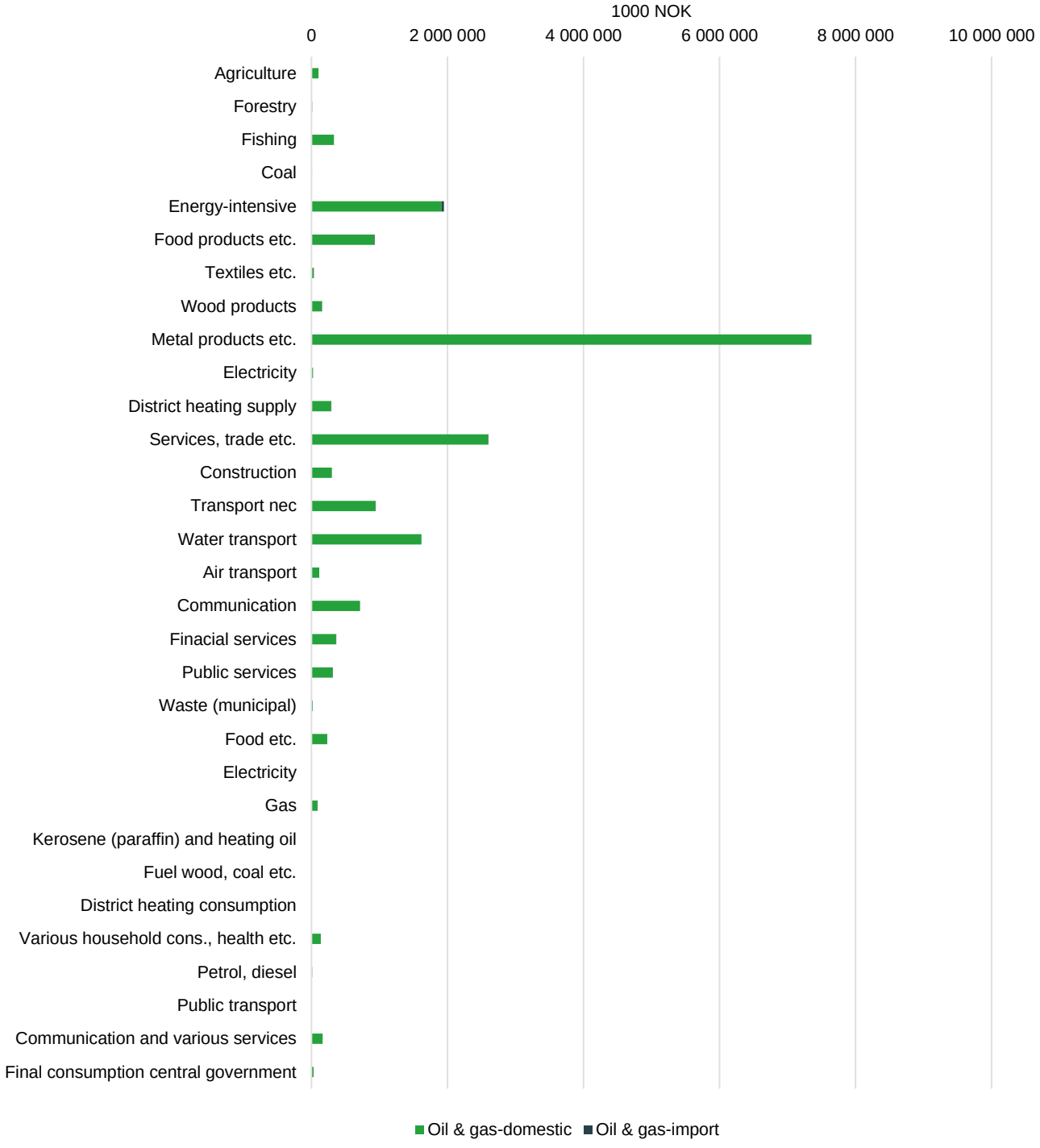
[4] All the sectors listed prior to export is producing sectors. The sectors from the group food etc. to communication and various services are household consumption sectors.

Figure 2.1. Deliveries from oil and gas extraction to producing sectors and final uses



Let us take a closer look at the oil and gas deliveries of values less than 10 bn NOK. Figure 2.2 shows that the oil and gas sector also has minor supplies to other sectors and final end users, e.g. metal products with a value of 7.4 bn NOK.

Figure 2.2. Deliveries from oil and gas extraction less than 10 bn NOK to producing sectors and final uses



For a list of values of domestic oil and gas deliveries see Table 2.1 (a complete list of both domestic and import deliveries is found in Table B2.1 in Appendix B). We have not been able to find figures of volume and/or price for oil and gas extraction from the Energy Accounts or other sources (but we have for the other energy deliveries). Notice that the total use value is 805.7 bn NOK as indicated above.

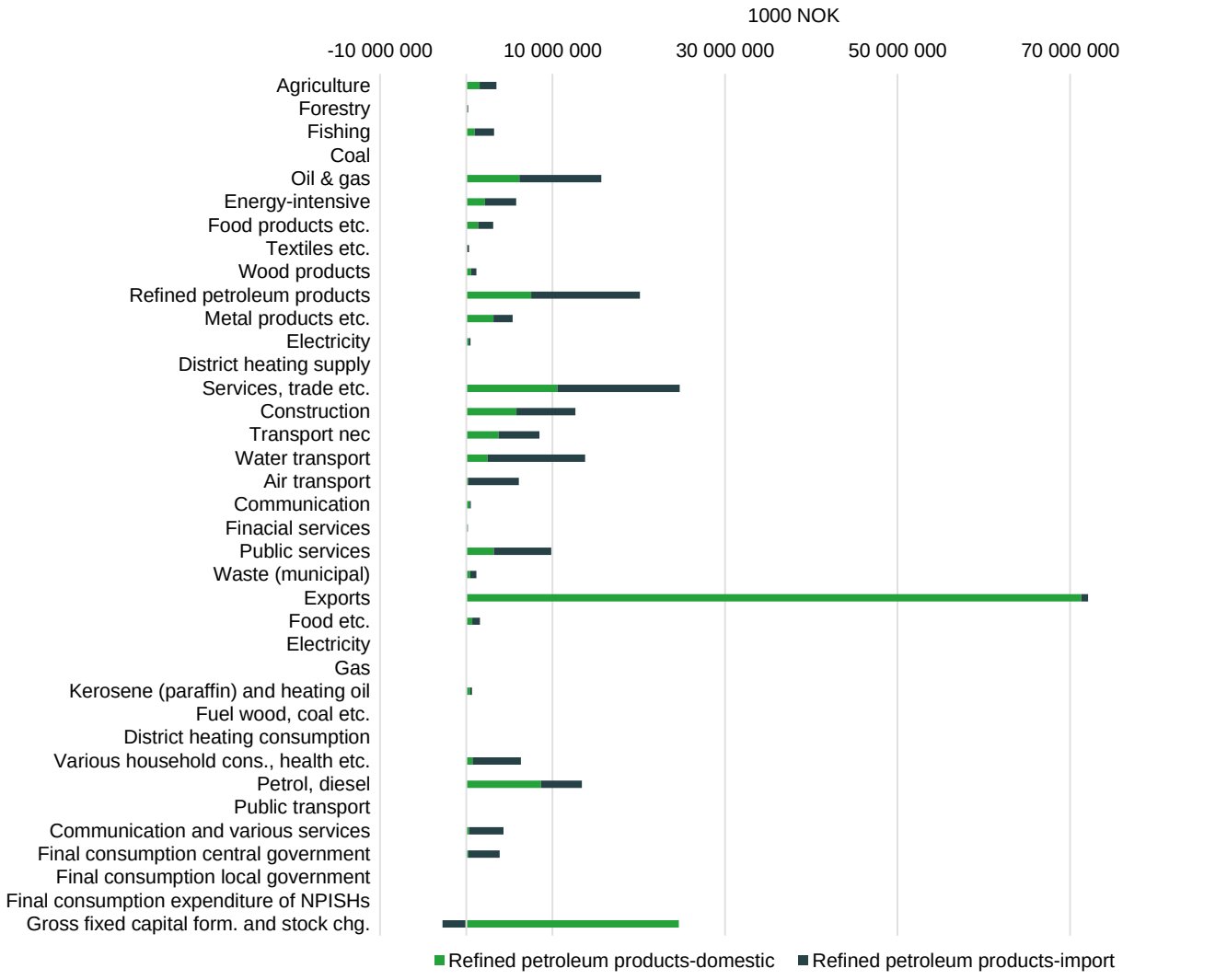
Table 2.1. Domestic oil and gas deliveries. Value in 1000 NOK

Receiving sector:	Value (1000 NOK)
Agriculture	103 838
Forestry	13 165
Fishing	332 261
Coal	7 043
Oil & gas	11 069 551
Energy-intensive	1911 731
Food products etc.	923 713
Textiles etc.	30 281
Wood products	152 048
Refined petroleum products	68 569 693
Metal products etc.	7345 677
Electricity	25 113
District heating	287 520
Services, trade etc.	2 598 070
Construction	298 701
Transport nec	940 400
Water transport	1618 634
Air transport	115 044
Communication	709 100
Financial services	361 919
Public services	310 008
Waste (municipal)	20 046
Total production sector deliveries	97 743 556
Export	589 094 021
Final use (incl. government consumption, gross fixed capital formation and stock changes)	118 898 588
…Of this Households	641 456
Total use	805 736 165

2.2. Refined petroleum sector deliveries to producing sectors and final uses

We see from Figure 2.3 that the refined petroleum sector (incl. chemicals etc.) provides goods for export of somewhat over 70 bn NOK. Many of the producing sectors also import refined petroleum sector products. The largest domestically receiving sectors are services, refined petroleum products (own deliveries), oil and gas extraction and construction. The largest end use sector is household consumption of petrol/diesel, where the bulk of deliveries should by far be petrol (gasoline) and diesel, even if this sector also consists of other refined petroleum fraction as the overview in Section 1 show. The gross fixed capital formation is practically all stock changes.

Figure 2.3. Deliveries from refined petroleum products (incl. chemical, rubber, plastic, pharmaceutical products) to producing sectors and final uses



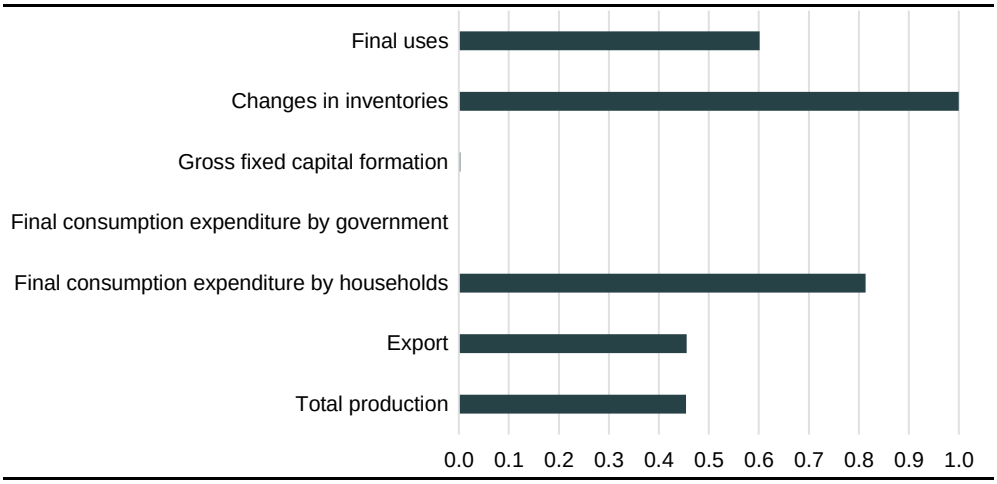
Let us separate the energy part of this heterogenous sector, which includes chemical, rubber, plastic, pharmaceutical products.[5] Figure 2.4 shows that refined petroleum alone constitutes around 45 per cent of total deliveries to producing sectors as well as exports. Refined petroleum alone supplies 60 per cent of total final uses and around 80 per cent of final consumption by households.

Biofuel is not a separate energy good in the National Accounts. However, let us do some calculations. The value of deliveries of both domestic supply and import to the transport sector[6] from the refined petroleum product sector (incl. chemicals) amounts to 8.5 bn NOK (see Figure 2.3). The share of domestic refined petroleum products *alone* is 82 per cent. If we assume the same share in import of refined petroleum products (incl. chemicals), total delivery of refined petroleum products *alone* stands at almost 7 bn NOK. From Table 2.2 we see that the price in the transport sector is set to 346 000 NOK/GWh (price and volume in this and the next section is from Statistics Norway (2016; 2017a). This means that the volume of refined petroleum in transport amounts to 20130 GWh. The Energy Accounts show that biofuel use in the transport sector (barring household consumption) is 865 GWh (Statistics Norway, 2017b), which is around 4.3 per cent of the receipts of refined petroleum products in the transport sector.

[5] We have detailed data for each sector. However, the sectors are aggregated to avoid identification of factories or plants.

[6] Transport includes pipeline transport, and services connected to transport.

Figure 2.4. Share of refined petroleum products domestic deliveries of total aggregated domestic deliveries (petroleum, rubber, plastic, pharmaceutical)



The SNOW model uses values from the National Accounts. However, we would also like to follow physical energy flows in simulations of the model. For the refined petroleum products sector (incl. chemicals) we have found price figures for the manufacturing industries from the Energy Accounts (Statistics Norway, 2019). These are prices before taxes and subsidies on products. We use the prices and the value figures to get volumes of the manufacturing industries (see Table 2.2). We indicate how we can use the price information for the manufacturing industries to set the prices for other sectors. If we are comfortable with these estimated prices, we can estimate the volumes for the non-manufacturing industries (not executed in Table 2.2)[7]. Table 2.2 shows that the total use value is 157.9 bn. This is also reflected in Table 1.1.

Table 2.2. Domestic refined petroleum product deliveries. Value in 1000 NOK, volume in GWH and price in 1000 NOK/GWh (excl. of taxes)

Receiving sector:	Value (1000 NOK)	Price (1000 NOK/GWh)[1]	Volume (GWh)[2]
Agriculture	1 531 525	339	
Forestry	93 655	332	
Fishing	956 747	338	
Coal	11 544	344	
Oil & gas	6 163 623	372	
Energy-intensive	2 148 242	357	6 022
Food products etc.	1 381 344	497	2 782
Textiles etc.	66 382	537	124
Wood products	549 032	574	956
Refined petroleum products	7 528 035	276	2 7274
Metal products etc.	3 160 776	591	4 830
Electricity	293 032	346	
District heating	21 486	346	
Services, trade etc.	10 575 606	346	
Construction	5 822 815	346	
Transport nec	3 743 530	346	
Water transport	2 461 859	346	
Air transport	210 943	346	
Communication	370 239	346	
Financial services	117 108	346	
Public services	3 193 261	346	
Waste (municipal)	440 043	346	
Total production sector deliveries	50 821 309		
Export	71 298 189		
Final use[3]	35 756 460		
…Of this Households	10 868 422		
Total use	157 875 958		

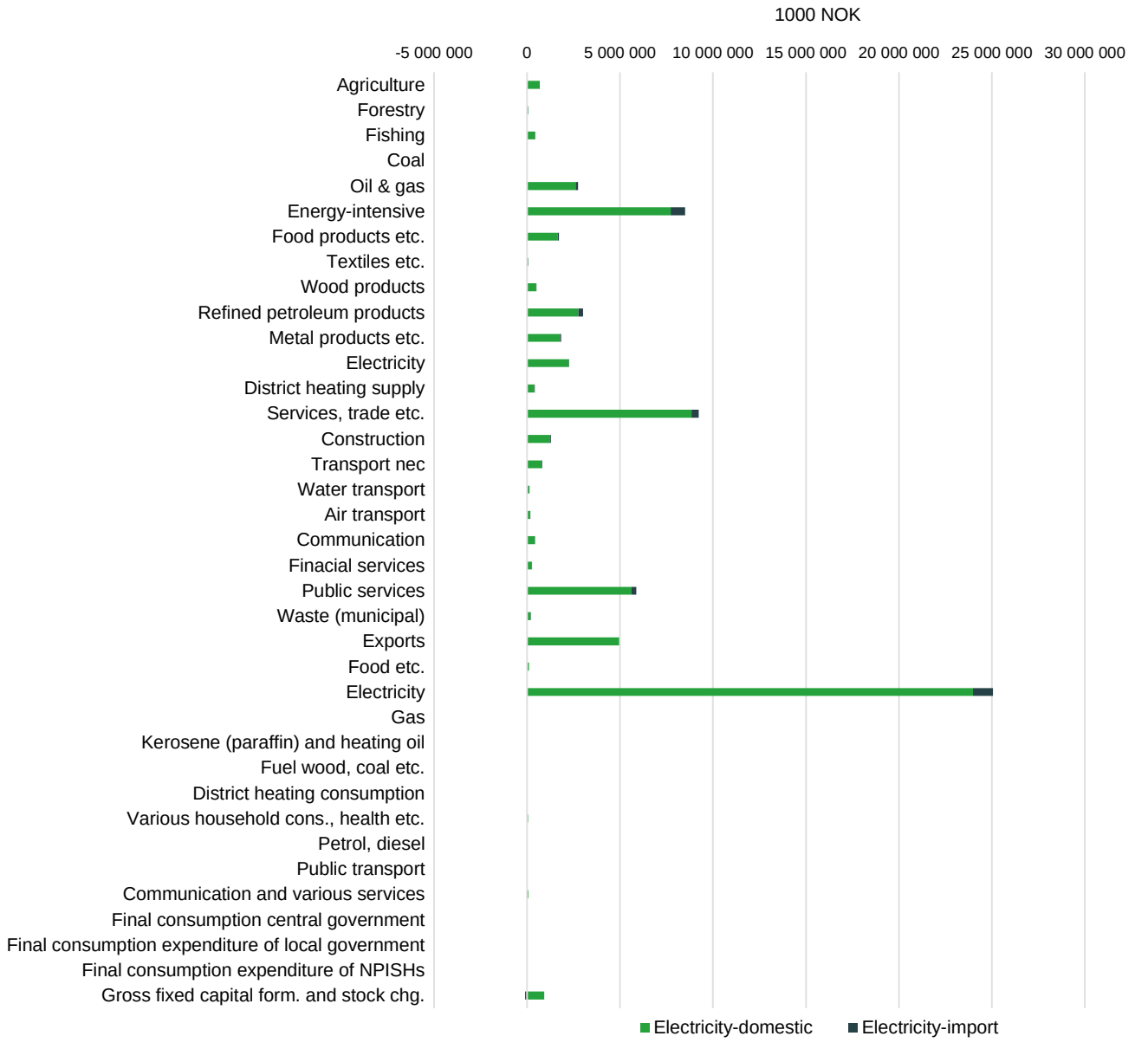
[1] Due to lack of data some figures have been set to the average price of other (similar) industries
[2] Lacks reliable data for sectors
[3] Incl. government consumption, gross fixed capital formation and stock changes

[7] The prices for the various goods are set to 1 in 2013 in the SNOW model. Hence, as we have information of the actual price (and volume), we can follow the development of the various future prices (and volumes) in simulations of the model.

2.3. Electricity deliveries to producing sectors and final uses

We see from Figure 2.5 that the most important electricity deliveries to producing sectors go to production of services (9 bn), energy intensive industries (8 bn) and public services (6 bn). The most important final use sector is household consumption of electricity which amounts to 25 bn (incl. import), and this constitutes 35 per cent of total electricity use. Note that the value of household consumption of electricity in Table 1.3 stands at 36.6 bn NOK. However, this includes taxes and subsidies on products, which will be discussed in Section 3. Electricity is exported for a value of 5 bn, whereas the import value stands at around 3.1 bn. The two largest importers of electricity are energy intensive industries (0.8 bn) and household consumption (1.1. bn). The amount of gross fixed capital formation is 0.9 bn NOK, which probably is investment in computer software. Again, the sum over all deliveries to producing and consuming sectors (incl. export) is the total use value. We see from Table 1.1 that this amounts to 68.7 bn for the electricity sector. This is also reflected in the lowest row in Table 2.3.

Figure 2.5. Deliveries from electricity sector to producing sectors and final uses



We have found price figures for electricity deliveries to the manufacturing industries as well as for households. We use the prices and the value figures to get volumes (see Table 2.3) and this makes it possible to follow physical energy flows in simulations of the model. We indicate how we can use the price information for the manufacturing industries to set the prices for other sectors. Hence, we can estimate the volumes for the non-manufacturing industries (not executed in Table 2.3). Are the prices reasonable? The average manufacturing price is 344 000 NOK/GWh. This price is 7 per cent higher than the average industry price (excl. of taxes) for Norway in IEA (2013). The average household price of electricity of 623 000 NOK/GWh (excl. of taxes) is also 7 per cent higher than in IEA (2013). Table 2.3 also shows the total use value of electricity of 68.7 bn as pointed out above. For a complete list of domestic and import value figures see Table B2.1 in Appendix B.

Table 2.3. Domestic electricity deliveries. Value in 1000 NOK, volume in GWH and price in 1000 NOK/GWh (excl. of taxes)

Receiving sector:	Value (1000 NOK)	Price (1000 NOK/GWh)[1]	Volume (GWh)[2]
Agriculture	661 762	357	
Forestry	65 173	357	
Fishing	431 371	357	
Coal	14 211	404	
Oil & gas	2 603 986	404	
Energy-intensive	7 731 529	283	27 326
Food products etc.	1 652 312	532	3 106
Textiles etc.	64 686	621	104
Wood products	487 504	539	905
Refined petroleum products	2 753 259	366	7 512
Metal products etc.	1 771 738	572	3 098
Electricity	2 258 438	344	
District heating	390 725	344	
Services, trade etc.	8 841 204	484	
Construction	1 244 021	344	
Transport nec	785 809	484	
Water transport	123 964	484	
Air transport	170 091	484	
Communication	424 606	388	
Financial services	256 845	388	
Public services	5 617 348	388	
Waste (municipal)	193 109	388	
Total production sector deliveries	38 543 691		
Export	4 945 365		
Final use[3]	25 166 959		
…Of this Households	24 234 337	623	38 918
Total use	68 656 015		

[1] Due to lack of data some figures have been set to the average price of other (similar) industries

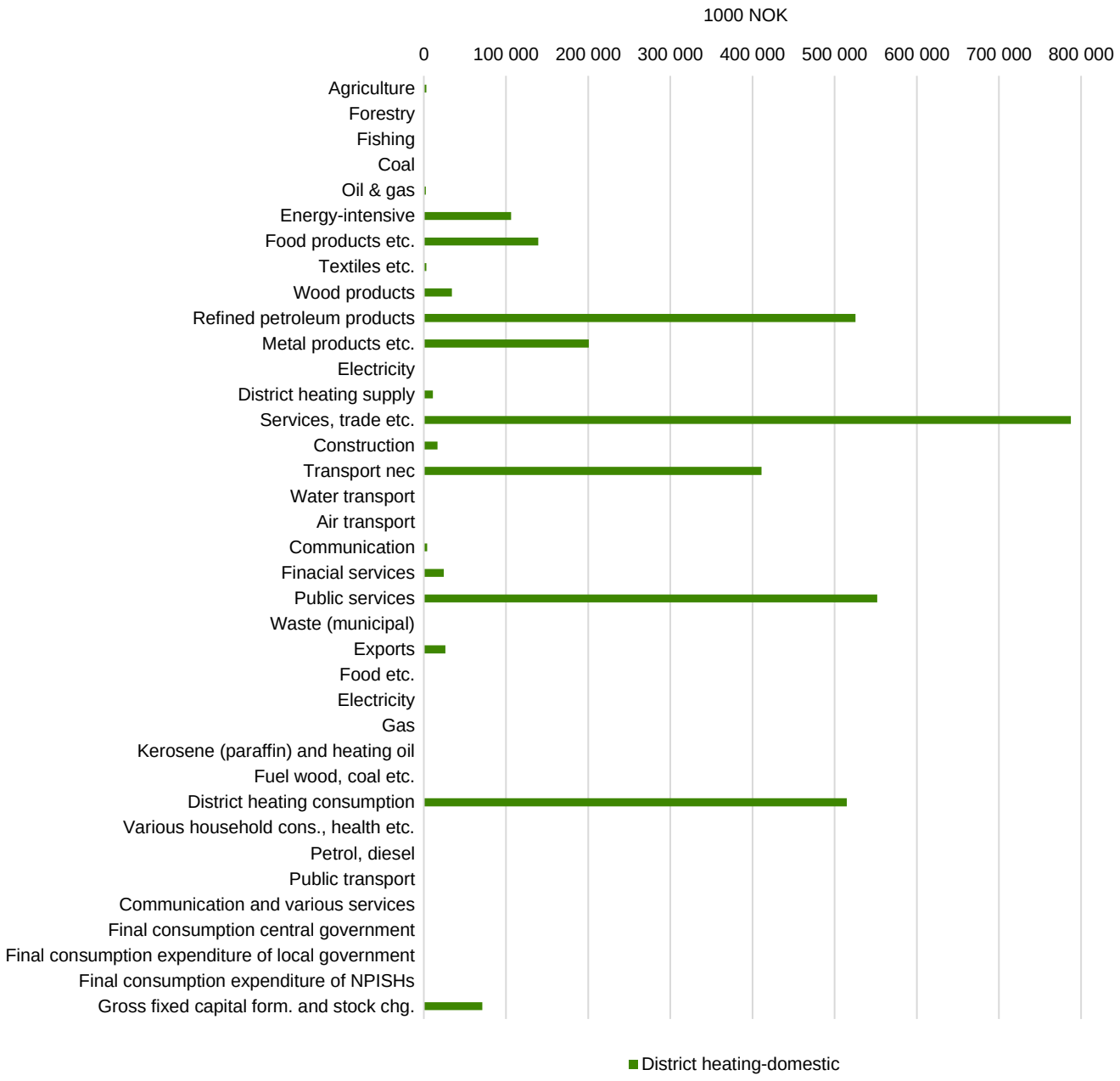
[2] Lacks reliable data for sectors

[3] Incl. government consumption, gross fixed capital formation and stock changes

2.4. District heating deliveries to producing sectors and final uses

As Figure 2.6 shows, the most valuable intermediate deliveries from district heating go to both private and public services as well as refined petroleum sector and (pipeline) transport. The most important end use sector is of course household consumption of district heating.

Figure 2.6. Deliveries from district heating to producing sectors and final uses



We have found price figures for district heating deliveries to the manufacturing industries as well as for households. Again, we use the prices and the value figures to get volumes (see Table 2.4). We indicate how we can use the price information for the manufacturing industries to set the prices for other sectors. Hence, we can estimate the volumes for the non-manufacturing industries (not executed in Table 2.4). We also see that the total use value is 3.4 bn, as also is indicated in Table 1.1.

Table 2.4. (Domestic) District heating (steam and hot water) deliveries. Value in 1000 NOK, volume in GWH and price in 1000 NOK/GWh (excl. of taxes)

Receiving sector:	Value (1000 NOK)	Price (1000 NOK/GWh)[1]	Volume (GWh)[2]
Agriculture	3 092	295	
Forestry	89	295	
Fishing	156	295	
Coal	3	295	
Oil & gas	2 349	295	
Energy-intensive	525 268	346	1 520
Food products etc.	139 132	338	412
Textiles etc.	3 009	828	4
Wood products	34 051	260	131
Refined petroleum products	525 268	346	1 520
Metal products etc.	200 665	188	1 065
Electricity	8	295	
District heating	11 006	295	
Services, trade etc.	787 700	295	
Construction	509 582	295	
Transport nec	113	295	
Water transport	26	295	
Air transport	4 090	295	
Communication	24 110	295	
Financial services	102 570	295	
Public services	551 850	295	
Waste (municipal)	121	295	
Total production sector deliveries	2 820 884		
Export	26 066		
Final use[3]	586 048		
…Of this Households	515 000	476	1083
Total use	3 432 998		

[1] Due to lack of data some figures have been set to the average price of other (similar) industries

[2] Lacks reliable data for sectors

[3] Incl. government consumption, gross fixed capital formation and stock changes

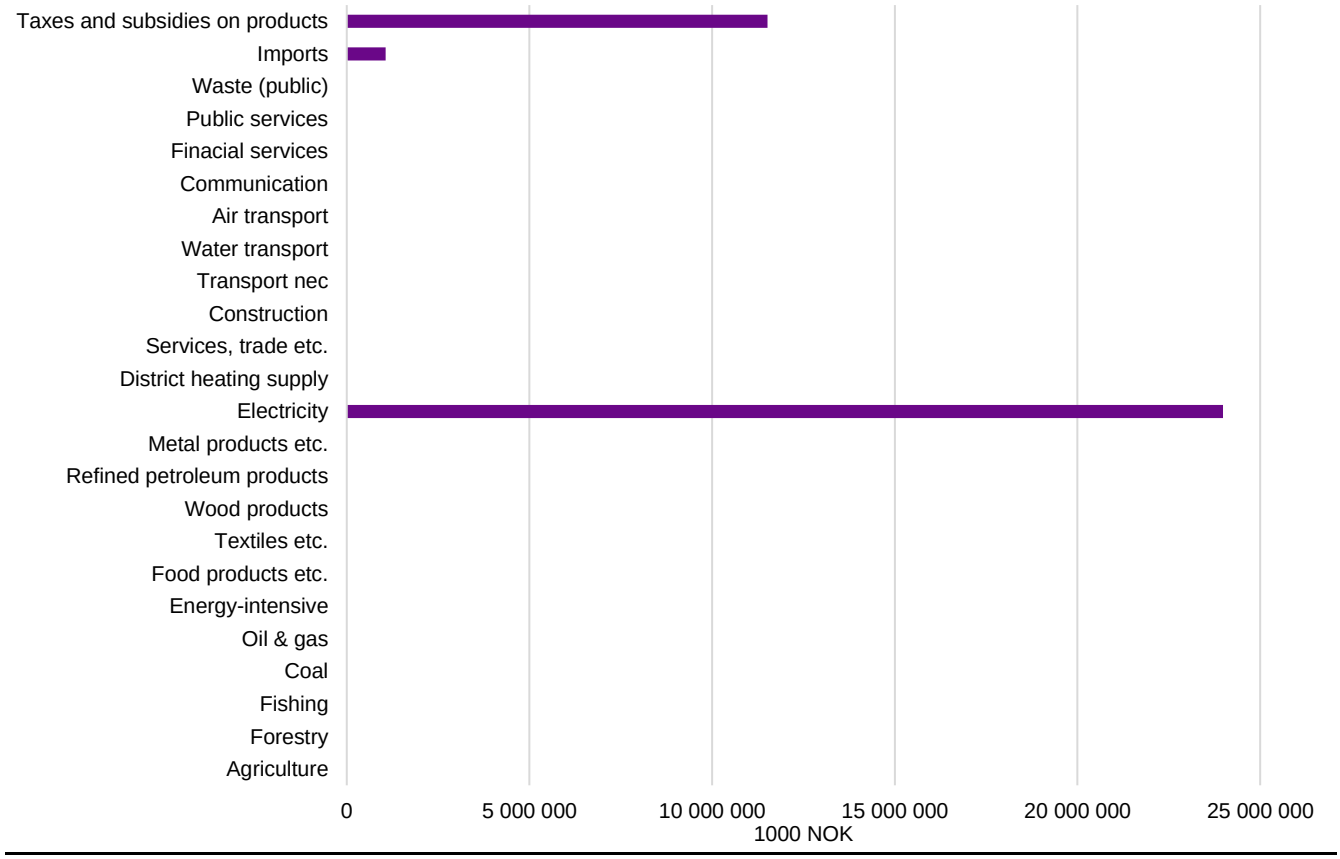
3. Deliveries from producing sectors to final energy uses

In the following we study more closely the deliveries from the producing sectors to the six household energy end use sectors (which generally consist of more than one consumption good); see Table 1.3 in Section 1). When we aggregate over the value of receipts from all producing industries to a certain final energy use sector, we must add taxes less subsidies on products to get output at basic prices (see Table 1.2). Further, adding imports we get supply at basic prices. As we saw from Table 1.3 the supply value in 2013 varies greatly over sectors from 36.6 bn in electricity and 34.6 bn in petrol/diesel to 3.7 bn in fuel wood and 1.4 bn in kerosene/heating oil. The sectors with lowest supply value are district heating consumption and gas with 0.6 bn and 0.2 bn, respectively. See Appendix B for a complete list of values of deliveries from producing sectors to final energy uses.

3.1. Deliveries from producing sectors to household consumption of electricity

Figure 3.1 shows that household consumption of domestically produced electricity amounts to 24 bn NOK, while the value of import is almost 1.1 bn NOK (and these two components are also reflected in Figure 2.5). Adding taxes (less subsidies) of 11.5 bn NOK, total supply stands at 36.6 bn NOK in 2013.The taxes are 58 per cent VAT and 42 per cent electricity tax (tax on electrical power plus contribution to the Energy Fund[8]). See Table B3.1 in Appendix B for a complete list of value figures.

Figure 3.1. Deliveries from producing sectors to household consumption of electricity



[8] In 2013 the income of the Fund comes from a mark-up on the network tariff for households of 0.01 NOK/kWh and a yearly contribution of 800 NOK per measuring point for other end users.

The SNOW model uses values from the National Accounts. However, we emphasize again that we would also like to follow future physical energy flows in simulations of the model. Table 3.1 shows the value, volume and price data for household electricity consumption. From the National Accounts in 2013 we get total supply value (= total household consumption value) which is the sum of domestic use[9], import and taxes on products. To get the household price we separate the supply value with the volume figure from the Energy Accounts (Statistics Norway, 2016) to get the household electricity price in 1000 NOK per GWh. Is the price of 940 000 NOK/GWh reasonable? The answer must be yes, since it is 8 per cent higher than the household electricity price (incl. taxes) in IEA (2013).

Table 3.1. Value, volume and price of household consumption of electricity in 2013

	1000 NOK				GWh	1000 NOK/GWh
	Final domestic end use	Import	Taxes less subsidies on products	Supply at basic prices = Total consumption)	Volume	Price
Electricity	23 986 032	1 067 968	1 1516 000	36 570 000	38 918	940

3.2. Deliveries from producing sectors to household consumption of petrol/diesel

We see from Figure 3.2 that the most important delivering sector to household consumption of petrol/diesel is the refined petroleum sector (incl. chemicals etc.), which is also reflected in Figure 2.3, at 8.7 bn NOK, while the import stands at 4.7 bn (74 per cent of the domestic deliveries of this mixed sector are refined petroleum products alone[10]). Figure 3.2 also shows that (private) services have deliveries for around 2.2. bn NOK. Taxes/subsidies are around 18.4 bn NOK, which means that total supply value is around 34.6 bn. This is also reflected in Table 1.3. The largest components of taxes are road tax on fuel and VAT, with 48 and 38 per cent of total tax, respectively. In addition, the CO_2-tax constitute 10 per cent and other taxes on products 4 per cent. Let us look at deliveries of less than 50 million NOK. Figure 3.3 shows that other sectors also have minor supplies to household consumption of petrol/diesel, e.g. metal products with 40 million NOK. See Table B3.1 in Appendix B for a complete list of value figures.

[9] This is marginally lower than the household consumption in Table 2.3, as the latter includes electricity use in other household sectors (as e.g. food, health) than household electricity consumption.

[10] We cannot present figures for the other fractions to avoid identification of factories or plants.

Figure 3.2. Deliveries from producing sectors to household consumption of petrol/diesel

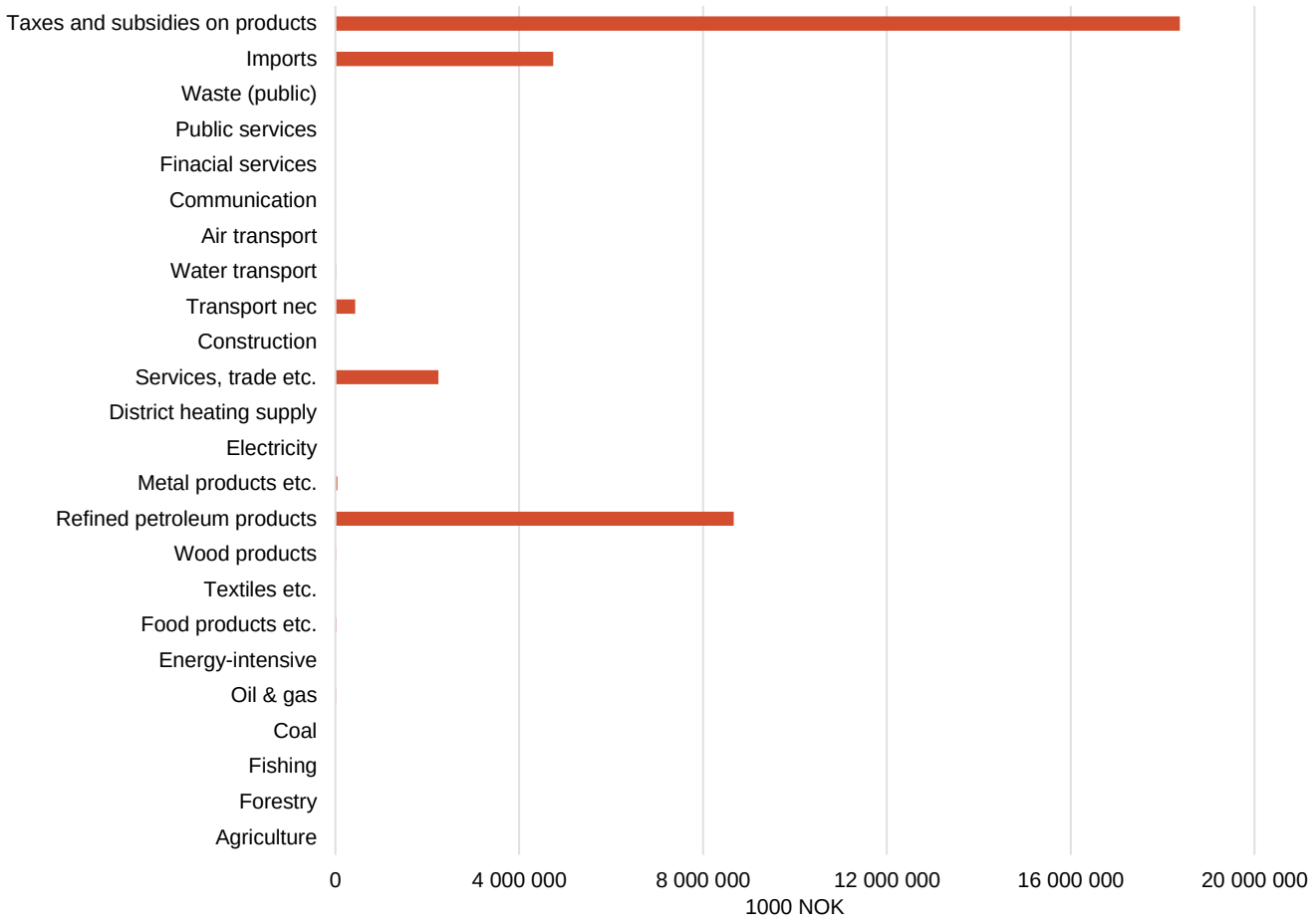
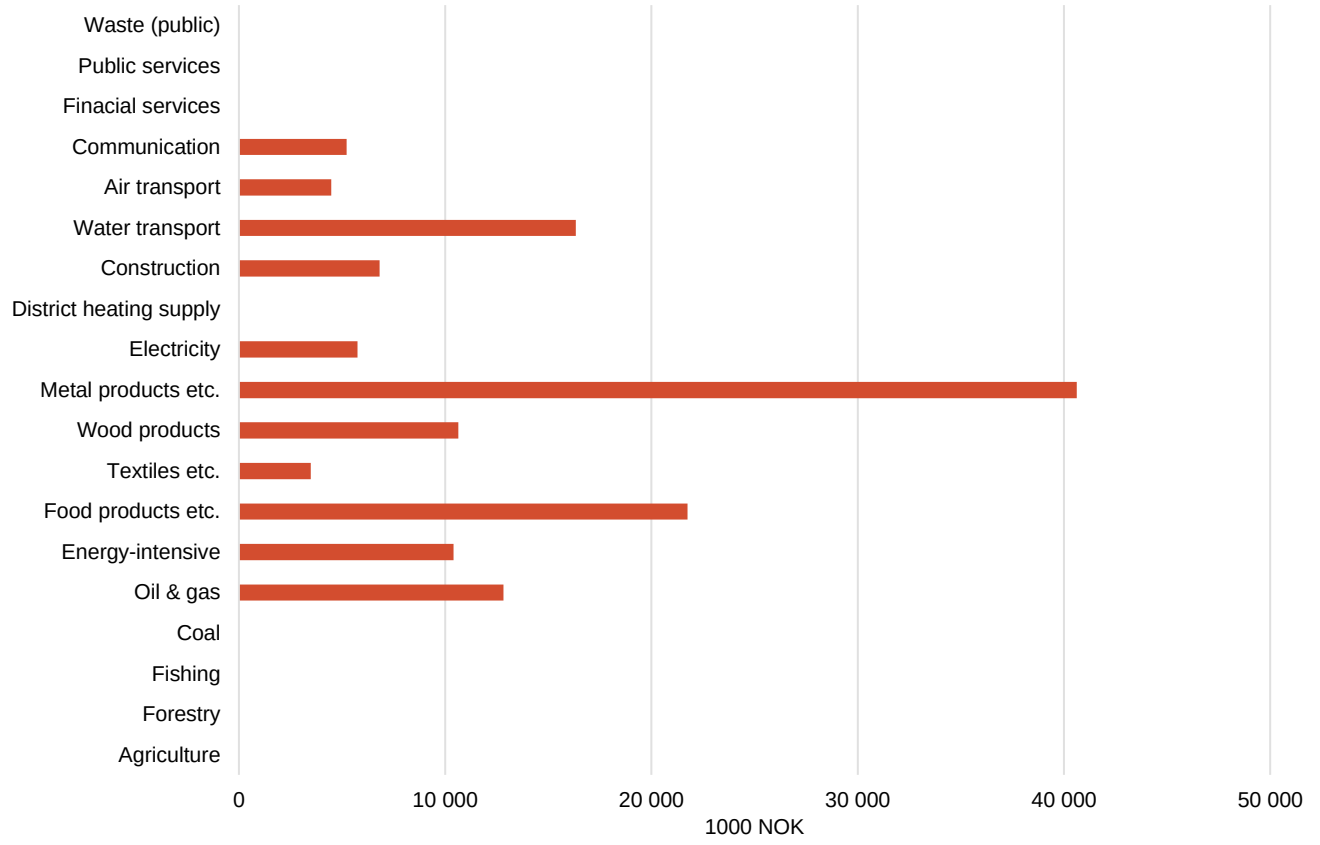


Figure 3.3. Deliveries from producing sectors to household consumption of petrol/diesel less than 50 million NOK



The household price for petrol/diesel in Table 3.2 is calculated in the same manner as the electricity price. This is true for the other energy end use goods that we present, except for biofuels. Further, we may conclude that the petrol/diesel price is reasonable as was also the electricity price. IEA (2013) presents a household automotive price of 1309 000 NOK/GWh and a gasoline premium unleaded price of 1631 000 NOK/GWh. A volume weighted average of these two prices is 1461 000 NOK/GWh, or 6.5 per cent lower than the estimated price in Table 3.2.

Table 3.2. Value, volume and price of household consumption of petrol/diesel in 2013

	1000 NOK				GWh	1000 NOK/GWh
	Final domestic end use	Import	Taxes less subsidies on products	Supply at basic prices = Total consumption)	Volume	Price
Petrol/diesel	11 476 648	4 737 352	18 378 000	34 592 000	21 629	1 564[1]

[1] If we do not deduct the value of lubricating oils, soap and detergents and antifreeze solution and such from total value of consumption, the price of petrol/diesel is 1599 000 NOK/GWh.

The value, volume and price of biofuel is shown in Table 3.3. As we do not have values for biofuels from the National Accounts, we start with the volume of biofuels from the Energy Accounts which is 610 GWh in 2013 in the household sector. Almost all biofuel in 2013 is imported (Statistics Norway, 2017 b)[11]. We assume the same price as for petrol/diesel and simply multiply this with the volume to get total consumption value. Table 3.3 also shows the same figures without CO_2-taxes. Even if biofuel is not a separate energy good in the SNOW model, we know that the value and volume share in the base year is around 2.8 per cent of total petrol/diesel consumption. This can be important information in simulations of the SNOW-NO model.

Table 3.3. Value, volume and price of household consumption of biofuel in 2013

	1000 NOK				GWh	1000 NOK/GWh
	Final domestic end use	Import	Taxes less subsidies on products	Supply at basic prices = Total consumption)	Volume	Price
Biofuel				975 390	610	1 564[1]
Biofuel less CO_2-taxes				921 100	610	1 475

[1] We assume the same price as for petrol/diesel. Hence, the value is estimated as price times volume.

[11] In 2017 the volume was almost four times higher than in 2013.

3.3. Deliveries from producing sectors to household consumption of fuel wood

Figure 3.4 shows that household consumption of fuel wood (where coal represents a very tiny share) receives deliveries from above all agriculture (1.5 bn NOK), (private) services (0.9 bn), forestry (0.6 bn) and (land) transport (0.15 bn). There is also some minor supply from other sectors. An amount of 62 million NOK of fuel wood is imported[12] and taxes/subsidies are 0.5 bn NOK, the latter being only VAT. See Table B3.1 in Appendix B for a complete list of value figures. Table 3.4 gives the value, volume and price of household consumption of fuel wood.

Figure 3.4. Deliveries from producing sectors to household consumption of fuel wood

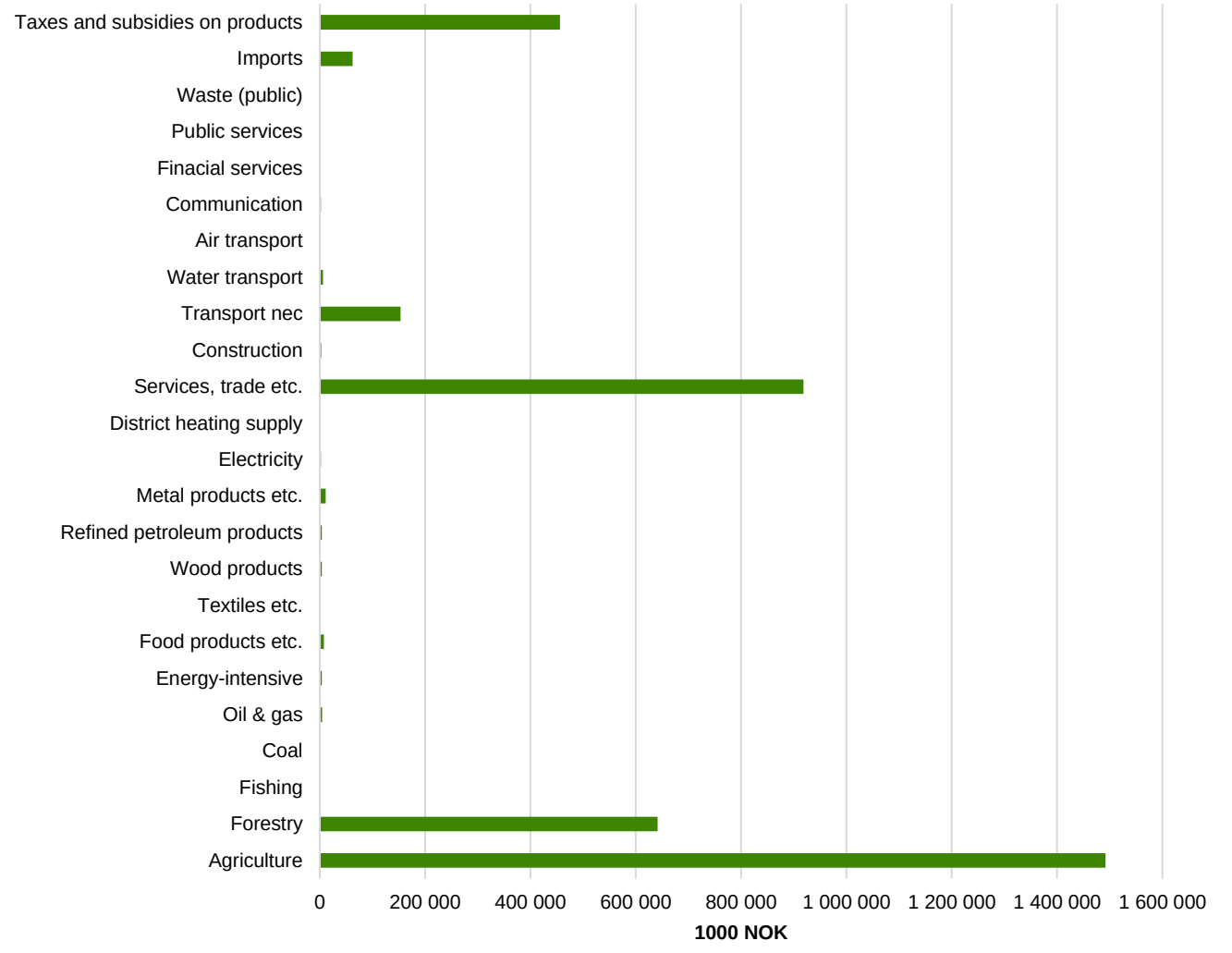


Table 3.4. Value, volume and price of household consumption of fuel wood in 2013

	1000 NOK			GWh	1000 NOK/GWh
	Final domestic end use	Import	Taxes less subsidies on products	Supply at basic prices = Total consumption)	Volume	Price
Fuel wood	3 254 752	62 248	456 000	3 773 000	6 104	618[1]

[1] We assume the same price for wood for own use

[12] Of this 98.5 per cent is forestry import and the rest are refined petroleum products (i.e. coal).

3.4. Deliveries from producing sectors to household consumption of kerosene and heating oil

Figure 3.5 shows the deliveries from sectors to household consumption of kerosene and heating oil (incl. fuel and marine oils). The refined petroleum sector (incl. chemicals etc.) has 465 million NOK, of which the refined petroleum sector alone stands for 30 per cent. Further, (private) services deliver for 344 million and (land) transport for 66 million. Import stands at 188 million NOK, while taxes/subsidies on products have a value of 316 million. The latter is composed of 88 per cent VAT, 8 per cent CO_2-tax on mineral products and 4 per cent other taxes on products. There are also some deliveries from other sectors of less than 5 million NOK. See Table B3.1 in Appendix B for a complete list of value figures.

Figure 3.5. Deliveries from producing sectors to household consumption of kerosene and heating oil

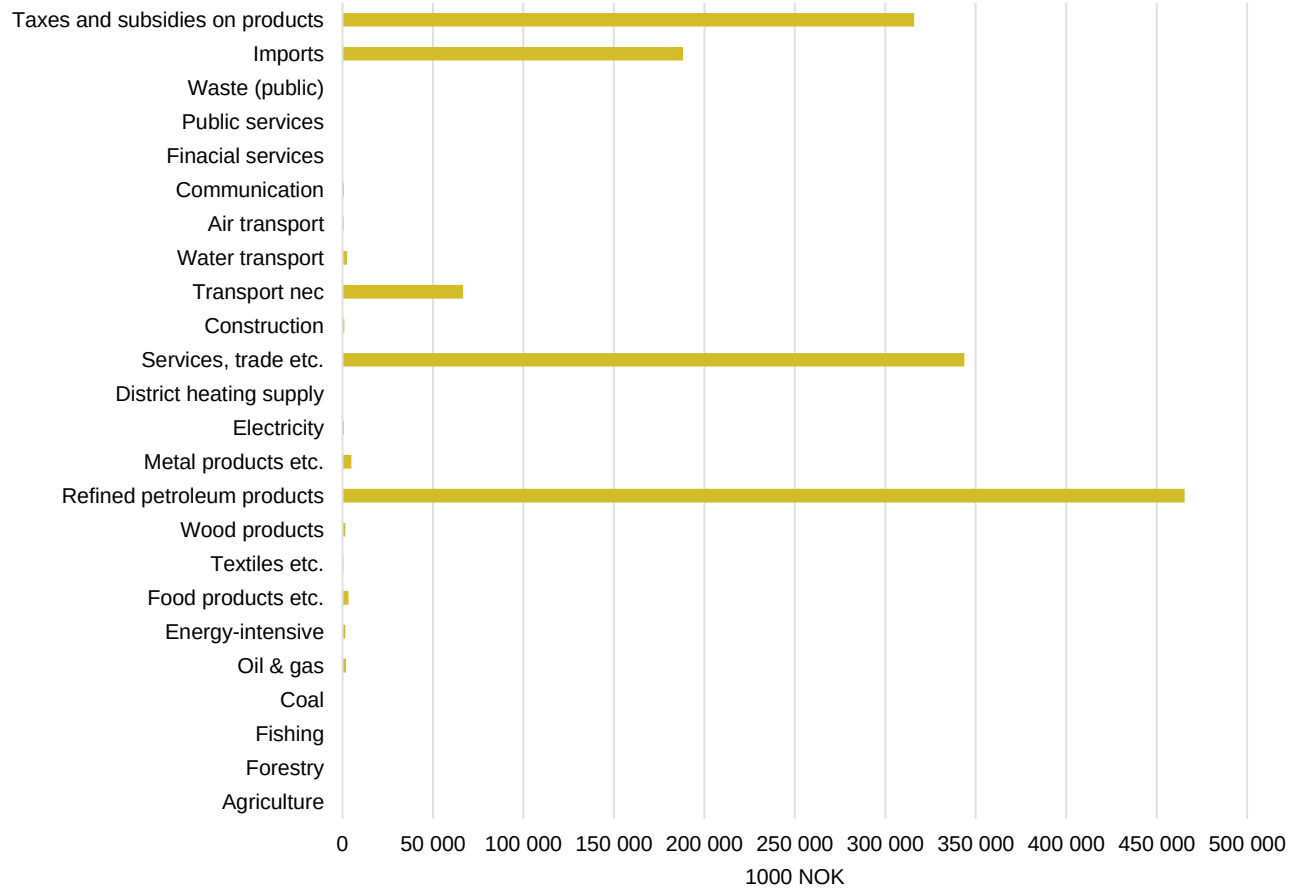


Table 1.3 shows that the kerosene (paraffin) and heating oil sector is a mix of various fractions, which make it difficult to compare with other sources. However, IEA (2013) presents a price of light fuel oil for household (incl. taxes) of 981 000 NOK/GWh, which is almost identical to our aggregate price estimate in Table 3.5.

Table 3.5. Value, volume and price of household consumption of kerosene and heating oil in 2013

	1000 NOK				GWh	1000 NOK/GWh
	Final domestic end use	Import	Taxes less subsidies on products	Supply at basic prices = Total consumption)	Volume	Price
Kerosene and heating oil	895 797	188 203	316 000	1 400 000	1 422	985

3.5. Deliveries from producing sectors to household consumption of district heating

We see from Figure 3.6 that production of district heating (steam and hot water) delivers for 515 million NOK to household consumption of district heating (this is also reflected in Figure 2.6). Adding VAT of 129 million to this supply, we get output at basic prices at 644 million which is equal to the value of supply since there is no import. Table 3.6 gives the value, volume and price of household consumption of district heating.

Figure 3.6. Deliveries from producing sectors to household consumption of district heating

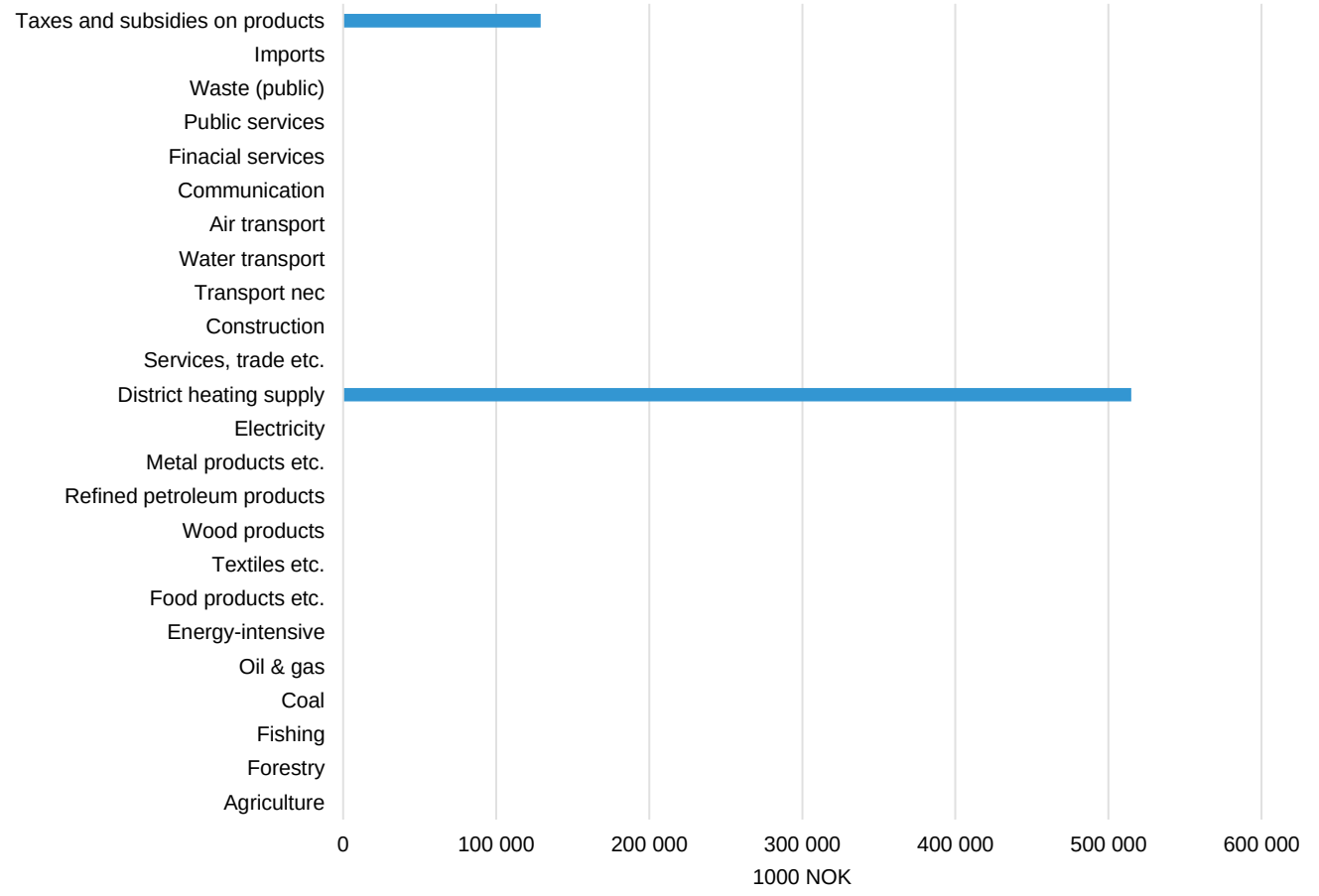
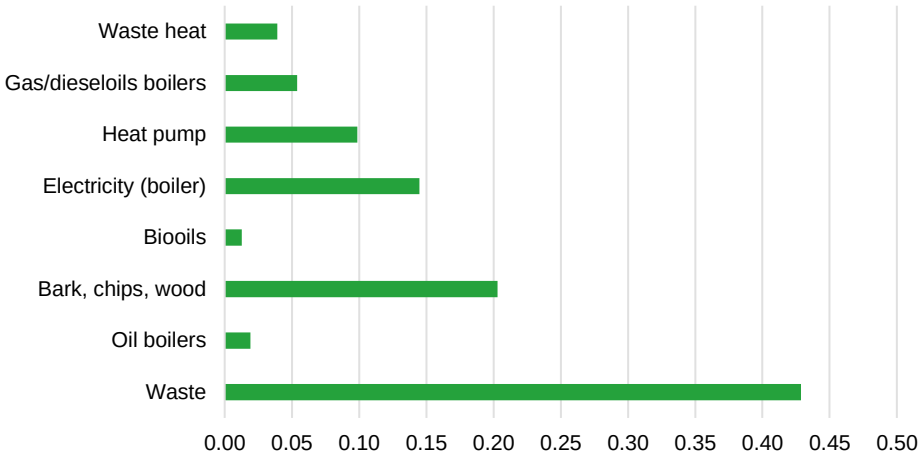


Table 3.6. Value, volume and price of household consumption of district heating in 2013

	1000 NOK				GWh	1000 NOK/GWh
	Final domestic end use	Import	Taxes less subsidies on products	Supply at basic prices = Total consumption)	Volume	Price
District heating	515 000	0	129 000	644 000	1 083	595

Different energy goods are used in the deliveries to consumption of district heating. Figure 3.7 shows the shares of fuel consumption in net total production of district heating from the Energy Accounts (Statistics Norway, 2018). The most important fuels in district heating are waste, solid biofuels (bark, chips, wood) and electricity with shares of 43, 20 and 15 per cent, respectively. We will return to this in the next section, where we study the deliveries from various sectors to energy supply.

Figure 3.7. Share of fuel consumption in net production of district heating in 2013 (GWh)



3.6. Deliveries from producing sectors to household consumption of gas

The last final household energy consuming sector is gas (mostly LPG). The sectors that deliver for more than 1 million NOK are (oil and) gas extraction with 89 million, private (services) 42 million, metal products 10 million, (land) transport 8 million, refined petroleum sector (incl. chemicals etc.) with 6 million. The refined petroleum sector alone delivers 37 per cent of these 6 million. Import stands at 27 million. Taxes are valued at 47 million of which 98 per cent is VAT and 2 per cent is CO_2-tax. See Table B3.1 in Appendix B for a complete list of value figures. Table 3.7 gives the value, volume and price of household consumption of gas.

Figure 3.8. Deliveries from producing sectors to household consumption of gas

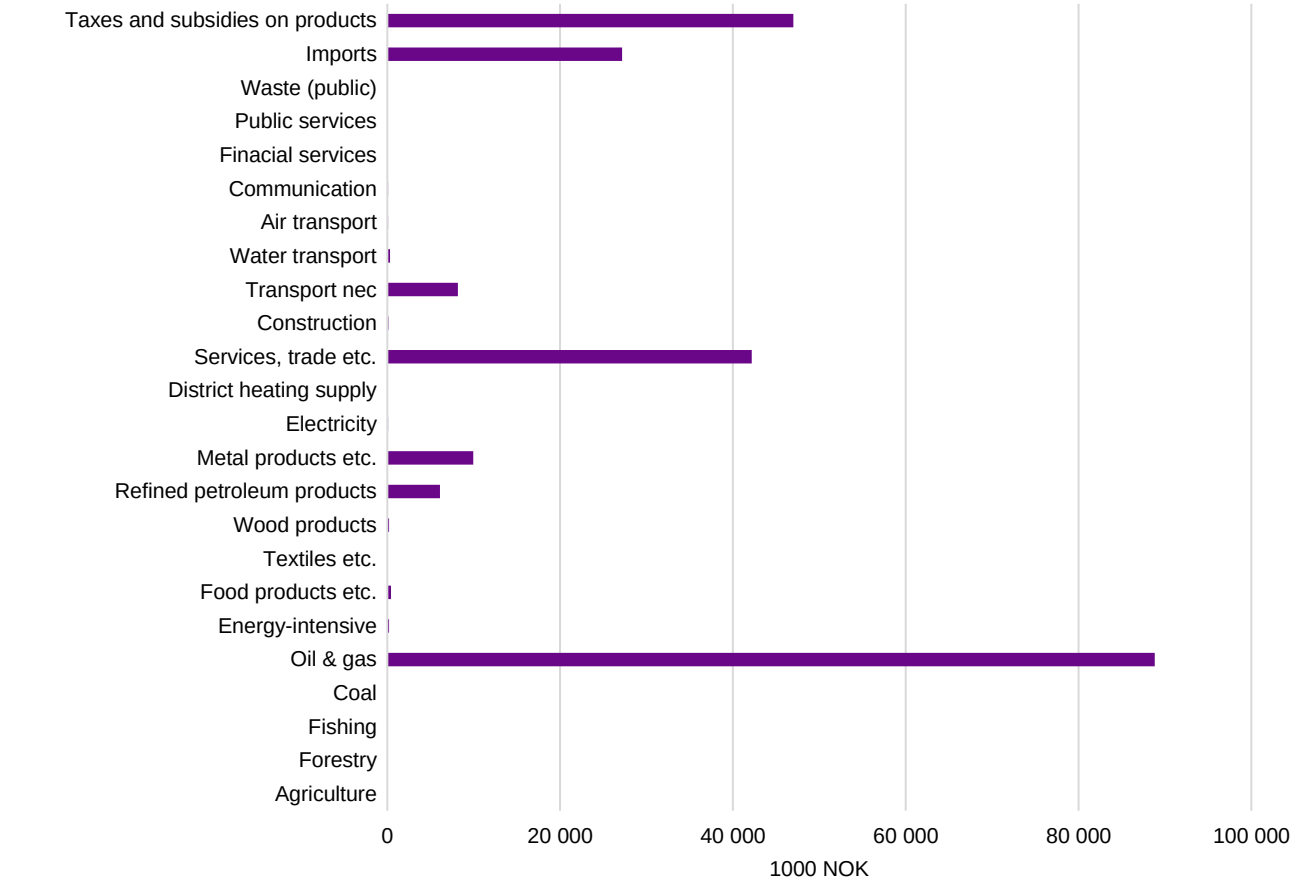


Table 3.7. Value, volume and price of household consumption of gas in 2013

	1000 NOK				GWh	1000 NOK/GWh
	Final domestic end use	Import	Taxes less subsidies on products	Supply at basic prices = Total consumption)	Volume	Price
Gas	156 818	27 182	47 000	231 000	117	1 974[1]

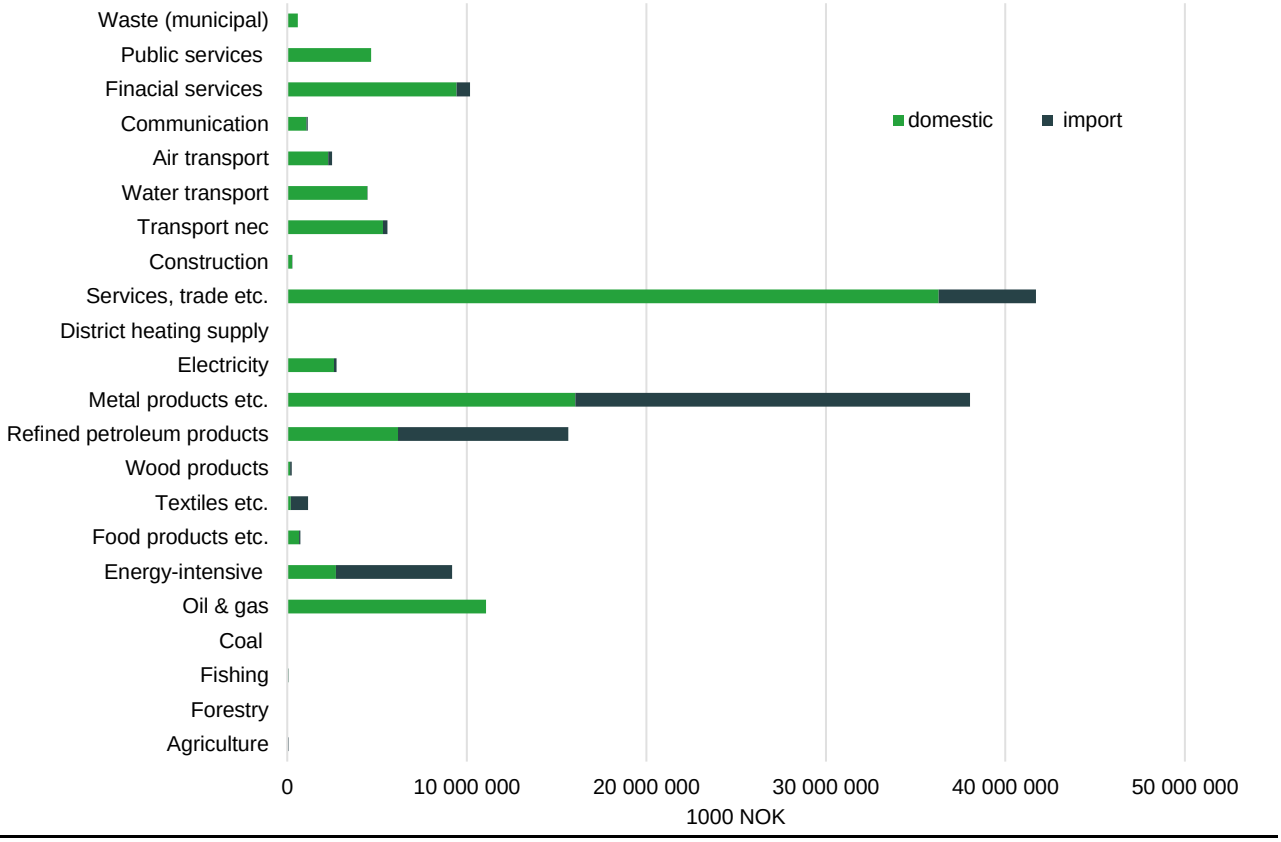
[1] The price net of the value of tanks, cisterns and containers of metal is 1444 000 NOK/GWh. The volume figure could comprise some oil products, which could lead to a too low price (and a marginally too high price for kerosene and heating oil in Table 3.5).

4. Deliveries from producing sectors and import to energy supply

4.1. Deliveries from producing sectors and import to oil and gas extraction

How dependent are the various energy producing sectors on receiving input from other sectors and import? For sector 1 (e.g. oil and gas extraction) in Table 1.2 this is the intermediate consumption value from various sectors ($a+b+c$) and import (i). As noted earlier, Table 1.2 does not show (for ease of exposition) the import deliveries from the various sectors. However, Figure 4.1 shows both domestic and import deliveries to the oil and gas extraction sector. Private services etc. supply amounts to over 42 bn NOK, of which 0.5 bn is imported. The metal products industries deliver for around 38 bn and more than half of this is imported. The oil and gas sector get supplies from refined petroleum sector (incl. chemical) of around 15 bn NOK, of which almost 10 bn is imported. The latter two figures are also reflected in Figure 2.3. Of the domestic deliveries from this mixed sector 69 per cent are refined petroleum products alone. See Table B4.1 in Appendix B for a complete list of values of deliveries from producing sectors and import to oil and gas extraction.

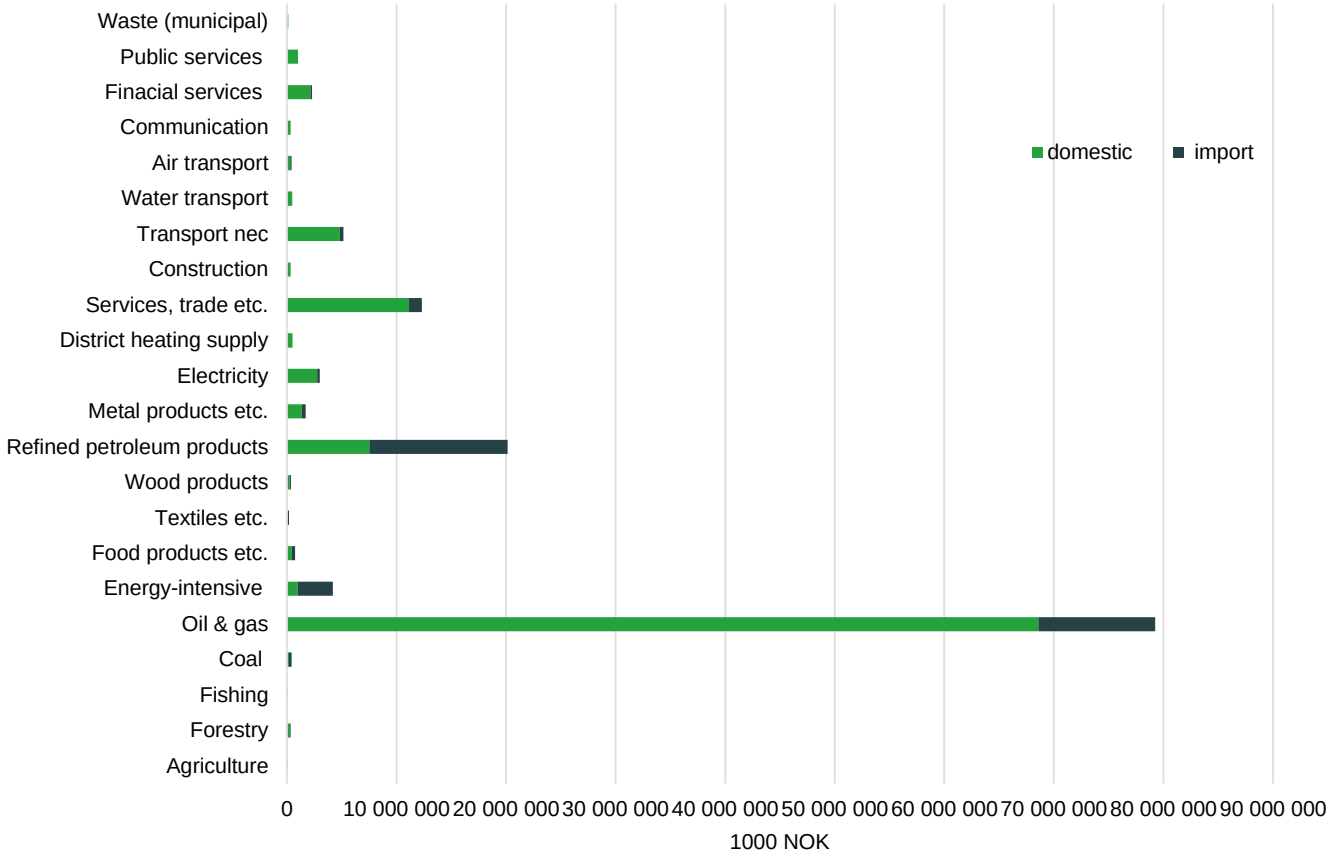
Figure 4.1. Deliveries from domestic sectors and import to oil and gas extraction



4.2. Deliveries from producing sectors and import to the refined petroleum sector

We see from Figure 4.2 that the value of deliveries from the oil and gas extraction sector to the refined petroleum sector is almost 80 bn NOK and that import is around 14 per cent of this value. This can also be seen from Figure 2.1. There are also internal deliveries from the refined petroleum sector of 7.5 bn NOK and foreign deliveries from this sector of 12.6 bn.

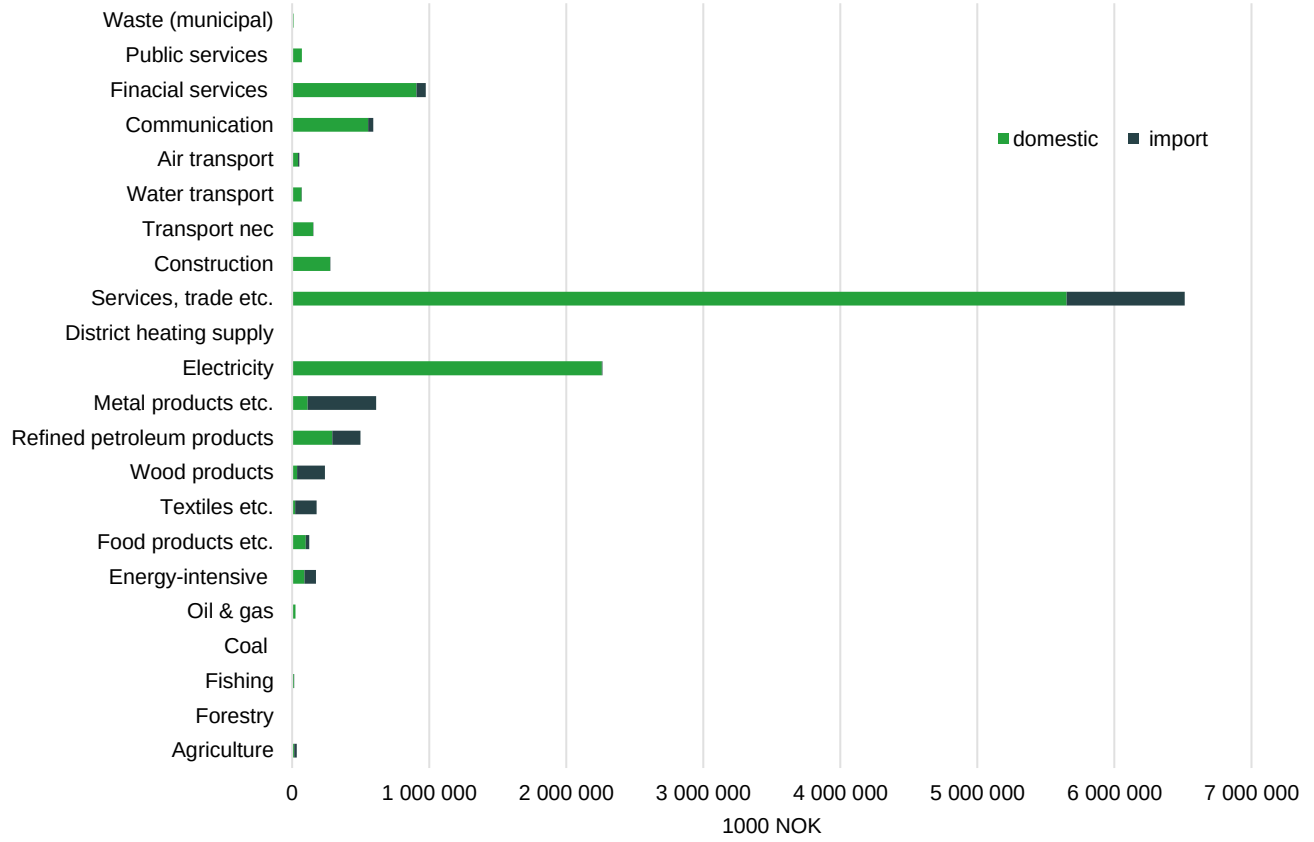
Figure 4.2. Deliveries from domestic sectors and import to refined petroleum products (incl. chemical, rubber, plastic, pharmaceutical products)



4.3. Deliveries from producing sectors and import to electricity supply

Total deliveries from private services to electricity supply is around 6.5 bn NOK, and 85 per cent of this amount is domestic deliveries, which is shown in Figure 4.3. More than 2 bn is internal deliveries. See Table B4.1 in Appendix B for a complete list of value figures.

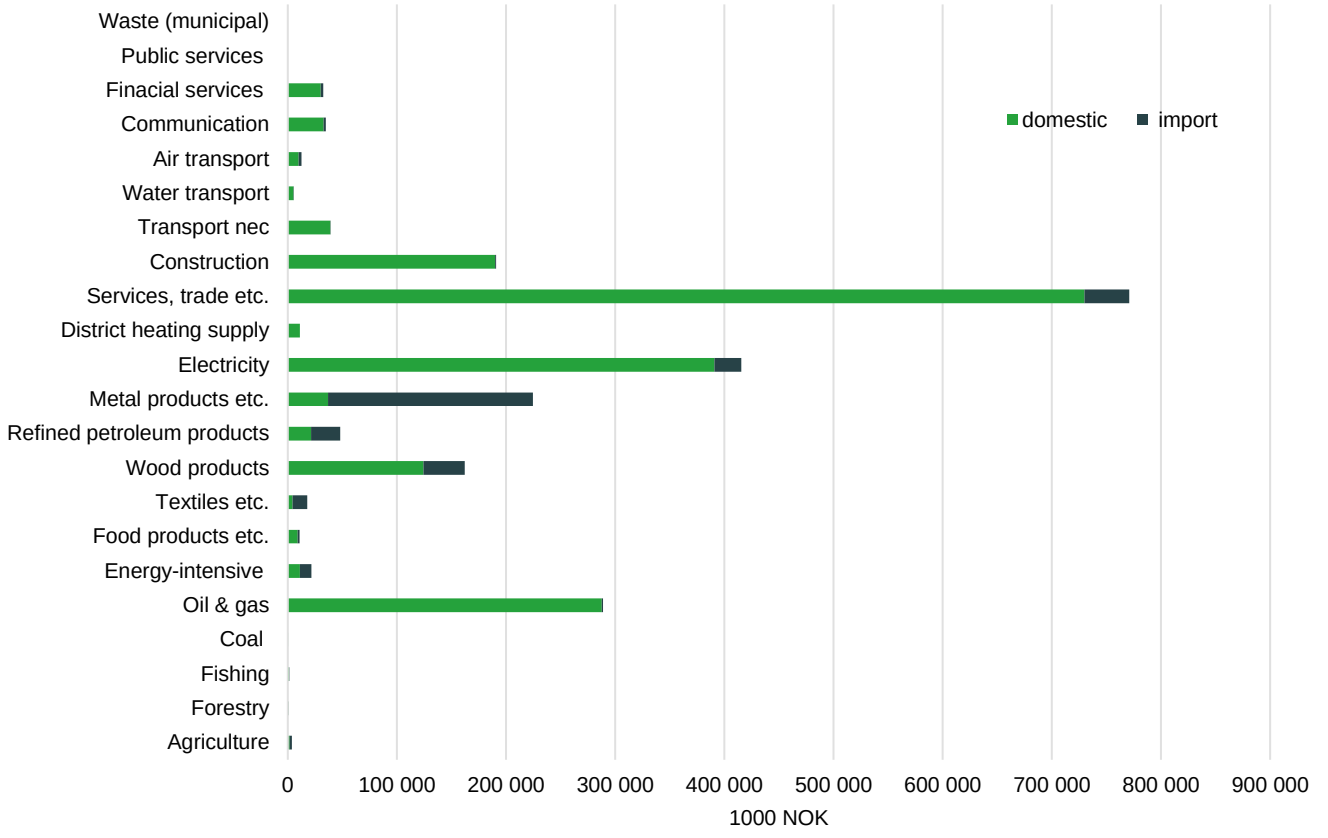
Figure 4.3. Deliveries from domestic sectors and import to electricity supply



4.4. Deliveries from producing sectors and import to district heating supply

Figure 4.4 shows that services supply to district heating amounts to 770 million, of which 5 per cent is imported. The import share from electricity to district heating is roughly the same quantity, and total electricity supply stands at over 400 million NOK. See Table B4.1 in Appendix B for a complete list of value figures. Waste is an important input in district heating as Figure 3.7 shows. Recycling of waste is confined to the private waste sector, which is part of the aggregated services, trade etc. sector in Figure 4.4. The delivery of bark, chips and wood shown in Figure 3.7 is found in the wood products sector below (forestry has only a marginally direct delivery). Likewise, electricity is an input to electrical boilers. The input of oil/gas/dieseloil should be reflected in the refined petroleum product sector in Figure 4.4. The relatively large delivery of oil and gas could possibly be an input in the construction process of district heating, as it is not completely a direct fuel delivery. It is evident that it is difficult to separate the value of the fuel delivery from e.g. the waste, electricity and wood products, as the value of deliveries may include other uses than direct fuel consumption in the supply of district heating.

Figure 4.4. Deliveries from domestic sectors and import to district heating supply



4.5. Decomposition of energy supply at basic prices

If we sum up over all domestic deliveries to each of the four energy producing sectors, we get total intermediate consumption (and this is $a+b+c$ in Table 1.2). The import value of the deliveries to e.g. oil and gas extraction of almost 46 bn is the same as the sum of various import goods in Figure 4.1 (characterised by the black part of the columns). This distribution is also shown in Table B4.1 in Appendix B. Following the outline from the sector columns in Table 1.2, we decompose total supply at basic prices as is shown in Table 4.1 below. Some of the quantities are broken down in subgroups; see Table A4.1-A4.4 in Appendix A. Notice also that for each sector the supply value at basic prices in the lowest row of Table 4.1 is equal to the total use value presented in Table 1.1, e.g. the value of electricity is 68.7 bn, which we also can see from Table 2.3. This is also reflected in Table 1.2. Notice further that the sum of all the values from the seventh first rows in Table 4.1 except intermediate consumption and import equals the value added in each receiving sector.

Table 4.1. Decomposition of supply at basic prices. 1000 NOK[1]

	Oil and gas extraction	Petroleum and coal products	Electricity sector	District heating
Total intermediate consumption	104 083 714	103 723 201	10 704 211	1 936 164
+Taxes and subsidies on products	561 239	237 661	359 549	104 583
+Compensation of employees	78 545 000	12 819 000	9 004 000	475 000
+Other taxes and subsidies on production	5 018 000	533 000	5 252 000	4 000
+Consumption of fixed capital	118 922 000	8 639 000	12 194 000	651 000
+Operating surplus	452 614 000	2 162 000	28 965 000	-94 000
+Import	45 992 047	29 761 138	2 177 240	356 253
=Supply at basic prices	805 736 000	157 875 000	68 656 000	3 433 000

[1] Some rounded figures

The figures in Table 4.1 can be useful in various ways. If we e.g. are interested in profitability, the return on capital in a sector can be calculated as the ratio between operating surplus less consumption of fixed capital[13] and total value of capital. By using the figures below, we calculate that the return on capital is around 24 and 6 per cent in the oil and gas and the electricity sector, respectively, while the return in the other two sectors is negative.

How about simulations of the SNOW-NO model for future years? Labour supply (in man years) is exogenous, however, a model with endogenous supply is under construction. Compensation of employees in a sector is man years times wage per man year plus employer's social security and pension contribution. Some of the taxes/subsidies are levied on input factors and some on production (see Rosnes et al, 2019 for an overview). The taxes can generally be changed exogenously. The amount of capital is endogenous and dependent on investment. However, as there is no profit in the model, we assume that the operating surplus is proportionally distributed to capital, labour and energy.

[13] We do not deduct an estimated salary for self-employed persons as this is of minor importance in these industries.

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Statistics Norway (2019): Energy use in the manufacturing sector, https://www.ssb.no/en/statbank/table/08205

Appendix A

Table A1.1. Producing industries and SNOW code

Industry	SNOW code
Agriculture	AGR
Forestry	FRS
Fishing	FSH
Coal production	COA
Oil & gas extraction	CRU
Minerals nec	OMN
Food products – meat	MEA
Vegetable oils and fats	VOL
Dairy products	MIL
Food products nec	OFD
Beverages and tobacco products	B_T
Textiles	TEX
Wearing apparel	WAP
Leather products	LEA
Wood products	LUM
Paper products, publishing	PPP
Petroleum, coal products	OIL
Chemical, rubber, plastic products	CRP
Mineral products nec	NMM
Ferrous metals	I_S
Metals nec	NFM
Metal products	FMP
Motor vehicles and parts	MVH
Transport equipment nec	OTN
Machinery and equipment, incl. electronic equipment	MEE
Manufactures nec	OMF
Electricity	ELE
Gas manufacture, distribution	GAS
Water	WTR
Construction	CNS
Trade	TRD
Transport nec	OTP
Water transport	WTP
Air transport	ATP
Communication	CMN
Financial services nec	OFI
Insurance	ISR
Business services nec	OBS
Recreational and other services	ROS
Defence	OSG
Dwellings	DWE
Public sector – governmental (adm., education, health, care, culture)	OSS
Public sector – municipal (adm., education, health, care, water, culture)	OSK
Private education, health, care	OSP
Waste (municipal)	AVK
Waste (private)	AVP

Table A1.2. Final end use sectors and SNOW code

Food and non-alcoholic beverages	CFAB
Alcoholic beverages and tobacco etc.	CABT
Clothing and footwear	CCAC
Housing & water	CHAW
Electricity	CELE
Gas	CGAS
Paraffin and heating oil	CPAH
Fuel wood, coal etc.	CFAC
District heating	CDHE
Furnishings, household equipment and routine household maintenance	CFHR
Health	CHEA
Transport equipment etc	CTEQ
Petrol, diesel	CPAD
Public transport (rail)	CRAI
Public transport (road)	CROA
Public transport (air)	CAIR
Public transport (boat)	CBOA
Communication	CCOM
Recreation and culture	CRAC
Education	CEDU
Restaurants and hotels	CRAH
Miscellaneous goods and services	CRAH
Final consumption expenditure of central government	GS
Final consumption expenditure of local government	GK
Final consumption expenditure of NPISHs	GF
Gross fixed capital formation – private	I
Gross fixed capital formation – central government	IG
Gross fixed capital formation – local government	IG
Changes in stocks and statistical discrepancies	ST

Table A2.1. Aggregated producing industries

Industries	No.	Aggregated industries	No.
Agriculture	0001	Agriculture	1
Forestry	0002	Forestry	2
Fishing	0003	Fishing	3
Coal	0004	Coal	4
Oil & gas	0005	Oil & gas	5
Minerals nec	0006	Energy-intensive	6+16+19+20+21
Food products - meat	0007	Food products etc.	7+8+9+10+11
Vegetable oils and fats	0008		
Dairy products	0009		
Food products nec	0010		
Beverages and tobacco products	0011		
Textiles	0012	Textiles etc.	12+13+14
Vwearing apparel	0013		
Lether products	0014		
Wood products	0015	Wood products	15+26
Paper products, publishing	0016		
Petroleum, coal products	0017	Petroleum, coal products	17+18
Chemical, rubber, plastic products	0018		
Mineral products nec	0019		
Ferrous metals	0020		
Metals nec	0021		
Metal products	0022	Metal products etc.	22+23+24+25
Motor vehicles and parts	0023		
Transport equipment nec	0024		
Machinery and equipment, incl. electronic equipment	0025		
Manufactures nec	0026		
Electricity	0027	Electricity	27
Gas manufacture, distribution	0028	Gas manufacture, distribution	28
Water	0029	Services, trade etc.	29+31+38+39+41+44+46
Construction	0030	Construction	30
Trade	0031		
Transport nec	0032	Transport nec	32
Water transport	0033	Water transport	33
Air transport	0034	Air transport	34
Communication	0035	Communication	35
Financial services nec	0036	Finacial services	36+37
Insurance	0037		
Business services nec	0038		
Recreational and other services	0039		
Defense	0040	Public services	40+42+43
Dwellings	0041		
Public Administration (Central) Education, Health, etc	0042		
Public Administration (Local) Education, Health, etc	0043		
Private Education, Health, etc	0044		
Waste (public)	0045	Waste (public)	45
Waste (private)	0046		

Table A2.2. Aggregated final end use sectors

Final consumption sector	Aggregated
Food and non-alcoholic beverages +Alcoholic beverages and tobacco etc. +Clothing and footwear +Housing & water	= Food etc.
Electricity	Electricity
Gas	Gas
Paraffin (kerosene) and heating oil	Parafin and heating oil
Fuel wood, coal etc.	Fuel wood
District heating	District heating
Furnishings, household equipment, routine household maintenance +Health +Transport equipment etc	= Various household cons., health etc.
Petrol, diesel	Petrol, diesel
Public transport (rail) +Public transport (road) +Public transport (air) +Public transport (boat)	= Public transport
Communication +Recreation and culture +Education +Restaurants and hotels +Miscellaneous goods and services	= Communication and various services
Final consumption expenditure of central government	Final cons. expend. of central govern.
Final consumption expenditure of local government	Final cons. expend. of local govern.
Final consumption expenditure of NPISHs	Final cons. Expend. of NPISHs
Gross fixed capital formation – private +Gross fixed capital formation – central government +Gross fixed capital formation – local government +Changes in stocks and statistical discrepancies	=Gross fixed capital form. + stock chg.

Table A4.1. Consumption of fixed capital by capital category. 1000 NOK

	Oil and gas extraction	Petroleum and coal products	Electricity sector	District heating
Machinery and equipment	27 293 000	5 967 000	5 912 000	146 000
Buildings and constructions	91 399 000	2 611 000	6 138 000	483 000
Transport equipment	230 000	61 000	144 000	22 000
Consumption of fixed capital	118 922 000	8 639 000	12 194 000	651 000

Table A4.2. Capital stock by capital category. 1000 NOK

	Oil and gas extraction	Petroleum and coal products	Electricity sector	District heating
Machinery and equipment	244 340 000	34 569 000	93 855 000	2 195 000
Buildings and constructions	1 157063 000	51 604 000	187 596 000	14 913 000
Transport equipment	2 221 000	361 000	861 000	108 000
Capital stock	1 403 624 000	86 534 000	282 312 000	17 216 000

Table A4.3. Taxes on products by tax category. 1000 NOK

	Oil and gas extraction	Petroleum and coal products	Electricity sector	District heating
Electricity tax	402 000	5 000	27 000	81 000
CO2-tax on oil and gas products	52 000	107 000	45 000	3 000
Tax on diesel and petrol	0	32 000	221 000	14 000
Car registration tax (for households)	0	0	0	0
VAT	42 000	22 000	46 000	4 000
Other taxes and subsidies on products (excl. the special taxes)	65 239	71 660	20 549	2 583
Total taxes on products	561 239	237 660	359 549	104 583

Table A4.4. Taxes on production by tax category. 1000 NOK

	Oil and gas extraction	Petroleum and coal products	Electricity sector	District heating
CO2-tax on petroleum production	3 293 000	0	0	0
ETS quotas	208 000	51 000	1 000	2 000
Resource tax on electricity production	0	0	1 605 000	0
Other taxes and subsidies on production - rest	1 517 000	482 000	3 646 000	2 000
Total taxes on production	5 018 000	533 000	5 252 000	4 000

Table A4.5. Labour costs by cost category. 1000 NOK

	Oil and gas extraction	Petroleum and coal products	Electricity sector	District heating
Wage (excl. taxes paid by employers)	59 701 000	10 314 000	7 216 000	404 000
Labour taxes (paid by employers)	9 435 000	1 485 000	1 012 000	57 000
Other labour payments (paid by employers)	9 409 000	1 020 000	776 000	14 000
Total labour costs	78 545 000	12 819 000	9 004 000	475 000

Appendix B

Table B2.1. Energy deliveries to producing sectors and final uses. 1000 NOK

Receiving sector	Oil & gas		Refined petroleum products	
	Import	Domestic	Import	Domestic
Agriculture	0	103 838	1 969 767	1 531 525
Forestry	0	13 165	123 886	93 655
Fishing	0	332 261	2 254 791	956 747
Coal	0	7 043	20 435	11 544
Oil & gas	0	11 069 551	9 497 015	6 163 623
Energy-intensive	34 478	1 911 731	3 645 567	2 148 242
Food products etc.	7 826	923 713	1 731 848	1 381 344
Textiles etc.	229	30 281	242 669	66 382
Wood products	46	152 048	624 503	549 032
Refined petroleum products	10 690 152	68 569 693	12 611 951	7 528 035
Metal products etc.	3 570	7 345 677	2 227 272	3 160 776
Electricity	0	25 113	204 978	293 032
District heating supply	1 419	287 520	26 516	21 486
Services, trade etc.	3 159	2 598 070	14 162 400	10 575 606
Construction	0	298 701	6 861 000	5 803 297
Transport nec	2 929	940 400	4 750 649	3 743 530
Water transport	0	1 618 634	11 302 955	2 461 859
Air transport	0	115 044	5 865 252	210 943
Communication	2 471	709 100	167 424	370 239
Finacial services	1 007	361 919	74 172	117 108
Public services	369	310 008	6 664 065	3 193 261
Waste (municipal)	0	20 046	742 108	440 043
Exports	0	589 094 021	802 000	71 298 189
Food etc.	0	231 908	896 710	692 356
Electricity	0	0	0	0
Gas	4 531	88 819	0	6 104
Kerosene (paraffin) and heating oil	0	1 969	188 203	465 502
Fuel wood, coal etc.	0	4 534	955	3 919
District heating consumption	0	0	0	0
Various household cons., health etc.	0	137 351	5 605 141	716 410
Petrol, diesel	0	12 831	4 737 352	8 666 028
Public transport	0	0	0	0
Communication and various services	0	164 044	3 994 393	318 103
Final consumption central government	0	31 053	3 606 948	254 476
Gross fixed capital form. and stock chg.	6 021 818	118 226 079	-2 766 909	24 633 562
Total import/use	16 774 004	805 736 165	102 836 016	157 }875 958

Table B2.1.(Cont) Energy deliveries to producing sectors and final uses. 1000 NOK

	Electricity		District heating
	Import	Domestic	Domestic
Agriculture	30 207	661 762	3 092
Forestry	2 122	65 173	89
Fishing	18 084	431 371	156
Coal	303	14 211	3
Oil & gas	137 802	2 603 986	2 349
Energy-intensive	774 783	7 731 529	106 244
Food products etc.	70 315	1 652 312	139 132
Textiles etc.	2 930	64 686	3 009
Wood products	24 347	487 504	34 051
Refined petroleum products	256 814	2 753 259	525 268
Metal products etc.	62 941	1 771 738	200 665
Electricity	6 163	2 258 438	8
District heating supply	24 752	390 725	11 006
Services, trade etc.	385 321	8 841 204	787 700
Construction	32 632	1 244 021	16 748
Transport nec	31 419	785 809	411 054
Water transport	4 748	123 964	113
Air transport	7 274	170 091	26
Communication	7 477	424 606	4 090
Finacial services	7 879	256 845	24 110
Public services	257 016	5 617 348	551 850
Waste (municipal)	8 789	193 109	121
Exports	0	4 945 365	26 066
Food etc.	0	104 665	0
Electricity	1 067 968	23 986 032	0
Gas	0	108	0
Kerosene (paraffin) and heating oil	0	882	0
Fuel wood, coal etc.	0	2 027	0
District heating consumption	0	0	515 000
Various household cons., health etc.	0	61 460	0
Petrol, diesel	0	5 743	0
Public transport	0	0	0
Communication and various services	0	73 420	0
Final consumption central government	0	14 220	0
Gross fixed capital form. and stock chg.	-97 088	918 402	71 048
Total import/use	3 124 998	68 656 015	3 432 998

Table B3.1. Deliveries from producing sectors to final energy uses. 1000 NOK

Delivering sector	Electricity	Gas	Kerosine and heating oil	Fuel wood, coal etc.	District heating	Petrol, diesel
Agriculture	0	0	0	1 492 000	0	0
Forestry	0	0	0	641 422	0	0
Fishing	0	0	0	0	0	0
Coal	0	0	0	0	0	0
Oil & gas	0	88 819	1 969	4 534	0	12 831
Energy-intensive	0	194	1 597	3 715	0	10 400
Food products etc.	0	410	3 339	7 676	0	21 747
Textiles etc.	0	66	537	1 232	0	3 492
Wood products	0	200	1 635	3 757	0	10 644
Refined petroleum products	0	6 104	465 502	3 919	0	8 666 028
Metal products etc.	0	9 950	4 898	11 259	0	40 618
Electricity	23 986 032	108	882	2 027	0	5 743
District heating supply	0	0	0	0	515 000	0
Services, trade etc.	0	42 174	343 774	918 481	0	2 238 496
Construction	0	129	1 047	2 409	0	6 823
Transport nec	0	8 173	66 618	153 128	0	433 782
Water transport	0	308	2 508	5 766	0	16 334
Air transport	0	85	688	1 581	0	4 480
Communication	0	98	803	1 846	0	5 230
Finacial services	0	0	0	0	0	0
Public services	0	0	0	0	0	0
Waste (public)	0	0	0	0	0	0
Imports	1 067 968	27 182	188 203	62 248	0	4 737 352
Taxes and subsidies on products	11 516 000	47 000	316 000	456 000	129 000	18 378 000
Output	36 570 000	231 000	1 400 000	3 773 000	644 000	34 592 000

Table B4.1. Deliveries from producing sectors and import to energy supply. 1000 NOK

Delivering sector	Oil and gas extraction		Refined petroleum products(incl. chemicals etc)	
	Domestic	Import	Domestic	Import
Agriculture	29 060	40 321	9255	12 975
Forestry	3 116	776	289 165	53 374
Fishing	45 307	1 640	16 880	547
Coal	1 222	0	202 280	224 985
Oil & gas	11 069 551	0	68 569 693	10 690 152
Energy-intensive	2 703 593	6 475 685	984 251	3 207 748
Food products etc.	651 067	86 923	461 866	298 276
Textiles etc.	204 436	962 187	65 557	136 418
Wood products	163 825	92 763	253 746	113 734
Refined petroleum products	6 163 623	9 497 015	7 528 035	12 611 951
Metal products etc.	16 049 540	21 974 454	1 362 055	343 561
Electricity	2 603 986	137 802	2 753 259	256 814
District heating supply	2 349	0	525 268	0
Services, trade etc.	36 292 327	5 414 337	11 147 981	1 182 687
Construction	269 057	153	313 584	1 273
Transport nec	5 329 828	253 117	4 849 229	316 323
Water transport	4 460 028	23 753	463 111	12 186
Air transport	2 278 131	217 093	309 889	111 368
Communication	1 075 509	69 497	318 033	20 659
Finacial services	9 428 065	744 531	2 140 055	167 107
Public services	4 674 806	0	1 009 489	0
Waste (municipal)	585 288	0	150 520	0

Table B4.1.(Cont.) Deliveries from producing sectors and import to energy supply. 1000 NOK

	Electricity supply		District heating	
	Domestic	Import	Domestic	Import
Agriculture	14 914	18 716	1 694	2 047
Forestry	4 441	1 105	624	155
Fishing	12 184	460	991	37
Coal	93	0	6	0
Oil & gas	25 113	0	287 520	1 419
Energy-intensive	90 687	83 031	11 163	10 534
Food products etc.	99 992	24 383	8 886	1 979
Textiles etc.	21 626	157 677	4 462	13 318
Wood products	36 695	203 412	124 208	37 835
Refined petroleum products	293 032	204 978	21 486	26 516
Metal products etc.	113 832	499 116	36 816	187 842
Electricity	2 258 438	6 163	390 725	24 752
District heating supply	8	0	11 006	0
Services, trade etc.	5 651 323	861 644	729 748	41 148
Construction	275 461	1 223	190 010	729
Transport nec	152 876	45	38 949	385
Water transport	67 697	1 017	5 225	308
Air transport	43 841	9 294	9 795	2 822
Communication	553 838	37 775	32 757	2 005
Finacial services	907 134	67 201	30 093	2 422
Public services	70 479	0	0	0
Waste (municipal)	10 507	0	0	0

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