Economy-wide material flow accounts – assessment of early estimates for reference year 2017

Eurostat E2, 5 June 2020

1 Introduction

In June/July 2018 Eurostat produced and published early estimates of the domestic extraction of materials (*2018-vintage of early estimate*) for reference year 2017. Eurostat estimates domestic extraction by four main material categories (biomass, metals, minerals, fossils) for each EU Member State and the aggregated EU economy. The estimation method is regression modelling employing a range of predictor variables such as volume indices of production, gross value added, monthly energy statistics, crop statistics etc. Annex 1 provides a short description of the estimation methodology.

This report assesses the quality of the early estimates for reference year 2017 by analysing the estimation error. The estimation error is defined as the difference between the *2018-vintage of early estimate* and the actual *2020-outturn* reported in December 2019[1] and published in March 2020. Eurostat E2 will undertake this assessment each year enabling a routine monitoring and assessment.

The estimation error is decomposed into three effects and the remaining estimation error:

- Effect 1 – due to revision of model specifications introduced in June 2019:
  Eurostat revises, if appropriate, the specifications of the (regression) models applied for each country and material category of domestic extraction (see Annexes). In general, Eurostat makes the model specifications based on fitness-of-estimation statistics that are derived from time series of model input data; the latter include predictors and EW-MFA data. Revisions of model specifications may become appropriate due to the extended time series that include data for one more reference year in comparison to the previous year's situation. Effect 1 is quantified by simulating the estimation for reference year 2017 with the 2019-vintage of model specifications (whilst keeping the 2018-vintage of input data).

- Effect 2 – due to revision of model input data available in June 2019:
  Both model input data (predictors and EW-MFA data) may have been revised between June 2018 and June 2019. This effect 2 is quantified by simulating the estimation for reference year 2017 using revised model specifications (i.e. the 2019-vintage of model specification as explained under effect 1) and using revised model input data that became available in June 2019, i.e. one year later than the initial estimate.

[1] Note, only by 31 December 2019, all European countries mandatorily reported EW-MFA data for reference year 2017 according to Regulation (EU) 691/2011 Annex III.

- Effect 3 – due to revision of EW-MFA available in March 2020:
  By March 2020 the EW-MFA data for some countries are revised again in comparison to the situation in June 2019. Most important, by March 2020 mandatorily reported data for reference year 2017 become available for all countries. While in June 2019 some countries' data for reference year 2019 were still estimates by Eurostat. Revised data for predictors are not available by March. This effect 3 is quantified by simulating the estimation for reference year 2017 with the June 2019 model specifications, the June 2019-vintage of predictor data, and the most recent and complete March 2020 vintage of EW-MFA data (2020-outturn).

- Remaining estimation error:
  This is the 'actual' remaining estimation error after the elimination of the above effects due to data revisions and changed model specifications. Eurostat quantifies this remaining error by simply 'deducting' the above three effect from the overall estimation error.

2 Assessing the estimation for the aggregated EU: non-metallic minerals cause the majority of estimation error

The *2020-outurn* for domestic extraction of materials for reference year 2017 and the aggregated EU is 5317.5 million tonnes, which is about 100 million tonnes lower than the *2018-vintage of early estimate* (see Table 1).

Two thirds of EU's domestic extraction is non-metallic minerals. Not surprisingly, this category also dominates the overall estimation error. For domestic extraction of non-metallic minerals the *2018-vintage of early estimate* is 145.7 million tonnes above the *2020-outturn*.

The estimation error for biomass is 37.7 million tonnes but with reversed signs (i.e. the *2018-vintage of early estimate* is lower than the *2020-outturn*).

Table 1: Domestic extraction for the reference year 2017 (thousand tonnes) – outturn versus early estimate, by main material categories

EU-27	2018-vintage of early estimate	2020-outturn	Estimation error (overall)	
Total materials	5 417 155	5 317 515	-99 640	1.9%
Biomass	1 563 223	1 600 900	37 677	2.4%
Metal ores	211 737	210 882	-855	0.4%
Non-metallic minerals	3 076 609	2 930 916	-145 693	5.0%
Fossil energy material/carriers	565 586	574 817	9 231	1.6%

Table 2 shows the EU estimation error in a breakdown by the three effects (see above) and by four main material categories. ***Effect 1*** quantifies the effect of the changed model specifications that took place in June 2019. With -3.2 million tonnes the effect of improved/changed model specifications was rather moderate.

Effect 2 (-102.7 million tonnes) is by far the most important effect 'explaining' the overall estimation error (-99.6 million tonnes). Effect 2 quantifies the impact of data revisions between June 2018 and June 2019. It takes into account both model input data: predictors and EW-MFA. In a deepened analysis, one could decompose further in order to find out which of the two is more important.

Within ***Effect 2*** the material category of non-metallic minerals is most important, followed by the material category biomass.

Table 2: Domestic extraction for the reference year 2017 (thousand tonnes) – decomposing the overall estimation error into three effects and remaining error

EU-27	Estimation error (overall)	Effect 1	Effect 2	Effect 3	remaining error
Total materials	**-99 640**	-3 169	-102 734	-4 924	11 186
Biomass	**37 677**	26 300	-16 067	-5 470	32 913
Metal ores	**-855**	5 411	-987	44	-5 324
Non-metallic minerals	**-145 693**	-37 483	-91 113	-2 133	-14 964
Fossil energy material/carriers	**9 231**	2 603	5 433	2 635	-1 439

3 Assessment by country

The overall estimation error – about 100 million tonnes – can also be broken down by country (see Table 3). By far, Romania shows the estimation error (-74 million tonnes) with the biggest effect in relation to EU's overall estimation error. Further, the estimation errors for Italy and France are significantly affecting the EU level with around 30 million tonnes each, however mutually levelling out because of opposite signs.

Table 3: Domestic extraction (all materials) for the reference year 2017 (thousand tonnes) – decomposing the EU overall estimation error by country

Geo	2018-vintage of early estimate	2020-outturn	Estimation error (overall)		Effect 1	Effect 2	Effect 3	remaining error
EU27	5 417 155	5 317 515	-99 640	100.0%	-3 169	-102 734	-4 924	11 186
Austria	147 538	131 757	-15 781	15.8%	-1 745	-9 213	-1 343	-3 481
Belgium	93 237	95 896	2 659	-2.7%	112	1 257	1 168	122
Bulgaria	147 009	140 619	-6 390	6.4%	740	-4 265	38	-2 903
Croatia	39 124	40 177	1 053	-1.1%	-474	39	-177	1 665
Cyprus	13 158	12 910	-247	0.2%	0	75	0	-322
Czechia	154 734	158 571	3 836	-3.9%	691	211	0	2 935
Denmark	114 603	114 285	-318	0.3%	41	255	-1 008	395
Estonia	42 863	44 253	1 390	-1.4%	-2 147	2 497	-1 720	2 760
Finland	167 410	170 763	3 353	-3.4%	5 099	-1 157	0	-589
France	609 973	636 067	26 094	-26.2%	37	-1 934	0	27 991
Germany	1 040 677	1 041 340	663	-0.7%	21 487	-19 800	12 362	-13 385
Greece	119 490	108 364	-11 126	11.2%	514	-8 267	778	-4 151
Hungary	122 404	125 636	3 232	-3.2%	-164	1 701	-426	2 120
Ireland	95 173	88 925	-6 248	6.3%	0	-2 901	990	-4 337
Italy	347 863	313 915	-33 948	34.1%	0	-19 911	-10 076	-3 960
Latvia	51 631	32 650	-18 981	19.0%	-442	-17 125	281	-1 695
Lithuania	46 238	49 199	2 961	-3.0%	-223	0	0	3 185
Luxembourg	2 005	2 029	24	0.0%	-44	-11	0	80
Malta	2 176	1 597	-579	0.6%	-244	-112	-23	-200
Netherlands	113 610	113 339	-271	0.3%	811	2 980	0	-4 062
Poland	678 878	674 409	-4 469	4.5%	-24 689	215	0	20 005
Portugal	133 710	145 647	11 937	-12.0%	261	1 539	0	10 137
Romania	482 892	408 880	-74 012	74.3%	2 563	-37 144	0	-39 430
Slovak Republic	60 620	60 341	-279	0.3%	-168	72	-4 105	3 922
Slovenia	24 490	23 979	-511	0.5%	-3 894	-302	24	3 660
Spain	325 908	330 416	4 509	-4.5%	166	1 311	-561	3 594
Sweden	239 743	251 552	11 809	-11.9%	-1 457	7 255	-1 123	7 133
United Kingdom	459 193	442 566	-16 627		-3 259	1 973	-15 230	-111
Norway	358 122	327 144	-30 977		-422	-9 728	-20 293	-535
Switzerland	48 375	60 424	12 049		244	14 029	-49	-2 175

Annex 1: Estimation methodology

Eurostat has developed a tool to provide early estimates of domestic extraction of four main material flow categories for EU Member States. The tool calculates the early estimate for each country/material combination according to a selected model equation. For each of the more than 100 country/material combinations, the user (Eurostat) has to specify the model type and chose the predictor. This is termed the 'model specification' (see Annexes 2 and 3).

The tool offers seven model equations (see Figure 1). Four of the models are regression-type equations (M1, M2, M3, M7). Six of the models employ predictors, and one model simply uses the domestic extraction value of the previous year (M6).

Figure 1: List of model equations

Model type	Names	Description
M1	Regression of absolute values	de_Predicted(t) = a + b * Predictor(t) Where a + b are derived from OLS regression
M2	Regression of absolute changes	de_Predicted(t) = de(t-1) + Absolute_change_predicted(t) Absolute_Change(t) = a + b *(Predictor(t)-predictor (t-1)) Where a + b are derived from OLS regression
M3	Regression of relative changes	de_Predicted(t) = de(t-1) * (1+relative change predicted (t)) Relative_Change(t) = a + b * ((Predictor(t)-Predictor (t-1)) / Predictor (t-1)) Where a + b are derived from OLS regression
M4	Annual relative change in predictor	de_predicted(t) =de(t-1) * (Predictor(t)/Predictor(t-1))
M5	Sum of Individual fuels (MF4 only)	de_predicted(t) = $\sum_i$ (de_i(t) * fuel_i(t)/fuel_i(t-1))
M6	Value of previous year	de_predicted(t) = de(t-1)
M7	Regression of logged values	ln_Predicted(t) = a + b * ln_Predictor(t) + e(t-1) Where a + b are derived from OLS regression

Where: de_Predicted denotes the predicted value of domestic extraction, ln_Predicted and ln_Predictor denote the natural logs of the actual values of domestic extraction and the predictor respectively, a is the constant term, b is the regression coefficient for the predictor and e is the residual from the regression

Both model input data (predictors and EW-MFA) are available for reference years starting with 2000.

The predictors are European statistics for which data must be available for the reference year for which the domestic extraction is estimated. The tight timeliness is a constraint and limits the choice of potential predictors. Figure 2 presents the list of predictors. There are different predictors for the four material categories.

Figure 2: List of predictors

Predictor code	Description	Indicator	Comment
P1	Agriculture, forestry and fishing	Gross value added (at basic prices)	used to estimate MF1
P2	Manufacture of food products; beverages and tobacco products	Volume index of production	used to estimate MF1
P3	Agriculture goods output	Production value at basic price	used to estimate MF1
P4	Crop output	Production value at basic price	used to estimate MF1
P5	Cereals for the production of grain (including seed)	Harvested production (1000 t)	used to estimate MF1
P6	Processing and preserving of fish, crustaceans and molluscs	Volume index of production	used to estimate MF1
P7	Forage plants	Production value at basic price	used to estimate MF1
P8	Live bovine animals	Thousand head (animals)	used to estimate MF1
P9	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	Volume index of production	used to estimate MF1
P10	Mining of iron ores	Volume index of production	used to estimate MF2
P11	Mining of metal ores	Volume index of production	used to estimate MF2
P13	Other mining and quarrying	Volume index of production	used to estimate MF3
P14	Construction	Gross value added (at basic prices)	used to estimate MF3
P15	Construction	Volume index of production	used to estimate MF3
P16	Mining of coal and lignite	Volume index of production	used to estimate MF4
P17	Extraction of crude petroleum and natural gas	Volume index of production	used to estimate MF4
P19	Natural gas	Primary production	used to estimate MF4
P20.1	Hard coal	Primary production	used to estimate MF4
P20.2	Lignite/Brown Coal	Primary production	used to estimate MF4
P20.3	Peat	Primary production	used to estimate MF4
P21.1	Crude oil (without NGL)	Primary production	used to estimate MF4
P21.2	Natural gas liquids (NGL)	Primary production	used to estimate MF4
P23	Extraction of crude petroleum	Volume index of production	used to estimate MF4

Annex 2: 2018-vintage of model specifications

	MF1 - Biomass			MF2 - Metal ores			MF3 - Non metallic minerals			MF4 - Fossil energy material/carriers		
	Estimation Range	2000	2016	Estimation Range	2000	2016	Estimation Range	2000	2016	Estimation Range	2000	2016
	Disaggregation	Predictors	Model Type	Disaggregation	Predictors	Model Type	Disaggregation	Predictors	Model Type	Disaggregation	Predictors	Model Type
Belgium	FALSE	P3 + P9	M1	FALSE	n.a.	n.a.	FALSE	P15	M4	FALSE	n.a.	n.a
Bulgaria	FALSE	P5	M1	FALSE	P11	M3	FALSE	P15	M3	FALSE	P16	M4
Czech Republic	FALSE	P5	M3	FALSE	P11	M6	FALSE	P15	M4	FALSE	P16	M1
Denmark	FALSE	P5	M3	FALSE	n.a.	n.a.	FALSE	P15	M4	TRUE	P20 + P21 + P19	M5
Germany	FALSE	P5	M4	FALSE	P11	M6	FALSE	P15	M3	FALSE	P16	M7
Estonia	FALSE	P9	M4	FALSE	n.a.	n.a.	FALSE	P13	M3	FALSE	P17	M7
Ireland	FALSE	P4	M6	FALSE	P11	M6	FALSE	P14	M3	FALSE	P16	M6
Greece	FALSE	P5	M7	FALSE	P11	M3	FALSE	P15	M6	FALSE	P16	M3
Spain	FALSE	P5	M7	FALSE	P11	M6	FALSE	P14	M4	FALSE	P16	M3
France	FALSE	P4	M3	FALSE	P11	M6	FALSE	P13	M4	FALSE	P17	M3
Croatia	FALSE	P5	M3	FALSE	n.a.	n.a.	FALSE	P15	M3	TRUE	P20 + P21 + P19	M5
Italy	FALSE	P5	M7	FALSE	P11	M6	FALSE	P15	M4	FALSE	P17	M7
Cyprus	FALSE	P5	M1	FALSE	P11	M6	FALSE	P14	M3	FALSE	n.a.	n.a
Latvia	FALSE	P9	M7	FALSE	n.a.	n.a.	FALSE	P13	M3	TRUE	P20 + P21 + P19	M5
Lithuania	FALSE	P5	M7	FALSE	n.a.	n.a.	FALSE	P15	M3	TRUE	P20 + P21 + P19	M6
Luxembourg	FALSE	P4	M6	FALSE	n.a.	n.a.	FALSE	P15	M4	FALSE	n.a.	n.a
Hungary	FALSE	P5	M7	FALSE	P11	M6	FALSE	P15	M4	FALSE	P16	M7
Malta	FALSE	P4	M3	FALSE	n.a.	n.a.	FALSE	P15	M4	FALSE	n.a.	n.a
Netherlands	FALSE	P4 + P6 + P7 + P8 + P9	M1	FALSE	n.a.	n.a.	FALSE	P15	M4	TRUE	P20 + P21 + P19	M5
Austria	FALSE	P5	M1	FALSE	P11	M6	FALSE	P15	M4	FALSE	P17	M4
Poland	FALSE	P5	M7	FALSE	P11	M6	FALSE	P15	M2	FALSE	P16	M3
Portugal	FALSE	P4	M6	FALSE	P11	M6	FALSE	P15	M4	FALSE	n.a.	n.a
Romania	FALSE	P5	M7	FALSE	P11	M4	FALSE	P14	M4	FALSE	P16	M7
Slovenia	FALSE	P4 + P6 + P7 + P8 + P9	M6	FALSE	n.a.	n.a.	FALSE	P15	M3	TRUE	P20 + P21 + P19	M6
Slovakia	FALSE	P5	M7	FALSE	P11	M6	FALSE	P15	M4	TRUE	P20 + P21 + P19	M6
Finland	FALSE	P9	M3	FALSE	P11	M4	FALSE	P13	M4	FALSE	P20 + P21 + P19	M6
Sweden	FALSE	P9	M3	FALSE	P11	M4	FALSE	P15	M3	TRUE	P20 + P21 + P19	M6
United Kingdom	FALSE	P5	M7	FALSE	P11	M4	FALSE	P15	M4	FALSE	P17	M7
Norway	FALSE	P9	M3	FALSE	P11	M4	FALSE	P15	M4	TRUE	P20 + P21 + P19	M5
Switzerland	FALSE	P4	M3	FALSE	n.a.	n.a	FALSE	P15	M1	FALSE	n.a.	n.a

Annex 3: 2019-vintage of model specifications

	MF1 - Biomass			MF2 - Metal ores			MF3 - Non metallic minerals			MF4 - Fossil energy material/carriers		
	Estimation Range	2000	2017	Estimation Range	2000	2017	Estimation Range	2000	2017	Estimation Range	2000	2017
	Disaggregation	Predictors	Model Type	Disaggregation	Predictors	Model Type	Disaggregation	Predictors	Model Type	Disaggregation	Predictors	Model Type
Belgium	FALSE	P4 + P6 + P7 + P8 + P9	M1	FALSE	n.a.	n.a.	FALSE	P15	M4	FALSE	n.a.	n.a
Bulgaria	FALSE	P5	M1	FALSE	P11	M3	FALSE	P15	M4	FALSE	P16	M3
Czech Republic	FALSE	P4 + P6 + P7 + P8 + P9	M3	FALSE	n.a.	M6	FALSE	P15	M4	FALSE	P16	M7
Denmark	FALSE	P4 + P6 + P7 + P8 + P9	M1	FALSE	n.a.	n.a.	FALSE	P15	M4	TRUE	P20 + P21 + P19	M5
Germany	FALSE	P4	M2	FALSE	P11	M6	FALSE	P15	M3	FALSE	P16	M7
Estonia	FALSE	P9	M3	FALSE	n.a.	n.a.	FALSE	P15	M2	FALSE	P17	M7
Ireland	FALSE	P4	M6	FALSE	P11	M6	FALSE	P14	M3	FALSE	P16	M6
Greece	FALSE	P5	M4	FALSE	P11	M3	FALSE	P15	M6	FALSE	P16	M3
Spain	FALSE	P5	M7	FALSE	P11	M6	FALSE	P14	M4	FALSE	P16	M6
France	FALSE	P4	M3	FALSE	P11	M6	FALSE	P13	M4	FALSE	P17	M4
Croatia	FALSE	P5	M3	FALSE	n.a.	n.a.	FALSE	P15	M7	TRUE	P20 + P21 + P19	M5
Italy	FALSE	P5	M7	FALSE	P11	M6	FALSE	P15	M4	FALSE	P17	M7
Cyprus	FALSE	P5	M1	FALSE	P11	M6	FALSE	P14	M3	FALSE	n.a.	n.a
Latvia	FALSE	P9	M3	FALSE	n.a.	n.a.	FALSE	P13	M3	! TRUE	P20 + P21 + P19	M6
Lithuania	FALSE	P5	M6	FALSE	n.a.	n.a.	FALSE	P15	M4	TRUE	P20 + P21 + P19	M6
Luxembourg	FALSE	P4	M4	FALSE	n.a.	n.a.	FALSE	P15	M4	FALSE	n.a.	n.a
Hungary	FALSE	P5	M7	FALSE	P11	M6	FALSE	P15	M4	FALSE	P16	M6
Malta	FALSE	P4	M6	FALSE	n.a.	n.a.	FALSE	P15	M6	FALSE	n.a.	n.a
Netherlands	FALSE	P4 + P6 + P7 + P8 + P9	M6	FALSE	n.a.	n.a.	FALSE	P15	M4	TRUE	P20 + P21 + P19	M6
Austria	FALSE	P4 + P6 + P7 + P8 + P9	M3	FALSE	P11	M6	FALSE	P14	M4	FALSE	P17	M6
Poland	FALSE	P3 + P9	M2	FALSE	P11	M6	FALSE	P15	M1	FALSE	P16	M6
Portugal	FALSE	P4 + P6 + P7 + P8 + P9	M1	FALSE	P11	M6	FALSE	P15	M4	FALSE	n.a.	n.a
Romania	FALSE	P4 + P6 + P7 + P8 + P9	M1	FALSE	P11	M6	FALSE	P14	M6	FALSE	P17	M3
Slovenia	FALSE	P3	M7	FALSE	n.a.	n.a.	FALSE	P14	M4	TRUE	P20 + P21 + P19	M3
Slovakia	FALSE	P5	M3	FALSE	P11	M6	FALSE	P15	M3	! TRUE	P20 + P21 + P19	M6
Finland	FALSE	P9	M3	FALSE	P11	M3	FALSE	P14	M3	FALSE	P20 + P21 + P19	M6
Sweden	FALSE	P9	M6	FALSE	P11	M4	FALSE	P14	M7	TRUE	P20 + P21 + P19	M6
United Kingdom	FALSE	P5	M6	FALSE	P11	M6	FALSE	P15	M4	FALSE	P17	M3
Norway	FALSE	P9	M3	FALSE	P11	M4	FALSE	P15	M4	TRUE	P20 + P21 + P19	M1
Switzerland	FALSE	P4	M2	FALSE	n.a.	n.a	FALSE	P15	M1	FALSE	n.a.	n.a

Annex 4: Estimation error by country and material

Table 4: Domestic extraction of biomass for the reference year 2017 (thousand tonnes) – decomposing the EU overall estimation error by country

Geo	Estimation error (overall)		Effect 1	Effect 2	Effect 3	remaining error
EU27	37 677	100.0%	26 300	-16 067	-5 470	32 913
Austria	-3 888	-10.3%	-296	-1 903	-294	-1 395
Belgium	1 155	3.1%	112	-1 089	2	2 130
Bulgaria	464	1.2%	0	-122	0	587
Croatia	949	2.5%	0	39	-244	1 154
Cyprus	-76	-0.2%	0	-37	0	-39
Czechia	1 040	2.8%	-381	211	0	1 209
Denmark	1 710	4.5%	41	232	0	1 436
Estonia	-675	-1.8%	-722	111	-1 720	1 656
Finland	-1 575	-4.2%	0	0	0	-1 575
France	27 482	72.9%	0	8 273	0	19 208
Germany	16 278	43.2%	21 487	1 904	-4 899	-2 214
Greece	-2 402	-6.4%	514	-5 858	0	2 943
Hungary	1 194	3.2%	0	993	-31	233
Ireland	671	1.8%	0	-36	-156	863
Italy	-3 895	-10.3%	0	-7 114	3 259	-40
Latvia	-17 264	-45.8%	-442	-17 125	281	22
Lithuania	236	0.6%	80	0	0	157
Luxembourg	-7	0.0%	-44	-11	0	48
Malta	13	0.0%	-4	1	6	10
Netherlands	4 837	12.8%	-612	683	0	4 765
Poland	4 342	11.5%	7 236	215	0	-3 110
Portugal	664	1.8%	261	364	0	39
Romania	3 631	9.6%	2 466	-3 069	0	4 234
Slovak Republic	-219	-0.6%	-114	0	11	-116
Slovenia	-750	-2.0%	-426	68	0	-391
Spain	-577	-1.5%	0	760	-563	-775
Sweden	4 338	11.5%	-2 855	6 444	-1 123	1 871
United Kingdom	11 742		-2 080	4 402	76	9 344
Norway	-80		0	-5	12	-87
Switzerland	14 771		244	14 184	-47	389

Table 5: Domestic extraction of metal ores for the reference year 2017 (thousand tonnes) – decomposing the EU overall estimation error by country

Geo	Estimation error (overall)		Effect 1	Effect 2	Effect 3	remaining error
EU27	-855	100.0%	5 411	-987	44	-5 324
Austria	171	-20.0%	0	-27	0	198
Belgium	0	0.0%	0	0	0	0
Bulgaria	-348	40.7%	0	-344	0	-4
Croatia	0	0.0%	0	0	0	0
Cyprus	-172	20.1%	0	0	0	-172
Czechia	-61	7.1%	0	0	0	-61
Denmark	0	0.0%	0	0	0	0
Estonia	0	0.0%	0	0	0	0
Finland	1 409	-165%	5 682	0	0	-4 273
France	116	-13.6%	0	69	0	47
Germany	29	-3.4%	0	23	1	4
Greece	-5	0.6%	0	390	0	-395
Hungary	-49	5.8%	0	-15	0	-34
Ireland	-292	34.2%	0	0	0	-292
Italy	-1 114	130.3%	0	-1 048	41	-108
Latvia	0	0.0%	0	0	0	0
Lithuania	0	0.0%	0	0	0	0
Luxembourg	0	0.0%	0	0	0	0
Malta	0	0.0%	0	0	0	0
Netherlands	0	0.0%	0	0	0	0
Poland	-1 260	147.3%	0	0	0	-1 260
Portugal	-1 263	147.7%	0	-38	0	-1 225
Romania	-206	24.1%	-271	4	0	60
Slovak Republic	1	-0.1%	0	0	0	1
Slovenia	0	0.0%	0	0	0	0
Spain	644	-75.3%	0	-2	1	645
Sweden	1 547	-181%	0	1	0	1 546
United Kingdom	5		0	0	3	2
Norway	-8 242		0	3 647	-11 902	13
Switzerland	0		0	0	0	0

Table 6: Domestic extraction of non-metallic minerals for the reference year 2017 (thousand tonnes) – decomposing the EU overall estimation error by country

Geo	Estimation error (overall)		Effect 1	Effect 2	Effect 3	remaining error
EU27	-145 693	100%	-37 483	-91 113	-2 133	-14 964
Austria	-11 743	8.1%	-1 156	-7 258	-1 040	-2 290
Belgium	1 504	-1.0%	0	2 346	1 166	-2 008
Bulgaria	-7 374	5.1%	192	-3 872	37	-3 731
Croatia	35	0.0%	-474	0	0	509
Cyprus	0	0.0%	0	112	0	-112
Czechia	-436	0.3%	0	0	0	-436
Denmark	-1 995	1.4%	0	12	-1 013	-994
Estonia	122	-0.1%	-1 425	1 176	0	372
Finland	3 429	-2.4%	-583	-1 157	0	5 169
France	-1 587	1.1%	0	-10 303	0	8 716
Germany	-18 250	12.5%	0	-21 743	14 479	-10 986
Greece	-9 693	6.7%	0	-2 843	778	-7 627
Hungary	3 112	-2.1%	0	-28	0	3 140
Ireland	-7 623	5.2%	0	-2 920	981	-5 684
Italy	-29 115	20.0%	0	-11 534	-13 375	-4 206
Latvia	-1 895	1.3%	0	0	0	-1 895
Lithuania	2 700	-1.9%	-303	0	0	3 003
Luxembourg	31	0.0%	0	0	0	31
Malta	-592	0.4%	-239	-113	-30	-210
Netherlands	-3 535	2.4%	0	-84	0	-3 451
Poland	-5 684	3.9%	-37 144	0	0	31 460
Portugal	12 536	-8.6%	0	1 213	0	11 323
Romania	-78 039	53.6%	2 303	-34 086	0	-46 256
Slovak Republic	83	-0.1%	-54	72	-4 117	4 182
Slovenia	229	-0.2%	1	-369	0	597
Spain	2 526	-1.7%	0	-79	0	2 605
Sweden	5 561	-3.8%	1 398	346	0	3 816
United Kingdom	-26 534		0	-1 461	-15 305	-9 769
Norway	-8 463		0	-1 508	-8 403	1 448
Switzerland	-2 722		0	-156	-2	-2 564

Table 7: Domestic extraction of fossil energy material/carriers for the reference year 2017 (thousand tonnes) – decomposing the EU overall estimation error by country

Geo	Estimation error (overall)		Effect 1	Effect 2	Effect 3	remaining error
EU27	9 231	100%	2 603	5 433	2 635	-1 439
Austria	-321	-3.5%	-293	-25	-9	6
Belgium	0	0.0%	0	0	0	0
Bulgaria	868	9.4%	548	74	0	246
Croatia	69	0.7%	0	0	67	2
Cyprus	0	0.0%	0	0	0	0
Czechia	3 294	35.7%	1 072	0	0	2 222
Denmark	-33	-0.4%	0	10	4	-48
Estonia	1 943	21.0%	0	1 210	0	732
Finland	90	1.0%	0	0	0	90
France	83	0.9%	37	27	0	19
Germany	2 607	28.2%	0	16	2 780	-189
Greece	974	10.5%	0	45	0	928
Hungary	-1 025	-11.1%	-164	752	-395	-1 219
Ireland	996	10.8%	0	55	165	776
Italy	177	1.9%	0	-215	-1	393
Latvia	177	1.9%	0	0	0	177
Lithuania	26	0.3%	0	0	0	26
Luxembourg	0	0.0%	0	0	0	0
Malta	0	0.0%	0	0	0	0
Netherlands	-1 573	-17.0%	1 423	2 380	0	-5 376
Poland	-1 867	-20.2%	5 219	0	0	-7 086
Portugal	0	0.0%	0	0	0	0
Romania	602	6.5%	-1 936	6	0	2 532
Slovak Republic	-144	-1.6%	0	0	0	-144
Slovenia	9	0.1%	-3 469	0	24	3 455
Spain	1 916	20.8%	166	632	0	1 118
Sweden	363	3.9%	0	464	0	-101
United Kingdom	-1 839		-1 179	-969	-4	313
Norway	-14 193		-422	-11 863	0	-1 908
Switzerland	0		0	0	0	0