

# Economy-wide material flow accounts – assessment of early estimates for reference year 2019

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*Eurostat E2, 18 May 2022*

## 1 Introduction

In June/July 2020 Eurostat produced and published early estimates of the domestic extraction of materials (*2020-vintage of early estimate*) for reference year 2019. 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 2019 by analysing the estimation error. The estimation error is defined as the difference between the *2020-vintage of early estimate* and the actual *2022-outturn* reported in December 2021<sup>1</sup> and published in March 2022. 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 2021:  
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 2019 with the 2020-vintage of model specifications (whilst keeping the 2020-vintage of input data).
- Effect 2 – due to revision of model input data available in June 2021:  
Both model input data (predictors and EW-MFA data) may have been revised between June 2020 and June 2021. This effect 2 is quantified by simulating the estimation for reference year 2019 using revised model specifications (i.e. the 2020-vintage of model specification as explained under effect 1) and using revised model input data that became available in June 2021, i.e. one year later than the initial estimate.

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<sup>1</sup> Note, only by 31 December 2021, all European countries mandatorily reported EW-MFA data for reference year 2019 according to Regulation (EU) 691/2011 Annex III.

- Effect 3 – due to revision of EW-MFA available in March 2022:  
By March 2022 the EW-MFA data for some countries are revised again in comparison to the situation in June 2021. Most important, by March 2022 mandatorily reported data for reference year 2019 become available for all countries. While in June 2021 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 2019 with the June 2021 model specifications, the June 2021-vintage of predictor data, and the most recent and complete March 2022 vintage of EW-MFA data (2022-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 *2022-outturn* for domestic extraction of materials for reference year 2019 and the aggregated EU is 5385 million tonnes, which is about 16.4 million tonnes bigger than the *2020-vintage of early estimate* (see Table 1). Table 1 also shows the estimation error by material category. The estimation error for biomass is biggest with -54.9 million tonnes, notably with reversed sign compared to the overall estimation error (i.e. the *2022-outturn* is lower than the *2020-vintage of early estimate*). The estimation error for non-metallic minerals amounts to 43.4 million tonnes (i.e. the *2022-outturn* is above the *2020-vintage of early estimate*).

Table 1: Domestic extraction for the reference year 2019 (thousand tonnes) – outturn versus early estimate, by main material categories

EU-27	2020-vintage of early estimate	2022-outturn	Estimation error (overall)	
Total materials	5 368 560	5 384 949	16 389	0.3%
Biomass	1 547 177	1 492 308	-54 869	3.7%
Metal ores	215 348	220 443	5 095	2.3%
Non-metallic minerals	3 150 527	3 193 921	43 395	1.4%
Fossil energy material/carriers	455 508	478 277	22 769	4.8%

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 2021. With -4.8 million tonnes the effect of improved/changed model specifications was rather moderate.

**Effect 2** (-63.7 million tonnes) is by far the most important effect 'explaining' the overall estimation error (16.4 million tonnes). Effect 2 quantifies the impact of data revisions between June 2020 and June 2021. It takes into account both model input data: predictors and EW-MFA. Within **Effect 2** the material category of biomass is most important, followed by the material category of non-metallic minerals.

With +13 million tonnes, **Effect 3** also significantly contributes to the overall estimation error. It quantifies the impact of MFA data revisions between June 2021 and March 2022.

The **remaining error**, i.e. the overall estimation error adjusted for the aforementioned effects is huge with 71.9 million tonnes and it is dominated by fossil energy material/carriers.

Table 2: Domestic extraction for the reference year 2019 (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	16 389	-4 827	-63 666	13 021	71 861
Biomass	-54 869	-8 286	-39 618	-21 559	14 594
Metal ores	5 095	-847	317	-217	5 842
Non-metallic minerals	43 395	13 673	-24 646	34 876	19 492
Fossil energy material/carriers	22 769	-9 367	282	-79	31 933

In summary, one may conclude that the *2020-vintage of early estimate* for reference year 2019 of the EU's domestic extraction was very good with 0.3%. However, the estimation error was rather big at the level of main material categories, in particular for biomass (3.7%) and fossil energy material/carriers (4.8%).

### 3 Assessment by country

The overall estimation error – about 16.4 million tonnes – can also be broken down by country (see Table 3). The estimation errors for Romania, Germany, and Poland contribute most to the EU overall estimation error. Data revisions (effects 2 and 3) in Germany, Romania and Poland played another significant role.

Table 3: Domestic extraction (all materials) for the reference year 2019 (thousand tonnes) – decomposing the EU overall estimation error by country

Geo	2020-vintage of early estimate	2022-outturn	Estimation error (overall)		Effect 1	Effect 2	Effect 3	remaining error
EU27	5 368 560	5 384 949	16 389	100.0%	-4 827	-63 666	13 021	71 861
Austria	138 134	135 840	-2 294	-14.0%	-1 770	1 544	422	-2 490
Belgium	94 142	95 632	1 490	9.1%	1 356	4 201	-41	-4 026
Bulgaria	147 791	146 384	-1 407	-8.6%	-5 928	296	-415	4 640
Croatia	43 346	41 460	-1 885	-11.5%	-51	105	-156	-1 784
Cyprus	14 381	13 738	-643	-3.9%	86	186	0	-915
Czechia	164 531	165 273	742	4.5%	-5 567	-627	0	6 936
Denmark	114 716	115 576	860	5.2%	4 572	1 806	6	-5 524
Estonia	44 219	41 609	-2 610	-15.9%	-1 704	1 572	-1 553	-925
Finland	172 774	168 078	-4 696	-28.7%	-2 519	-3 080	0	903
France	633 152	633 131	-21	-0.1%	-923	-8 636	0	9 538
Germany	980 152	945 094	-35 059	-213.9%	3 451	-36 588	31 272	-33 193
Greece	93 090	107 984	14 894	90.9%	-5 708	1 613	7 519	11 471
Hungary	158 099	146 430	-11 669	-71.2%	1 266	-2 839	-11	-10 085
Ireland	95 389	98 401	3 012	18.4%	-4 234	1 724	-92	5 614
Italy	322 659	331 214	8 555	52.2%	1 141	-2 168	0	9 582
Latvia	33 336	35 449	2 114	12.9%	-832	0	0	2 946
Lithuania	50 013	50 229	216	1.3%	-650	628	0	237
Luxembourg	2 104	2 035	-69	-0.4%	-18	33	-109	25
Malta	1 869	2 195	326	2.0%	0	2	2	322
Netherlands	99 889	97 760	-2 129	-13.0%	-2 928	-150	0	950
Poland	657 735	628 889	-28 846	-176.0%	-6 208	1 158	-30 454	6 658
Portugal	155 438	147 757	-7 681	-46.9%	625	-6 661	58	-1 703
Romania	461 495	526 230	64 735	395.0%	25 208	-33 324	0	72 851
Slovak Republic	61 803	57 520	-4 284	-26.1%	-946	-49	0	-3 289
Slovenia	26 579	24 559	-2 020	-12.3%	-78	449	0	-2 391
Spain	348 481	361 475	12 994	79.3%	-1 440	17 764	6 574	-9 904
Sweden	253 244	265 007	11 764	71.8%	-1 028	-2 625	0	15 417
United Kingdom	440 209	435 665	-4 544		-102 367	10 956	0	86 867
Norway	344 955	316 493	-28 462		15 351	-20 514	129	-23 428
Switzerland	60 977	59 876	-1 101		267	-1 275	412	-505

## 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: 2020-vintage of model specifications

	MF1 - Biomass				MF2 - Metal ores				MF3 - Non metallic minerals				MF4 - Fossil energy material/carriers			
	Estimation Range		2000	2018	Estimation Range		2000	2018	Estimation Range		2000	2018	Estimation Range		2000	2018
	Disaggregation	Predictors	Model Type	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	n.a.	FALSE	n.a.	n.a.	n.a.	
Bulgaria	FALSE	P4 + P6 + P7 + P8 + P9	M1	!	FALSE	P11	M3	!	FALSE	P15	M4	FALSE	P20 + P21 + P19	M1	!	
Czech Republic	FALSE	P4 + P6 + P7 + P8 + P9	M3	!	FALSE	n.a.	M6	!	FALSE	P15	M4	FALSE	P16	M3	!	
Denmark	FALSE	P4	M2	!	FALSE	n.a.	n.a.	FALSE	P15	M3	!	TRUE	P20 + P21 + P19	M5	!	
Germany	FALSE	P5	M3	!	FALSE	P11	M6	!	FALSE	P15	M3	FALSE	P20 + P21 + P19	M3	!	
Estonia	FALSE	P9	M3	!	FALSE	n.a.	n.a.	FALSE	P15	M2	!	FALSE	P17	M7	!	
Ireland	FALSE	P4	M2	!	FALSE	n.a.	M6	!	FALSE	P14	M3	TRUE	P20 + P21 + P19	M5	!	
Greece	FALSE	P5	M4	!	FALSE	P11	M6	!	FALSE	P15	M4	TRUE	P20 + P21 + P19	M5	!	
Spain	FALSE	P5	M7	!	FALSE	n.a.	M6	!	FALSE	P14	M4	FALSE	n.a.	M6	!	
France	FALSE	P4	M3	!	FALSE	n.a.	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	n.a.	M6	!	FALSE	P15	M4	FALSE	P17	M7	!	
Cyprus	FALSE	P5	M6	!	FALSE	n.a.	M6	!	FALSE	P15	M2	FALSE	n.a.	n.a.	!	
Latvia	FALSE	P9	M3	!	FALSE	n.a.	n.a.	FALSE	P15	M4	!	FALSE	P20 + P21 + P19	M1	!	
Lithuania	FALSE	P4 + P6 + P7 + P8 + P9	M3	!	FALSE	n.a.	n.a.	FALSE	P15	M4	!	FALSE	P20 + P21 + P19	M1	!	
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	TRUE	P20 + P21 + P19	M5	!	
Malta	FALSE	P4	M6	!	FALSE	n.a.	n.a.	FALSE	P15	M6	!	FALSE	n.a.	n.a.	!	
Netherlands	FALSE	P4 + P6 + P7 + P8 + P9	M1	!	FALSE	n.a.	n.a.	FALSE	P15	M4	!	FALSE	P17	M4	!	
Austria	FALSE	P4 + P6 + P7 + P8 + P9	M7	!	FALSE	n.a.	M6	!	FALSE	P14	M4	FALSE	P20 + P21 + P19	M1	!	
Poland	FALSE	P4 + P6 + P7 + P8 + P9	M1	!	FALSE	n.a.	M6	!	FALSE	P13	M1	FALSE	P20 + P21 + P19	M7	!	
Portugal	FALSE	P4 + P6 + P7 + P8 + P9	M1	!	FALSE	n.a.	M6	!	FALSE	P15	M4	FALSE	n.a.	n.a.	!	
Romania	FALSE	P4 + P6 + P7 + P8 + P9	M7	!	FALSE	P11	M6	!	FALSE	P13	M4	TRUE	P20 + P21 + P19	M5	!	
Slovenia	FALSE	P5	M3	!	FALSE	n.a.	n.a.	FALSE	P14	M4	!	TRUE	P20 + P21 + P19	M5	!	
Slovakia	FALSE	P5	M3	!	FALSE	n.a.	M6	!	FALSE	P15	M3	!	TRUE	P20 + P21 + P19	M5	!
Finland	FALSE	P9	M3	!	FALSE	P11	M3	!	FALSE	P14	M4	TRUE	P20 + P21 + P19	M5	!	
Sweden	FALSE	P9	M6	!	FALSE	n.a.	M6	!	FALSE	P14	M7	FALSE	P20 + P21 + P19	M2	!	
United Kingdom	FALSE	P4 + P6 + P7 + P8 + P9	M3	!	FALSE	n.a.	M6	!	FALSE	P15	M4	TRUE	P20 + P21 + P19	M5	!	
Norway	FALSE	P9	M6	!	FALSE	P11	M6	!	FALSE	P15	M6	TRUE	P20 + P21 + P19	M6	!	
Switzerland	FALSE	P4	M6	!	FALSE	n.a.	M6	!!	FALSE	P15	M6	FALSE	n.a.	M6	!!	

## Annex 3: 2021-vintage of model specifications

	MF1 - Biomass			MF2 - Metal ores			MF3 - Non metallic minerals			MF4 - Fossil energy material/carriers		
	Estimation Range	2001	2019	Estimation Range	2001	2019	Estimation Range	2001	2019	Estimation Range	2009	2019
	Disaggregation	Predictors	Model Type	Disaggregation	Predictors	Model Type	Disaggregation	Predictors	Model Type	Disaggregation	Predictors	Model Type
BE	FALSE	P5	M4	FALSE	n.a.	n.a.	FALSE	P13	M3	FALSE	n.a.	n.a.
BG	FALSE	P5	M7	FALSE	P11	M3	FALSE	P15	M3	FALSE	n.a.	n.a.
CZ	FALSE	P5	M4	FALSE	n.a.	n.a.	FALSE	P15	M7	FALSE	n.a.	n.a.
DK	FALSE	P5	M4	FALSE	n.a.	n.a.	FALSE	P15	M3	TRUE	n.a.	n.a.
DE	FALSE	P5	M1	FALSE	P11	M6	FALSE	P15	M3	FALSE	n.a.	n.a.
EE	FALSE	P9	M4	FALSE	n.a.	n.a.	FALSE	P15	M3	FALSE	n.a.	n.a.
IE	FALSE	P8	M3	FALSE	P11	M6	FALSE	P14	M4	TRUE	n.a.	n.a.
EL	FALSE	P4	M4	FALSE	P11	M6	FALSE	P15	M7	TRUE	n.a.	n.a.
ES	FALSE	P5	M7	FALSE	P11	M6	FALSE	P14	M4	FALSE	n.a.	n.a.
FR	FALSE	P4	M3	FALSE	P11	M6	FALSE	P13	M3	FALSE	n.a.	n.a.
HR	FALSE	P5	M3	FALSE	n.a.	n.a.	FALSE	P15	M7	TRUE	n.a.	n.a.
IT	FALSE	P5	M3	FALSE	P11	M6	FALSE	P15	M4	FALSE	n.a.	n.a.
CY	FALSE	P4	M4	FALSE	n.a.	M6	FALSE	P15	M4	FALSE	n.a.	n.a.
LV	FALSE	P9	M3	FALSE	n.a.	n.a.	FALSE	P15	M4	FALSE	n.a.	n.a.
LT	FALSE	P1	M4	FALSE	n.a.	n.a.	FALSE	P15	M4	FALSE	n.a.	n.a.
LU	FALSE	P8	M4	FALSE	n.a.	n.a.	FALSE	P15	M4	FALSE	n.a.	n.a.
HU	FALSE	P5	M7	FALSE	n.a.	n.a.	FALSE	P15	M4	TRUE	n.a.	n.a.
MT	FALSE	P4	M6	FALSE	n.a.	n.a.	FALSE	P15	M6	FALSE	n.a.	n.a.
NL	FALSE	P4	M1	FALSE	n.a.	n.a.	FALSE	P15	M4	FALSE	n.a.	n.a.
AT	FALSE	P4 + P6 + P7 + P8 + P9	M6	FALSE	P11	M6	FALSE	P14	M4	FALSE	n.a.	n.a.
PL	FALSE	P4 + P6 + P7 + P8 + P9	M2	FALSE	P11	M6	FALSE	P13	M3	FALSE	n.a.	n.a.
PT	FALSE	P3 + P9	M2	FALSE	P11	M6	FALSE	P13	M7	FALSE	n.a.	n.a.
RO	FALSE	P3 + P9	M2	FALSE	P11	M4	FALSE	P14	M7	TRUE	n.a.	n.a.
SI	FALSE	P4 + P6 + P7 + P8 + P9	M3	FALSE	n.a.	n.a.	FALSE	P14	M4	TRUE	n.a.	n.a.
SK	FALSE	P4	M3	FALSE	P11	M6	FALSE	P15	M3	TRUE	n.a.	n.a.
FI	FALSE	P9	M3	FALSE	P11	M4	FALSE	P14	M3	TRUE	n.a.	n.a.
SE	FALSE	P9	M3	FALSE	P11	M6	FALSE	P14	M7	FALSE	n.a.	n.a.
UK	FALSE	P7	M6	FALSE	P11	M6	FALSE	P15	M6	TRUE	n.a.	n.a.
NO	FALSE	P1	M4	FALSE	P11	M4	FALSE	P15	M3	TRUE	n.a.	n.a.
CH	FALSE	P7	M7	FALSE	P11	M6	FALSE	P15	M4	FALSE	n.a.	n.a.

Note: In June 2021, MF.4 was estimated outside of the tool due to the changes in the energy data, which are used as predictors for MF.4. Instead, MF.4 was estimated manually.

## Annex 4: Estimation error by country and material

Table 4: Domestic extraction of biomass for the reference year 2019 (thousand tonnes) – decomposing the EU overall estimation error by country

Geo	Estimation error (overall)		Effect 1	Effect 2	Effect 3	remaining error
EU27	-54 869	100.0%	-8 286	-39 618	-21 559	14 594
Austria	-40	0.1%	-835	-186	499	482
Belgium	1 818	-3.3%	2 553	1 453	-5	-2 184
Bulgaria	861	-1.6%	1 593	261	-198	-796
Croatia	-331	0.6%	0	50	-156	-226
Cyprus	139	-0.3%	11	81	0	47
Czechia	3 339	-6.1%	2 811	-627	0	1 155
Denmark	2 149	-3.9%	6 644	3 192	6	-7 694
Estonia	-196	0.4%	-541	785	-1 553	1 114
Finland	-362	0.7%	0	-328	0	-34
France	8 309	-15.1%	0	2 100	0	6 209
Germany	-48 660	88.7%	-8 772	-47 394	4 630	2 876
Greece	7 176	-13.1%	575	1 885	5 930	-1 213
Hungary	-2 531	4.6%	0	-1 587	-11	-933
Ireland	463	-0.8%	-556	2	-300	1 317
Italy	4 596	-8.4%	-424	-1 664	0	6 683
Latvia	3 121	-5.7%	0	0	0	3 121
Lithuania	648	-1.2%	-460	635	0	473
Luxembourg	39	-0.1%	-18	1	-5	62
Malta	-7	0.0%	0	0	0	-7
Netherlands	1 966	-3.6%	1 639	-23	0	350
Poland	-35 706	65.1%	-12 125	1 158	-30 454	5 716
Portugal	-1 002	1.8%	-596	-121	58	-343
Romania	-1 643	3.0%	1 608	-243	0	-3 008
Slovak Republic	-1 119	2.0%	-480	-49	0	-590
Slovenia	-417	0.8%	-311	-36	0	-71
Spain	-4 375	8.0%	0	1 618	1	-5 994
Sweden	6 896	-12.6%	-603	-581	0	8 080
United Kingdom	-404		-5 521	36	0	5 082
Norway	464		637	-1 406	0	1 233
Switzerland	-553		720	-104	64	-1 233

Table 5: Domestic extraction of metal ores for the reference year 2019 (thousand tonnes) – decomposing the EU overall estimation error by country

Geo	Estimation error (overall)		Effect 1	Effect 2	Effect 3	remaining error
EU27	5 095	100.0%	-847	317	-217	5 842
Austria	445	8.7%	0	0	0	445
Belgium	0	0.0%	0	0	0	0
Bulgaria	365	7.2%	0	-1	-217	582
Croatia	0	0.0%	0	0	0	0
Cyprus	107	2.1%	0	152	0	-45
Czechia	0	0.0%	0	0	0	0
Denmark	0	0.0%	0	0	0	0
Estonia	0	0.0%	0	0	0	0
Finland	41	1%	-974	0	0	1 015
France	7	0.1%	0	0	0	7
Germany	70	1.4%	0	0	0	70
Greece	-510	-10.0%	0	-37	0	-472
Hungary	-4	-0.1%	-4	0	0	0
Ireland	261	5.1%	0	0	0	261
Italy	-95	-1.9%	0	-97	0	3
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	-455	-8.9%	0	0	0	-455
Portugal	41	0.8%	0	0	0	41
Romania	360	7.1%	132	-52	0	280
Slovak Republic	3	0.0%	0	0	0	3
Slovenia	0	0.0%	0	0	0	0
Spain	-922	-18.1%	0	101	0	-1 023
Sweden	5 381	106%	0	251	0	5 130
United Kingdom	0		0	3	0	-3
Norway	-10 500		-2 262	-8 592	0	354
Switzerland	0		0	0	0	0

Table 6: Domestic extraction of non-metallic minerals for the reference year 2019 (thousand tonnes) – decomposing the EU overall estimation error by country

Geo	Estimation error (overall)		Effect 1	Effect 2	Effect 3	remaining error
EU27	43 395	100%	13 673	-24 646	34 876	19 492
Austria	-1 895	-4.4%	0	1 714	-76	-3 532
Belgium	-427	-1.0%	-1 197	2 566	0	-1 796
Bulgaria	568	1.3%	-399	36	0	931
Croatia	-1 629	-3.8%	0	0	0	-1 629
Cyprus	-889	-2.0%	75	-47	0	-917
Czechia	-2 496	-5.8%	-1 141	0	0	-1 355
Denmark	-1 283	-3.0%	0	-1 396	0	112
Estonia	-1 300	-3.0%	143	788	0	-2 231
Finland	-4 259	-9.8%	-796	-2 752	0	-711
France	-8 368	-19.3%	-885	-10 736	0	3 253
Germany	6 862	15.8%	0	10 806	26 641	-30 586
Greece	8 261	19.0%	2 677	-235	1 632	4 187
Hungary	-10 300	-23.7%	0	-1 252	0	-9 048
Ireland	4 869	11.2%	-769	1 723	207	3 708
Italy	4 084	9.4%	0	-413	0	4 497
Latvia	-1 358	-3.1%	0	0	0	-1 358
Lithuania	-396	-0.9%	0	0	0	-396
Luxembourg	-109	-0.3%	0	33	-104	-37
Malta	333	0.8%	0	2	2	329
Netherlands	-3 750	-8.6%	0	-127	0	-3 622
Poland	-16 193	-37.3%	-12 625	0	0	-3 568
Portugal	-6 720	-15.5%	1 221	-6 540	0	-1 402
Romania	64 415	148.4%	27 369	-33 030	0	70 076
Slovak Republic	-3 211	-7.4%	0	0	0	-3 211
Slovenia	-1 721	-4.0%	0	485	0	-2 206
Spain	20 684	47.7%	0	16 025	6 573	-1 914
Sweden	-377	-0.9%	0	-2 296	0	1 919
United Kingdom	-4 156		-4 655	10 917	0	-10 418
Norway	-555		3 230	-4 459	3	671
Switzerland	-548		-453	-1 171	348	728

Table 7: Domestic extraction of fossil energy material/carriers for the reference year 2019 (thousand tonnes) – decomposing the EU overall estimation error by country

Geo	Estimation error (overall)		Effect 1	Effect 2	Effect 3	remaining error
EU27	22 769	100%	-9 367	282	-79	31 933
Austria	-804	-3.5%	-935	16	0	115
Belgium	99	0.4%	0	181	-36	-47
Bulgaria	-3 200	-14.1%	-7 122	0	0	3 922
Croatia	75	0.3%	-51	55	0	71
Cyprus	0	0.0%	0	0	0	0
Czechia	-100	-0.4%	-7 237	0	0	7 136
Denmark	-5	0.0%	-2 072	10	0	2 057
Estonia	-1 114	-4.9%	-1 306	0	0	192
Finland	-116	-0.5%	-749	0	0	633
France	31	0.1%	-38	0	0	69
Germany	6 669	29.3%	12 223	0	0	-5 554
Greece	-33	-0.1%	-8 960	1	-43	8 969
Hungary	1 167	5.1%	1 270	0	0	-103
Ireland	-2 580	-11.3%	-2 908	0	0	329
Italy	-30	-0.1%	1 565	5	0	-1 601
Latvia	351	1.5%	-832	0	0	1 183
Lithuania	-37	-0.2%	-190	-7	0	160
Luxembourg	0	0.0%	0	0	0	0
Malta	0	0.0%	0	0	0	0
Netherlands	-345	-1.5%	-4 567	0	0	4 222
Poland	23 507	103.2%	18 542	0	0	4 965
Portugal	0	0.0%	0	0	0	0
Romania	1 602	7.0%	-3 901	0	0	5 503
Slovak Republic	43	0.2%	-466	0	0	509
Slovenia	118	0.5%	233	0	0	-114
Spain	-2 393	-10.5%	-1 440	20	0	-973
Sweden	-136	-0.6%	-425	0	0	289
United Kingdom	16		-92 191	0	0	92 207
Norway	-17 871		13 746	-6 056	126	-25 687
Switzerland	0		0	0	0	0