European Residual Mixes

Results of the calculation of Residual Mixes for the calendar year 2019

Version 1.1, 2020-09-08

Note: compared to version 1.0, only the Table 7: Residual Mixes 2017, 2018 and 2019 is changed due to error correction in a formula. The affected countries are HR, FR, DE, IS, LT, SI, ES, SE, CH and for years 2017 and 2018.

Introduction

The purpose of a Guarantee of Origin (GO) system is to enable consumers to have their say on how electricity is generated by selecting the supplier and power product. For consumers to be able to make informed choices, electricity suppliers must disclose the origin and environmental attributes of sold electricity (IEM Directive (EU) 2019/944, Annex 1 (5)). This is called electricity disclosure.

For power companies to be able to tell their customers anything about the origin of the electricity in todays unbundled, international and complex power market, they need a way to track electricity from production to consumption. The main tracking tool for electricity is the GO (REDII Directive 2018/2001, Art 19). As long as not all consumption is tracked using GOs, a *residual mix* is needed to make the GO a reliable tracking instrument. A country's residual mix represents the shares of electricity generation attributes available for disclosure, after the use of explicit tracking systems, such as GO, have been accounted for. Without a residual mix, renewable electricity sold with GOs would be double counted because the same electricity would be disclosed to consumers buying "regular" electricity.

Due to the international nature of both the electricity markets and tracking systems, the volume of available generation attributes in the domestic residual mix differs from the volume of untracked consumption[1]. Thus, the calculation of residual mixes needs to be centrally coordinated and a common pool for balancing generation attributes must be used. This is achieved via the European Attribute Mix (EAM), which replaces the deficit of energy origin caused by exported GOs. EAM acts as an "equalising reservoir" for generation attributes for national residual mixes. After the attribute balancing via the EAM the volume of available generation attributes in the residual mix is equal to the untracked consumption in every country. *This is a precondition for the GO to be a credible tracking instrument in the context of international trading.*

Residual mix is only needed when consumption is partially explicitly tracked. In so-called "full disclosure domains" residual mix is not needed because all consumption is covered by cancelled GOs. Austria has had a full disclosure system in place since 2017 and hence the residual mix zero. Also, Switzerland has full disclosure regulation but, due to detailed implementation and calculation rules, a residual mix can still be calculated and is included in the results.
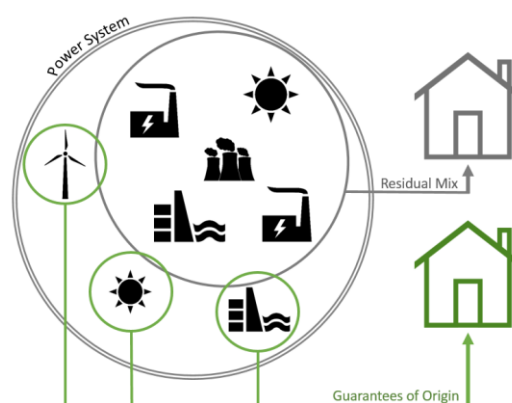
Note: For the revised calculation methodology and results since 2015, please refer to the AIB-website. *For additional background information regarding the concept of residual mix calculations and its application please refer to the website of the RE-DISS project* http://www.reliable-disclosure.org, *where you can find the* final report *of the project,* residual mix calculation methodology, results of previous year calculations *(up to year 2014) and the* RE-DISS Best Practice Recommendations.

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[1] Untracked consumption = Electricity consumption for which the energy source is not explicitly disclosed through tracking instruments such as Guarantees of Origin.

Starting from this year, the residual mix calculation methodology has been changed, from Shifted Transaction based method to Issuance based method. The reason for this are the difficulties identified in the earlier method in the current Guarantee of Origin (GO) environment, mainly that international trading activities had direct impact to residual mix. Following that, the biggest difference between the methodologies is that Issuance and Expiry volumes are used instead of Import and Export volumes when calculating domestic residual mixes. At the same time, the environmental indicators have been toned down to Direct CO2 and Radioactive waste, due to difficulties in updating the advanced emission factors and due to IEM Directive ((EU) 2019/944) only requiring these two. For more information refer to methodology revision material on: https://www.aib-net.org/facts/european-residual-mix.

The calculation area has been expanded this year with Serbia joining in. Regarding the data sources, the usual production and exchange data sources on ENTSO-E were not available this year. Instead, Eurostat were used as the main production data source and the exchange data were collected from ENTSO-E Transparency platform (instead of Power Statistics used before).

Description of the Document

The main results of this document are the **European Attribute Mix** (EAM) and the residual mixes for all countries. A wide variety of additional information is also presented as supporting material. The **EAM (**Table 1**)** is the mix of energy sources and the corresponding environmental indicators that is collected from countries which have surpluses of energy attributes. The EAM is to be used for filling up national residual mixes (calculated by national disclosure competent bodies) in case of a deficit of disclosure attributes. The national surpluses and deficits to/from EAM are shown in Table 3 and Figure 3.

The **national residual mixes** for 32 European countries[2] are shown in the Table 2, Figure 1 and Figure 2. Note that the official residual mixes for each country are in principle published by the respective national authorities. Also note that for countries without recorded explicit tracking, untracked consumption equals the total electricity consumption, and thus the residual mix is applicable for the disclosure of the entire electricity consumption.[3]

Energy sources in the residual mixes are divided in three main categories: renewable, nuclear and fossil, of which renewable and fossil are further divided into subcategories (Table 8). Selected subcategories are based on relevance in terms of volume and perceived consumer importance. The used categorization is also identical to all residual mix calculations since the 2013.

Figure 4 shows the **direct greenhouse gas emissions** as direct CO_2 emissions per kWh of produced electricity. Figure 5 shows the content of **highly active radioactive waste** as mgRW/kWh. Both of these environmental indicators are shown for the European Attribute Mix (EAM), the production mix (PM), the residual mix (RM) and the total supplier mix (TSM) of European countries.

The base data for the direct CO_2-emissions have been based on the following references: Treyer and Bauer (2013), Dong Energy A/S, Energi.dk, Vattenfall (2010), Fritsche and Rausch (2009), Bauer (2008) and GEMIS database (GEMIS, 2015). The data for the radioactive waste has been compiled based on BDEW (2014), DECC (2014), the Platts World Database and IAEA PRIS. These indicators reflect the differences in waste rates produced by the types of nuclear power reactors used in the respective countries per kWh of electricity. Due to a lack of detailed data per reactor, the waste rates have been based on estimates of typical data for five major types of reactors used in Europe. However, where available, factors as reported by national authorities are used instead.

The total supplier mixes (TSMs) are presented in Table 4, and Figure 6. The total supplier mix represents the total consumption mix of a country, i.e. shares of energy sources in the tracked and untracked part of consumption. Thus,

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[2]   Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Iceland, Ireland (All-Island), Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland

[3]   Calculation of the Residual Mix obviously can only take the volumes of explicit tracking systems into account if the respective data is public or known by the authority and respectively being made available to the one who conducts the calculation. This means that explicit tracking systems, for which no statistical data is available to the competent authority and/or AIB, cannot be reflected in the residual mix and are therefore likely to lead to double counting.

both explicitly tracked and available remaining electricity attributes are included in the TSM, which equals in physical volume with the country's total electricity consumption. The production mixes are shown in Table 5.

The evolution of attributes, on the European scale: how much renewables are in the Production mix, how much of those are left in the residual mix and finally how much renewables are carried on to EAM is shown in the Table 6 and Figure 8.

The rest of the results are different kinds of **comparisons** between different mixes and different years. Figure 7 present the comparison between the production and residual mix of different countries, and Figure 9 that of production and total supplier mix. Table 7 and Figure 10 show the difference between final residual mixes of 2017, 2018 and 2019.

With the change in the calculation methodology all the results are now from Issuance Based methodology. Furthermore, the Shifted Transaction Based results are not calculated anymore at all. At the same time the environmental indicators have been limited to direct CO_2 emissions and radioactive waste as those are the only ones required in the internal electricity market directive (EU) 2019/944 (Annex 1 (5)). This results report has also been streamlined for easier reading.

Note: Any use of the data presented in this document should include a reference to AIB.

Note: The calculated country and energy source/technology emission factors forming the base for the National Residual Mix calculations may not be sold, distributed or processed as part of a derivative tool.

Disclaimer on data quality:

Because of the 12 months lifetime of GOs, the residual mixes were calculated based on all recorded GO transactions during the assumed time period (1.4.2019 – 31.3.2020) for disclosure of 2019 consumption, irrespective of the underlying production year of these GOs. This ensures that all GO transactions are considered in the calculation.

Volumes which have been explicitly tracked without the use of transparent tracking instruments, e.g. by so-called contract based tracking, self-declarations etc., cannot be taken into account at all.

These preliminary results has been done with the data available on 21st of April 2020.

Partners

References

Generation data: Eurostat: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg_cb_em&lang=en

EECS Guarantee of Origin Statistics: Association of Issuing Bodies

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Platts: The Platts World Database, 2014

Treyer and Bauer 2013. Life cycle inventories of electricity generation and power supply in version 3 of the ecoinvent database—part I: electricity generation. The International Journal of Life Cycle Assessment, 27 Nov 2013, doi:10.1007/s11367-013-0665-2

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Table 1: European Attribute Mix (EAM) 2019: Energy source distribution and environmental indicators

	RE Total	RE unspecified	RE biomass	RE solar	RE geothermal	RE wind	RE hydro	Nuclear	FO Total	FO unspecified	FO hard coal	FO lignite	FO oil	FO gas	CO2 (gCO2/kWh)	Rad waste (mg/kWh)
EAM	4.44 %	0.00 %	0.88 %	1.15 %	0.01 %	1.66 %	0.75 %	42.02 %	53.53 %	3.94 %	26.75 %	2.31 %	0.90 %	19.63 %	402.59	1.22

EAM = European Attribute Mix is used for balancing surpluses and deficits in national residual mixes caused by international trading of electricity and guarantees of origin.

Table 2: Residual Mixes 2019

	RE Total	RE unspecified	RE biomass	RE solar	RE geothermal	RE wind	RE hydro	Nuclear	FO Total	FO unspecified	FO hard coal	FO lignite	FO oil	FO gas	Untracked %	CO2 (gCO2/kWh)	Rad waste ( )mg/kWh
AT	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00	0.00
BE	9.28 %	0.00 %	2.01 %	4.90 %	0.11 %	1.44 %	0.82 %	52.40 %	38.32 %	1.54 %	3.57 %	0.00 %	0.02 %	33.20 %	61.02 %	187.67	1.41
BG	17.00 %	0.00 %	2.90 %	3.58 %	0.00 %	3.31 %	7.21 %	39.52 %	43.48 %	0.40 %	37.92 %	0.00 %	0.40 %	4.77 %	99.91 %	437.37	1.38
CH	12.70 %	0.00 %	3.77 %	3.28 %	0.00 %	0.00 %	5.65 %	82.96 %	4.34 %	2.72 %	0.00 %	0.00 %	0.22 %	1.40 %	12.80 %	18.53	3.98
CY	9.61 %	0.00 %	0.78 %	3.68 %	0.00 %	5.16 %	0.00 %	0.00 %	90.39 %	0.00 %	0.00 %	0.00 %	90.39 %	0.00 %	100.00 %	675.56	0.00
CZ	3.90 %	0.00 %	1.81 %	1.66 %	0.00 %	0.00 %	0.44 %	39.09 %	57.01 %	0.10 %	2.84 %	46.18 %	0.15 %	7.74 %	98.12 %	595.11	1.37
DE	0.55 %	0.00 %	0.00 %	0.46 %	0.00 %	0.09 %	0.00 %	21.41 %	78.04 %	5.32 %	47.27 %	0.00 %	1.37 %	24.08 %	41.89 %	609.37	0.58
DK	3.39 %	0.00 %	0.67 %	0.88 %	0.01 %	1.27 %	0.57 %	32.07 %	64.54 %	5.58 %	34.06 %	1.76 %	1.49 %	21.64 %	81.21 %	465.21	0.93
EE	1.48 %	0.00 %	0.29 %	0.38 %	0.00 %	0.55 %	0.25 %	16.73 %	81.79 %	55.31 %	11.27 %	0.77 %	0.39 %	14.05 %	95.09 %	757.71	0.51
ES	5.36 %	0.00 %	0.77 %	1.86 %	0.00 %	2.17 %	0.56 %	35.70 %	58.94 %	1.14 %	10.91 %	0.28 %	6.67 %	39.94 %	68.69 %	342.69	0.97
FI	4.97 %	0.86 %	1.82 %	0.63 %	0.01 %	0.49 %	1.17 %	51.69 %	43.35 %	2.82 %	16.65 %	5.31 %	0.70 %	17.86 %	71.71 %	310.13	1.55
FR	8.42 %	0.00 %	1.01 %	2.10 %	0.00 %	4.49 %	0.82 %	81.98 %	9.60 %	0.48 %	0.35 %	0.00 %	0.50 %	8.28 %	89.10 %	43.19	2.21
GB	2.73 %	0.00 %	0.00 %	2.30 %	0.00 %	0.43 %	0.00 %	26.26 %	71.01 %	2.84 %	2.90 %	0.00 %	0.45 %	64.82 %	62.09 %	347.50	2.10
GR	22.93 %	0.00 %	0.88 %	7.02 %	0.14 %	7.78 %	7.11 %	5.84 %	71.23 %	0.68 %	8.06 %	19.05 %	8.40 %	35.05 %	95.40 %	577.44	0.17
HR	4.37 %	0.00 %	0.55 %	0.73 %	0.09 %	1.05 %	1.95 %	26.49 %	69.14 %	2.48 %	22.04 %	14.44 %	1.29 %	28.88 %	70.22 %	514.15	0.77
HU	10.87 %	0.00 %	4.28 %	3.36 %	0.02 %	1.97 %	1.23 %	47.93 %	41.20 %	1.47 %	15.78 %	0.39 %	0.33 %	23.22 %	96.48 %	285.74	1.64
IE	25.74 %	0.00 %	4.44 %	0.58 %	0.00 %	20.56 %	0.15 %	0.00 %	74.26 %	1.71 %	8.95 %	13.12 %	0.10 %	50.39 %	11.33 %	495.15	0.00
IS	6.57 %	0.00 %	0.86 %	1.12 %	2.20 %	1.66 %	0.73 %	41.08 %	52.35 %	3.85 %	26.15 %	2.26 %	0.89 %	19.19 %	84.38 %	393.67	1.19
IT	9.50 %	0.80 %	1.17 %	4.36 %	0.01 %	1.10 %	2.05 %	9.02 %	81.48 %	5.65 %	17.75 %	0.50 %	1.70 %	55.88 %	83.35 %	465.89	0.26
LT	28.94 %	0.92 %	5.14 %	1.16 %	0.01 %	17.96 %	3.74 %	6.20 %	64.87 %	1.10 %	5.35 %	0.00 %	1.06 %	57.36 %	61.20 %	351.93	0.23
LU	3.99 %	0.00 %	0.79 %	1.03 %	0.01 %	1.49 %	0.67 %	37.73 %	58.28 %	13.75 %	24.02 %	2.07 %	0.81 %	17.63 %	9.40 %	449.33	1.10
LV	44.96 %	0.00 %	11.37 %	0.01 %	0.01 %	2.10 %	31.48 %	2.70 %	52.33 %	0.03 %	2.32 %	0.00 %	0.09 %	49.88 %	99.07 %	315.24	0.10
MT	8.47 %	0.00 %	0.21 %	7.67 %	0.00 %	0.40 %	0.18 %	10.18 %	81.36 %	0.95 %	6.48 %	0.56 %	1.07 %	72.29 %	100.00 %	378.35	0.30

NL	**5.36 %**	0.00 %	0.01 %	5.25 %	0.00 %	0.01 %	0.09 %	**3.65 %**	**90.99 %**	0.03 %	25.66 %	0.02 %	2.36 %	62.91 %	46.17 %	555.21	0.10
NO	**6.51 %**	0.00 %	0.95 %	1.31 %	0.01 %	1.57 %	2.67 %	**39.78 %**	**53.71 %**	4.39 %	25.45 %	2.19 %	0.85 %	20.84 %	79.57 %	396.27	1.15
PL	**5.15 %**	0.00 %	1.66 %	0.64 %	0.00 %	1.90 %	0.95 %	**7.23 %**	**87.62 %**	0.63 %	74.03 %	0.37 %	0.15 %	12.44 %	97.16 %	810.97	0.21
PT	**53.89 %**	0.00 %	7.66 %	2.53 %	0.37 %	26.32 %	17.00 %	**0.97 %**	**45.14 %**	0.65 %	10.48 %	0.05 %	2.35 %	31.61 %	95.92 %	256.03	0.03
RO	**43.63 %**	0.00 %	0.48 %	3.17 %	0.00 %	12.03 %	27.95 %	**20.45 %**	**35.92 %**	0.00 %	22.02 %	0.00 %	0.15 %	13.75 %	99.62 %	310.68	3.41
RS	**26.54 %**	0.00 %	0.05 %	0.07 %	0.00 %	0.16 %	26.26 %	**2.19 %**	**71.27 %**	0.21 %	1.90 %	66.98 %	0.05 %	2.14 %	95.63 %	765.75	0.06
SE	**3.49 %**	0.00 %	1.85 %	0.00 %	0.00 %	0.00 %	1.64 %	**87.27 %**	**9.24 %**	6.94 %	0.00 %	0.75 %	0.49 %	1.06 %	12.63 %	50.22	2.36
SI	**2.49 %**	0.00 %	0.63 %	1.29 %	0.00 %	0.37 %	0.20 %	**52.22 %**	**45.30 %**	0.82 %	36.90 %	0.45 %	0.20 %	6.93 %	87.50 %	364.12	1.43
SK	**18.02 %**	1.44 %	5.01 %	1.78 %	0.00 %	1.72 %	8.07 %	**55.49 %**	**26.50 %**	0.60 %	6.86 %	5.18 %	1.49 %	12.36 %	94.21 %	198.59	1.90

Untracked Consumption = Electricity consumption not explicitly disclosed through tracking instruments such as Guarantees of Origin.
Note: CO_2 and radioactive waste figures reported are destined for purposes of electricity disclosure only (rf. page 2).
Data Sources: Information reported by national Competent Bodies; Association of Issuing Bodies (AIB); Eurostat

Graphs with detailed calculations results

Figure 1: Residual Mixes 2019
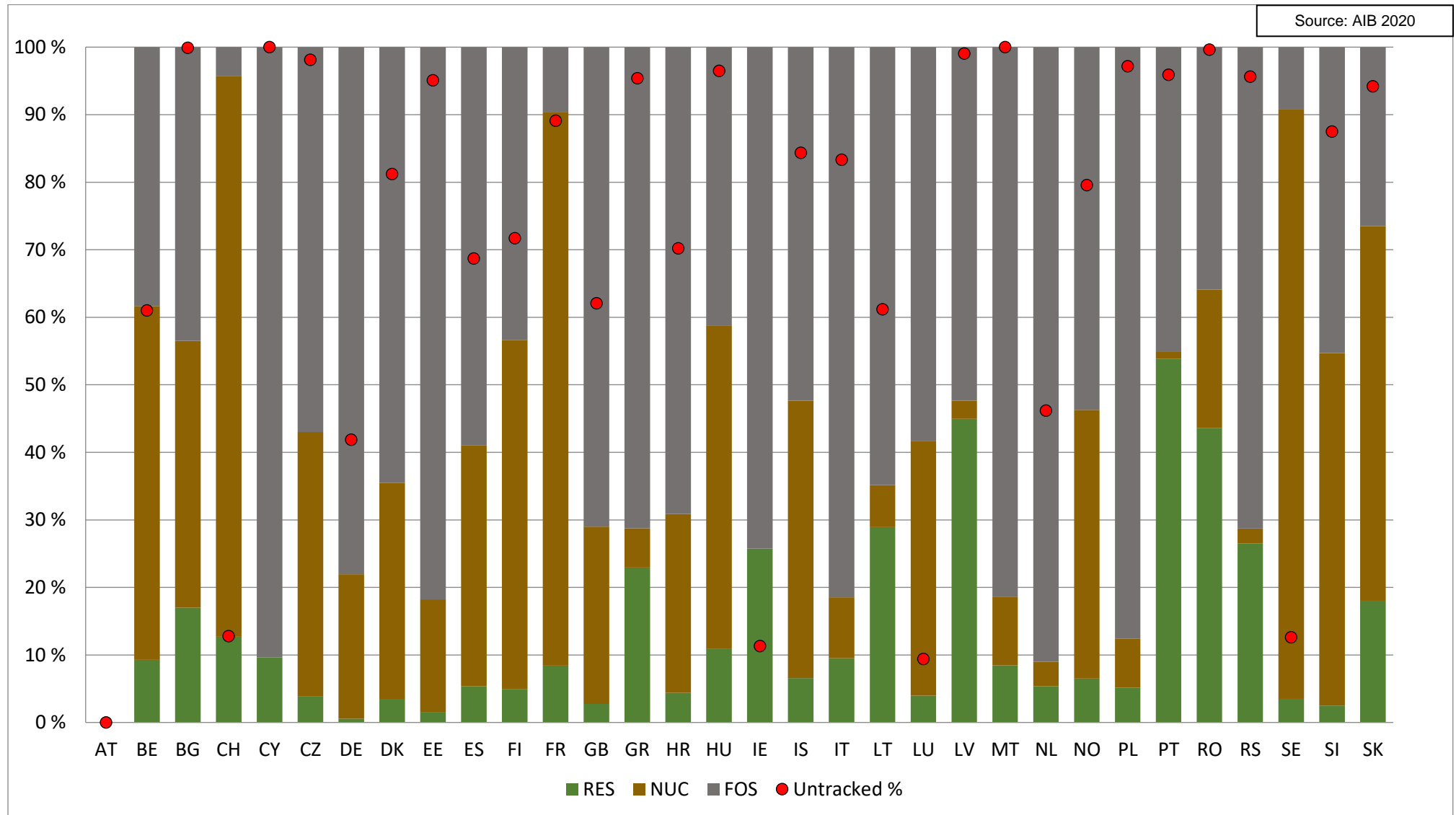
Figure 2: Residual Mixes 2019 (detailed fuel categories)
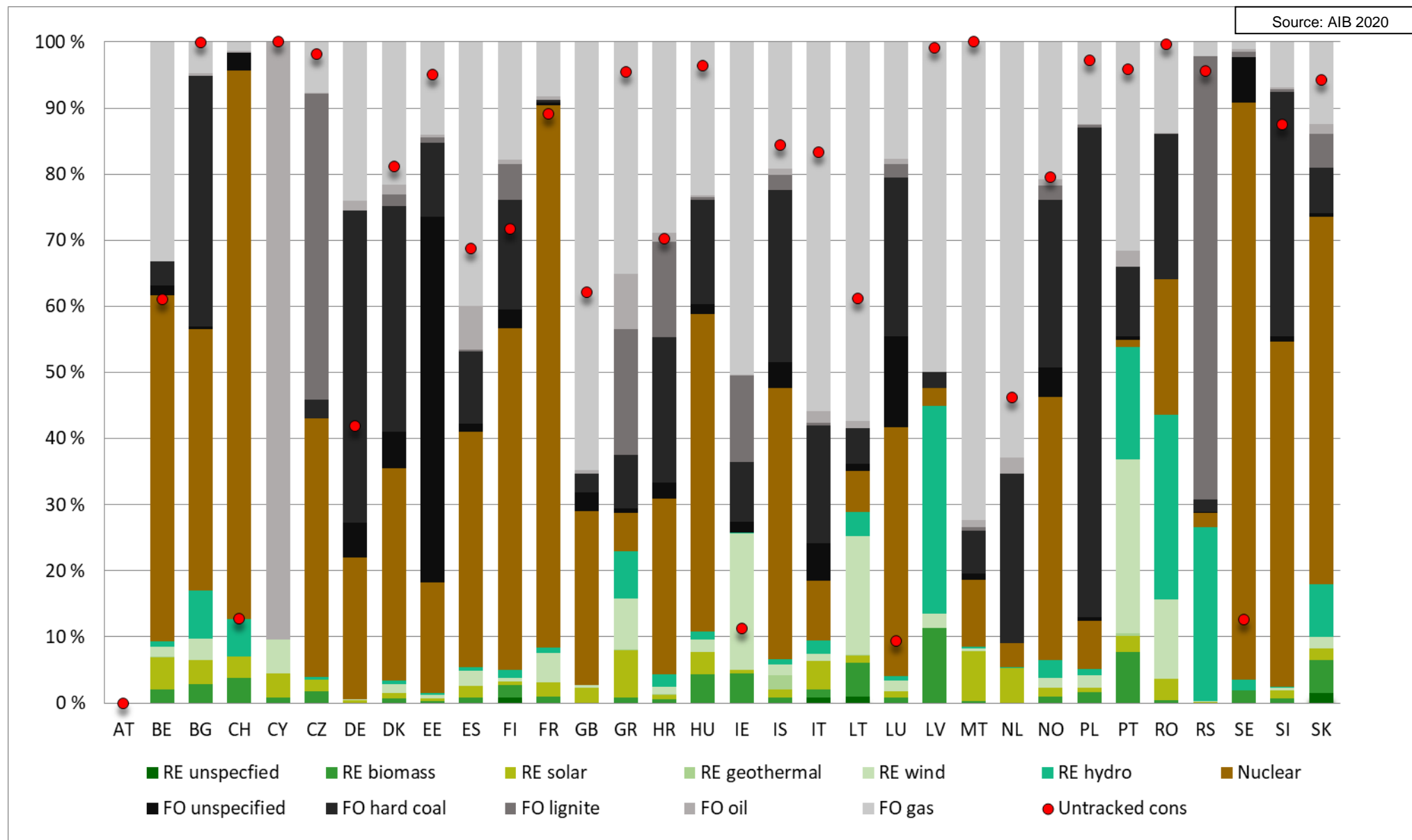
Figure 3: Attributes [TWh] to(positive)/from(negative) the European Attribute Mix 2019[4]

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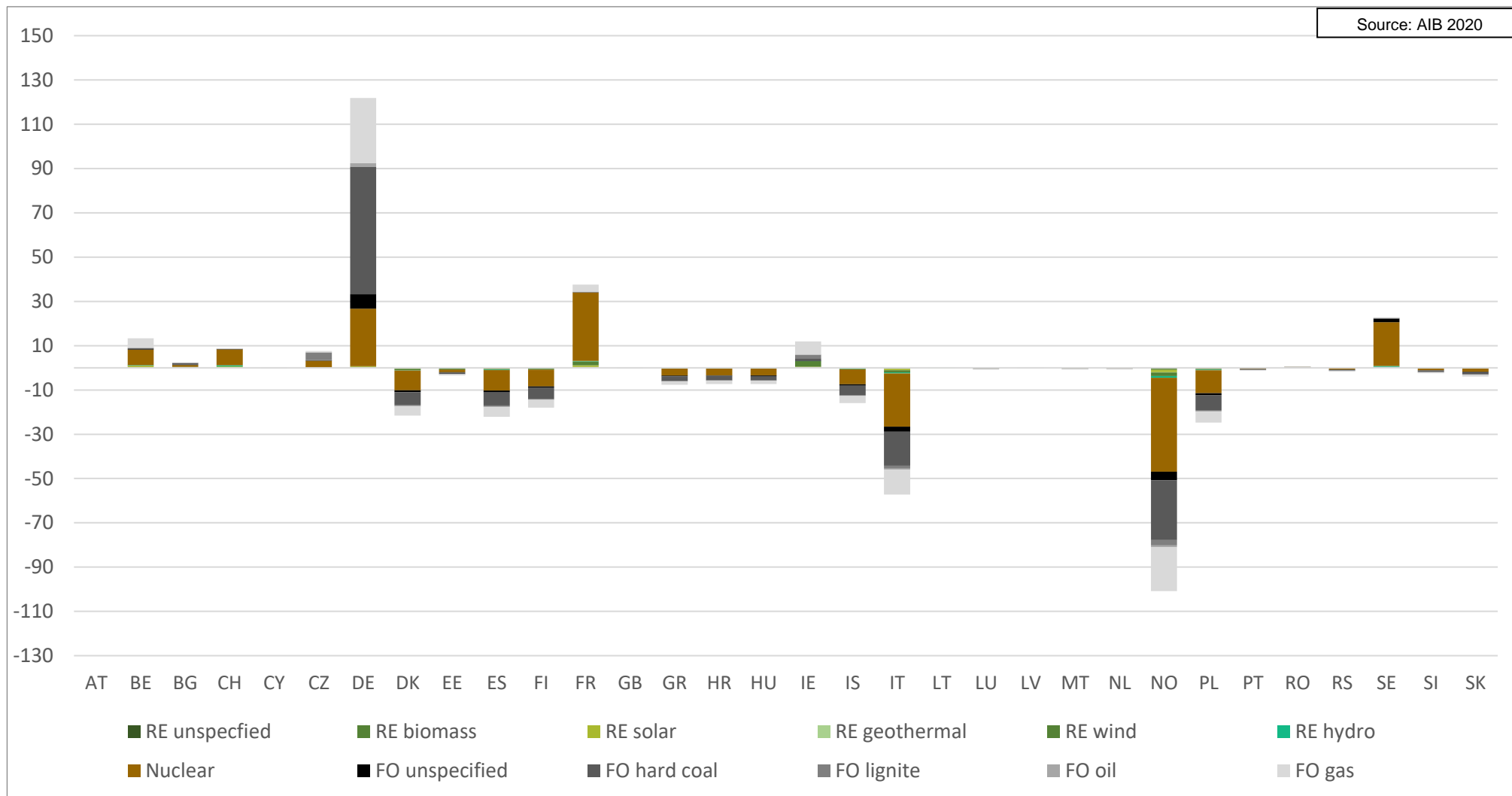
[4] In this figure, the renewable energy added to the EAM does not equal the renewable energy taken out of it, which may seem peculiar. There are two reasons for it: 1) temporal attribute deficit caused by issuing volumes being higher than cancellation volumes, and 2) some countries have negative renewable energy balance in domestic residual mixes (caused by variation in disclosure periods and GO lifetimes overlapping two disclosure periods). This negativity is transferred into the EAM before considering the domestic residual mix attribute surpluses and deficits.

Table 3: Attributes [TWh] to/from the European Attribute Mix 2019[5]

	RE unspeci-fied	RE biomass	RE solar	RE geother-mal	RE wind	RE hydro	Nuclear	FO unspeci-fied	FO hard coal	FO lignite	FO oil	FO gas
AT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BE	0.00	0.27	0.66	0.01	0.19	0.11	7.01	0.21	0.48	0.00	0.00	4.44
BG	0.00	0.07	0.08	0.00	0.08	0.17	0.92	0.01	0.88	0.00	0.01	0.11
CH	0.00	0.33	0.29	0.00	0.00	0.49	7.24	0.24	0.00	0.00	0.02	0.12
CY	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
CZ	0.00	0.14	0.13	0.00	0.00	0.03	2.96	0.01	0.21	3.50	0.01	0.59
DE	0.00	0.00	0.56	0.00	0.11	0.00	26.09	6.49	57.61	0.00	1.66	29.35
DK	-0.01	-0.25	-0.24	0.00	-0.61	-0.16	-8.92	-0.84	-5.68	-0.49	-0.19	-4.17
EE	0.00	-0.11	-0.03	0.00	-0.64	-0.02	-1.15	-0.11	-0.73	-0.06	-0.02	-0.54
ES	0.00	-0.19	-0.25	0.00	-0.37	-0.17	-9.29	-0.87	-5.91	-0.51	-0.20	-4.34
FI	0.00	-0.16	-0.21	0.00	-0.30	-0.13	-7.57	-0.71	-4.82	-0.42	-0.16	-3.54
FR	0.00	0.38	0.79	0.00	1.69	0.31	30.78	0.18	0.13	0.00	0.19	3.11
GB	0.00	0.00	0.01	0.00	0.00	0.00	0.08	0.01	0.01	0.00	0.00	0.20
GR	0.00	-0.07	-0.09	0.00	-0.13	-0.06	-3.22	-0.30	-2.05	-0.18	-0.07	-1.51
HR	0.00	-0.06	-0.08	0.00	-0.12	-0.05	-3.07	-0.29	-1.95	-0.17	-0.07	-1.43
HU	0.00	-0.06	-0.08	0.00	-0.12	-0.05	-3.07	-0.29	-1.96	-0.17	-0.07	-1.44
IE	0.00	0.53	0.07	0.00	2.45	0.02	0.00	0.20	1.06	1.56	0.01	5.99
IS	0.00	-0.14	-0.18	0.00	-0.27	-0.12	-6.70	-0.63	-4.27	-0.37	-0.14	-3.13
IT	0.00	-0.50	-0.66	0.00	-0.95	-0.43	-24.07	-2.26	-15.32	-1.32	-0.51	-11.25
LT	0.00	0.02	0.00	0.00	0.06	0.01	0.02	0.00	0.02	0.00	0.00	0.19
LU	0.00	-0.02	-0.01	0.00	-0.03	-0.01	-0.21	-0.02	-0.13	-0.01	0.00	-0.10
LV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MT	0.00	-0.01	-0.01	0.00	-0.01	0.00	-0.27	-0.03	-0.17	-0.01	-0.01	-0.13
NL	0.00	0.00	-0.01	0.00	-0.01	0.00	-0.20	-0.02	-0.12	-0.01	0.00	-0.09
NO	0.00	-0.89	-1.16	-0.01	-1.68	-0.75	-42.38	-3.98	-26.98	-2.33	-0.91	-19.80
PL	0.00	-0.22	-0.28	0.00	-0.41	-0.18	-10.38	-0.97	-6.61	-0.57	-0.22	-4.85

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[5] Same as in previous figure 3, the renewable energy added to the EAM does not equal the renewable energy taken out of it. For more information refer to footnote 4.

	RE unspeci-fied	RE biomass	RE solar	RE geother-mal	RE wind	RE hydro	Nuclear	FO unspeci-fied	FO hard coal	FO lignite	FO oil	FO gas
PT	0.00	-0.01	-0.01	0.00	-0.02	-0.01	-0.50	-0.05	-0.32	-0.03	-0.01	-0.24
RO	0.00	0.00	0.02	0.00	0.08	0.18	0.13	0.00	0.14	0.00	0.00	0.09
RS	0.00	-0.01	-0.02	0.00	-0.03	-0.01	-0.70	-0.07	-0.44	-0.04	-0.01	-0.33
SE	0.00	0.42	0.00	0.00	0.00	0.37	19.88	1.58	0.00	0.17	0.11	0.24
SI	0.00	-0.02	-0.03	0.00	-0.04	-0.02	-1.02	-0.10	-0.65	-0.06	-0.02	-0.48
SK	0.00	-0.03	-0.04	0.00	-0.06	-0.03	-1.64	-0.15	-1.04	-0.09	-0.04	-0.77

Figure 4: Direct CO_2 content in Production, Residual and Total Supplier mix 2019 [gCO_2/kWh]

	AT	BE	BG	CH	CY	CZ	DE	DK	EE	ES	FI	FR	GB	GR	HR	HU	IE	IS	IT	LT	LU	LV	MT	NL	NO	PL	PT	RO	RS	SE	SI
Production mix CO2	133	153	437	12	677	545	379	154	723	220	136	39	227	549	273	253	348	0	339	149	139	303	371	452	11	791	253	310	763	12	244
Residual mix CO2	0	188	437	19	676	595	609	465	758	343	310	43	348	577	514	286	495	394	466	352	449	315	378	555	396	811	256	311	766	50	364
Supplier mix CO2	145	123	437	10	676	584	255	378	721	250	222	40	216	551	379	276	189	332	388	215	146	312	378	290	315	788	246	310	734	8	319

Figure 5: Highly active radioactive waste content in the Production Mix, the Residual Mix and the Total Suppler Mix 2019 [mgRW/kWh]

	AT	BE	BG	CH	CY	CZ	DE	DK	EE	ES	FI	FR	GB	GR	HR	HU	IE	IS	IT	LT	LU	LV	MT	NL	NO	PL	PT	RO	RS	SE	SI	SK
Production mix RW	0.0	1.3	1.4	1.8	0.0	1.3	0.4	0.0	0.0	0.6	1.0	1.9	1.4	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	3.5	0.0	1.1	1.0	1.9
Residual mix RW	0.0	1.4	1.4	4.0	0.0	1.4	0.6	0.9	0.5	1.0	1.6	2.2	2.1	0.2	0.8	1.6	0.0	1.2	0.3	0.2	1.1	0.1	0.3	0.1	1.2	0.2	0.0	3.4	0.1	2.4	1.4	1.9
Total supplier mix RW	0.0	1.1	1.4	1.4	0.0	1.3	0.2	0.8	0.5	0.7	1.1	2.0	1.3	0.2	0.5	1.6	0.0	1.0	0.2	0.1	0.1	0.1	0.3	0.1	0.9	0.2	0.0	3.4	0.1	0.9	1.2	1.8

Table 4: Total Supplier Mix 2019

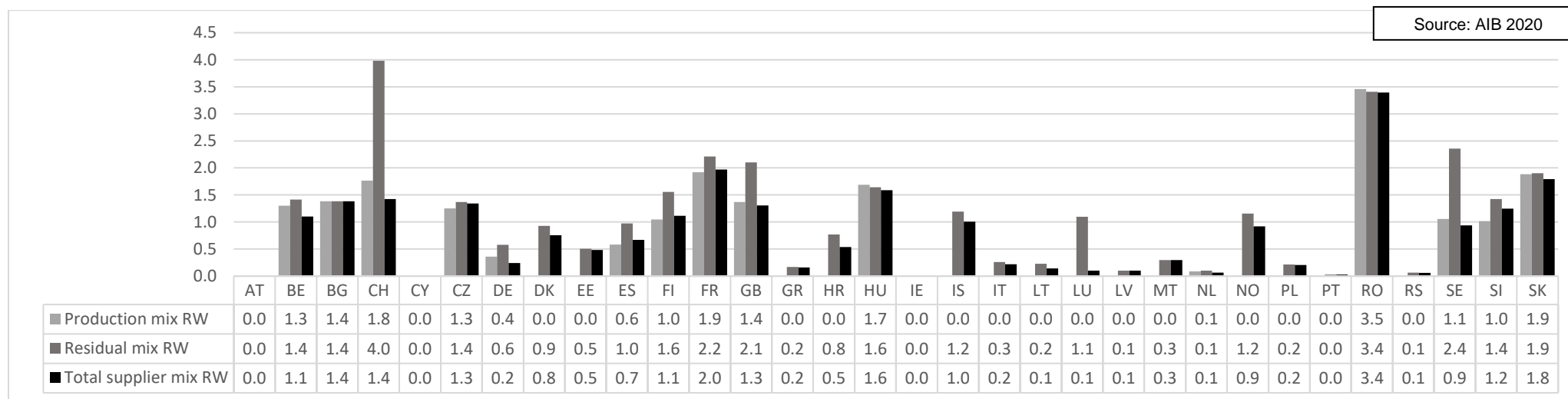|	Volume (TWh)	RE unspecified	RE biomass	RE solar	RE geothermal	RE wind	RE hydro	Nuclear	FO unspecified	FO hard coal	FO lignite	FO oil	FO gas	CO2 (gCO2/kWh)	Rad waste ()mg/kWh
AT	70.59	0.50 %	5.03 %	0.02 %	0.00 %	8.45 %	57.69 %	0.00 %	1.60 %	4.17 %	0.00 %	0.65 %	21.90 %	145.04	0.00
BE	84.13	0.60 %	6.02 %	4.34 %	0.33 %	5.92 %	16.57 %	40.87 %	0.19 %	2.18 %	0.00 %	0.01 %	22.97 %	123.03	1.10
BG	34.00	0.00 %	2.90 %	3.57 %	0.00 %	3.39 %	7.21 %	39.48 %	0.40 %	37.89 %	0.00 %	0.40 %	4.76 %	436.99	1.38
CH	61.95	0.00 %	0.78 %	1.80 %	0.04 %	0.72 %	64.60 %	29.64 %	1.45 %	0.00 %	0.00 %	0.03 %	0.93 %	10.20	1.42
CY	4.85	0.00 %	0.78 %	3.68 %	0.00 %	5.16 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	90.39 %	0.00 %	675.56	0.00
CZ	66.92	0.00 %	2.49 %	1.71 %	0.00 %	0.09 %	1.41 %	38.35 %	0.10 %	2.78 %	45.32 %	0.15 %	7.59 %	583.94	1.34
DE	501.62	0.25 %	3.40 %	8.61 %	0.22 %	25.81 %	20.06 %	8.97 %	2.23 %	19.80 %	0.00 %	0.57 %	10.09 %	255.24	0.24
DK	34.24	0.11 %	1.69 %	0.72 %	0.00 %	16.81 %	2.21 %	26.04 %	4.53 %	27.66 %	1.43 %	1.21 %	17.58 %	377.81	0.76
EE	8.65	0.00 %	2.40 %	0.37 %	0.00 %	1.71 %	1.83 %	15.91 %	52.59 %	10.72 %	0.73 %	0.37 %	13.36 %	720.53	0.48
ES	265.53	0.00 %	4.12 %	5.24 %	0.00 %	16.64 %	5.65 %	24.52 %	1.08 %	7.50 %	0.19 %	4.58 %	30.48 %	249.86	0.67
FI	86.09	0.70 %	8.47 %	1.20 %	0.01 %	3.95 %	17.52 %	37.06 %	2.03 %	11.94 %	3.81 %	0.50 %	12.81 %	222.38	1.11
FR	477.40	0.01 %	1.43 %	1.94 %	0.11 %	5.21 %	9.71 %	73.04 %	0.42 %	0.31 %	0.00 %	0.44 %	7.38 %	39.67	1.97
GB	312.51	0.02 %	8.81 %	6.97 %	0.00 %	21.59 %	2.23 %	16.30 %	1.77 %	1.80 %	0.00 %	0.28 %	40.25 %	215.77	1.30
GR	57.92	0.00 %	0.84 %	6.76 %	0.13 %	8.43 %	10.32 %	5.57 %	0.65 %	7.69 %	18.18 %	8.01 %	33.44 %	550.89	0.16
HR	16.49	0.00 %	5.17 %	0.94 %	0.06 %	9.55 %	13.79 %	18.60 %	1.74 %	15.48 %	10.14 %	0.91 %	23.62 %	379.36	0.54
HU	44.51	0.23 %	4.80 %	3.26 %	0.02 %	2.27 %	3.43 %	46.25 %	1.42 %	15.23 %	0.38 %	0.32 %	22.40 %	275.68	1.59
IE	38.20	0.87 %	13.15 %	0.99 %	0.23 %	34.51 %	13.18 %	0.00 %	0.19 %	1.01 %	1.49 %	0.35 %	34.02 %	189.34	0.00
IS	19.33	0.00 %	0.72 %	0.95 %	8.82 %	1.40 %	9.28 %	34.66 %	3.25 %	22.06 %	1.90 %	0.75 %	16.19 %	332.17	1.01
IT	320.24	0.73 %	2.78 %	4.08 %	2.02 %	2.63 %	12.33 %	7.52 %	4.71 %	14.80 %	0.41 %	1.41 %	46.58 %	388.31	0.22
LT	12.47	0.66 %	11.96 %	1.16 %	0.01 %	28.32 %	14.41 %	3.79 %	0.67 %	3.27 %	0.00 %	0.65 %	35.10 %	215.38	0.14
LU	5.94	0.12 %	5.44 %	2.15 %	0.00 %	5.10 %	63.91 %	3.55 %	12.56 %	2.26 %	0.19 %	0.08 %	4.64 %	146.42	0.10
LV	7.30	0.01 %	11.36 %	0.04 %	0.01 %	2.72 %	31.34 %	2.68 %	0.03 %	2.30 %	0.00 %	0.09 %	49.42 %	312.30	0.10
MT	2.63	0.00 %	0.21 %	7.67 %	0.00 %	0.40 %	0.18 %	10.18 %	0.95 %	6.48 %	0.56 %	1.07 %	72.29 %	378.34	0.30
NL	117.97	0.14 %	3.97 %	3.51 %	0.01 %	31.54 %	10.44 %	2.38 %	0.61 %	12.75 %	0.01 %	1.09 %	33.56 %	289.78	0.06
NO	133.90	0.00 %	1.19 %	1.06 %	0.01 %	3.01 %	20.31 %	31.69 %	3.49 %	20.25 %	1.74 %	0.68 %	16.58 %	315.32	0.92

PL	158.56	0.00 %	1.87 %	0.62 %	0.01 %	4.16 %	1.18 %	7.02 %	0.61 %	71.93 %	0.36 %	0.15 %	12.09 %	787.95	0.21
PT	53.89	0.00 %	8.56 %	2.43 %	0.36 %	25.70 %	18.72 %	0.93 %	0.63 %	10.05 %	0.05 %	2.25 %	30.32 %	245.58	0.03
RO	55.39	0.00 %	0.48 %	3.16 %	0.00 %	12.23 %	27.98 %	20.37 %	0.00 %	21.93 %	0.00 %	0.15 %	13.70 %	309.52	3.39
RS	33.26	0.03 %	0.60 %	0.10 %	0.02 %	2.87 %	25.85 %	2.10 %	0.20 %	1.82 %	64.05 %	0.04 %	2.32 %	733.60	0.06
SE	138.32	0.47 %	6.77 %	0.71 %	0.11 %	7.20 %	48.40 %	34.82 %	1.09 %	0.00 %	0.09 %	0.06 %	0.28 %	8.08	0.94
SI	14.34	0.00 %	1.61 %	1.97 %	0.00 %	0.33 %	10.76 %	45.69 %	0.72 %	32.29 %	0.39 %	0.17 %	6.06 %	318.62	1.25
SK	27.52	1.36 %	6.65 %	1.69 %	0.00 %	4.36 %	8.70 %	52.28 %	0.56 %	6.47 %	4.88 %	1.40 %	11.65 %	187.10	1.79

Figure 6: Total Supplier Mix 2019
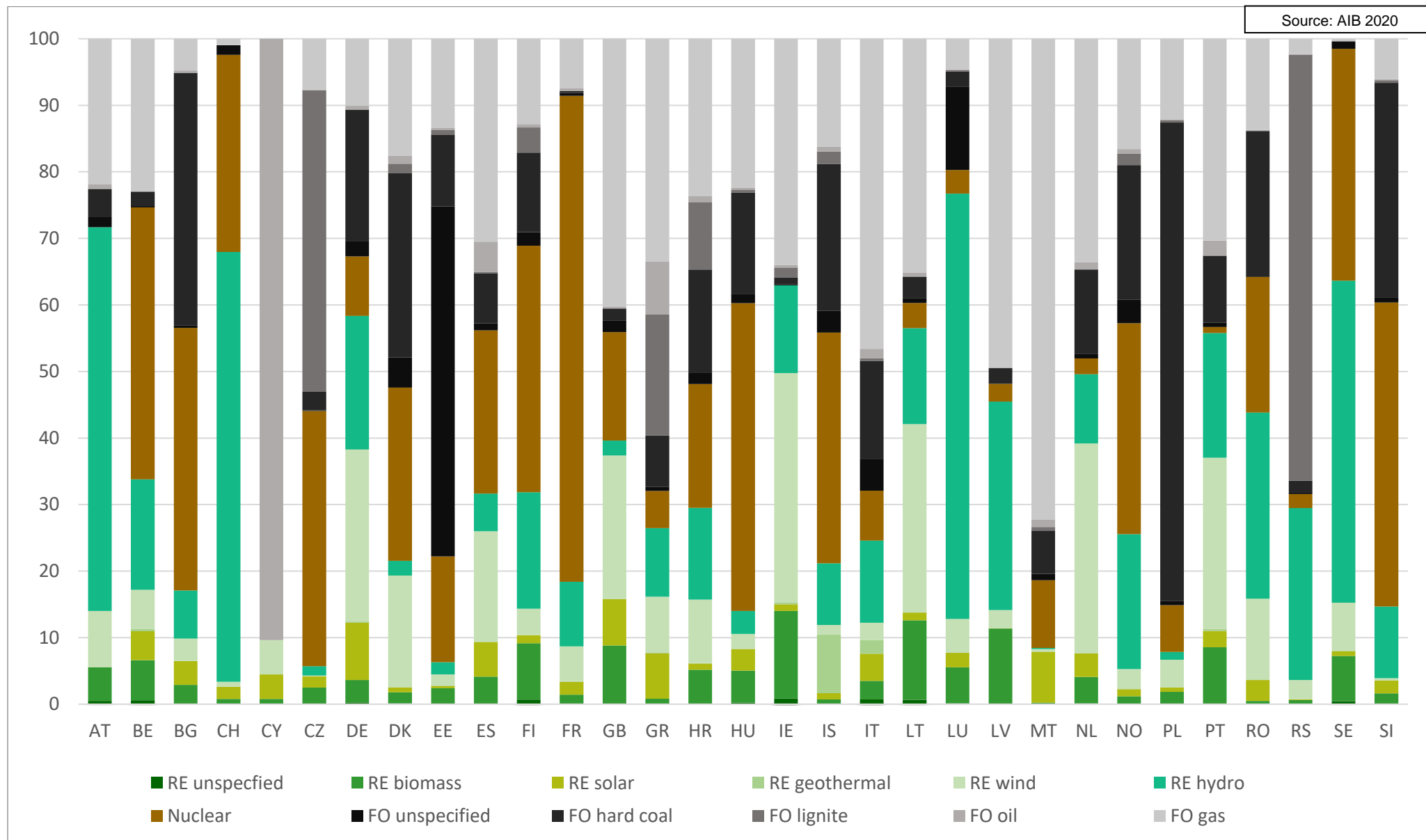
Table 5: Production Mix 2019[6]

	Volume [TWh]	RE unspecified	RE biomass	RE solar	RE geothermal	RE wind	RE hydro	Nuclear	FO unspecified	FO hard coal	FO lignite	FO oil	FO gas	CO2 (gCO2/kWh)	Rad waste (mg/kWh)
AT	67.46	0.00 %	3.98 %	0.00 %	0.00 %	11.77 %	59.81 %	0.00 %	1.24 %	5.17 %	0.00 %	0.93 %	17.11 %	132.86	0.00
BE	85.99	0.00 %	5.24 %	4.11 %	0.00 %	10.68 %	0.28 %	48.15 %	1.19 %	2.69 %	0.00 %	0.01 %	27.64 %	153.13	1.30
BG	39.81	0.00 %	2.90 %	3.58 %	0.00 %	3.31 %	7.21 %	39.52 %	0.40 %	37.92 %	0.00 %	0.40 %	4.77 %	437.37	1.38
CH	68.14	0.00 %	2.90 %	2.98 %	0.00 %	0.22 %	54.27 %	36.82 %	1.83 %	0.00 %	0.00 %	0.05 %	0.92 %	11.82	1.77
CY	4.85	0.00 %	0.78 %	3.69 %	0.00 %	4.91 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	90.62 %	0.00 %	677.29	0.00
CZ	80.01	0.00 %	5.82 %	2.83 %	0.00 %	0.86 %	2.53 %	35.77 %	0.09 %	2.60 %	42.27 %	0.14 %	7.08 %	544.65	1.25
DE	534.29	0.00 %	3.05 %	8.41 %	0.04 %	23.56 %	3.15 %	13.30 %	3.31 %	29.37 %	0.00 %	0.85 %	14.96 %	378.62	0.36
DK	28.45	0.00 %	16.63 %	3.39 %	0.00 %	56.76 %	0.06 %	0.00 %	2.52 %	13.34 %	0.00 %	0.79 %	6.51 %	154.44	0.00
EE	6.44	0.62 %	18.04 %	0.79 %	0.00 %	10.73 %	0.34 %	0.00 %	68.90 %	0.00 %	0.00 %	0.00 %	0.58 %	723.28	0.00
ES	258.66	0.00 %	1.74 %	5.54 %	0.00 %	21.12 %	9.28 %	21.58 %	0.86 %	4.90 %	0.00 %	4.52 %	30.46 %	220.26	0.58
FI	65.80	1.53 %	17.00 %	0.27 %	0.00 %	9.10 %	18.67 %	34.84 %	1.54 %	6.45 %	4.35 %	0.34 %	5.91 %	136.22	1.05
FR	533.10	0.00 %	1.44 %	2.18 %	0.00 %	6.40 %	10.41 %	71.19 %	0.41 %	0.30 %	0.00 %	0.43 %	7.24 %	38.95	1.92
GB	297.90	0.00 %	10.26 %	4.21 %	0.00 %	20.24 %	1.83 %	17.13 %	1.85 %	1.89 %	0.00 %	0.29 %	42.29 %	226.70	1.37
GR	47.97	0.00 %	0.76 %	8.28 %	0.00 %	15.17 %	8.29 %	0.00 %	0.15 %	0.00 %	21.72 %	9.58 %	36.04 %	549.01	0.00
HR	12.14	0.00 %	6.35 %	0.60 %	0.62 %	11.99 %	47.10 %	0.00 %	0.00 %	0.00 %	12.38 %	0.69 %	20.27 %	273.15	0.00
HU	31.92	0.00 %	5.81 %	4.31 %	0.03 %	2.21 %	0.67 %	48.28 %	1.08 %	11.32 %	0.00 %	0.13 %	26.17 %	252.98	1.69
IE	37.71	0.00 %	2.17 %	0.37 %	0.00 %	34.08 %	2.40 %	0.00 %	0.73 %	3.85 %	5.64 %	0.39 %	50.36 %	348.04	0.00
IS	19.49	0.00 %	0.00 %	0.00 %	30.88 %	0.03 %	69.07 %	0.00 %	0.00 %	0.00 %	0.00 %	0.01 %	0.00 %	0.11	0.00
IT	299.19	0.72 %	5.01 %	8.13 %	1.90 %	6.71 %	15.10 %	0.00 %	4.29 %	10.72 %	0.00 %	1.34 %	46.10 %	338.54	0.00
LT	3.06	2.38 %	12.36 %	2.75 %	0.00 %	47.56 %	11.20 %	0.00 %	2.56 %	0.00 %	0.00 %	1.69 %	19.50 %	149.13	0.00
LU	0.91	0.00 %	27.04 %	14.33 %	0.00 %	28.82 %	3.97 %	0.00 %	7.16 %	0.00 %	0.00 %	0.00 %	18.68 %	139.39	0.00
LV	6.18	0.00 %	13.31 %	0.00 %	0.00 %	2.46 %	33.93 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	50.31 %	303.33	0.00
MT	1.99	0.00 %	0.00 %	9.75 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	1.12 %	89.13 %	370.60	0.00

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[6] The physical electricity imports and exports outside of the Residual mix calculation area are not included in these figures.

	Volume [TWh]	RE unspecified	RE biomass	RE solar	RE geothermal	RE wind	RE hydro	Nuclear	FO unspecified	FO hard coal	FO lignite	FO oil	FO gas	CO2 (gCO2/kWh)	Rad waste (mg/kWh)
NL	117.12	0.00 %	4.15 %	4.34 %	0.00 %	9.81 %	0.06 %	3.17 %	1.15 %	16.49 %	0.00 %	1.13 %	59.68 %	452.07	0.09
NO	133.85	0.00 %	0.17 %	0.00 %	0.00 %	4.14 %	93.40 %	0.00 %	0.52 %	0.00 %	0.00 %	0.00 %	1.78 %	11.18	0.00
PL	147.94	0.00 %	4.39 %	0.49 %	0.00 %	9.94 %	1.26 %	0.00 %	0.74 %	73.41 %	0.00 %	0.00 %	9.77 %	791.07	0.00
PT	50.50	0.00 %	7.82 %	2.56 %	0.38 %	26.90 %	17.39 %	0.00 %	0.57 %	10.09 %	0.00 %	2.38 %	31.89 %	252.55	0.00
RO	53.87	0.00 %	0.49 %	3.27 %	0.00 %	12.45 %	28.72 %	19.21 %	0.00 %	21.67 %	0.00 %	0.13 %	14.08 %	310.11	3.46
RS	33.26	0.00 %	0.35 %	0.05 %	0.00 %	2.74 %	27.14 %	0.00 %	0.00 %	0.00 %	68.30 %	0.00 %	1.42 %	762.53	0.00
SE	164.45	0.00 %	7.32 %	0.00 %	0.00 %	12.10 %	39.29 %	39.12 %	1.55 %	0.00 %	0.19 %	0.12 %	0.33 %	11.89	1.06
SI	14.74	0.00 %	1.37 %	1.82 %	0.00 %	0.04 %	29.45 %	37.55 %	0.05 %	27.02 %	0.00 %	0.02 %	2.68 %	243.85	1.01
SK	26.82	1.70 %	5.96 %	2.19 %	0.00 %	0.02 %	16.12 %	53.81 %	0.00 %	3.11 %	5.29 %	1.48 %	10.30 %	151.10	1.88

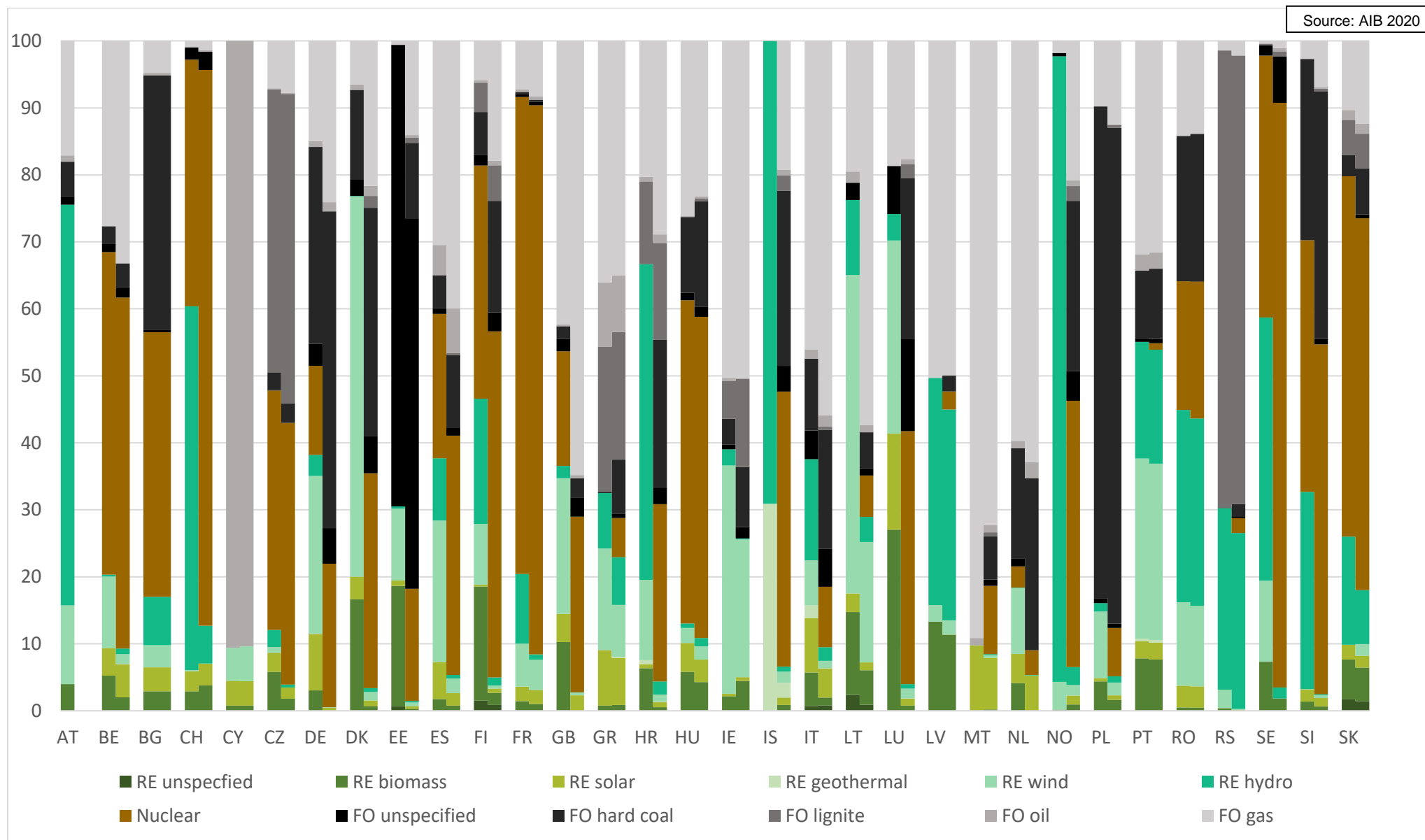Figure 7: Production Mix (left) and Final Residual Mix (right) 2019

Figure 8: European Total Production Mix (left), Total of all available attributes in Final Residual Mixes (middle) and EAM (right) 2019
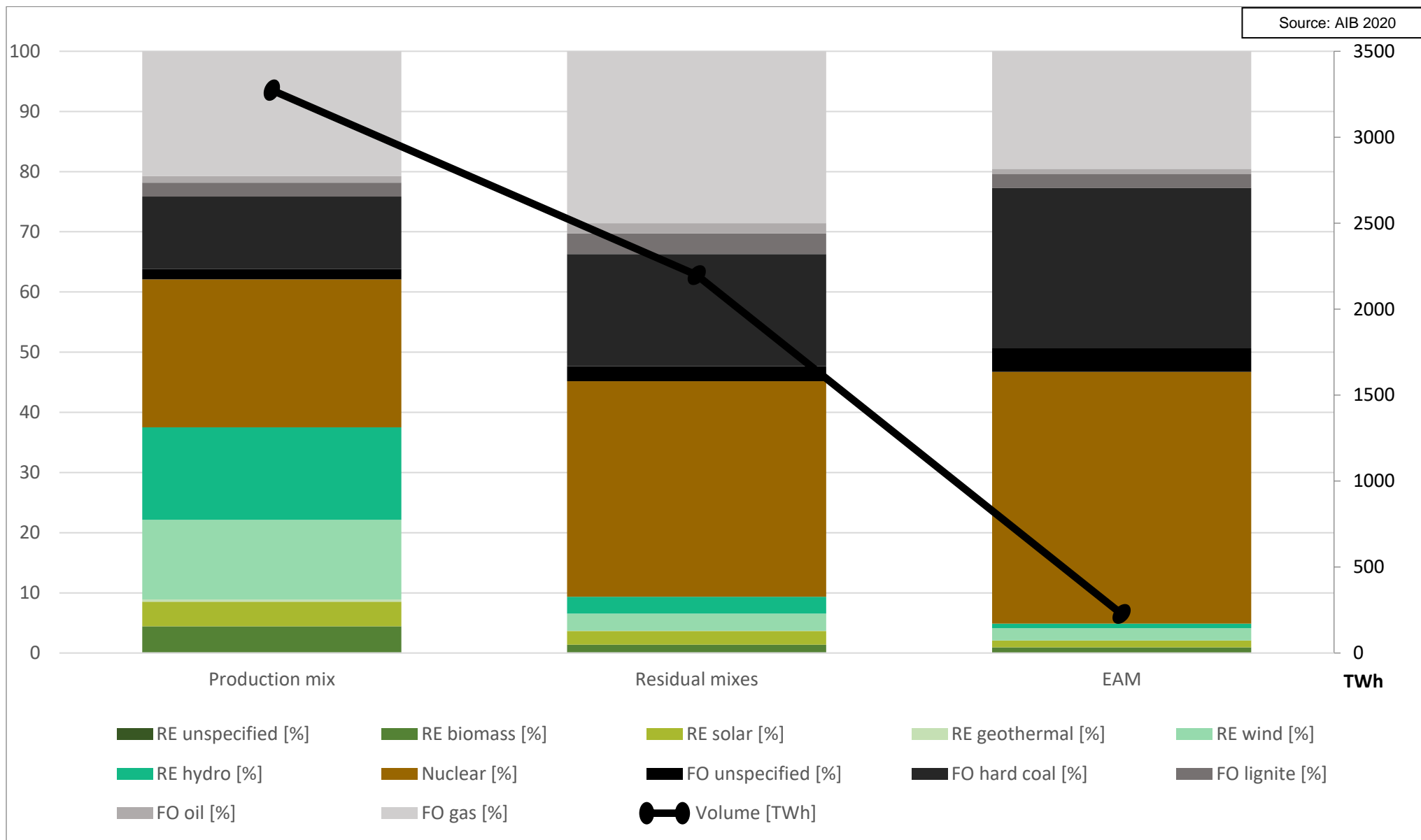
Table 6: European Total Production Mix, Total of all available attributes in Final Residual Mixes and European Attribute Mix 2019

	Production mix	Residual mix	European attribute mix
Volume [TWh]	**3274.03**	**2198.51**	**227.38**
RE unspecfied %	0.11 %	0.14 %	0.00 %
RE biomass %	4.31 %	1.23 %	0.95 %
RE solar %	4.09 %	2.28 %	1.14 %
RE geothermal %	0.37 %	0.03 %	0.01 %
RE wind %	13.27 %	2.88 %	2.04 %
RE hydro %	15.33 %	2.78 %	0.75 %
Nuclear %	24.59 %	35.82 %	41.83 %
FO unspecified %	1.73 %	2.49 %	3.92 %
FO hard coal %	12.05 %	18.65 %	26.63 %
FO lignite %	2.30 %	3.42 %	2.30 %
FO oil %	1.14 %	1.71 %	0.89 %
FO gas %	20.70 %	28.57 %	19.54 %

Figure 9: Production Mix (left) and Total Supplier Mix (right) 2019
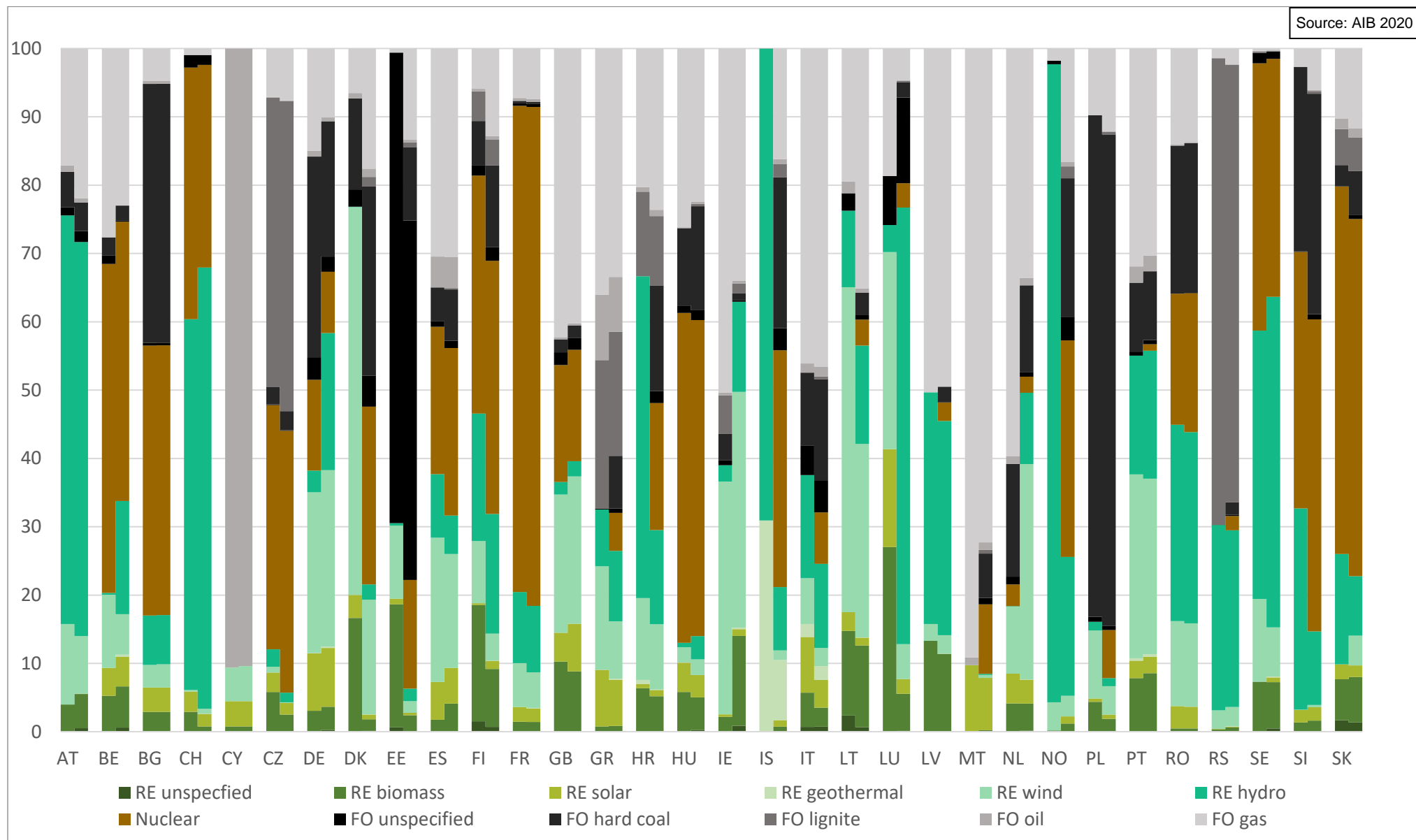
Figure 10: Residual Mixes 2017, 2018 and 2019[7]
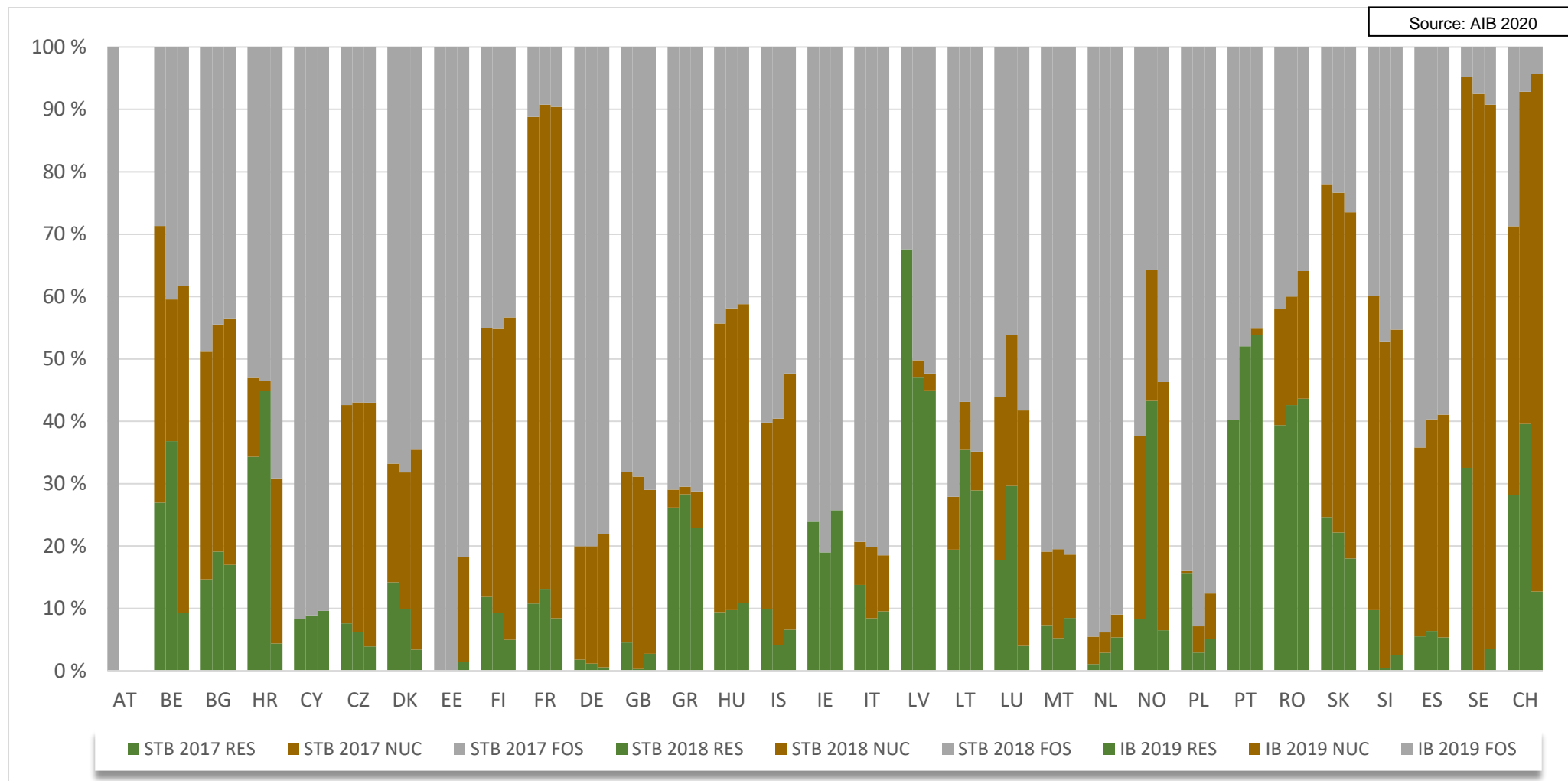
Table 7: Residual Mixes 2017, 2018 and 2019

		2017 STB	2018 STB	2019 IB			2017 STB	2018 STB	2019 IB			2017 STB	2018 STB	2019 IB
AT	RES	0.0 %	0.0 %	0.0 %	DE	RES	1.8 %	1.2 %	0.6 %	NL	RES	1.1 %	2.9 %	5.4 %
	NUC	0.0 %	0.0 %	0.0 %		NUC	18.2 %	18.8 %	21.4 %		NUC	4.4 %	3.3 %	3.6 %
	FOS	100.0 %	0.0 %	0.0 %		FOS	80.0 %	80.0 %	78.0 %		FOS	94.5 %	93.8 %	91.0 %
BE	RES	26.9 %	36.8 %	9.3 %	GB	RES	4.5 %	0.3 %	2.7 %	NO	RES	8.3 %	43.3 %	6.5 %
	NUC	44.4 %	22.7 %	52.4 %		NUC	27.3 %	30.8 %	26.3 %		NUC	29.4 %	21.1 %	39.8 %
	FOS	28.7 %	40.5 %	38.3 %		FOS	68.1 %	68.9 %	71.0 %		FOS	62.3 %	35.7 %	53.7 %
BG	RES	14.7 %	19.1 %	17.0 %	GR	RES	26.2 %	28.3 %	22.9 %	PL	RES	15.6 %	2.9 %	5.2 %
	NUC	36.5 %	36.4 %	39.5 %		NUC	2.9 %	1.2 %	5.8 %		NUC	0.4 %	4.2 %	7.2 %
	FOS	48.8 %	44.5 %	43.5 %		FOS	71.0 %	70.5 %	71.2 %		FOS	84.0 %	92.9 %	87.6 %
HR	RES	34.3 %	44.8 %	3.9 %	HU	RES	9.4 %	9.7 %	10.9 %	PT	RES	40.2 %	52.0 %	53.9 %
	NUC	12.7 %	1.6 %	28.7 %		NUC	46.3 %	48.4 %	47.9 %		NUC	0.0 %	0.0 %	1.0 %
	FOS	53.0 %	53.5 %	67.3 %		FOS	44.3 %	41.9 %	41.2 %		FOS	59.8 %	48.0 %	45.1 %
CY	RES	8.3 %	8.9 %	9.6 %	IS	RES	9.9 %	4.1 %	6.6 %	RO	RES	39.4 %	42.6 %	43.6 %
	NUC	0.0 %	0.0 %	0.0 %		NUC	29.9 %	36.3 %	41.1 %		NUC	18.6 %	17.4 %	20.4 %
	FOS	91.7 %	91.1 %	90.4 %		FOS	60.2 %	59.6 %	52.3 %		FOS	42.0 %	40.0 %	35.9 %
CZ	RES	7.6 %	6.2 %	3.9 %	IE	RES	23.9 %	19.0 %	25.7 %	SK	RES	24.7 %	22.2 %	18.0 %
	NUC	35.0 %	36.9 %	39.1 %		NUC	0.0 %	0.0 %	0.0 %		NUC	53.4 %	54.5 %	55.5 %
	FOS	57.4 %	57.0 %	57.0 %		FOS	76.1 %	81.0 %	74.3 %		FOS	22.0 %	23.3 %	26.5 %
DK	RES	14.2 %	9.8 %	3.4 %	IT	RES	13.8 %	8.4 %	9.5 %	SI	RES	9.7 %	0.5 %	2.5 %
	NUC	19.0 %	22.0 %	32.1 %		NUC	6.9 %	11.5 %	9.0 %		NUC	50.3 %	52.3 %	52.2 %
	FOS	66.8 %	68.2 %	64.5 %		FOS	79.3 %	80.1 %	81.5 %		FOS	40.0 %	47.3 %	45.3 %
EE	RES	0.0 %	0.0 %	1.5 %	LV	RES	67.6 %	47.0 %	45.0 %	ES	RES	5.5 %	6.4 %	5.4 %
	NUC	0.0 %	0.0 %	16.7 %		NUC	0.0 %	2.8 %	2.7 %		NUC	30.3 %	33.9 %	35.7 %
	FOS	100.0 %	100.0 %	81.8 %		FOS	32.4 %	50.2 %	52.3 %		FOS	64.2 %	59.7 %	58.9 %
FI	RES	11.9 %	9.2 %	5.0 %	LT	RES	19.4 %	35.4 %	28.9 %	SE	RES	32.6 %	0.0 %	3.5 %
	NUC	43.1 %	45.6 %	51.7 %		NUC	8.5 %	7.7 %	6.2 %		NUC	62.6 %	92.5 %	87.3 %
	FOS	45.1 %	45.2 %	43.3 %		FOS	72.1 %	56.9 %	64.9 %		FOS	4.8 %	7.5 %	9.2 %
FR	RES	10.8 %	13.1 %	8.4 %	MT	RES	7.3 %	5.2 %	8.5 %	CH	RES	28.2 %	39.6 %	12.7 %
	NUC	78.0 %	77.6 %	82.0 %		NUC	11.8 %	14.3 %	10.2 %		NUC	43.0 %	53.3 %	83.0 %
	FOS	11.2 %	9.2 %	9.6 %		FOS	80.9 %	80.5 %	81.4 %		FOS	28.7 %	7.1 %	4.3 %

Annex 1: Fuel Categories

Table 8: Fuel category breakdown

Fact Sheet 5 compliance		Fuel code	Fuel description (including all subcategories)	Sub-table reference
Renewable	Unspecified & Other	F01000000	Renewable – Unspecified	
		F01040300	Renewable – Heat – Aerothermal	
		F01040400	Renewable – Heat – Hydrothermal	
		F01040501	Renewable – Heat – Process heat – Biogenic	
		F01050000	Renewable – Mechanical source or other – Unspecified	
	Solar	F01040100	Renewable – Heat – Solar	
	Wind	F01050100	Renewable – Mechanical source or other – Wind	
	Hydro & Marine	F01050200	Renewable – Mechanical source or other – Hydro & Marine	
	Geothermal	F01040200	Renewable – Heat – Geothermal	
	Biomass	F01010000	Renewable – Solid	
		F01020000	Renewable – Liquid	
		F01030000	Renewable – Gaseous	
Nuclear		F03010100	Nuclear – Solid – Radioactive fuel	
Fossil	Unspecified & Other	F02000000	Fossil – Unspecified	
		F02010000	Fossil – Solid – Unspecified	
		F02010400	Fossil – Solid – Municipal waste	
		F02010500	Fossil – Solid – Industrial and commercial waste	
		F02020000	Fossil – Liquid – Unspecified	
		F02030000	Fossil – Gaseous	T4
		F02040000	Fossil – Heat	
	Hard Coal	F02010100	Fossil – Solid – Hard coal	T1
	Brown Coal / Lignite	F02010300	Fossil – Solid – Peat	
		F02010200	Fossil – Solid – Brown coal	T2
	Natural Gas	F02030100	Fossil – Gaseous – Natural Gas	
		F02020200	Fossil – Liquid – Natural gas liquids	
	Oil	F02020100	Fossil – Liquid – Crude oil	
		F02020300	Fossil – Liquid – Petroleum products	T3

T1 Hard coal sub-categories		
0	F0201010	Unspecified
1	F0201010	Anthracite
2	F0201010	Bituminous coal
3	F0201010	Coking coal
4	F0201010	Coke-oven coke
5	F0201010	Lignite coke

T2 Brown coal sub-categories		
0	F0201020	Unspecified
1	F0201020	Sub-bituminous coal
2	F0201020	Lignite
3	F0201020	Brown coal briquette
4	F0201020	Peat briquette

T3 Petroleum products sub-categories		
0	F020203	Unspecified
1	F020203	Ethane
2	F020203	Naphtha
3	F020203	Aviation gasoline
4	F020203	Motor gasoline
5	F020203	Aviation turbine fuel
6	F020203	Other kerosene
7	F020203	Gas and diesel oil
8	F020203	Fuel oil low-sulphur
9	F020203	Fuel oil high-sulphur
10	F020203	Liquid petroleum gas
11	F020203	Orimulsion
12	F020203	Bitumen
13	F020203	Lubricants
14	F020203	Petroleum coke
15	F020203	Refinery feedstock

T4 Gaseous sub-categories			
0	F020300	Unspecified	Unspecified
20	F020302	Coal-derived gas	Unspecified
21	F020302	Coal-derived gas	Blast furnace gas
22	F020302	Coal-derived gas	Coke-oven gas
30	F020303	Petroleum products	Unspecified
31	F020303	Petroleum products	Propane
32	F020303	Petroleum products	Butane
33	F020303	Petroleum products	Refinery gas
34	F020303	Petroleum products	Chemical waste gas
40	F020304	Municipal gas plant	Unspecified
50	F020305	Process gas	Unspecified
51	F020305	Process gas	Carbon monoxide
52	F020305	Process gas	Methane
53	F020305	Process gas	Hydrogen (fossil sourced)
54	F020305	Process gas	Phosphor gas
55	F020305	Process gas	Oxy gas