

# European Residual Mixes 2015

## Results of the calculation of Residual Mixes for purposes of electricity disclosure in Europe for the calendar year 2015

Version 1.0, 13<sup>th</sup> May 2016

### Introduction

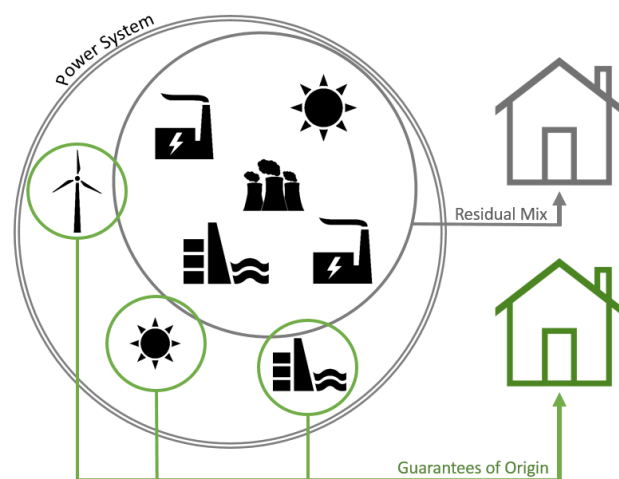
**Note:** For background information regarding the concept of residual mix calculations and its application please refer to the website of the RE-DISS project <http://www.reliable-disclosure.org>, where you can find the [final report](#) of the project, [residual mix calculation methodology](#), [results of previous year calculations](#) and the [RE-DISS Best Practice Recommendations](#).

European residual mixes for years 2009 to 2014 were calculated by the RE-DISS Project Phases I and II (Reliable Disclosure Systems for Europe). As the RE-DISS project ended in September 2015, AIB offered to facilitate the calculations for the coming years (see [press release](#)). AIB considers residual mix calculation which is both reliable and coordinated at a European level crucial in its mission to guarantee the origin of European energy. The calculations for 2015 are made following the methodology developed by the RE-DISS projects.

Under EU's Internal Energy Market Directive (2009/72/EC, Art. 3(9)), electricity suppliers must inform their customers of the origin and environmental attributes of sold electricity. This is called electricity disclosure. The aim is to enable informed consumer choice, and for that choice to be based on other matters than electricity prices alone, such as environmental values.

For renewable energy, tracking is often done by associating electricity sales with cancelled Guarantees of Origin (GOs). A country's residual mix represents the shares of electricity generation attributes available for disclosure, after the use of explicit tracking systems, such as guarantees of origin, has been accounted for. Without the residual mix calculation, renewable electricity sold with GOs would be double counted where disclosure information is presented 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<sup>1</sup>. Thus, the calculation needs to be harmonised for the entire Europe, which is achieved through the European Attribute Mix (EAM). The EAM replaces the deficit of energy origin caused by exported GOs, by operating as an "equalising reservoir" for generation attributes in national residual mixes. After the attribute balancing via EAM (see Figure 3), the volume of available generation attributes in each country's residual mix is equal to the untracked consumption of the country. This is a precondition for the shares of different energy sources in the residual mix to be reliably used for disclosure of untracked consumption.



<sup>1</sup> Untracked consumption = Electricity consumption for which the energy source is not explicitly disclosed through tracking instruments such as Guarantees of Origin.

## Description of the Document

Table 1 presents the energy sources and environmental indicator information of the European Attribute Mix of 2015 to be used for filling in national residual mixes in case of a deficit of disclosure attributes. Table 2, Figure 1 and Figure 2 represent the national residual mixes for 2015 as calculated for 31 European countries<sup>2</sup>. In Figure 1 and Figure 2, colours indicate different energy sources as elaborated by the legend, and the solid black line in Figure 1 shows the share of untracked consumption out of the total electricity consumption. 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.<sup>3</sup>

The results shown are based on the Shifted-Transaction Based Methodology. However, to acknowledge different perspectives to national calculations, Table 3 and Figure 21 provide national results following the Issuance-Based Methodology.<sup>4</sup>

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 4). Selected subcategories are based on relevance in terms of volume and perceived consumer importance. The used categorization is also identical to the 2013 and 2014 residual mix calculations.

Table 1 and Figure 4 show the carbon emissions for the final residual mixes 2015 differentiated into

- direct greenhouse gas emissions given as the single greenhouse gas CO<sub>2</sub> emissions,
- greenhouse gas emissions given as the single greenhouse gas CO<sub>2</sub> emissions based on a life-cycle analysis (LCA) and thus including up- and downstream impacts throughout the electricity generation value chain,
- direct greenhouse gas emissions, given as CO<sub>2</sub> equivalents (CO<sub>2</sub>e), which includes the effects of other greenhouse gases than CO<sub>2</sub>, and
- greenhouse gas emissions based on an LCA approach, given as CO<sub>2</sub> equivalents (CO<sub>2</sub>e). This is the most comprehensive emission figure as it contains CO<sub>2</sub> and other greenhouse gases and the full electricity generation value chain.

The base data for the direct CO<sub>2</sub>-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 life-cycle-based CO<sub>2</sub>-emissions, as well as the direct and life-cycle-based Global Warming Potential have been provided by the Ecoinvent database (Ecoinvent v3.1 Database). The data for the radioactive waste has been compiled based on BDEW (2014), DECC (2014), the Platts World Database and IAEA PRIS. However, where available, factors as reported by national competent authorities are used instead.

Note that these figures are destined for electricity disclosure purposes only. The RE-DISS Disclosure Guidelines for Electricity Suppliers recommend that the direct CO<sub>2</sub> emissions (and the indicator on radioactive waste) are being used in disclosure statements directly on or with the bills. The other three indicators for carbon emissions are provided for information purpose and can be used for second-level information (e.g. on a related website) provided by suppliers and other bodies.

Table 1 and Figure 6 show the content of high-level radioactive waste in the European Attribute Mix (EAM), the production mix (PM), the residual mix (RM) and the total supplier mix (TSM) of European countries in 2015. 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. Input factors are the same as used in 2014 calculation.

The total supplier mixes (TSMs) are presented in Figure 7 and Figure 8. The total supplier mix represents the total consumption mix of the country, i.e. shares of energy sources in the tracked and untracked part of consumption. Thus, both available and explicitly tracked attributes are included in the TSM, which equals in physical volume with the country's total electricity consumption.

<sup>2</sup> Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland

<sup>3</sup> 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.

<sup>4</sup> For more information on the Shifted-Transaction Based Methodology (STBM) and the Issuance-Based Methodology, see the Residual Mix Methodology description in Deliverable 7.2 of the RE-DISS II project (see [http://www.reliable-disclosure.org/upload/234-D7.2\\_RMCalculation.pdf](http://www.reliable-disclosure.org/upload/234-D7.2_RMCalculation.pdf)).

Figure 9, Figure 10 present the comparison between the production and residual mix of different countries, and Figure 13 and Figure 14 that of production and total supplier mix (in TWh in Figure 15 and Figure 16). Figure 17 and Figure 18 show the difference between final residual mixes and production mixes of 2013, 2014 and 2015. Finally, Figure 19 and Figure 20 disclose the volumes of EECS and National GO transactions which have been taken into account for the calculation (but not those of other Reliable Tracking Systems).

**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 (1.4.2015 – 31.3.2016) for disclosure of 2015 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.

#### Partners

**grexel**

 Østfoldforskning

 ecoinvent

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Table 1: European Attribute Mix (EAM) 2015: Energy source distribution and environmental indicators

	Renewables Total	Renewables Unspecified	Solar	Wind	Hydro & Ma- rine	Geothermal	Biomass	Nuclear Total	Fossil Total	Fossil Unspeci- fied	Lignite	Hard Coal	Gas	Oil	Direct CO2 (gCO2/kWh)	LCA CO2 (gCO2/kWh)	Direct GWP (gCO2/kWh)	LCA GWP (gCO2/kWh)	RW (mgRW/kWh)
<b>EAM</b>	<b>4.04%</b>	0.20%	0.30%	1.24%	1.61%	0.00%	0.69%	<b>34.99%</b>	<b>60.96%</b>	11.22%	22.83%	16.74%	9.25%	0.92%	548.26	578.66	552.43	625.04	1.02

**EAM** = European Attribute Mix. Used to balance surpluses and deficit in national residual mixes caused by international trading of electricity and guarantees of origin.

Table 2: Final Residual Mixes for 2015

	Residual Mix																
	Renewables Total	Renewables Unspecified	Solar	Wind	Hydro & Ma- rine	Geothermal	Biomass	Nuclear Total	Fossil Total	Fossil Un- specified	Lignite	Hard Coal	Gas	Oil	Untracked consumption	Direct CO2 (gCO2/kWh)	High-level RW (mgRW/kWh)
AT	69.23%	7.52%	0.00%	0.00%	42.75%	0.00%	18.95%	0.00%	30.77%	9.44%	0.00%	6.49%	11.81%	3.04%	32.80%	190.15	0.00
BE	11.91%	0.07%	2.27%	3.27%	4.45%	0.39%	1.45%	25.96%	62.12%	4.13%	8.41%	12.95%	36.11%	0.51%	38.62%	433.81	0.73
BG	19.56%	0.00%	3.09%	3.24%	12.79%	0.00%	0.44%	32.50%	47.94%	0.10%	42.44%	2.33%	3.06%	0.01%	99.84%	510.66	1.14
HR	45.70%	0.04%	0.06%	4.96%	40.48%	0.00%	0.15%	6.66%	47.64%	3.46%	21.38%	15.76%	6.62%	0.42%	96.97%	474.61	0.19
CY	8.50%	0.00%	2.47%	5.17%	0.00%	0.00%	0.87%	0.00%	91.50%	0.00%	0.00%	0.00%	0.00%	91.50%	100.00%	711.85	0.00
CZ	11.77%	3.17%	2.88%	0.71%	2.67%	0.00%	2.34%	33.13%	55.10%	0.18%	42.15%	6.31%	6.41%	0.05%	97.67%	582.38	1.16
DK	13.22%	0.12%	1.93%	6.62%	4.12%	0.00%	0.42%	21.27%	65.52%	8.73%	13.87%	30.10%	11.77%	1.04%	92.56%	523.66	0.62
EE	2.48%	0.06%	0.10%	0.38%	0.81%	0.00%	1.12%	10.82%	86.70%	71.33%	7.06%	5.18%	2.86%	0.28%	97.53%	878.37	0.31
FI	10.76%	0.66%	0.08%	0.81%	1.96%	0.00%	7.24%	46.25%	42.99%	8.06%	6.28%	14.36%	13.70%	0.60%	76.01%	299.81	1.38
FR	11.94%	0.00%	1.46%	4.12%	4.87%	0.00%	1.49%	81.41%	6.65%	0.00%	0.00%	1.68%	4.31%	0.66%	98.17%	37.40	2.20
DE	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	21.45%	78.55%	2.69%	35.36%	26.48%	12.72%	1.30%	52.49%	757.64	0.58
GB	5.37%	0.01%	0.01%	3.96%	0.59%	0.00%	0.79%	26.01%	68.62%	0.45%	0.91%	28.54%	38.05%	0.67%	76.65%	482.84	2.01
GR	27.94%	0.02%	7.08%	7.97%	12.36%	0.00%	0.51%	3.15%	68.91%	1.01%	44.59%	2.99%	20.20%	0.12%	99.02%	680.71	0.09
HU	9.22%	1.18%	0.13%	1.94%	1.80%	0.00%	4.17%	49.44%	41.34%	2.19%	18.03%	10.20%	10.60%	0.33%	98.95%	375.67	1.69
IS	71.87%	0.06%	0.09%	0.43%	68.69%	2.40%	0.20%	10.25%	17.88%	3.29%	6.69%	4.91%	2.71%	0.28%	93.96%	160.75	0.30

Table 2: Final Residual Mixes for 2015

	Residual Mix																
	Renewables Total	Renewables Unspecified	Solar	Wind	Hydro & Ma- rine	Geothermal	Biomass	Nuclear Total	Fossil Total	Fossil Un- specified	Lignite	Hard Coal	Gas	Oil	Untracked consumption	Direct CO2 (gCO2/kWh)	High-level RW (mgRW/kWh)
IE	29.16%	0.77%	0.00%	24.17%	3.57%	0.00%	0.65%	0.00%	70.84%	0.36%	14.12%	38.41%	17.86%	0.08%	27.58%	639.00	0.00
IT	24.10%	1.87%	7.55%	3.25%	5.18%	0.00%	6.25%	6.30%	69.60%	12.16%	4.11%	16.90%	34.76%	1.67%	87.75%	434.59	0.18
LV	43.60%	5.49%	0.00%	2.16%	30.66%	0.00%	5.29%	3.74%	52.66%	9.20%	0.37%	3.25%	39.66%	0.17%	94.59%	333.20	0.11
LT	19.01%	0.06%	0.76%	7.76%	6.63%	0.00%	3.81%	12.49%	68.49%	10.97%	6.36%	7.26%	43.41%	0.50%	97.53%	474.76	0.37
LU	2.98%	0.15%	0.22%	0.91%	1.18%	0.00%	0.51%	25.80%	71.22%	10.28%	16.83%	12.35%	31.08%	0.68%	48.47%	502.96	0.75
MT	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	100.00%	100.00%	817.84	0.00
NL	1.12%	0.00%	0.10%	0.97%	0.00%	0.05%	0.00%	4.37%	94.51%	94.51%	0.00%	0.00%	0.00%	0.00%	61.69%	574.97	0.12
NO	21.25%	0.16%	0.57%	1.49%	18.50%	0.00%	0.54%	27.61%	51.14%	8.81%	17.92%	13.17%	10.52%	0.72%	84.32%	446.41	0.80
PL	12.88%	0.32%	0.03%	6.88%	1.21%	0.00%	4.43%	0.14%	86.98%	6.21%	32.57%	45.47%	2.73%	0.00%	99.60%	869.87	0.00
PT	47.25%	0.01%	1.56%	23.12%	17.17%	0.00%	5.39%	1.56%	51.20%	0.99%	1.02%	28.58%	20.37%	0.24%	99.74%	367.05	0.05
RO	41.82%	0.00%	3.18%	11.21%	26.59%	0.00%	0.84%	17.62%	40.56%	6.83%	23.18%	3.26%	7.29%	0.00%	99.94%	410.37	3.17
SK	24.34%	2.18%	2.16%	0.06%	15.61%	0.00%	4.34%	56.10%	19.56%	0.44%	6.98%	3.86%	7.21%	1.07%	93.63%	162.28	1.96
SI	24.90%	1.04%	0.41%	0.01%	22.75%	0.00%	0.69%	42.87%	32.22%	1.57%	30.42%	0.11%	0.11%	0.01%	91.48%	369.66	1.16
ES	11.81%	0.26%	2.95%	4.04%	2.91%	0.00%	1.65%	28.81%	59.38%	0.86%	3.16%	24.98%	23.87%	6.51%	73.70%	438.75	0.78
SE	13.91%	0.00%	0.00%	4.73%	2.98%	0.00%	6.20%	78.15%	7.94%	4.79%	0.00%	1.18%	1.71%	0.26%	21.29%	42.56	2.11



Table 2: Final Residual Mixes for 2015

	Residual Mix																
	Renewables Total	Renewables Unspecified	Solar	Wind	Hydro & Ma- rine	Geothermal	Biomass	Nuclear Total	Fossil Total	Fossil Un- specified	Lignite	Hard Coal	Gas	Oil	Untracked consumption	Direct CO <sub>2</sub> (gCO <sub>2</sub> /kWh)	High-level RW (mgRW/kWh)
CH	41.81%	0.00%	6.62%	0.00%	27.27%	0.00%	7.92%	51.29%	6.90%	6.90%	0.00%	0.00%	0.00%	0.00%	20.86%	27.57	1.38

**Untracked Consumption** = Electricity consumption not explicitly disclosed through tracking instruments such as Guarantees of Origin.

**Note:** CO<sub>2</sub> 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); ENTSO-E

Graphs with detailed calculations results

Figure 1: Final Residual Mixes for 2015

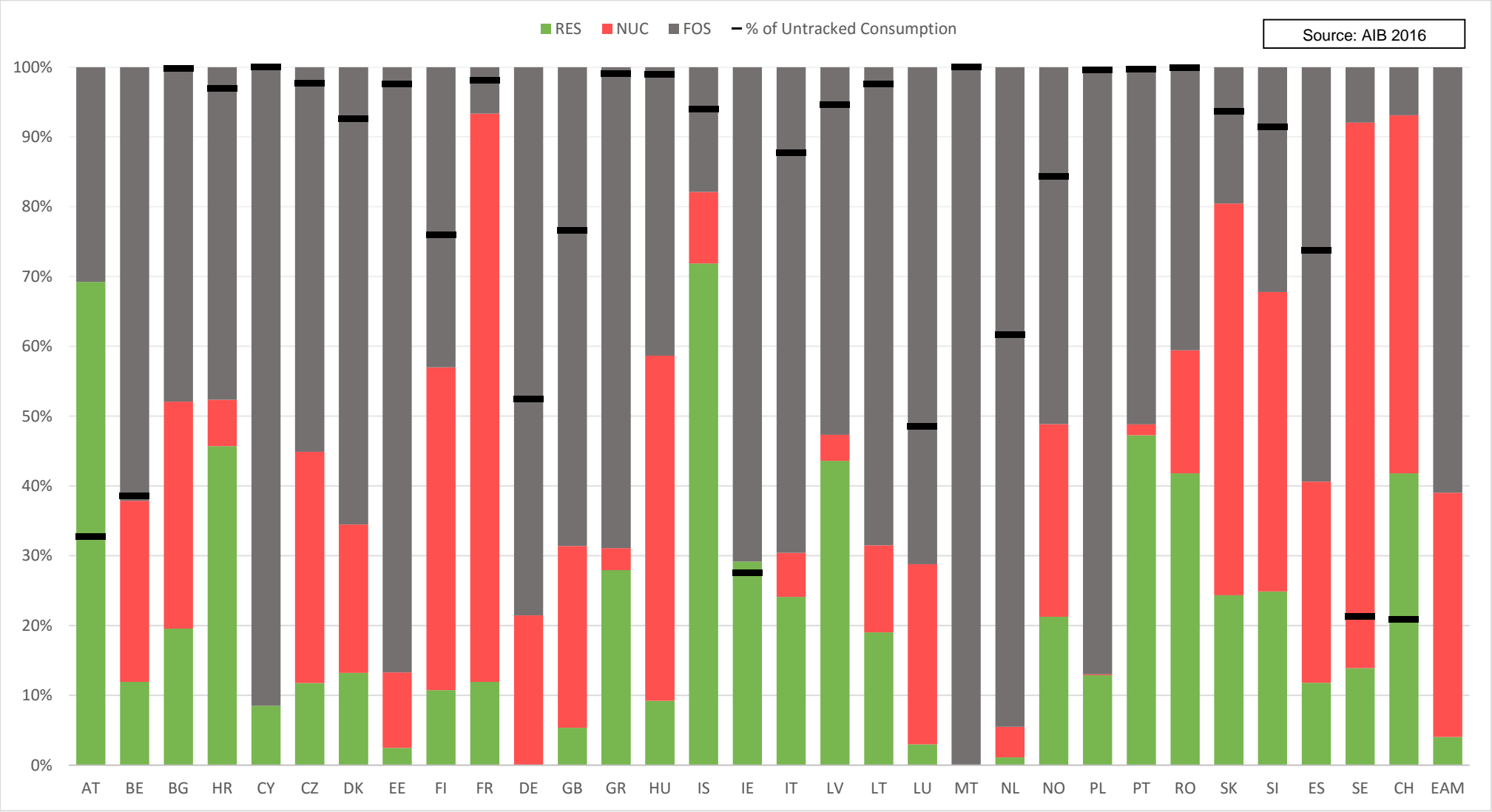


Figure 2: Final Residual Mixes for 2015 (detailed fuel categories)

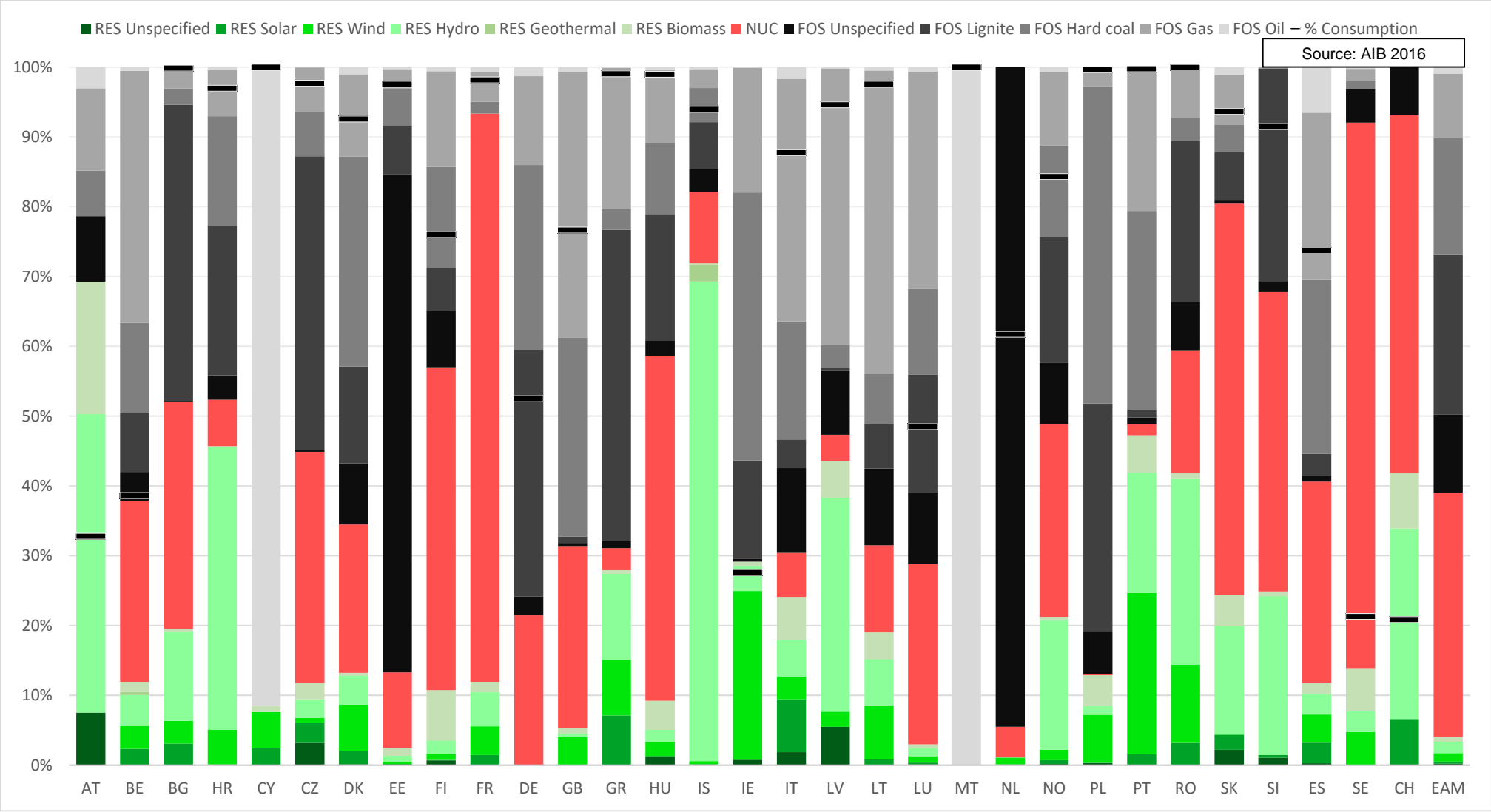
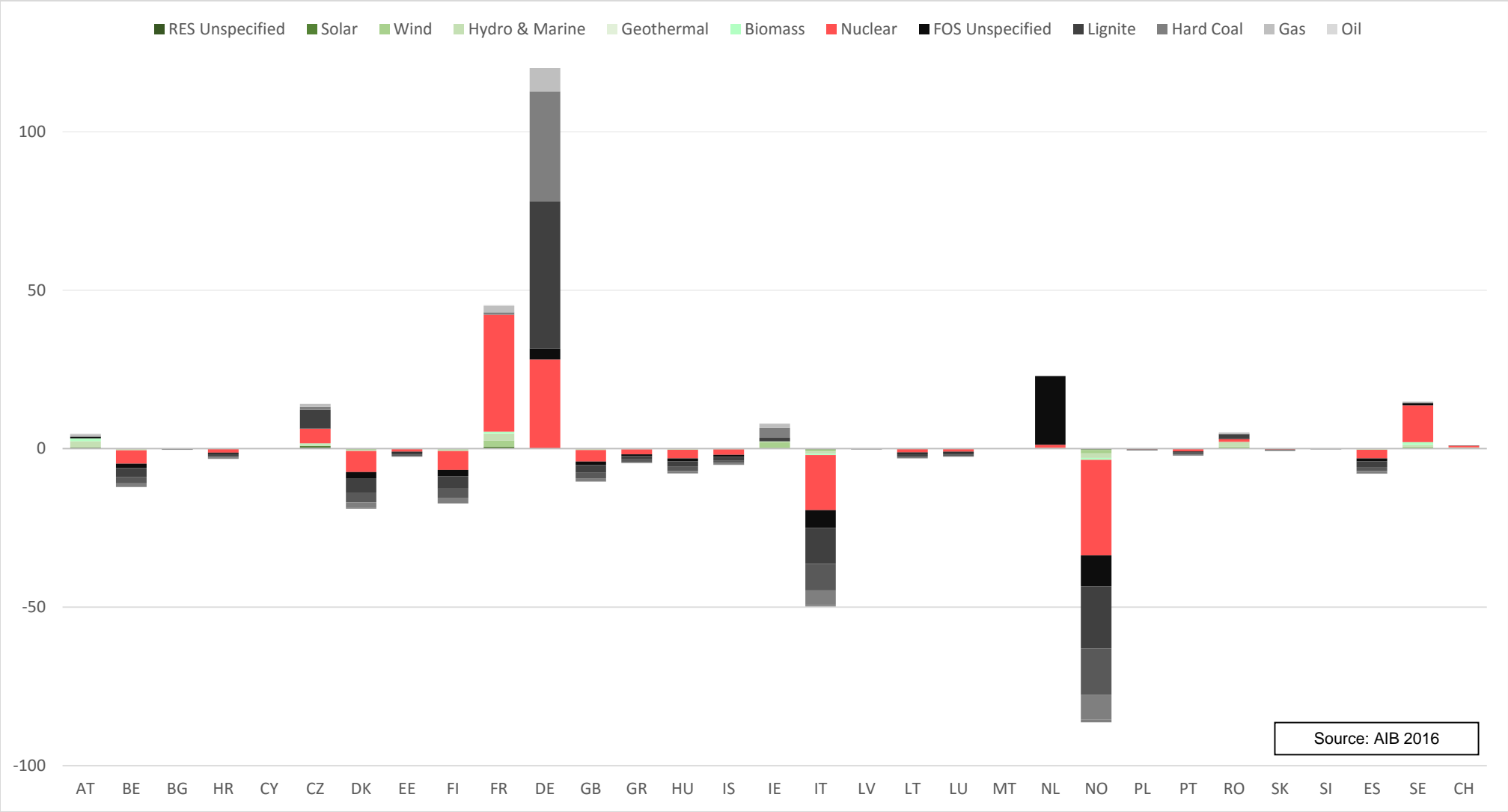
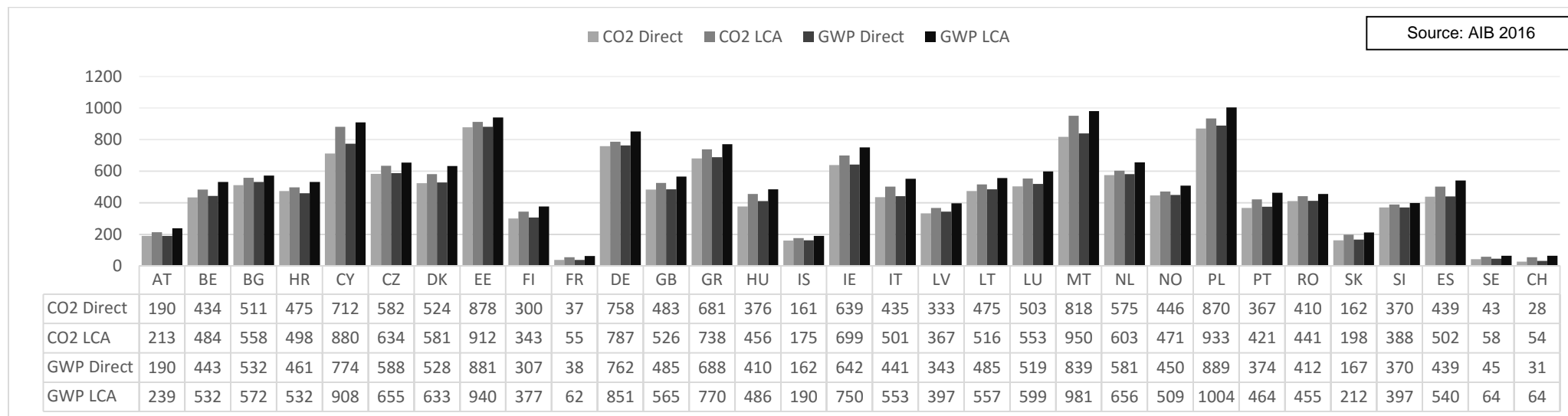


Figure 3: Attributes [TWh] to/from the European Attribute Mix 2015<sup>5</sup>



<sup>5</sup> In this figure, the renewable energy added to the EAM does not equal the renewable energy taken out of it, which might seem peculiar. The reason for this is that some individual domains have negative renewable energy balance in domestic residual mixes (caused by previous production year GOs being used or exported). This negativity is transferred into the EAM

Figure 4: CO<sub>2</sub> content in Final Residual Mixes 2015 [gCO<sub>2</sub>(e)/kWh]

**CO<sub>2</sub> Direct** = Direct onsite CO<sub>2</sub> emissions [gCO<sub>2</sub>/kWh].

**CO<sub>2</sub> LCA** = Life Cycle Assessment CO<sub>2</sub> emissions gCO<sub>2</sub>/kWh].

**GWP Direct** = Direct onsite Global Warming Potential emissions gCO<sub>2</sub>e/kWh].

**GWP LCA** = Life Cycle Assessment Global Warming Potential emissions gCO<sub>2</sub>e/kWh].

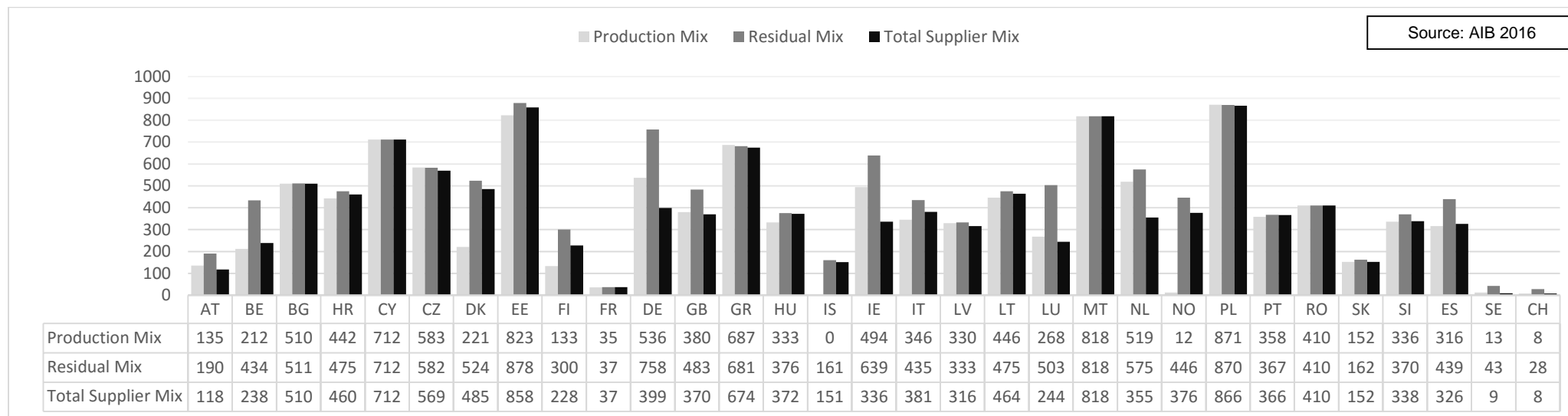
Figure 5: Direct CO<sub>2</sub> emissions for Production Mix, Residual Mix, and Total Supplier Mix [gCO<sub>2</sub>/kWh]

Figure 6: High-level radioactive waste (RW) content in the Production Mix (PM), the Residual Mix (RM) and the Total Supplier Mix (TSM) 2015 [mgRW/kWh]

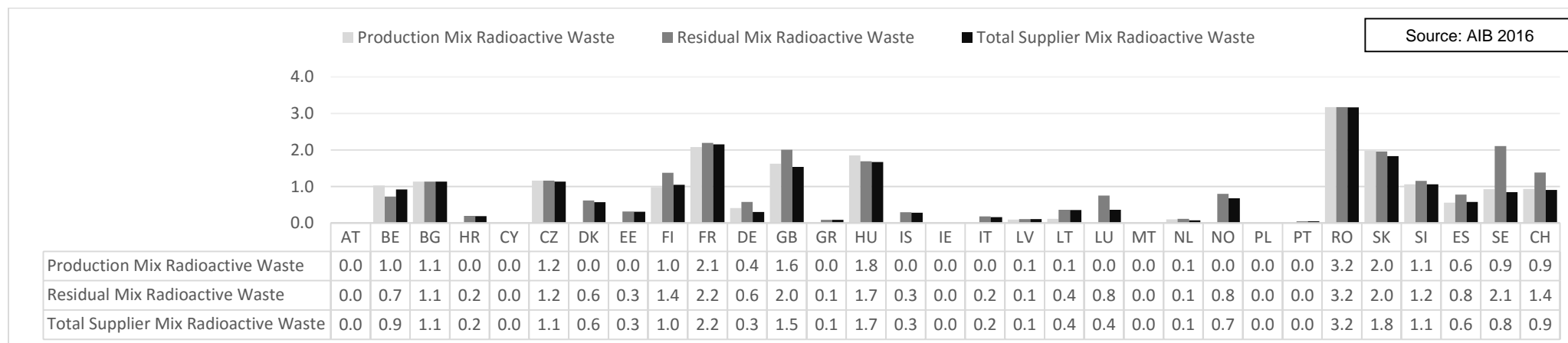


Figure 7: Total Supplier Mix 2015

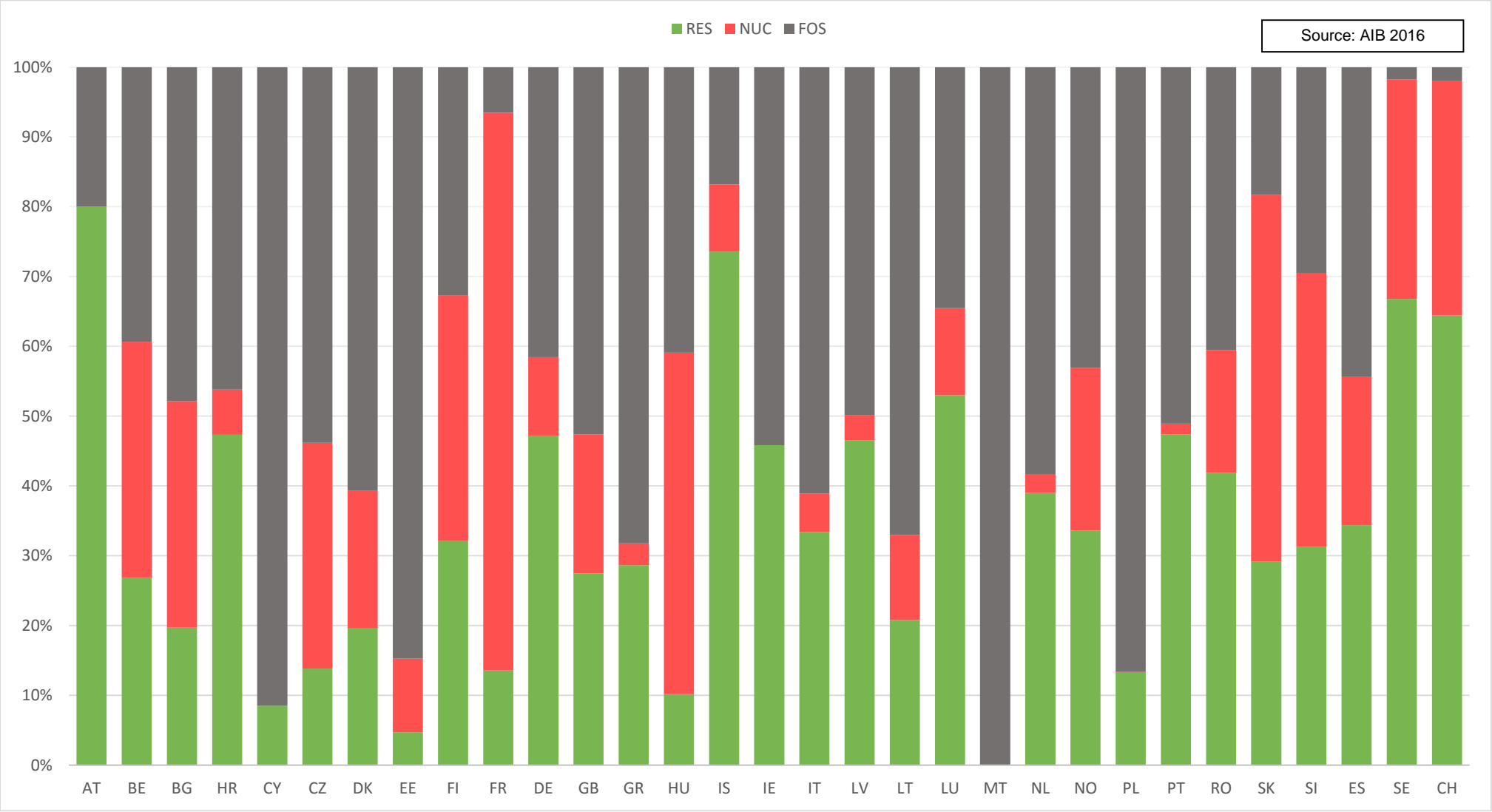


Figure 8: Total Supplier Mix 2015 (detailed fuel categories)

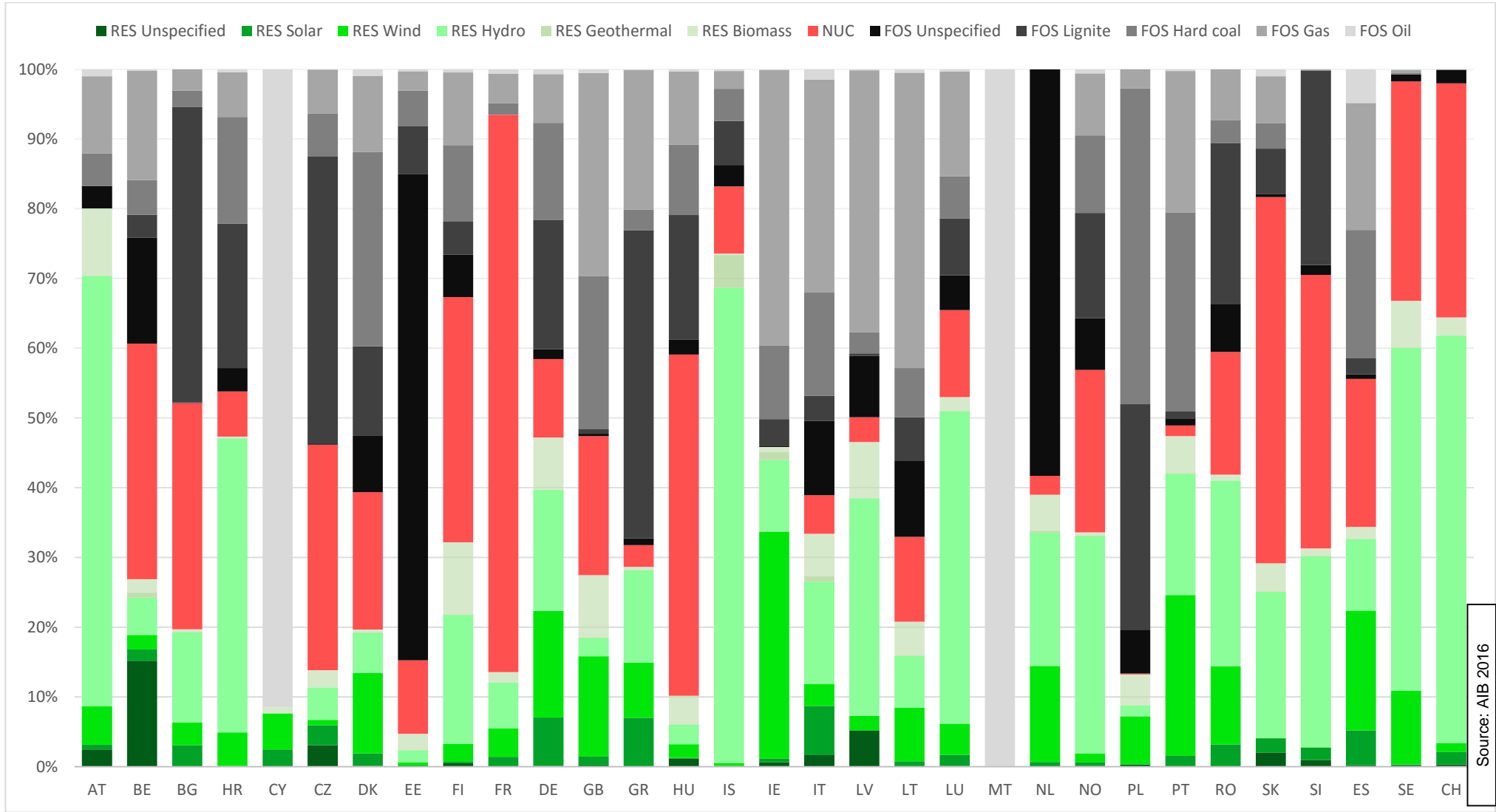




Figure 9: Production Mix (left) and Final Residual Mix (right) 2015



Figure 10: Production Mix (left) and Final Residual Mix (right) 2015 (detailed fuel categories)

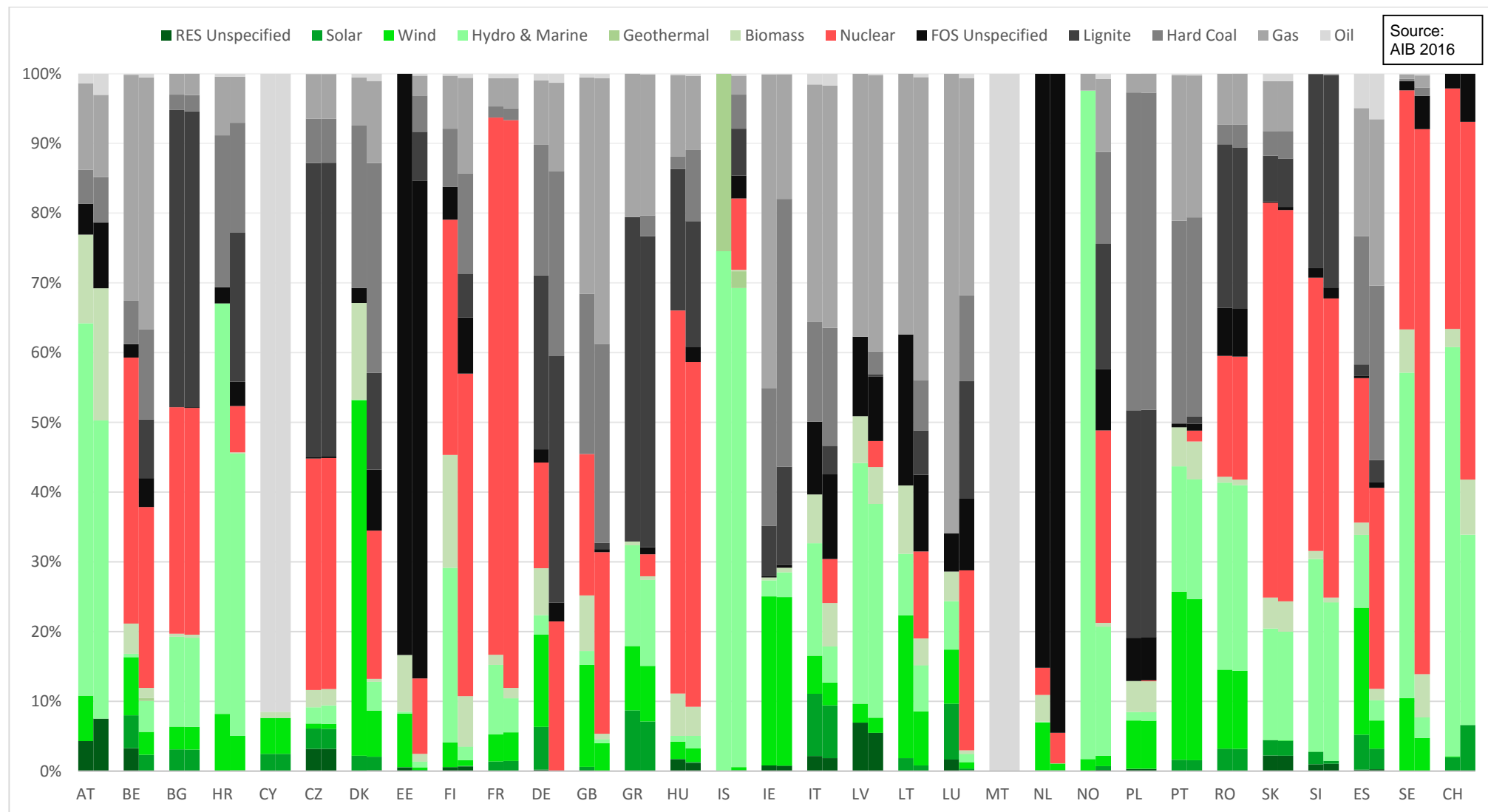


Figure 11: European Total Production Mix (left), Total of all available attributes in Final Residual Mixes (middle) and EAM (right) 2015

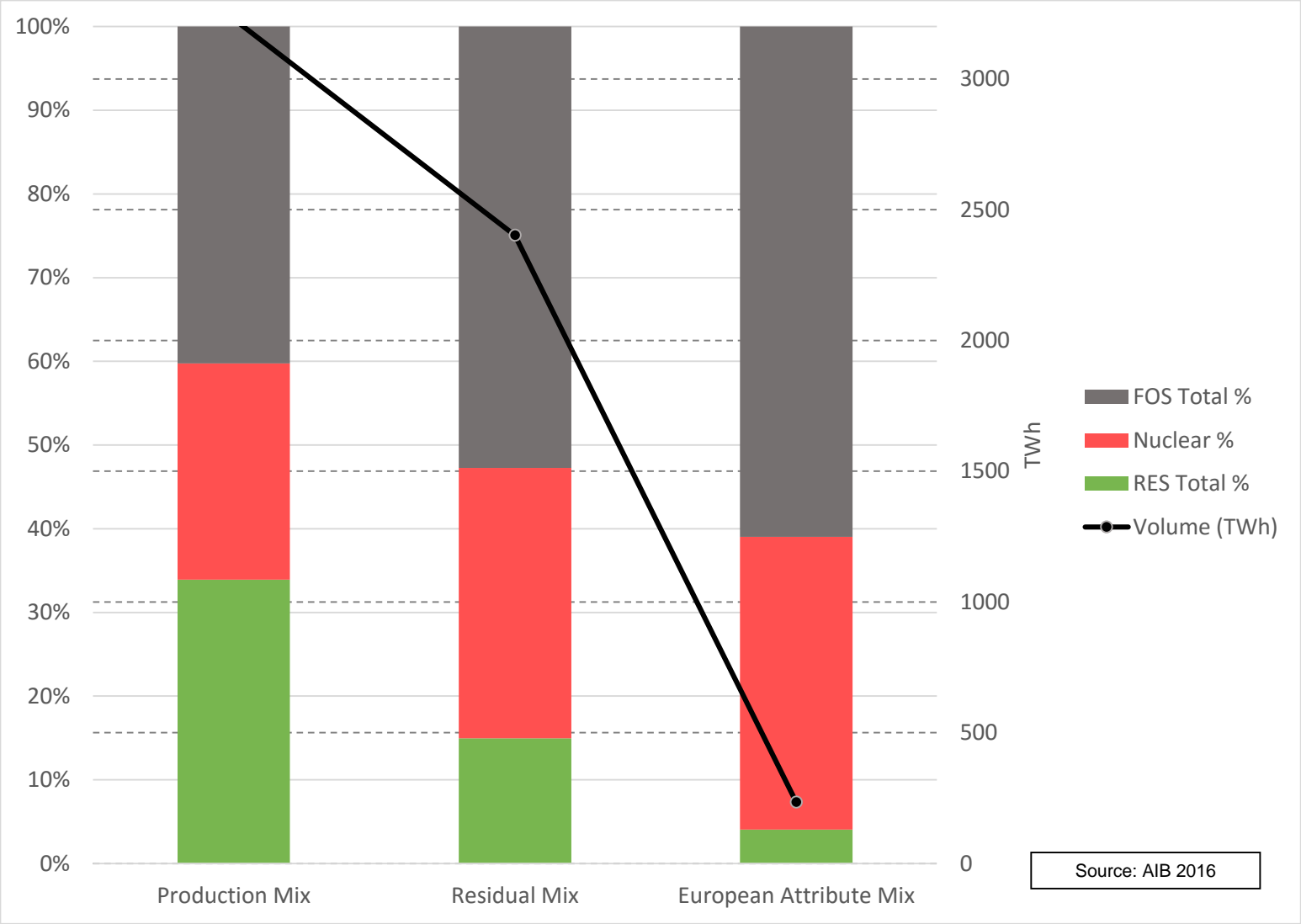


Figure 12 European Total Production Mix (left), Total of all available attributes in Final Residual Mixes (middle) and EAM (right) 2015 (detailed fuel categories)

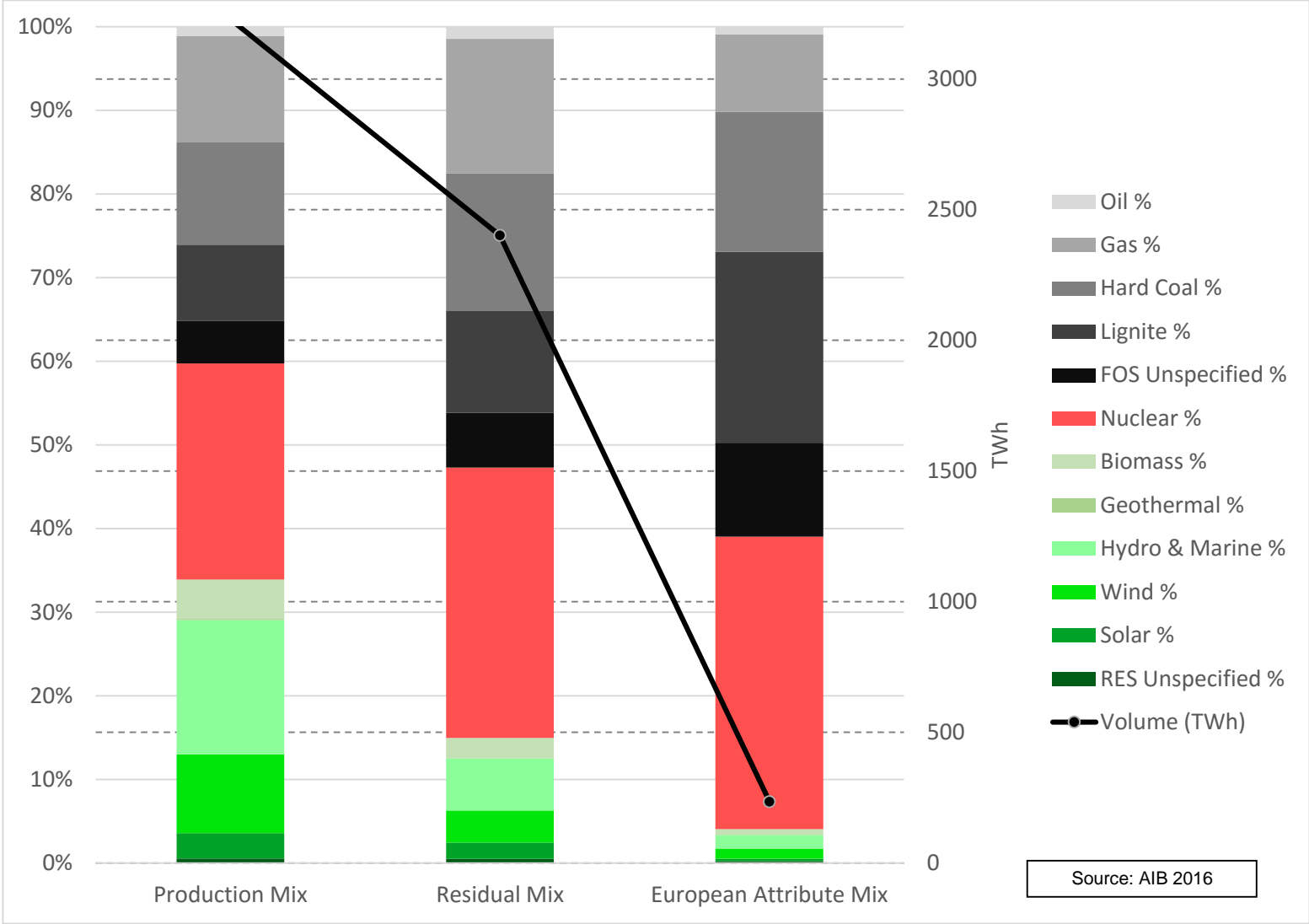


Figure 13: Production Mix (left) and Total Supplier Mix (right) 2015



Figure 14: Production Mix (left) and Total Supplier Mix (right) 2015 (detailed fuel categories)

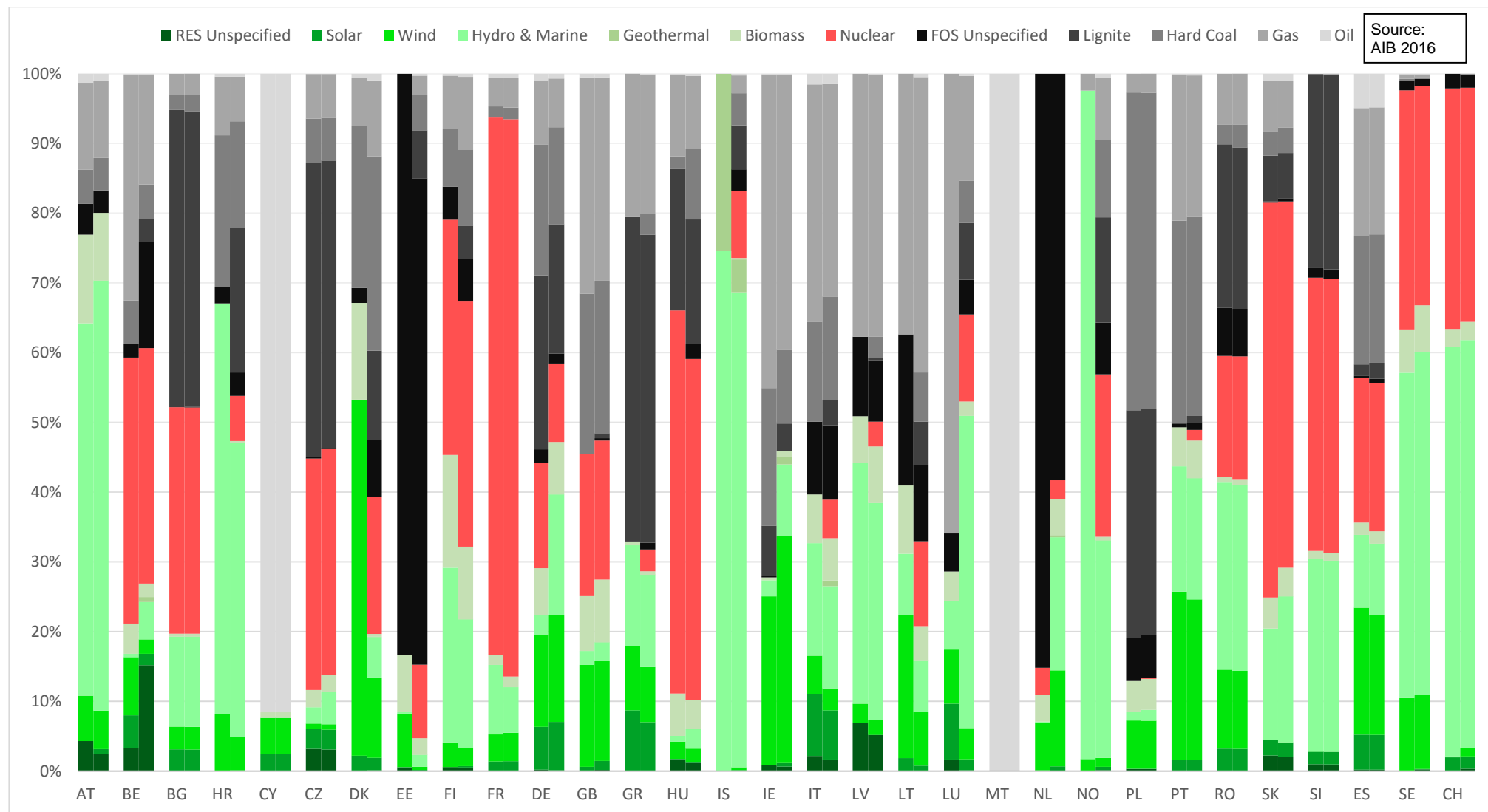


Figure 15: Production Mix (left) and Total Supplier Mix (right) [TWh] 2015

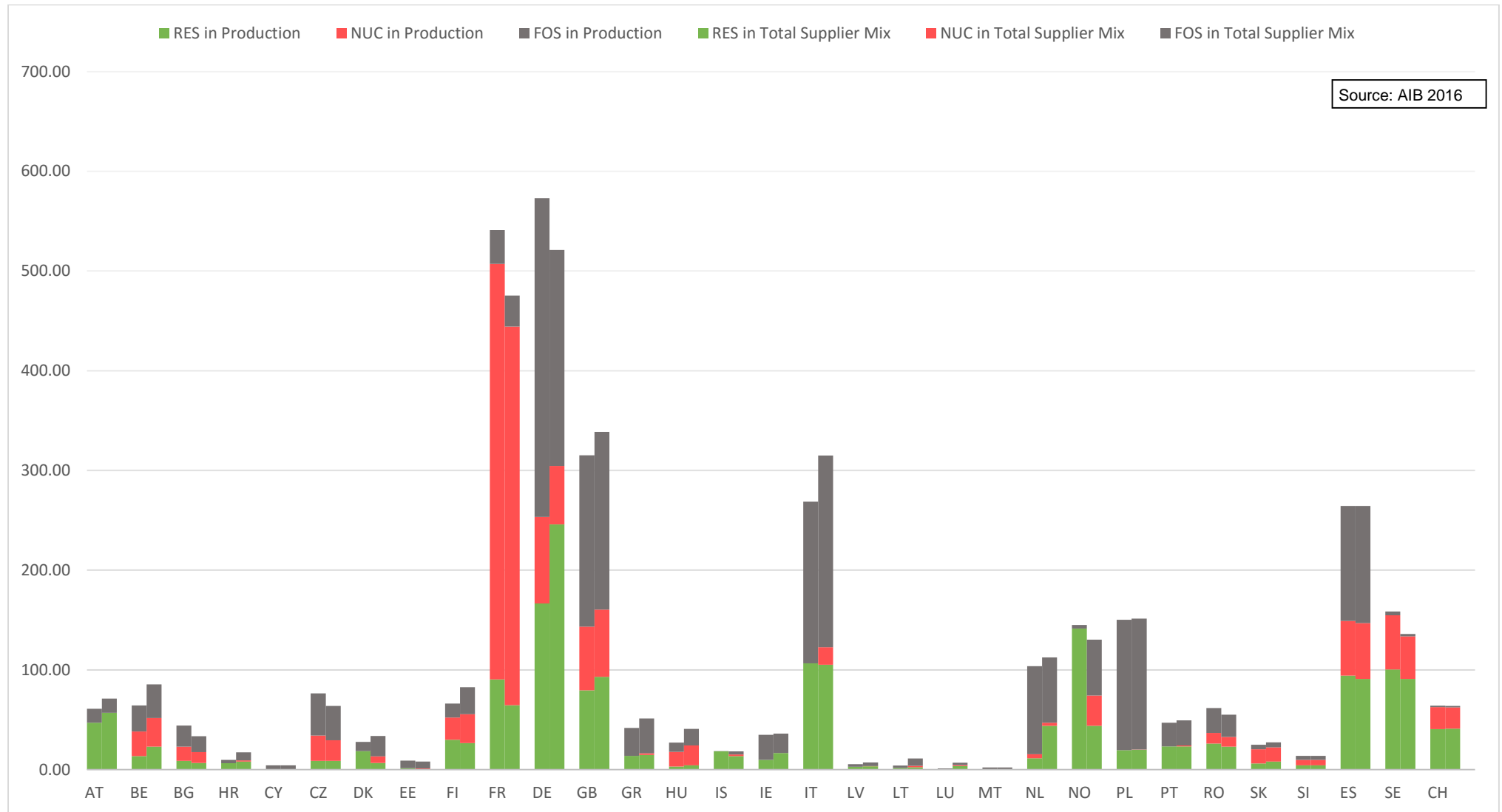


Figure 16: Production Mix (left) and Total Supplier Mix (right) [TWh] 2015 (detailed fuel categories)

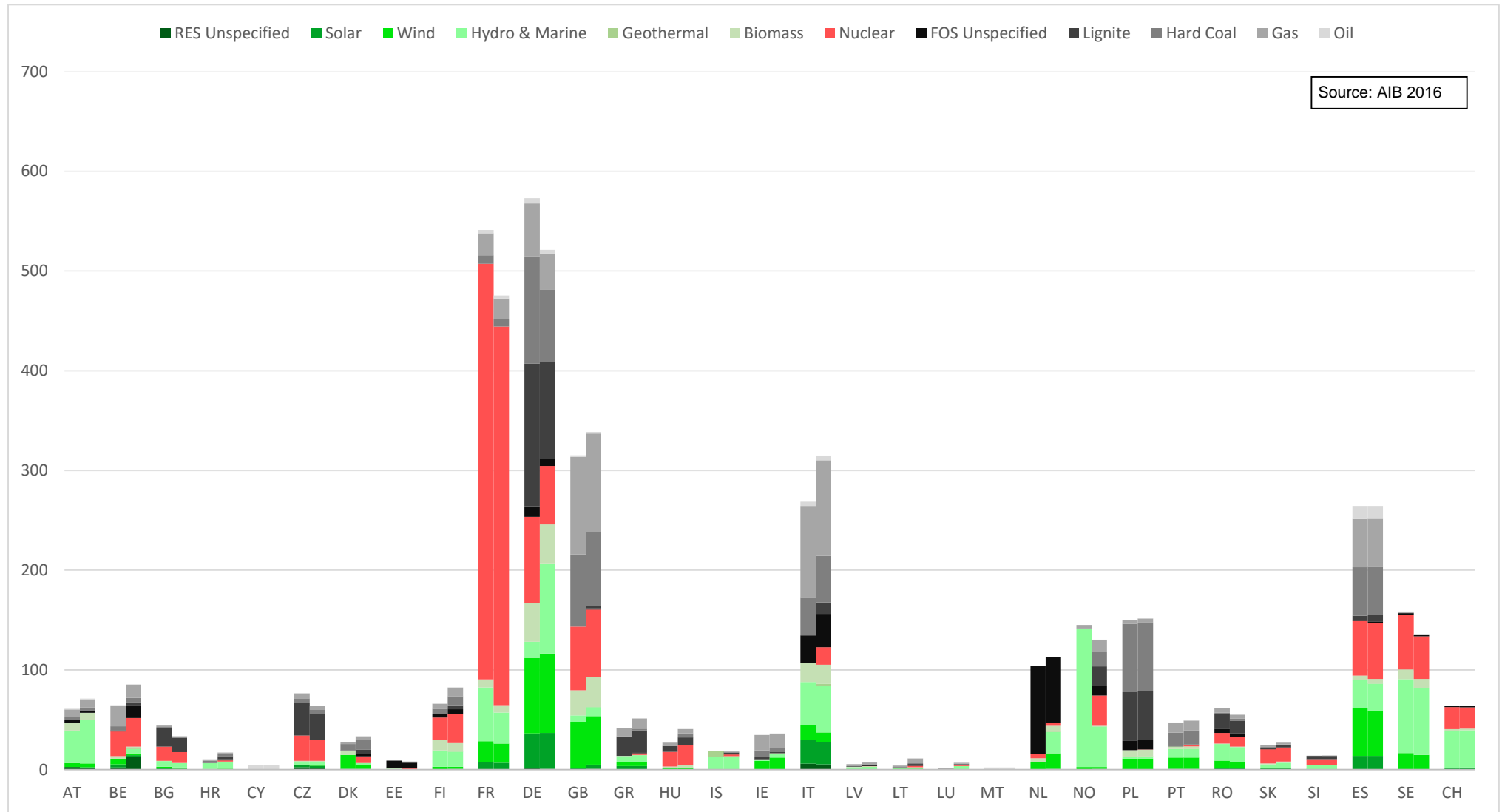




Figure 17: Residual Mixes 2013, 2014 and 2015

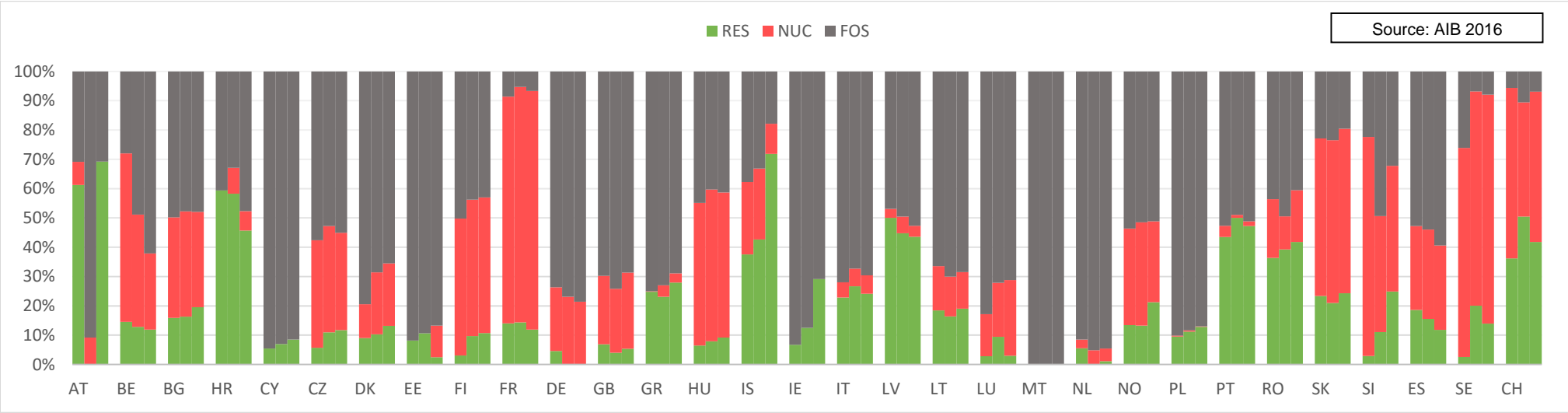


Figure 18: Production Mixes 2013, 2014 and 2015

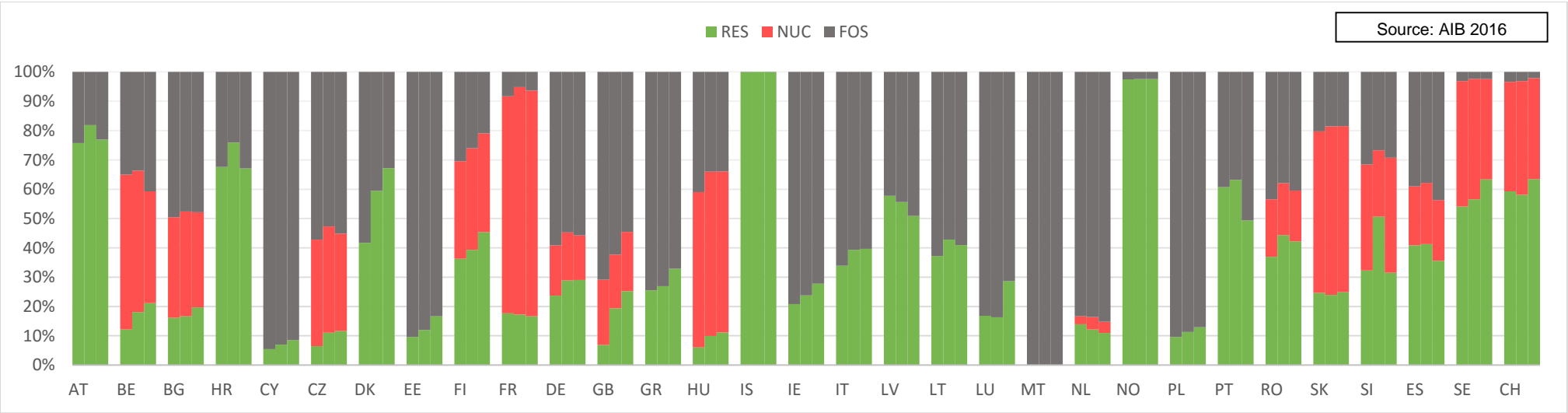


Figure 19: Recorded cancellations of EECS and National GOs in 2015 [TWh]

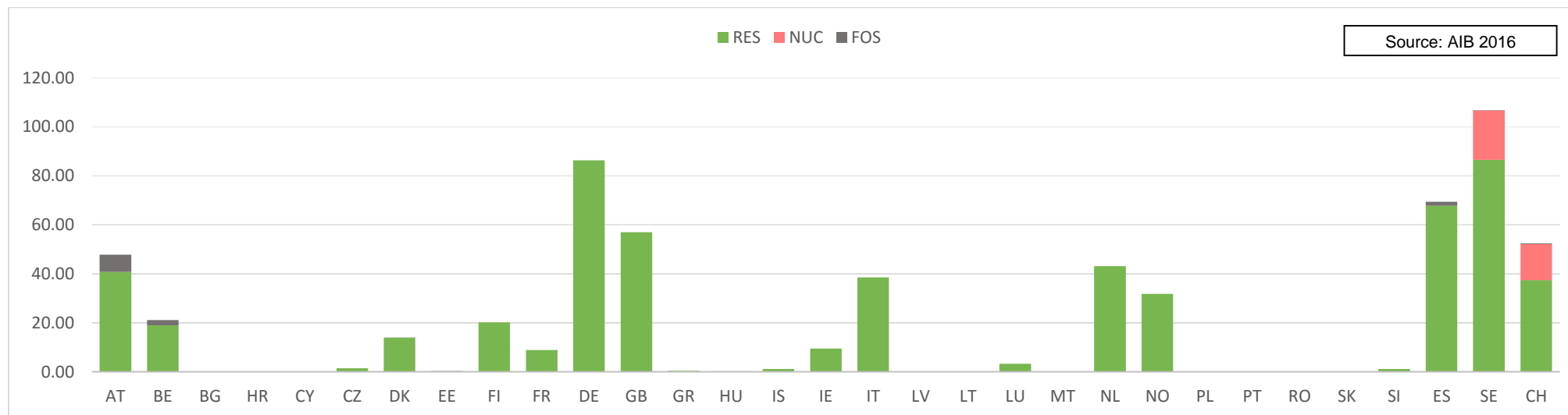


Figure 20: Recorded imports and exports of EECS and National GOs in 2015 [TWh] (Note that ex-domain cancellations are not included)

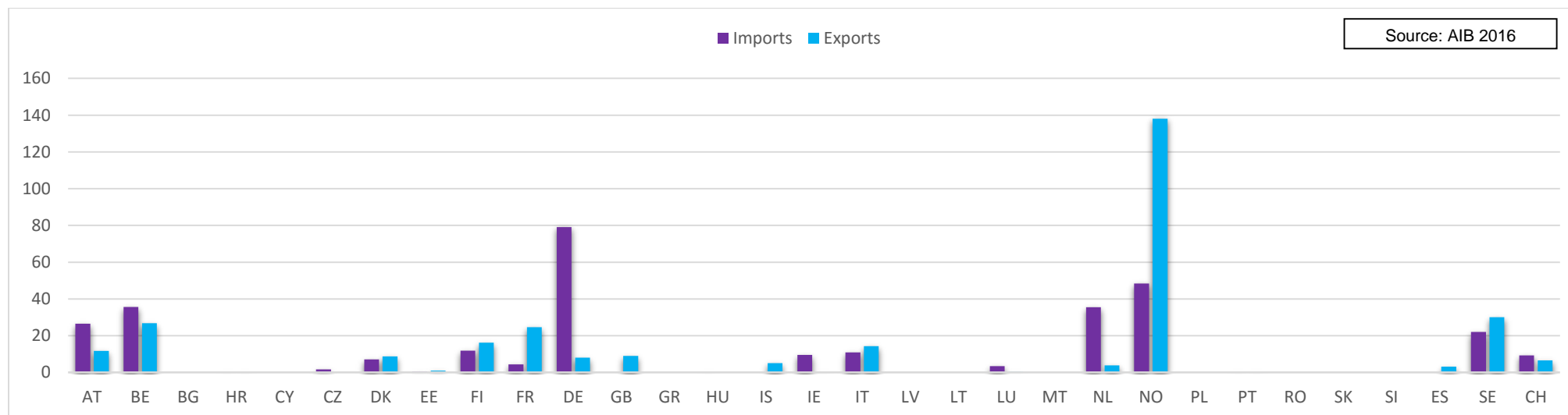


Table 3 Residual Mixes 2015 Issuance Based Methodology

	Residual Mix																
	Renewables Total	Renewables Unspecified	Solar	Wind	Hydro & Ma- rine	Geothermal	Biomass	Nuclear Total	Fossil Total	Fossil Unspec- ified	Lignite	Hard Coal	Gas	Oil	Untracked consumption	Direct CO2 (gCO2/kWh)	High-level RW (mgRW/kWh)
AT	2.95%	0.15%	0.22%	0.91%	1.17%	0.00%	0.50%	25.56%	71.48%	19.89%	16.68%	14.74%	16.60%	3.56%	32.80%	560.68	0.74
BE	11.30%	0.07%	5.24%	3.33%	1.36%	0.04%	1.26%	24.57%	64.13%	3.69%	7.50%	13.01%	39.44%	0.49%	38.62%	413.54	0.69
BG	19.56%	0.00%	3.09%	3.24%	12.79%	0.00%	0.44%	32.50%	47.94%	0.10%	42.44%	2.33%	3.06%	0.01%	99.84%	510.66	1.14
HR	45.52%	0.04%	0.06%	4.97%	40.32%	0.00%	0.13%	6.73%	47.75%	3.48%	21.42%	15.79%	6.64%	0.42%	96.97%	475.64	0.20
CY	8.21%	0.00%	2.47%	4.87%	0.00%	0.00%	0.87%	0.11%	91.68%	0.03%	0.07%	0.05%	0.03%	91.50%	100.00%	713.51	0.00
CZ	11.54%	3.19%	2.89%	0.72%	2.30%	0.00%	2.44%	33.22%	55.24%	0.18%	42.26%	6.33%	6.43%	0.05%	97.67%	583.88	1.16
DK	12.98%	0.11%	2.11%	7.19%	0.89%	0.00%	2.67%	18.72%	68.30%	7.91%	12.21%	36.08%	11.09%	1.01%	92.56%	537.85	0.54
EE	16.37%	0.44%	0.06%	6.07%	0.39%	0.00%	9.42%	5.42%	78.20%	70.49%	3.54%	2.60%	1.43%	0.14%	97.53%	803.22	0.16
FI	16.84%	0.65%	0.06%	1.25%	5.64%	0.00%	9.24%	44.03%	39.13%	7.34%	4.83%	13.30%	13.12%	0.54%	76.01%	265.04	1.31
FR	13.82%	0.00%	1.42%	4.03%	6.90%	0.00%	1.47%	79.67%	6.51%	0.00%	0.00%	1.65%	4.22%	0.65%	98.17%	36.61	2.15
DE	0.16%	0.00%	0.00%	0.00%	0.16%	0.00%	0.00%	21.41%	78.43%	2.68%	35.31%	26.44%	12.70%	1.29%	52.49%	756.43	0.58
GB	1.67%	0.02%	0.02%	1.32%	0.25%	0.00%	0.05%	27.36%	70.97%	0.88%	1.79%	29.18%	38.41%	0.70%	76.65%	503.96	2.05
GR	33.87%	0.01%	7.36%	8.50%	17.53%	0.00%	0.47%	0.99%	65.15%	0.32%	43.18%	1.95%	19.63%	0.07%	99.02%	646.86	0.03
HU	10.03%	1.18%	0.13%	1.91%	1.92%	0.00%	4.89%	49.15%	40.83%	2.09%	17.84%	10.06%	10.52%	0.32%	98.95%	371.05	1.68
IS	77.05%	0.05%	0.07%	0.36%	71.47%	4.93%	0.17%	8.36%	14.58%	2.68%	5.46%	4.00%	2.21%	0.23%	93.96%	131.14	0.24

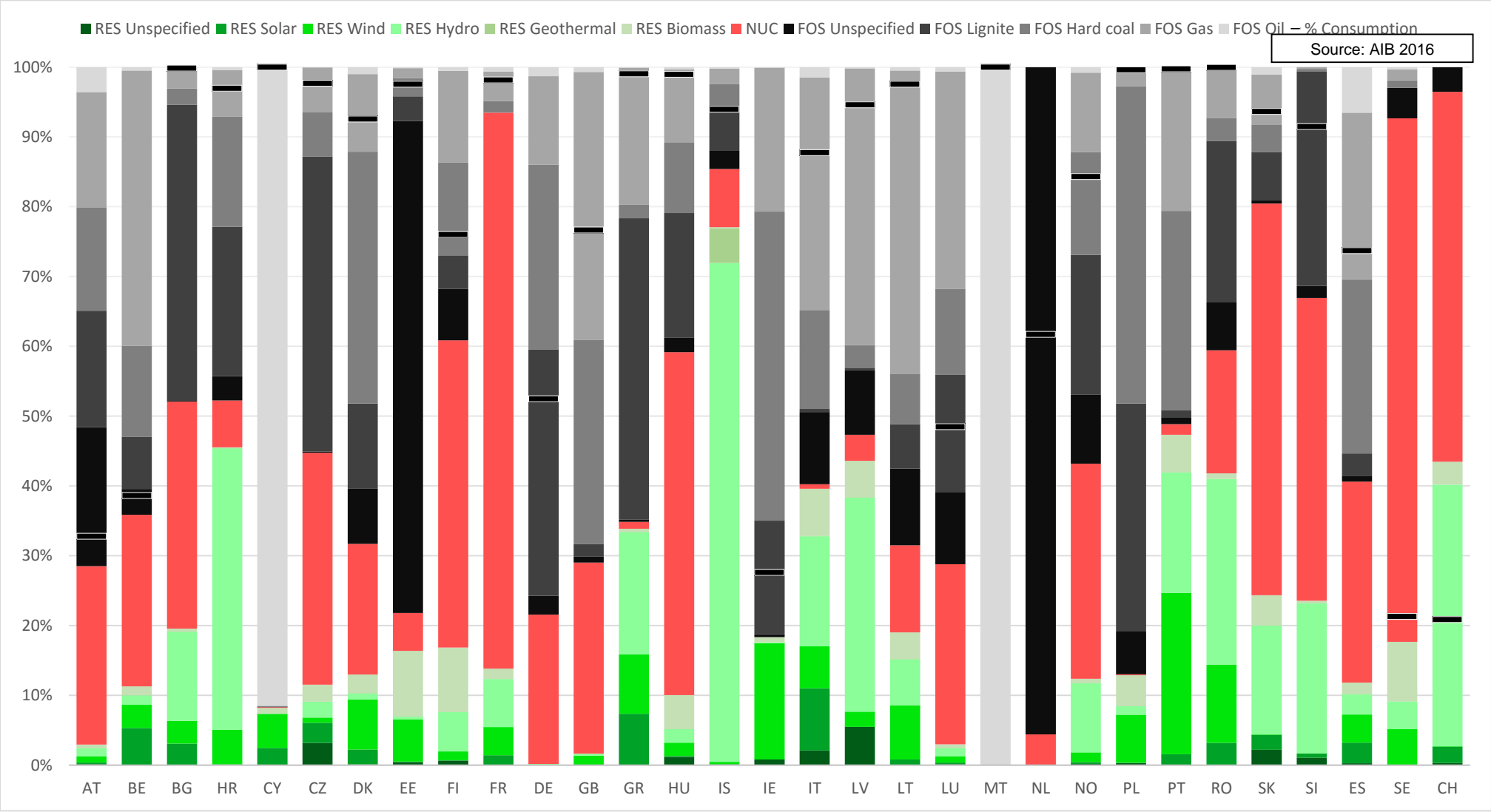
Table 3 Residual Mixes 2015 Issuance Based Methodology

	Residual Mix																
	Renewables Total	Renewables Unspecified	Solar	Wind	Hydro & Ma- rine	Geothermal	Biomass	Nuclear Total	Fossil Total	Fossil Unspec- ified	Lignite	Hard Coal	Gas	Oil	Untracked consumption	Direct CO2 (gCO2/kWh)	High-level RW (mgRW/kWh)
IE	18.34%	0.80%	0.00%	16.69%	0.09%	0.00%	0.75%	0.00%	81.66%	0.41%	16.28%	44.28%	20.59%	0.10%	27.58%	736.64	0.00
IT	39.59%	2.11%	8.92%	6.00%	15.74%	0.03%	6.79%	0.65%	59.76%	10.34%	0.42%	14.20%	33.27%	1.52%	87.75%	346.10	0.02
LV	43.60%	5.49%	0.00%	2.16%	30.66%	0.00%	5.29%	3.74%	52.66%	9.20%	0.37%	3.25%	39.66%	0.17%	94.59%	333.20	0.11
LT	19.01%	0.06%	0.76%	7.76%	6.63%	0.00%	3.81%	12.49%	68.49%	10.97%	6.36%	7.26%	43.41%	0.50%	97.53%	474.76	0.37
LU	2.98%	0.15%	0.22%	0.91%	1.18%	0.00%	0.51%	25.80%	71.22%	10.28%	16.83%	12.35%	31.08%	0.68%	48.47%	502.96	0.75
MT	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	100.00%	100.00%	817.84	0.00
NL	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	4.41%	95.59%	95.59%	0.00%	0.00%	0.00%	0.00%	61.69%	582.12	0.12
NO	12.38%	0.17%	0.27%	1.40%	9.92%	0.00%	0.61%	30.83%	56.80%	9.85%	20.04%	14.72%	11.38%	0.81%	84.32%	497.32	0.90
PL	12.88%	0.32%	0.03%	6.88%	1.21%	0.00%	4.43%	0.14%	86.98%	6.21%	32.57%	45.47%	2.73%	0.00%	99.60%	869.87	0.00
PT	47.34%	0.01%	1.56%	23.12%	17.27%	0.00%	5.39%	1.52%	51.14%	0.98%	0.99%	28.56%	20.36%	0.24%	99.74%	366.51	0.04
RO	41.82%	0.00%	3.18%	11.21%	26.59%	0.00%	0.84%	17.62%	40.56%	6.83%	23.18%	3.26%	7.29%	0.00%	99.94%	410.37	3.17
SK	24.34%	2.18%	2.16%	0.06%	15.61%	0.00%	4.34%	56.10%	19.56%	0.44%	6.98%	3.86%	7.21%	1.07%	93.63%	162.28	1.96
SI	23.56%	1.05%	0.60%	0.03%	21.52%	0.00%	0.37%	43.36%	33.07%	1.72%	30.74%	0.35%	0.24%	0.02%	91.48%	377.30	1.17
ES	11.82%	0.26%	2.95%	4.04%	2.92%	0.00%	1.65%	28.81%	59.38%	0.86%	3.15%	24.98%	23.87%	6.51%	73.70%	438.71	0.78
SE	17.65%	0.00%	0.00%	5.16%	3.96%	0.01%	8.52%	75.01%	7.34%	4.38%	0.00%	1.08%	1.55%	0.33%	21.29%	39.31	2.03

Table 3 Residual Mixes 2015 Issuance Based Methodology

	Residual Mix																
	Renewables Total	Renewables Unspecified	Solar	Wind	Hydro & Ma- rine	Geothermal	Biomass	Nuclear Total	Fossil Total	Fossil Unspec- ified	Lignite	Hard Coal	Gas	Oil	Untracked consumption	Direct CO2 (gCO2/kWh)	High-level RW (mgRW/kWh)
<b>CH</b>	<b>43.47%</b>	0.29%	2.36%	0.05%	37.47%	0.00%	3.31%	<b>53.00%</b>	<b>3.53%</b>	3.53%	0.00%	0.00%	0.00%	0.00%	20.86%	14.06	1.43

Figure 21 Residual Mixes 2015 Issuance Based Methodology



## Annex 1: Fuel Categories

Table 4 Fuel category breakdown

Fact Sheet 5 compliance		Fuel code	Fuel description (including all subcategories)	Sub-table reference		T1 Hard coal sub-categories	
Renewable	Unspecified & Other	F01000000	Renewable - Unspecified			0	F0201010 Unspecified
		F01040300	Renewable - Heat - Aerothermal			1	F0201010 Anthracite
		F01040400	Renewable - Heat - Hydrothermal			2	F0201010 Bituminous coal
		F01040501	Renewable - Heat - Process heat - Biogenic			3	F0201010 Coking coal
		F01050000	Renewable - Mechanical source or other - Unspecified			4	F0201010 Coke-oven coke
	Solar	F01040100	Renewable - Heat - Solar			5	F0201010 Lignite coke
	Wind	F01050100	Renewable - Mechanical source or other - Wind				
	Hydro & Marine	F01050200	Renewable - Mechanical source or other - Hydro & Marine			T2 Brown coal sub-categories	
	Geothermal	F01040200	Renewable - Heat - Geothermal			0	F0201020 Unspecified
	Biomass	F01010000	Renewable - Solid			1	F0201020 Sub-bituminous coal
F01020000		Renewable - Liquid			2	F0201020 Lignite	
F01030000		Renewable - Gaseous			3	F0201020 Brown coal briquette	
Nuclear		F03010100	Nuclear - Solid - Radioactive fuel		4	F0201020 Peat briquette	
Fossil	Unspecified & Other	F020000000	Fossil - Unspecified			T3 Petroleum products sub-categories	
		F02010000	Fossil - Solid - Unspecified			0	F0202030 Unspecified
		F02010400	Fossil - Solid - Municipal waste			1	F0202030 Ethane
		F02010500	Fossil - Solid - Industrial and commercial waste			2	F0202030 Naphtha
		F02020000	Fossil - Liquid - Unspecified			3	F0202030 Aviation gasoline
		F02030000	Fossil - Gaseous	T4		4	F0202030 Motor gasoline
		F02040000	Fossil - Heat			5	F0202030 Aviation turbine fuel
	Hard Coal	F02010100	Fossil - Solid - Hard coal	T1		6	F0202030 Other kerosene
	Brown Coal / Lignite	F02010300	Fossil - Solid - Peat			7	F0202030 Gas and diesel oil
		F02010200	Fossil - Solid - Brown coal	T2		8	F0202030 Fuel oil low-sulphur
	Natural Gas	F02030100	Fossil - Gaseous - Natural Gas			9	F0202030 Fuel oil high-sulphur
		F02020200	Fossil - Liquid - Natural gas liquids			10	F0202030 Liquid petroleum gas
		Oil	F02020100	Fossil - Liquid - Crude oil			11
	F02020300		Fossil - Liquid - Petroleum products	T3		12	F0202030 Bitumen
						13	F0202030 Lubricants
					14	F0202030 Petroleum coke	
					15	F0202030 Refinery feedstock	
						T4 Gaseous sub-categories	
					0	F0203000 Unspecified	Unspecified
					20	F0203020 Coal-derived gas	Unspecified
					21	F0203020 Coal-derived gas	Blast furnace gas
					22	F0203020 Coal-derived gas	Coke-oven gas
					30	F0203030 Petroleum products	Unspecified
					31	F0203030 Petroleum products	Propane
					32	F0203030 Petroleum products	Butane
					33	F0203030 Petroleum products	Refinery gas
					34	F0203030 Petroleum products	Chemical waste gas
					40	F0203040 Municipal gas plant	Unspecified
					50	F0203050 Process gas	Unspecified
					51	F0203050 Process gas	Carbon monoxide
					52	F0203050 Process gas	Methane
					53	F0203050 Process gas	Hydrogen (fossil sourced)
					54	F0203050 Process gas	Phosphor gas
					55	F0203050 Process gas	Oxy gas