

European Residual Mixes 2013

Results of the calculation of Residual Mixes for purposes of electricity disclosure in Europe for the calendar year 2013

Version 1.0, 15 May 2014

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 Phase I of the project and the RE-DISS Best Practice Recommendations.

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. Due to the international nature of both the electricity markets and tracking systems, the amount of available generation attributes (in MWh) in the domestic residual mix differs from the volume of untracked consumption¹. Thus, the calculation needs to be harmonised for the entire Europe, which is achieved through the European Attribute Mix (EAM), the "equalising reservoir" for generation attributes. After the attribute balancing via EAM (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 an absolute precondition for the shares of different energy sources in the residual mix to be reliably used for disclosure of untracked consumption.

Table 1, Figure 1 and Figure 2 represent the national residual mixes for 2013 as calculated by the RE-DISS II project for 31 European countries². In Figure 1 and Figure 2, colours indicate different energy sources as elaborated by the legend, and the solid black line in Figure 1 illustrates 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.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 2). Selected subcategories are based on relevance in terms of volume and perceived consumer importance.

Based on the national onsite CO₂ emission factor for fossil fuel, the CO₂ content of the residual mix was also calculated for each country (Table 1 and Figure 4). Note that these figures are destined for electricity disclosure purposes only. This does not imply any recommendation by the RE-DISS project team of these figures to be used in corporate or product carbon footprint calculation. This is due to unresolved data inconsistencies and open issues regarding carbon footprint methodologies. For the calculation of radioactive waste content in the residual mix (Figure 5) a default factor of 3 mg was used for radioactive waste per kWh of nuclear power generated.

The total supplier mixes (TSMs) are presented in Figure 6 and Figure 7. 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,

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

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

³ Calculation of the Residual Mix obviously can only take the volumes of explicit tracking systems into account if the respective data is public, 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 RE-DISS, cannot be reflected in the residual mix and are therefore likely to lead to double counting.



both available and explicitly tracked attributes are included in the TSM, which equals in physical volume with the country's total electricity consumption.

Figure 8, Figure 9 and Figure 10 present the comparison between the production and residual mix of different countries, and Figure 12 and Figure 13 that of production and total supplier mix (in TWh in Figure 14 and Figure 15). Figure 16 and Figure 17 show the difference between final residual mixes and production mixes of 2011, 2012 and 2013. Finally, Figure 18 and Figure 19 disclose the volumes of EECS and National GO transactions which have been taken into account for the calculation.

Note: Any use of the data presented in this document should include a reference to the RE-DISS II project and the title and version number of this document.

Disclaimer on data quality:

Because of unavailability of consistent data, the residual mixes were calculated based on all recorded GO transactions during the assumed time period for disclosure of 2013 consumption (1.4.2013 – 31.3.2014), irrespective of the underlying production year of these GOs. Given the current availability of data, this is the best available information. 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. RE-DISS will continue to work with national governments and competent bodies as responsible policy makers as well as with the providers of this data to further improve data quality and consistency in the future.

Residual mixes disclosed in this document are not final and may change due to later data updates, particularly regarding contract-based tracking. Note that through the European Attribute Mix, this might affect also the residual mixes of other countries.

Disclaimer:

The sole responsibility for the content of this document lies with the authors. It does not necessarily reflect the opinion of the European Union. Neither the EACI nor the European Commission are responsible for any use that may be made of the information contained therein.

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Table 1: Final Residual Mixes and European Attribute Mix for 2013

	Residual Mix														Untracked consumption	gCO ₂ /kWh	mgRW/kWh
	Renewables Total	Renewables Unspecified	Solar	Wind	Hydro & Marine	Geothermal	Biomass	Nuclear Total	Fossil Total	Fossil Unspecified	Lignite	Hard Coal	Gas	Oil			
AT	61,20 %	0,07 %	0,09 %	0,24 %	60,65 %	0,01 %	0,14 %	7,95 %	30,85 %	22,49 %	4,59 %	2,51 %	1,18 %	0,08 %	17,09 %	189,12	0,24
BE	14,58 %	0,00 %	3,34 %	4,59 %	2,69 %	1,58 %	2,37 %	57,43 %	27,99 %	0,00 %	0,00 %	2,95 %	25,04 %	0,00 %	68,23 %	117,78	1,72
BG	15,86 %	0,01 %	3,08 %	3,21 %	9,54 %	0,00 %	0,02 %	34,35 %	49,79 %	48,54 %	0,68 %	0,37 %	0,18 %	0,01 %	99,93 %	509,23	1,03
HR	59,37 %	0,00 %	0,06 %	2,88 %	55,73 %	0,00 %	0,70 %	0,00 %	40,63 %	1,56 %	16,79 %	12,72 %	9,32 %	0,24 %	99,46 %	309,62	0,00
CY	5,45 %	0,00 %	0,00 %	5,45 %	0,00 %	0,00 %	0,00 %	0,00 %	94,55 %	0,00 %	0,00 %	0,00 %	0,00 %	94,55 %	100,00 %	869,89	0,00
CZ	5,68 %	0,00 %	1,96 %	0,47 %	1,93 %	0,00 %	1,33 %	36,67 %	57,65 %	2,52 %	40,71 %	6,11 %	8,30 %	0,01 %	98,87 %	547,35	1,10
DK	9,01 %	0,10 %	0,14 %	7,01 %	1,54 %	0,02 %	0,21 %	11,56 %	79,43 %	5,52 %	6,68 %	48,18 %	18,65 %	0,40 %	93,31 %	634,98	0,35
EE	8,21 %	0,00 %	0,00 %	3,33 %	0,18 %	0,00 %	4,70 %	0,00 %	91,79 %	91,79 %	0,00 %	0,00 %	0,00 %	0,00 %	99,50 %	1 142,24	0,00
FI	3,10 %	0,07 %	0,07 %	0,15 %	1,96 %	0,01 %	0,85 %	46,70 %	50,19 %	9,19 %	2,95 %	20,51 %	16,81 %	0,74 %	67,21 %	417,44	1,40
FR	14,05 %	0,00 %	0,88 %	3,04 %	8,97 %	0,00 %	1,16 %	77,34 %	8,62 %	0,00 %	0,00 %	3,83 %	3,70 %	1,08 %	97,65 %	63,63	2,32
DE	4,57 %	0,26 %	0,00 %	0,00 %	4,29 %	0,00 %	0,02 %	21,76 %	73,67 %	20,18 %	33,55 %	16,15 %	3,62 %	0,17 %	63,47 %	784,56	0,65
GB	6,93 %	0,03 %	0,03 %	5,71 %	1,10 %	0,00 %	0,05 %	23,32 %	69,75 %	1,37 %	1,55 %	41,23 %	25,57 %	0,03 %	97,90 %	469,05	0,70
GR	24,82 %	0,05 %	6,83 %	6,93 %	10,62 %	0,00 %	0,39 %	0,13 %	75,05 %	0,09 %	49,22 %	0,38 %	25,35 %	0,01 %	99,13 %	895,29	0,00
HU	6,50 %	0,05 %	0,07 %	1,96 %	2,39 %	0,01 %	2,01 %	48,62 %	44,89 %	2,82 %	18,95 %	8,77 %	14,12 %	0,22 %	99,69 %	374,62	1,46
IS	37,59 %	0,20 %	0,29 %	0,76 %	29,72 %	6,17 %	0,45 %	24,66 %	37,75 %	11,80 %	14,25 %	7,78 %	3,66 %	0,25 %	99,62 %	364,63	0,74
IE	6,71 %	0,00 %	0,00 %	6,71 %	0,00 %	0,00 %	0,00 %	0,00 %	93,29 %	1,17 %	14,95 %	42,96 %	34,14 %	0,07 %	42,11 %	360,14	0,00
IT	22,84 %	0,84 %	7,84 %	4,50 %	9,56 %	0,01 %	0,09 %	5,17 %	71,99 %	8,21 %	2,99 %	15,88 %	37,80 %	7,12 %	89,33 %	511,17	0,15
LV	50,06 %	3,88 %	0,00 %	1,62 %	41,93 %	0,00 %	2,63 %	3,05 %	46,89 %	6,88 %	0,00 %	2,88 %	36,64 %	0,48 %	87,46 %	202,43	0,09

	Residual Mix																
	Renewables Total	Renewables Unspecified	Solar	Wind	Hydro & Marine	Geothermal	Biomass	Nuclear Total	Fossil Total	Fossil Unspecified	Lignite	Hard Coal	Gas	Oil	Untracked consumption	gCO ₂ /kWh	mgRW/kWh
LT	18,46 %	0,16 %	0,56 %	6,00 %	8,29 %	0,02 %	3,44 %	15,13 %	66,41 %	19,77 %	6,99 %	6,70 %	31,32 %	1,63 %	99,70 %	495,59	0,45
LU	2,82 %	0,12 %	0,17 %	0,43 %	1,82 %	0,02 %	0,26 %	14,32 %	82,86 %	6,84 %	8,28 %	4,52 %	63,07 %	0,15 %	33,78 %	442,50	0,43
MT	0,00 %	0,00 %	0,00 %	0,00 %	0,00 %	0,00 %	0,00 %	0,00 %	100,00 %	0,23 %	0,00 %	0,00 %	0,00 %	99,77 %	100,00 %	920,00	0,00
NL	5,53 %	2,67 %	0,00 %	0,57 %	2,28 %	0,01 %	0,00 %	2,98 %	91,49 %	91,49 %	0,00 %	0,00 %	0,00 %	0,00 %	64,76 %	475,55	0,09
NO	13,41 %	0,27 %	0,39 %	1,50 %	10,29 %	0,05 %	0,91 %	33,01 %	53,58 %	18,23 %	19,06 %	10,43 %	5,52 %	0,34 %	85,75 %	502,63	0,99
PL	9,57 %	0,07 %	0,00 %	3,76 %	1,52 %	0,00 %	4,21 %	0,32 %	90,12 %	0,00 %	34,51 %	53,53 %	2,08 %	0,00 %	99,54 %	881,25	0,01
PT	43,52 %	0,03 %	1,51 %	0,25 %	39,71 %	0,01 %	2,02 %	3,81 %	52,67 %	1,82 %	2,20 %	29,60 %	18,48 %	0,57 %	55,35 %	358,41	0,11
RO	36,39 %	0,00 %	0,74 %	8,32 %	26,75 %	0,00 %	0,57 %	20,04 %	43,57 %	9,07 %	21,99 %	5,66 %	6,84 %	0,01 %	99,97 %	424,63	0,60
SK	23,39 %	4,05 %	2,08 %	0,09 %	16,48 %	0,00 %	0,70 %	53,76 %	22,85 %	2,90 %	7,61 %	4,28 %	8,02 %	0,03 %	99,92 %	174,89	1,61
SI	2,88 %	0,12 %	0,17 %	0,44 %	1,86 %	0,02 %	0,26 %	74,78 %	22,35 %	6,98 %	8,44 %	4,61 %	2,17 %	0,15 %	32,97 %	215,94	2,24
ES	18,63 %	0,08 %	4,35 %	6,98 %	4,11 %	0,00 %	3,11 %	28,57 %	52,80 %	0,00 %	1,81 %	19,36 %	26,30 %	5,33 %	69,65 %	278,19	0,86
SE	2,60 %	0,00 %	0,00 %	1,17 %	0,00 %	0,00 %	1,42 %	71,32 %	26,08 %	10,70 %	0,00 %	5,20 %	9,21 %	0,96 %	1,40 %	228,74	2,14
CH	36,18 %	2,85 %	0,00 %	0,27 %	33,06 %	0,00 %	0,00 %	58,20 %	5,62 %	5,62 %	0,00 %	0,00 %	0,00 %	0,00 %	55,07 %	35,71	1,75
EAM	7,22 %	0,30 %	0,43 %	1,09 %	4,67 %	0,06 %	0,66 %	36,67 %	56,11 %	17,53 %	21,19 %	11,57 %	5,44 %	0,38 %		542,17	1,10

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

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

Note: CO₂ and radioactive waste figures reported are destined for purposes of electricity disclosure only (rf. page 1).

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 2013

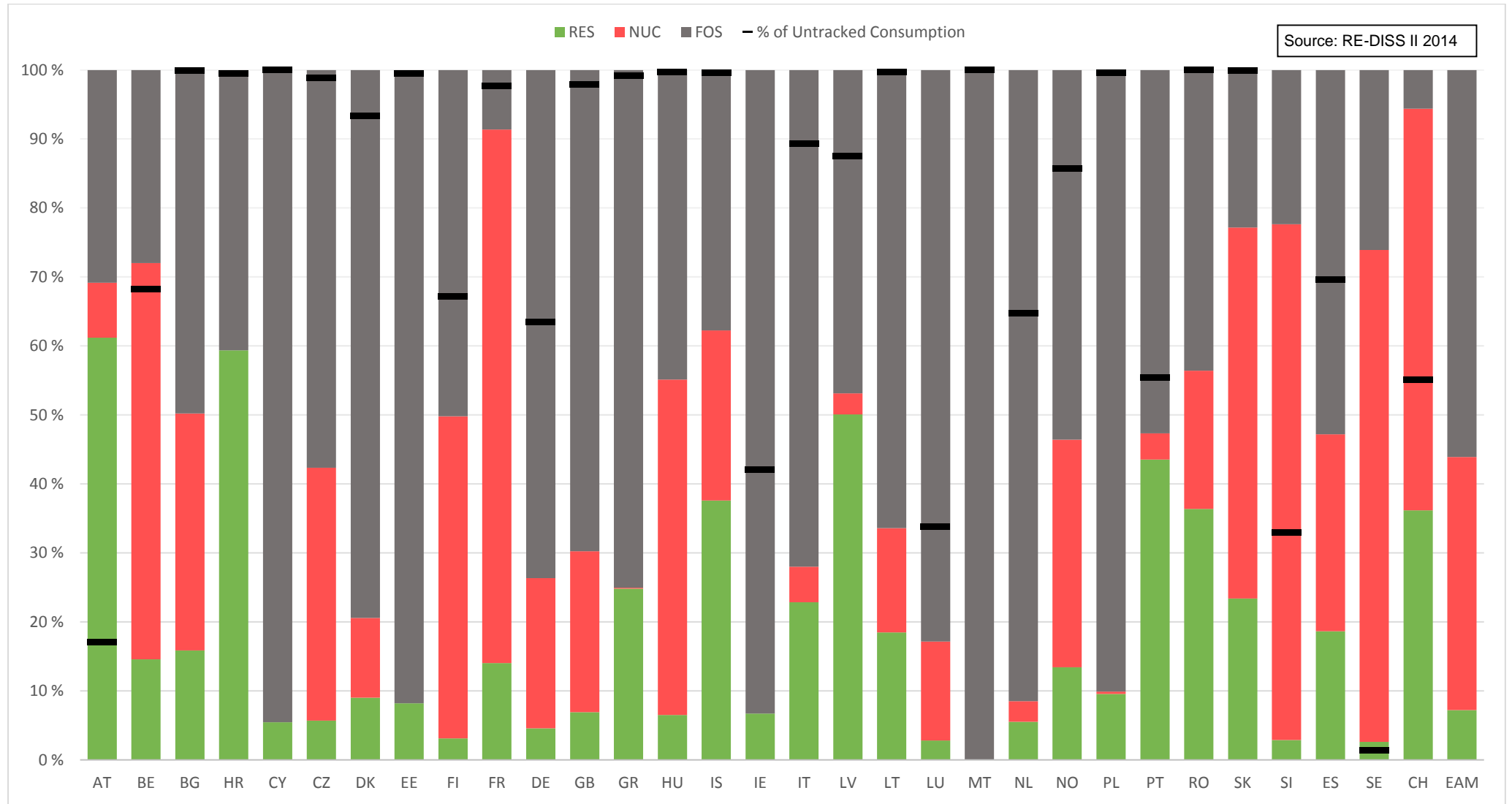
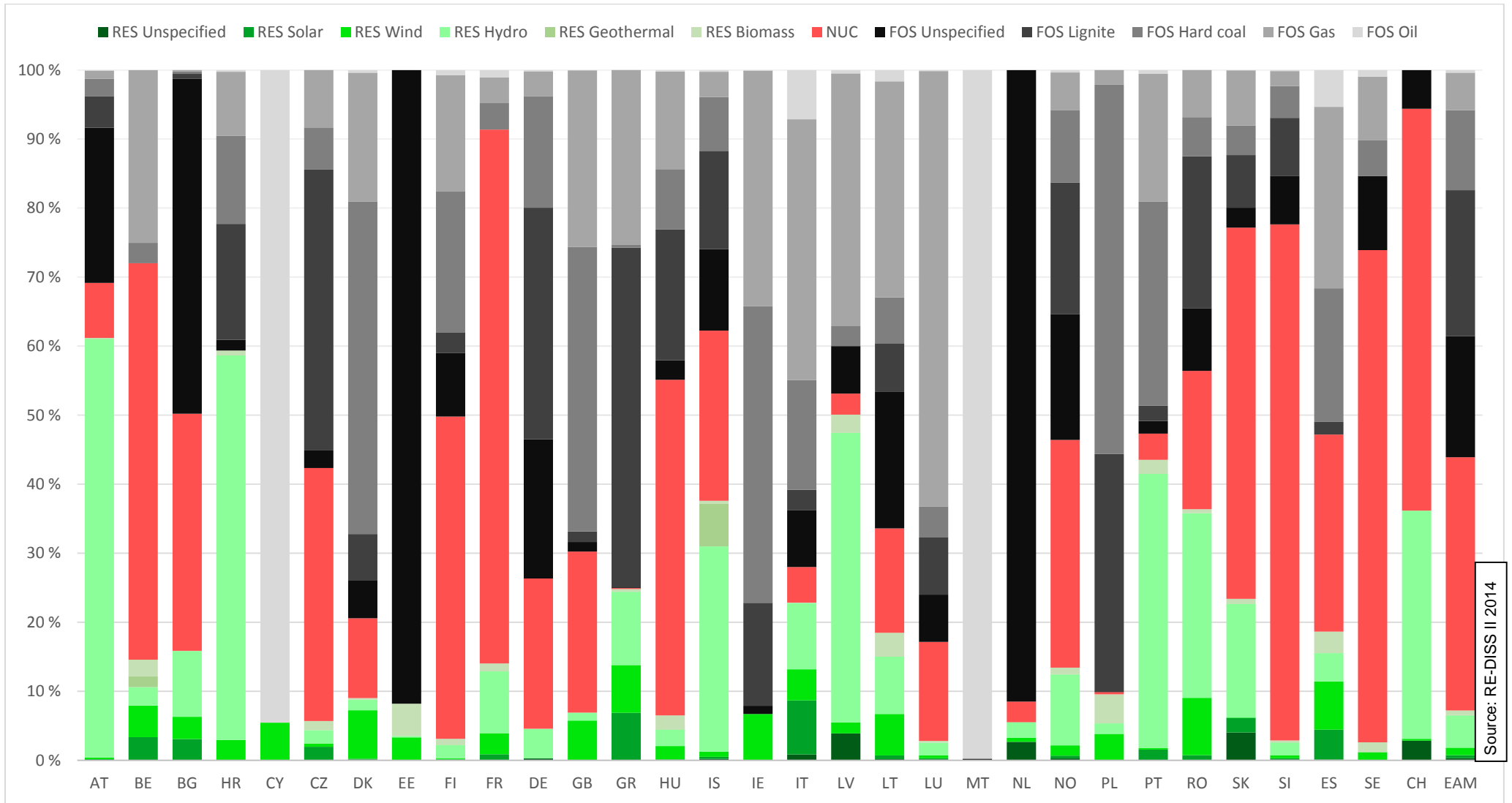


Figure 2: Final Residual Mixes for 2013 (detailed fuel categories)



Source: RE-DISS II 2014

Figure 3: Attributes (TWh) to/from the European Attribute Mix 2013

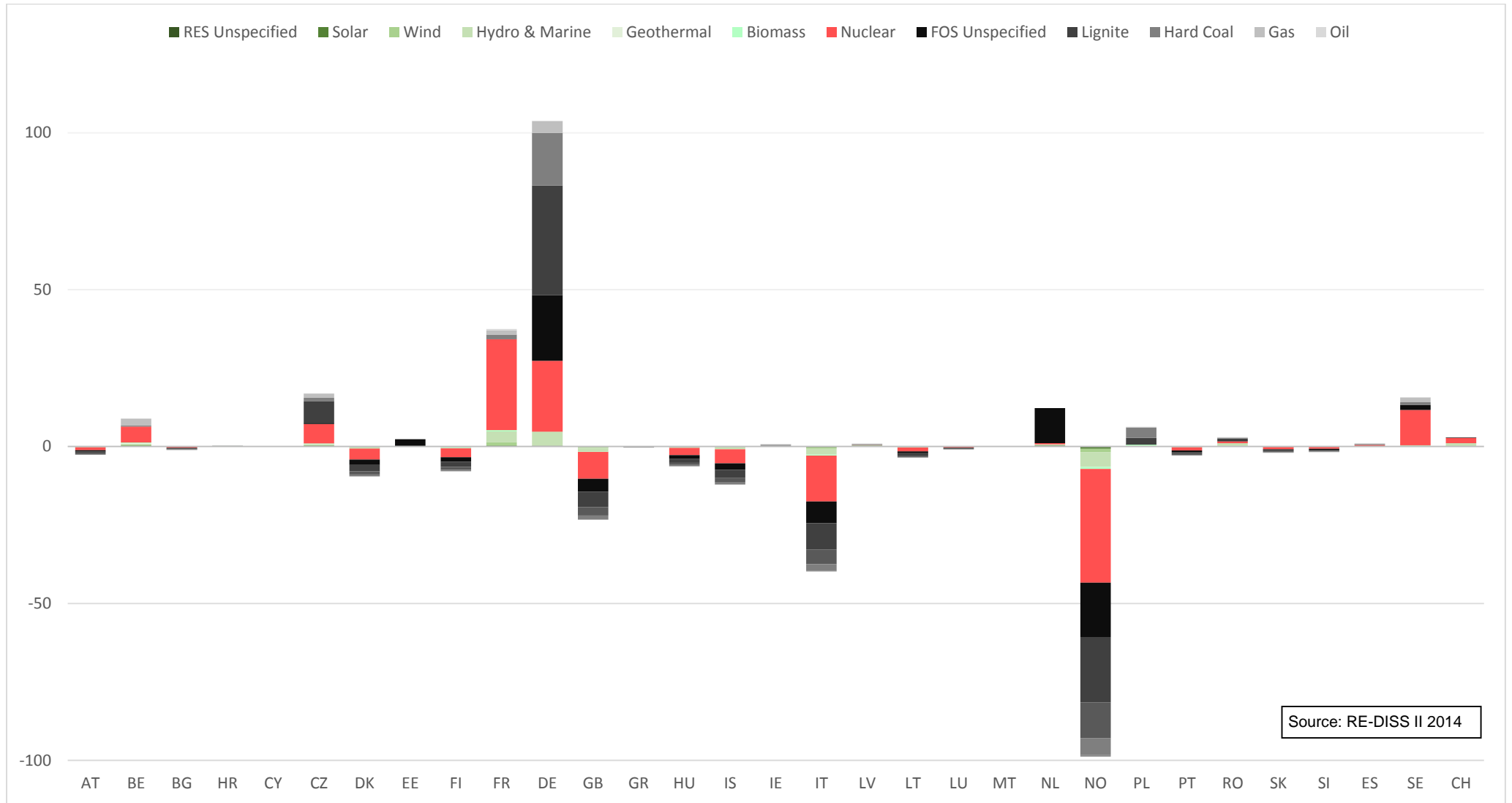


Figure 4: CO₂ content in Final Residual Mixes 2013

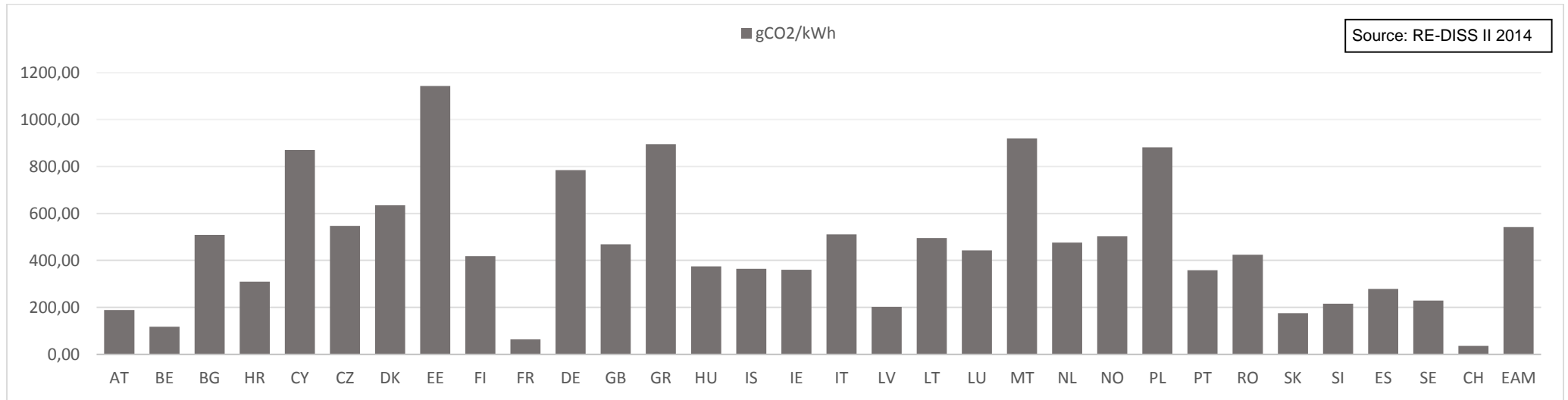


Figure 5: Radioactive waste content in Final Residual Mixes 2013

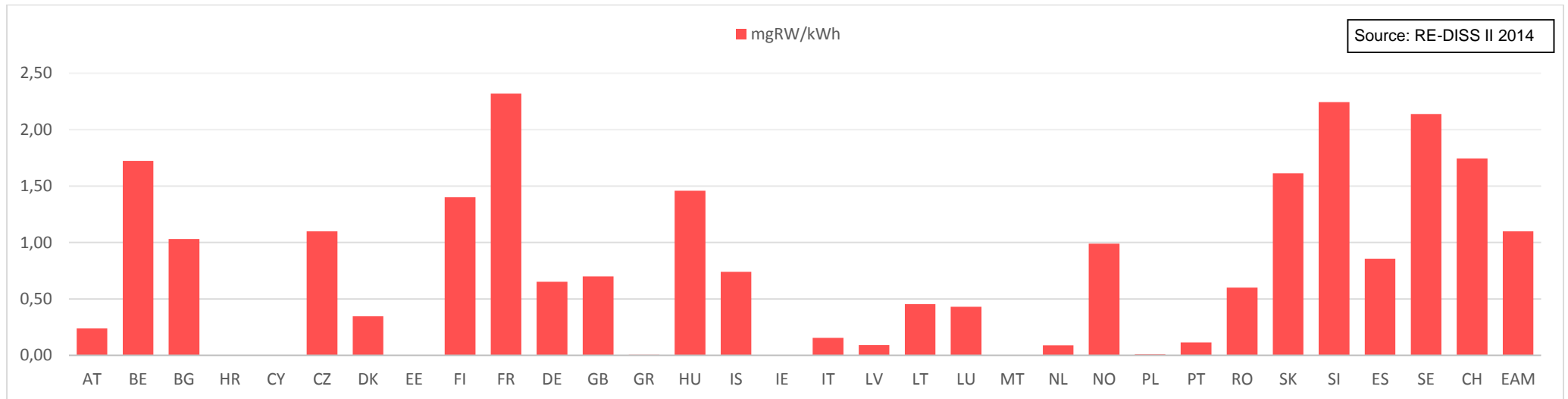


Figure 6: Total Supplier Mix 2013

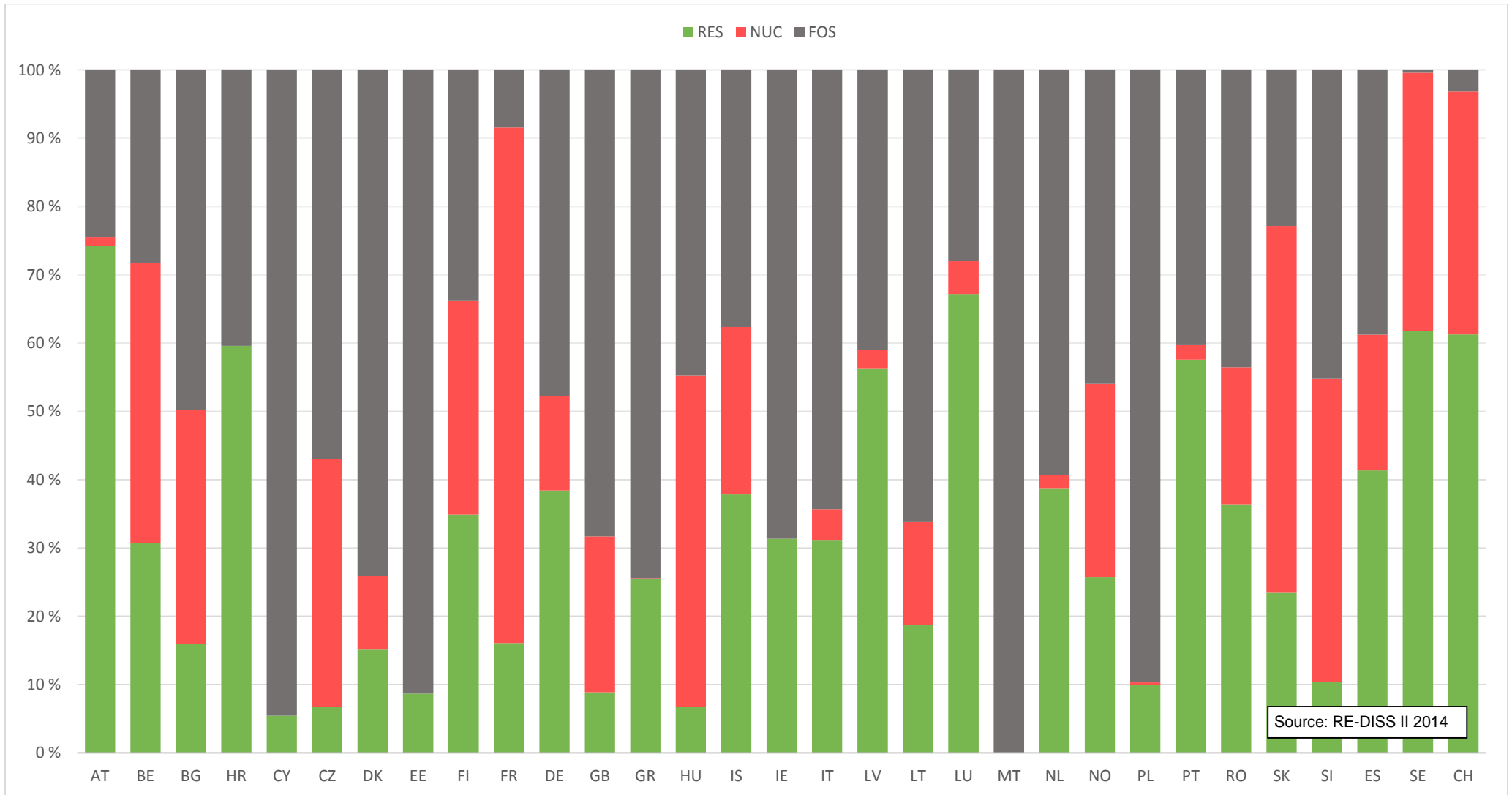
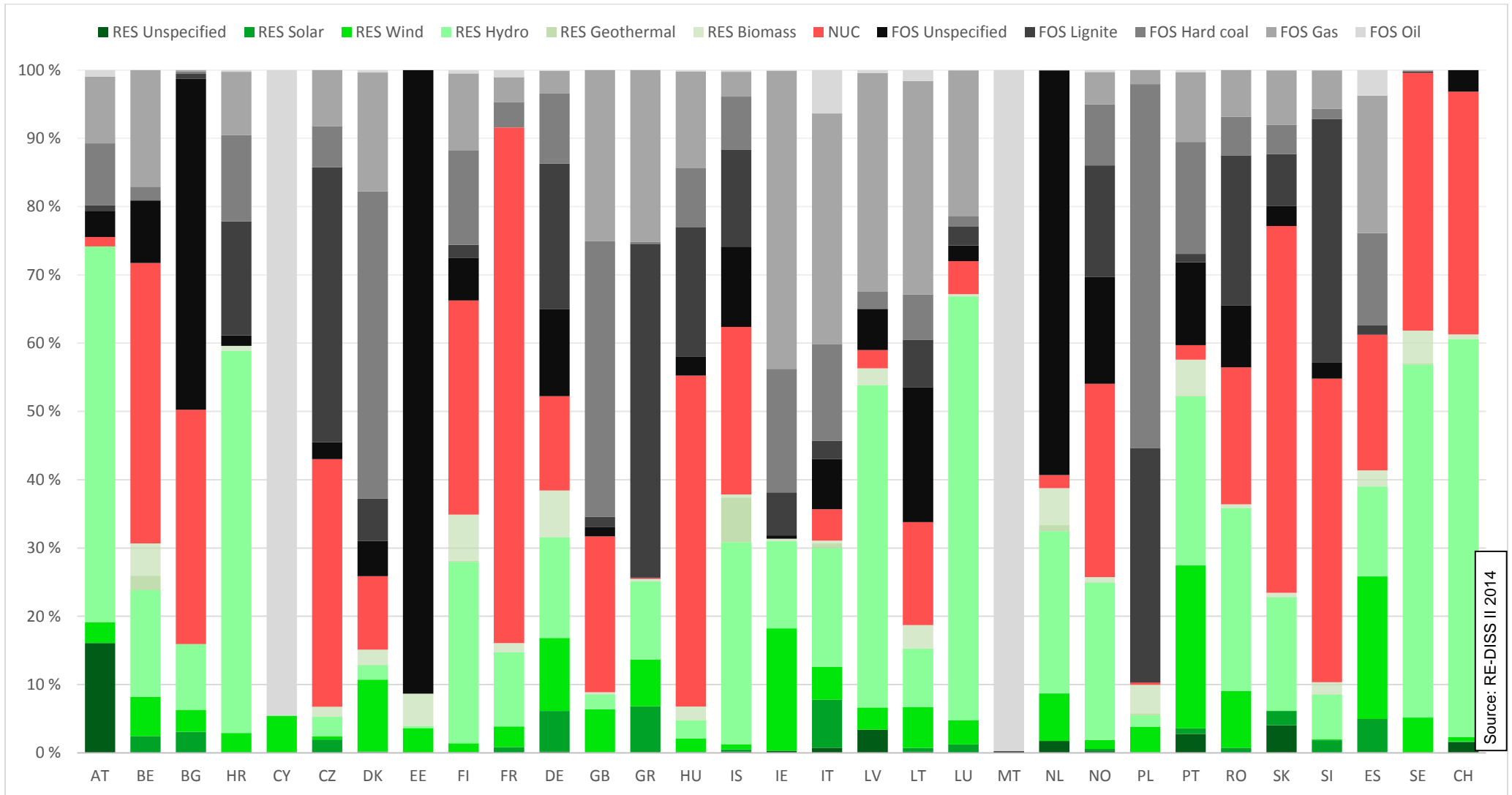


Figure 7: Total Supplier Mix 2013 (detailed fuel categories)



Source: RE-DISS II 2014

Figure 8: Production Mix (left) and Final Residual Mix (right) 2013

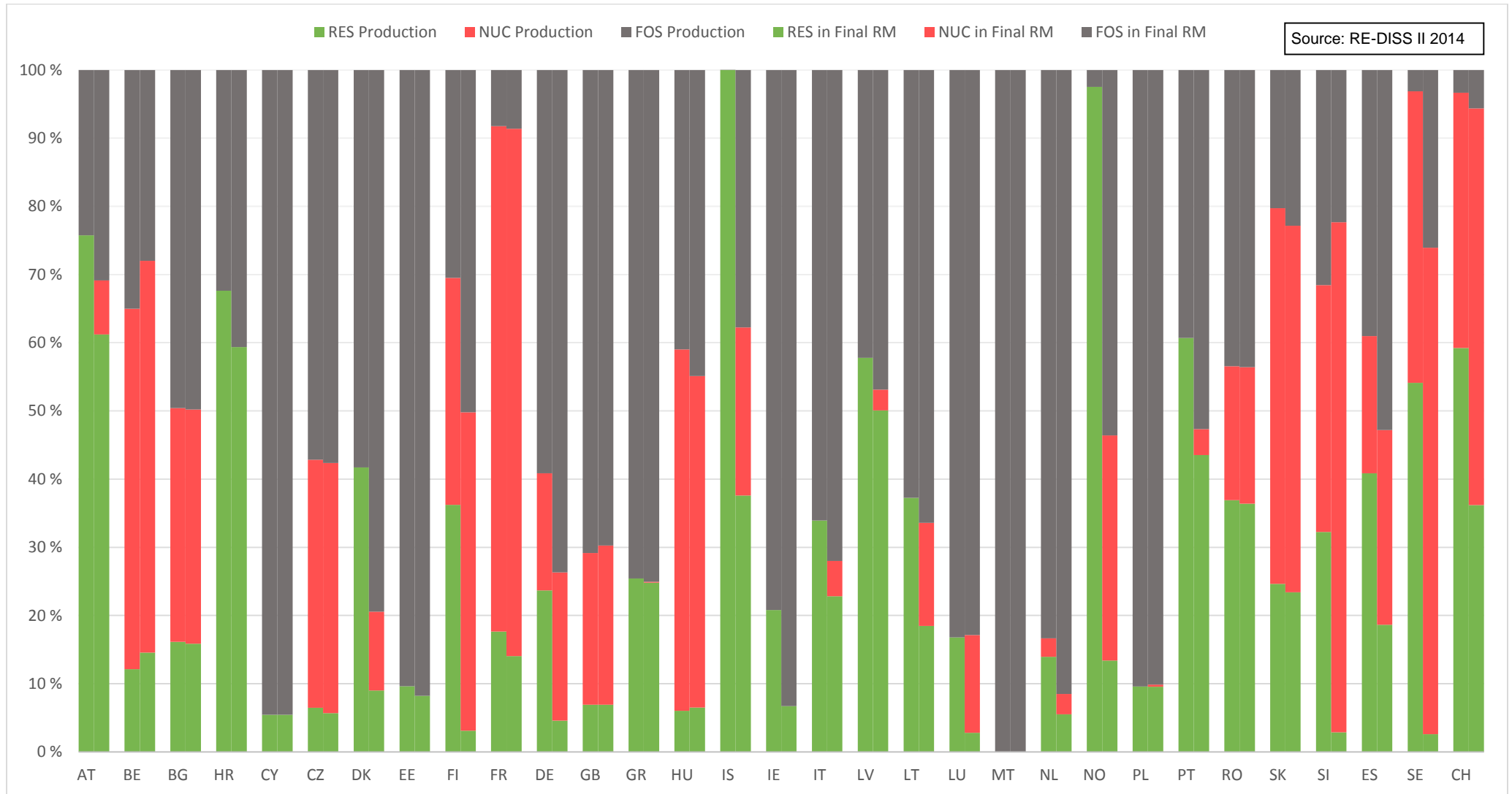


Figure 9: Production Mix (left) and Final Residual Mix (right) 2013 (detailed fuel categories)

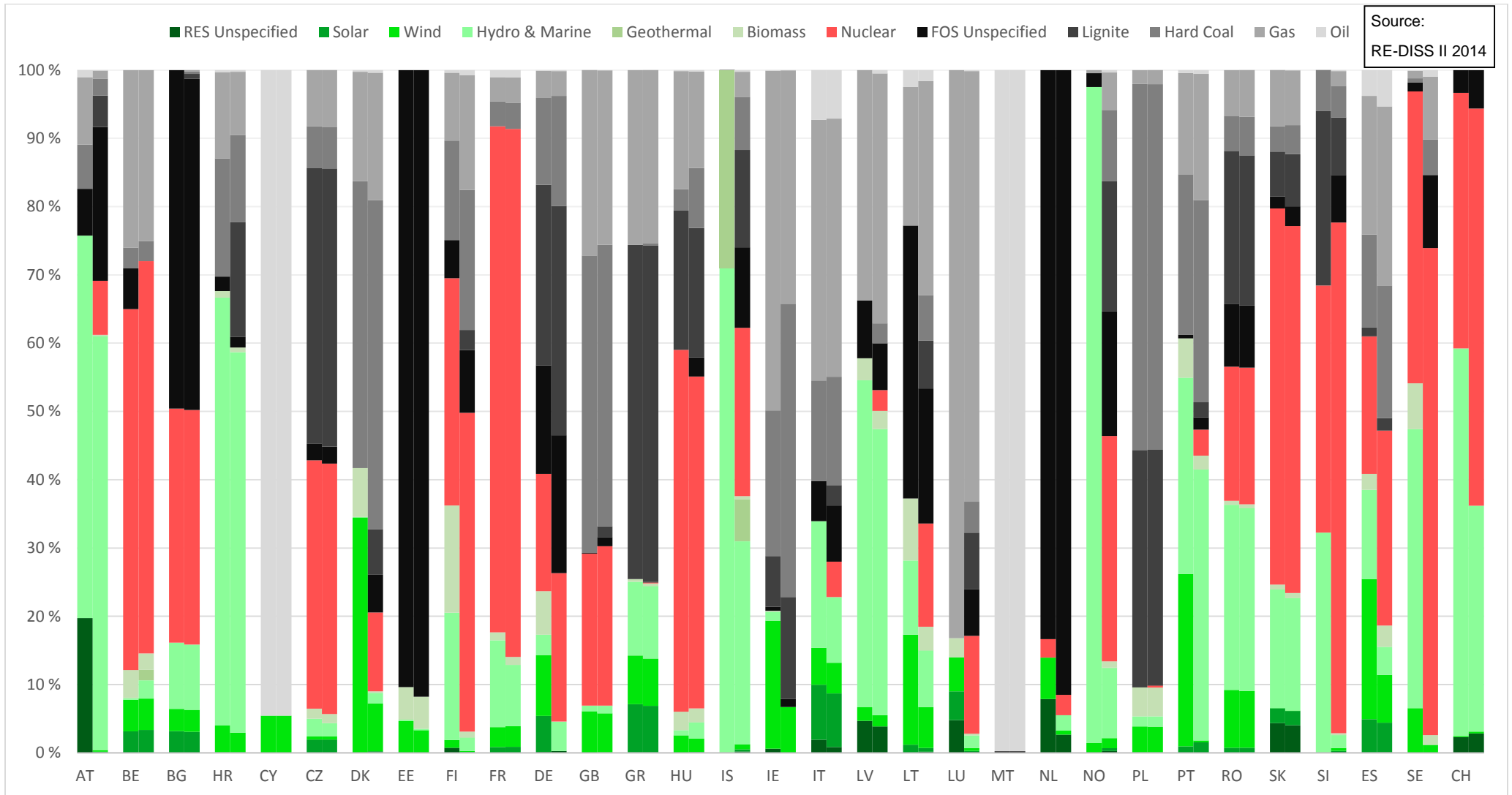


Figure 10: European Total Production Mix (left), Total of all available attributes in Final Residual Mixes (middle) and EAM (right) 2013

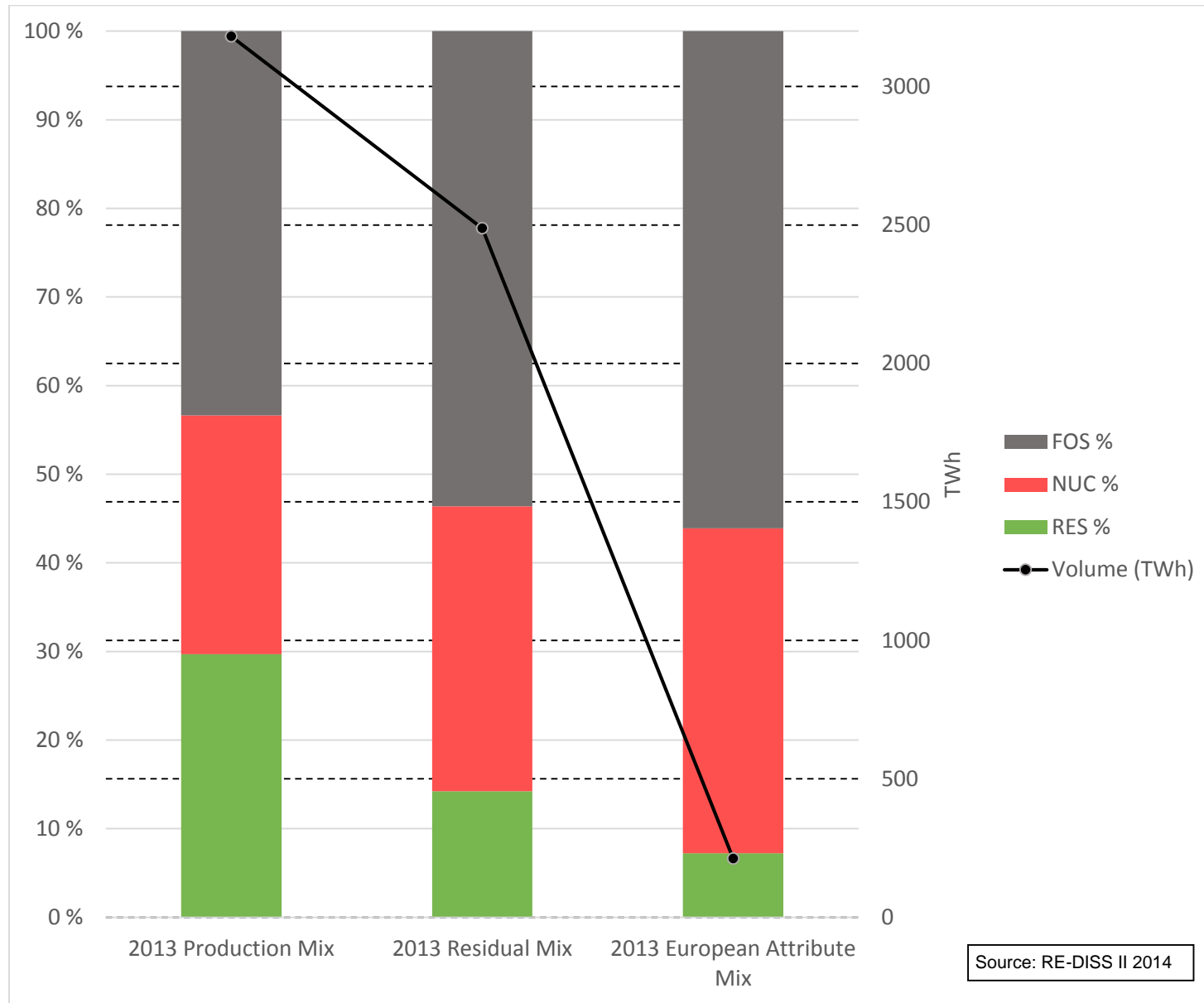


Figure 11 European Total Production Mix (left), Total of all available attributes in Final Residual Mixes (middle) and EAM (right) 2013 (detailed fuel categories)

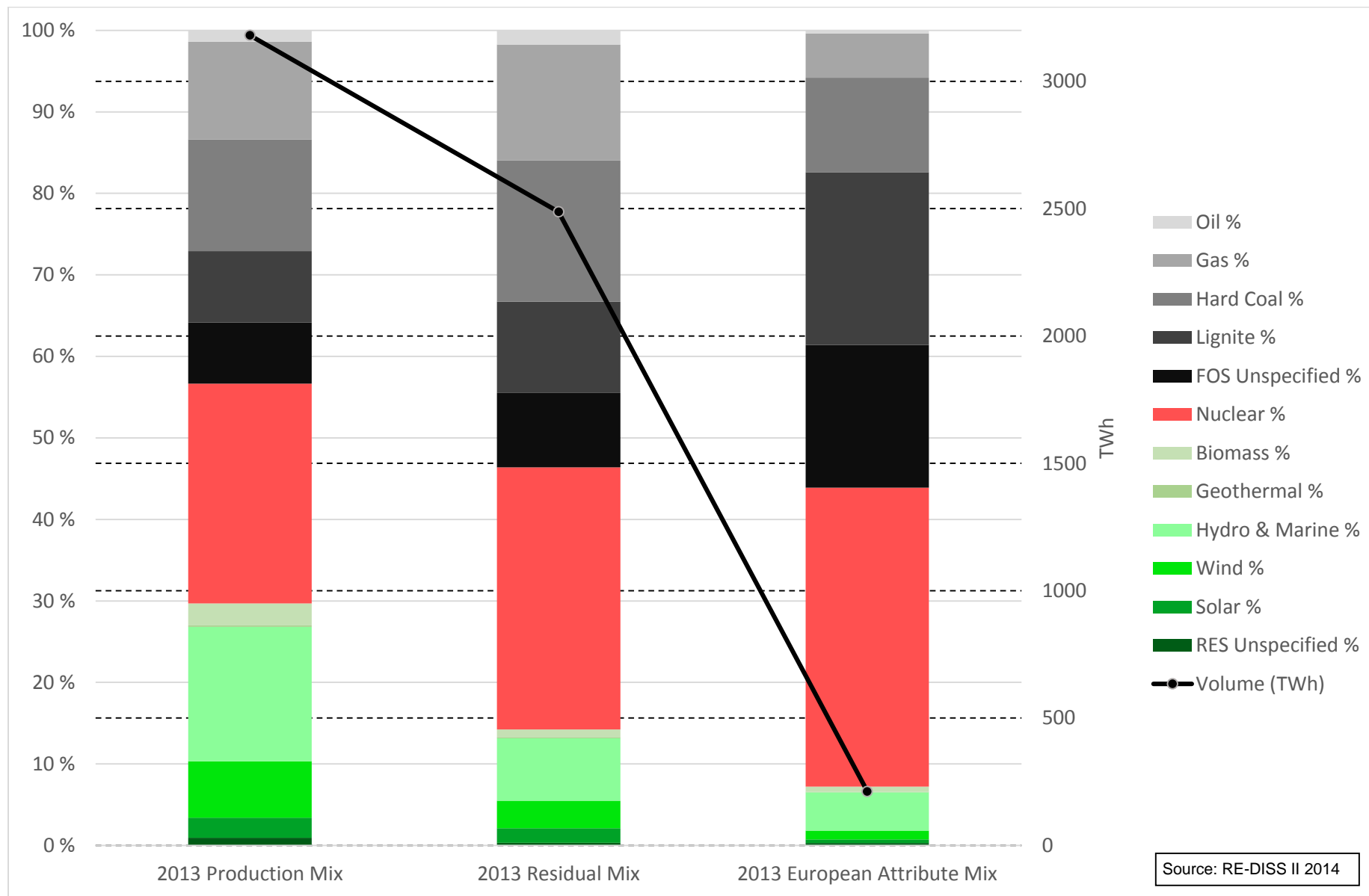
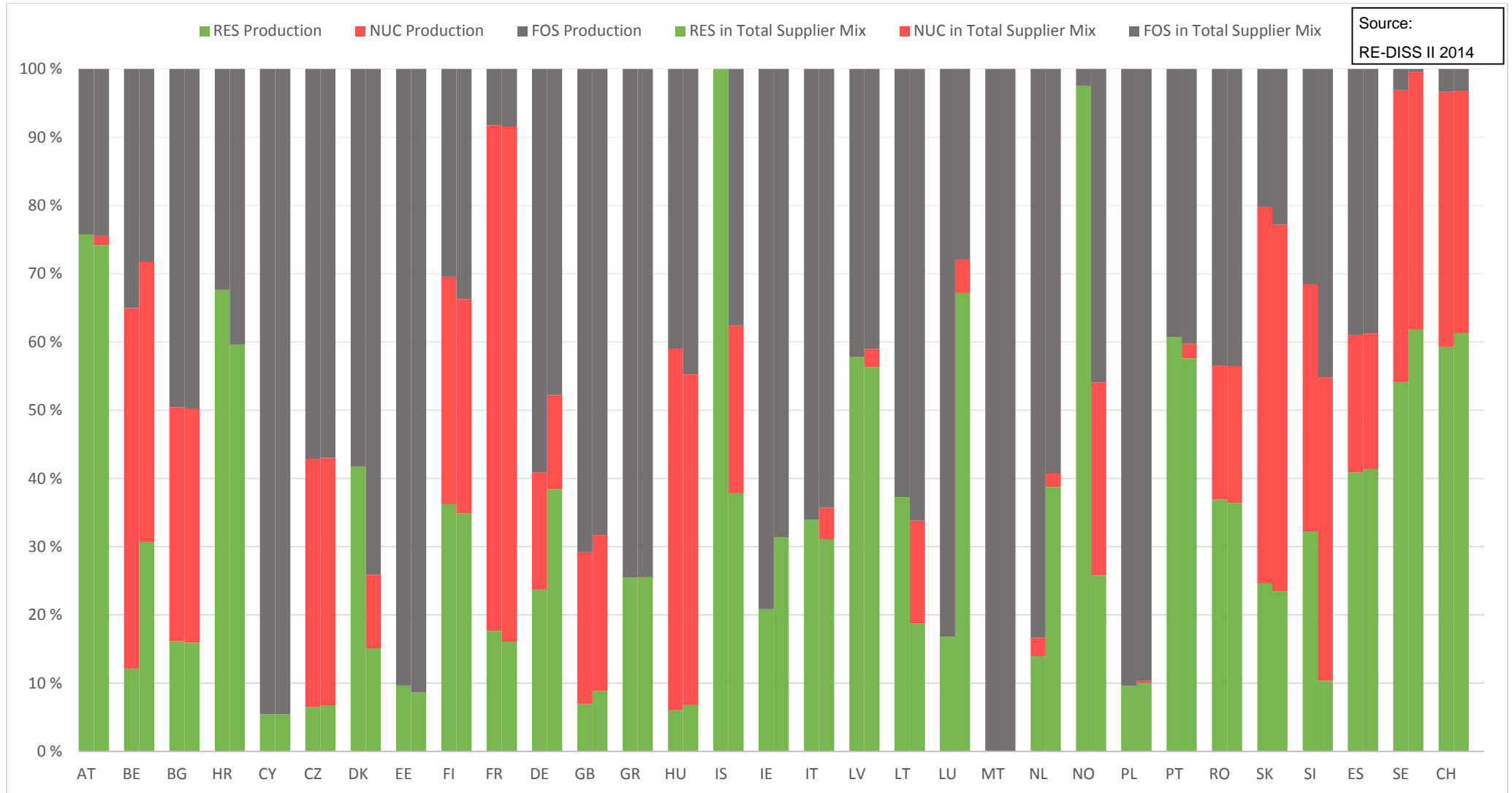


Figure 12: Production Mix (left) and Total Supplier Mix (right) 2013



Source:
RE-DISS II 2014

Figure 13: Production Mix (left) and Total Supplier Mix (right) 2013 (detailed fuel categories)

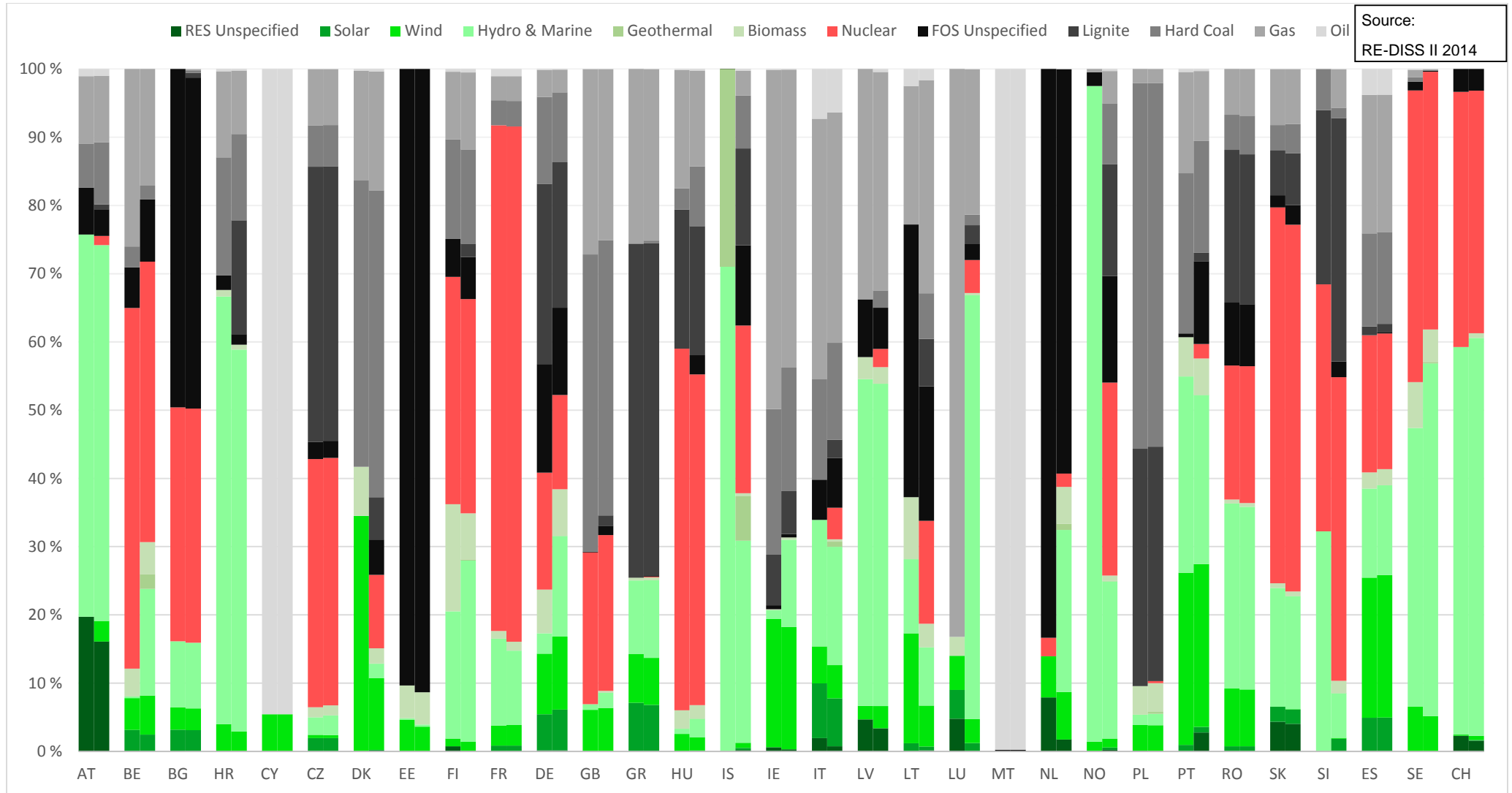


Figure 14: Production Mix (left) and Total Supplier Mix (right) in TWh 2013

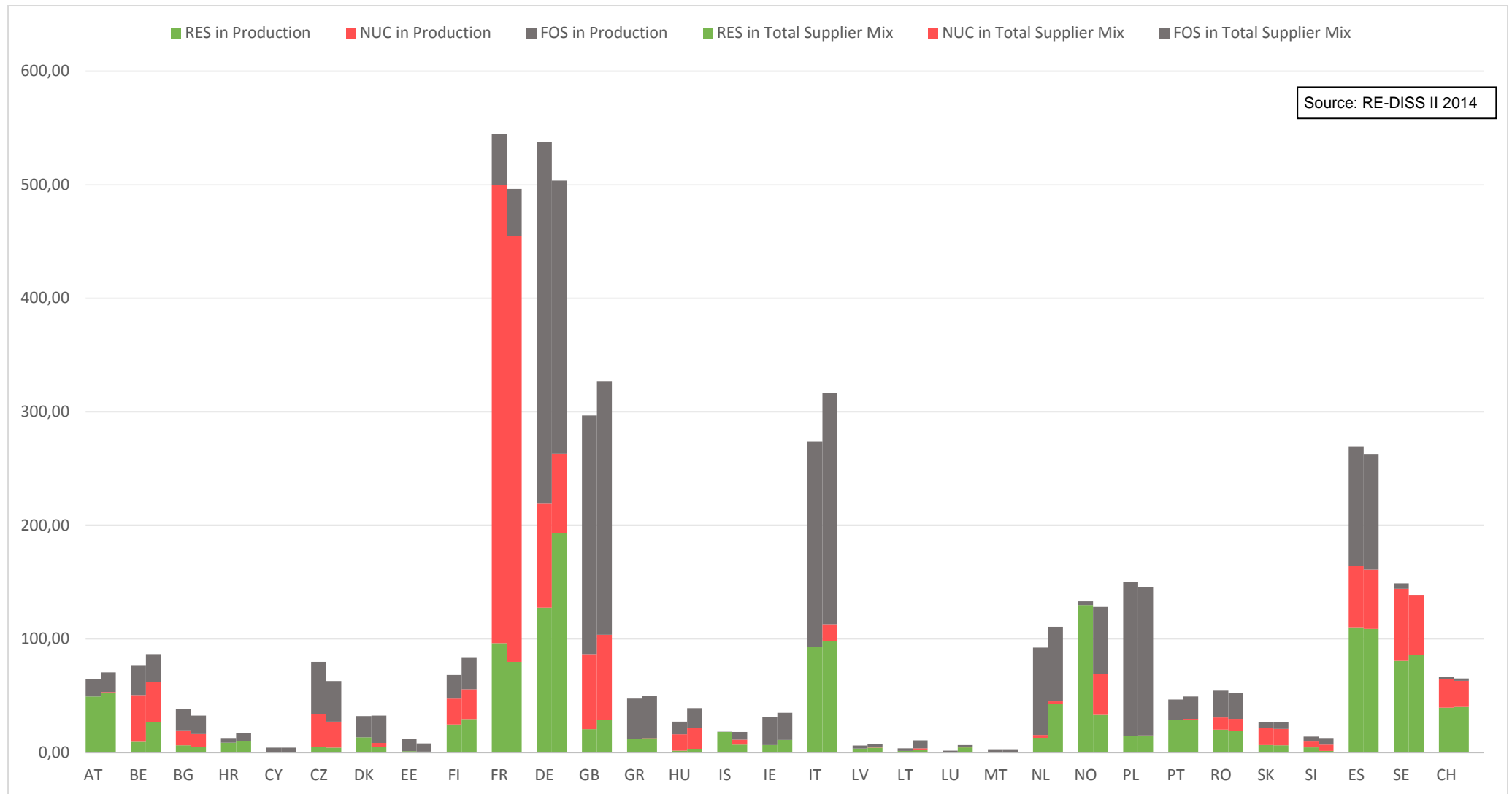


Figure 15: Production Mix (left) and Total Supplier Mix (right) in TWh 2013 (detailed fuel categories)

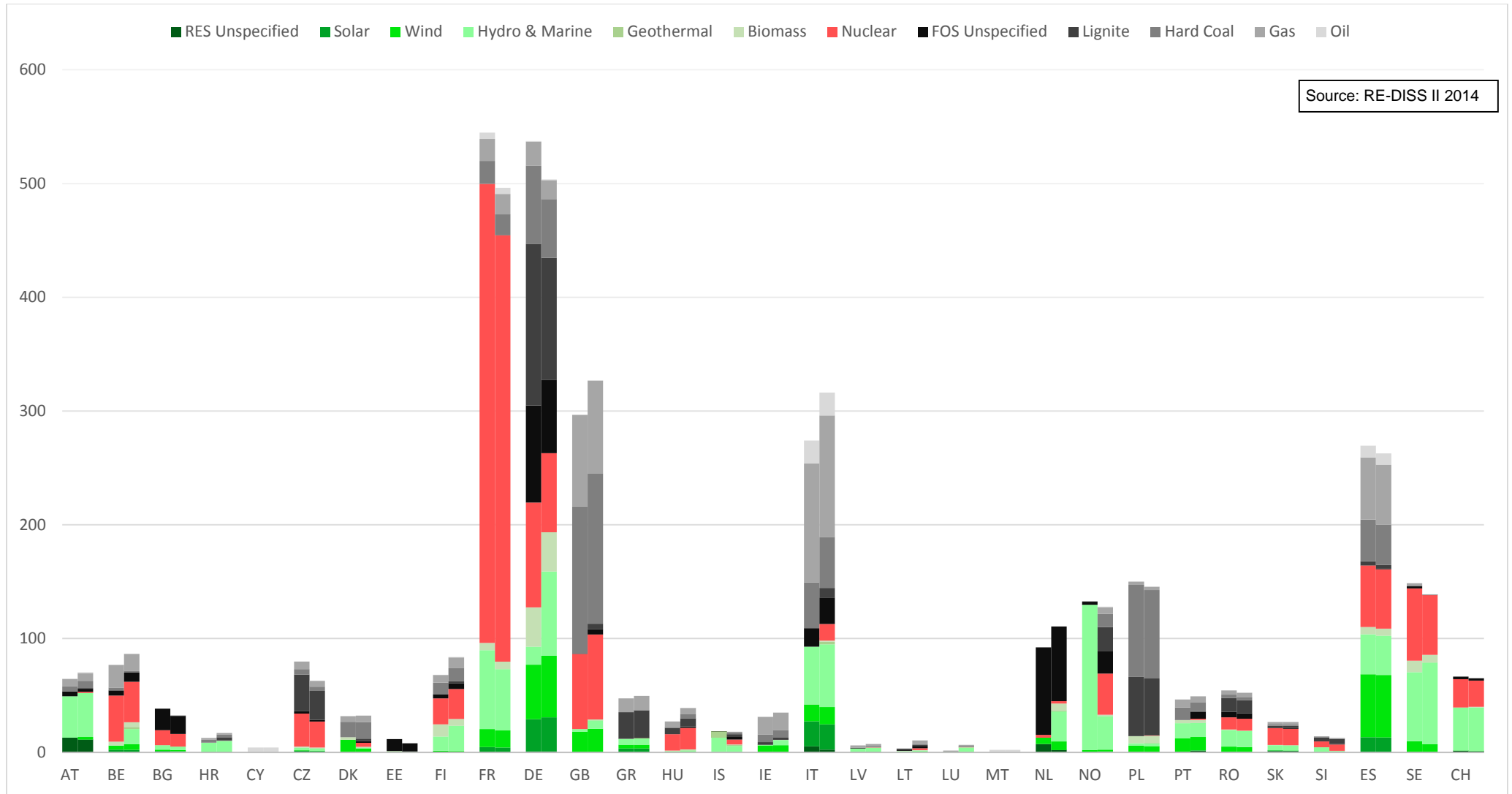


Figure 16: Residual Mixes 2011, 2012 and 2013

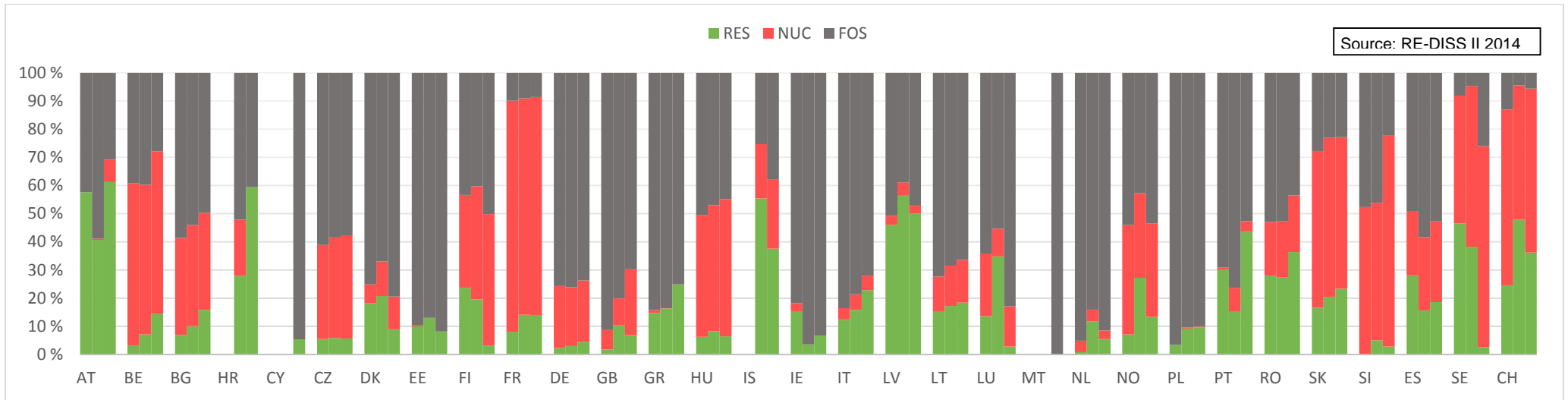


Figure 17: Production Mixes 2011, 2012 and 2013

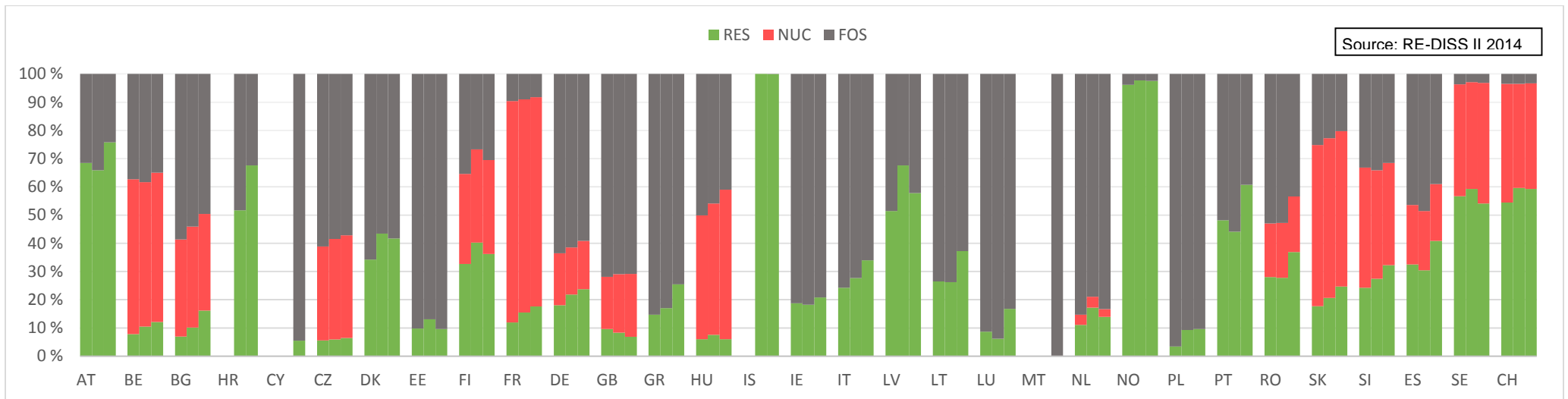


Figure 18: Recorded cancellations of EECS and National GOs in 2013 (Note that in Spain, the volume of cancelled national GOs reflects the volume issued plus imported minus exported.)

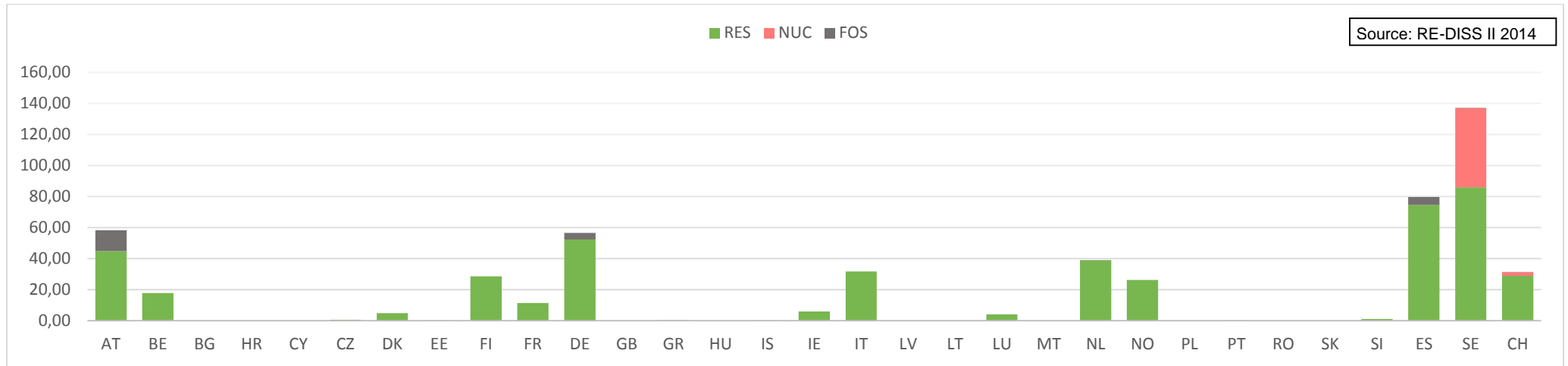
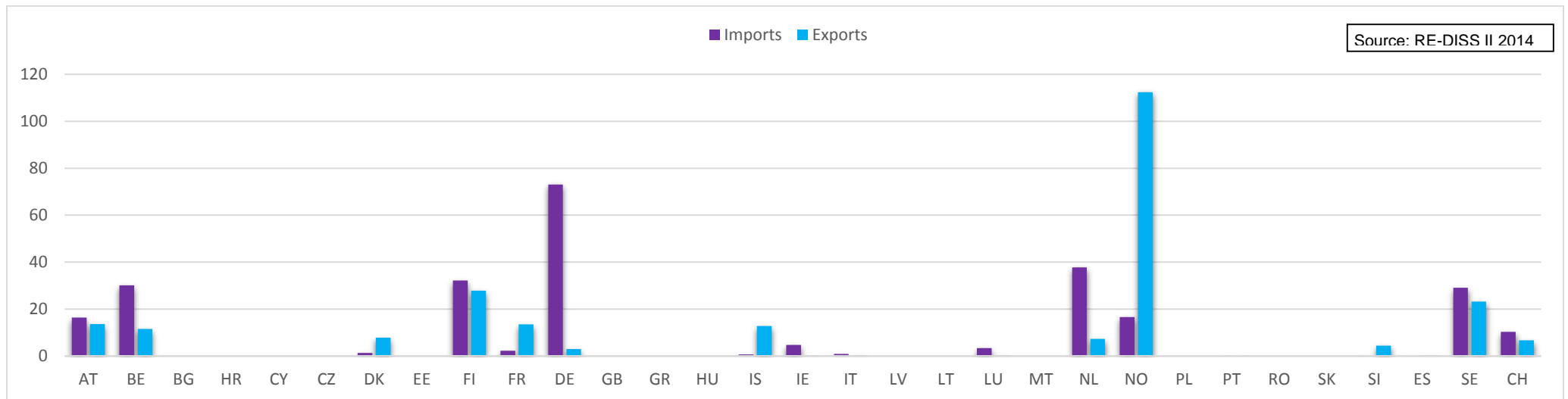


Figure 19: Recorded imports and exports of EECS and National GOs in 2013 (Note that ex-domain cancellations are not included)



Annex 1: Fuel Categories

Table 2 Fuel category breakdown

Fact Sheet 5 compliance		Fuel code	Fuel description (including all subcategories)	Sub-table reference		
Renewable	Unspecified & Other	F0100000	Renewable - Unspecified			T1 Hard coal sub-categories
		F01040300	Renewable - Heat - Aerothermal			0 F0201010 Unspecified
		F01040400	Renewable - Heat - Hydrothermal			1 F0201010 Anthracite
		F01040501	Renewable - Heat - Process heat - Biogenic			2 F0201010 Bituminous coal
		F01050000	Renewable - Mechanical source or other - Unspecified			3 F0201010 Coking coal
	Solar	F01040100	Renewable - Heat - Solar			4 F0201010 Coke-oven coke
	Wind	F01050100	Renewable - Mechanical source or other - Wind			5 F0201010 Lignite coke
	Hydro & Marine	F01050200	Renewable - Mechanical source or other - Hydro & Marine			
	Geothermal	F01040200	Renewable - Heat - Geothermal			T2 Brown coal sub-categories
	Biomass	F01010000	Renewable - Solid			0 F0201020 Unspecified
F01020000		Renewable - Liquid			1 F0201020 Sub-bituminous coal	
F01030000		Renewable - Gaseous			2 F0201020 Lignite	
Nuclear	F03010100	Nuclear - Solid - Radioactive fuel			3 F0201020 Brown coal briquette	
Fossil	Unspecified & Other	F02000000	Fossil - Unspecified			4 F0201020 Peat briquette
		F02010000	Fossil - Solid - Unspecified			
		F02010400	Fossil - Solid - Municipal waste			T3 Petroleum products sub-categories
		F02010500	Fossil - Solid - Industrial and commercial waste			0 F0202030 Unspecified
		F02020000	Fossil - Liquid - Unspecified			1 F0202030 Ethane
		F02030000	Fossil - Gaseous	T4		2 F0202030 Naphtha
		F02040000	Fossil - Heat			3 F0202030 Aviation gasoline
	Hard Coal	F02010100	Fossil - Solid - Hard coal	T1		4 F0202030 Motor gasoline
	Brown Coal / Lignite	F02010300	Fossil - Solid - Peat			5 F0202030 Aviation turbine fuel
		F02010200	Fossil - Solid - Brown coal	T2		6 F0202030 Other kerosene
	Natural Gas	F02030100	Fossil - Gaseous - Natural Gas			7 F0202030 Gas and diesel oil
		F02020200	Fossil - Liquid - Natural gas liquids			8 F0202030 Fuel oil low-sulphur
	Oil	F02020100	Fossil - Liquid - Crude oil			9 F0202030 Fuel oil high-sulphur
		F02020300	Fossil - Liquid - Petroleum products	T3		10 F0202030 Liquid petroleum gas
						11 F0202030 Orimulsion
					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	