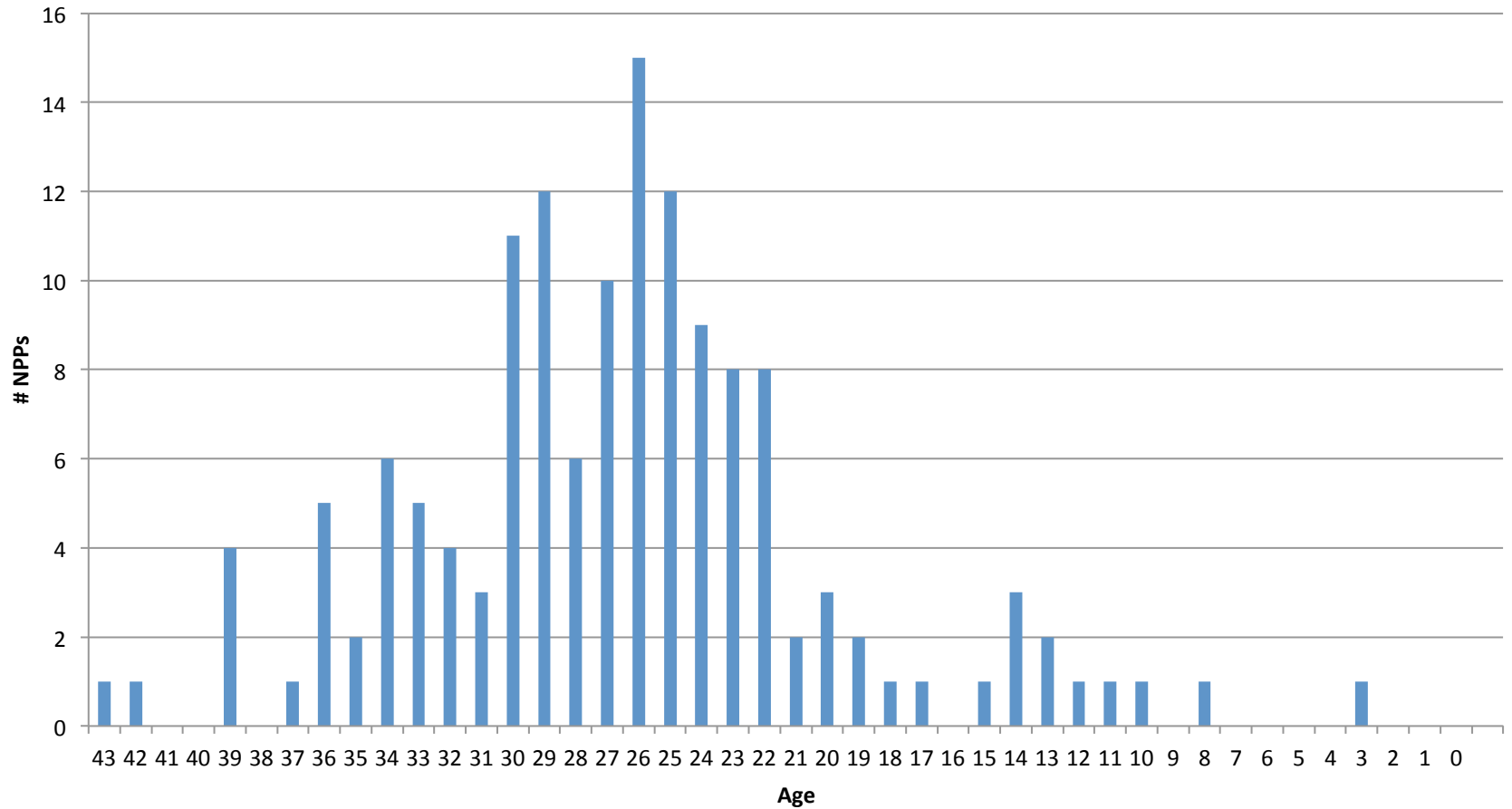


**Nuclear outlook in the EU by 2020
and beyond
FSR Annual Conference
May, 2011**

François Lévêque
Michel Berthélemy

Mines-ParisTech

NPPs in the EU in 2010 (Total = 143)



Nuclear outlook in the EU by 2020

- Scenario 1 « *Low scenario* » :
 - Lifetime = 40 years;
 - Germany phasing-out by 2020;
 - 14 new-built by 2020
- Scenario 2 « *High scenario* » :
 - Lifetime = 60 years;
 - Germany partial phasing-out by 2020 (only the 7 oldest closed-down);
 - 19 new-built by 2020
- Final electricity consumption is estimated to 3528 TWh based on MS renewable energy actions plans

New built expected in the two scenarios

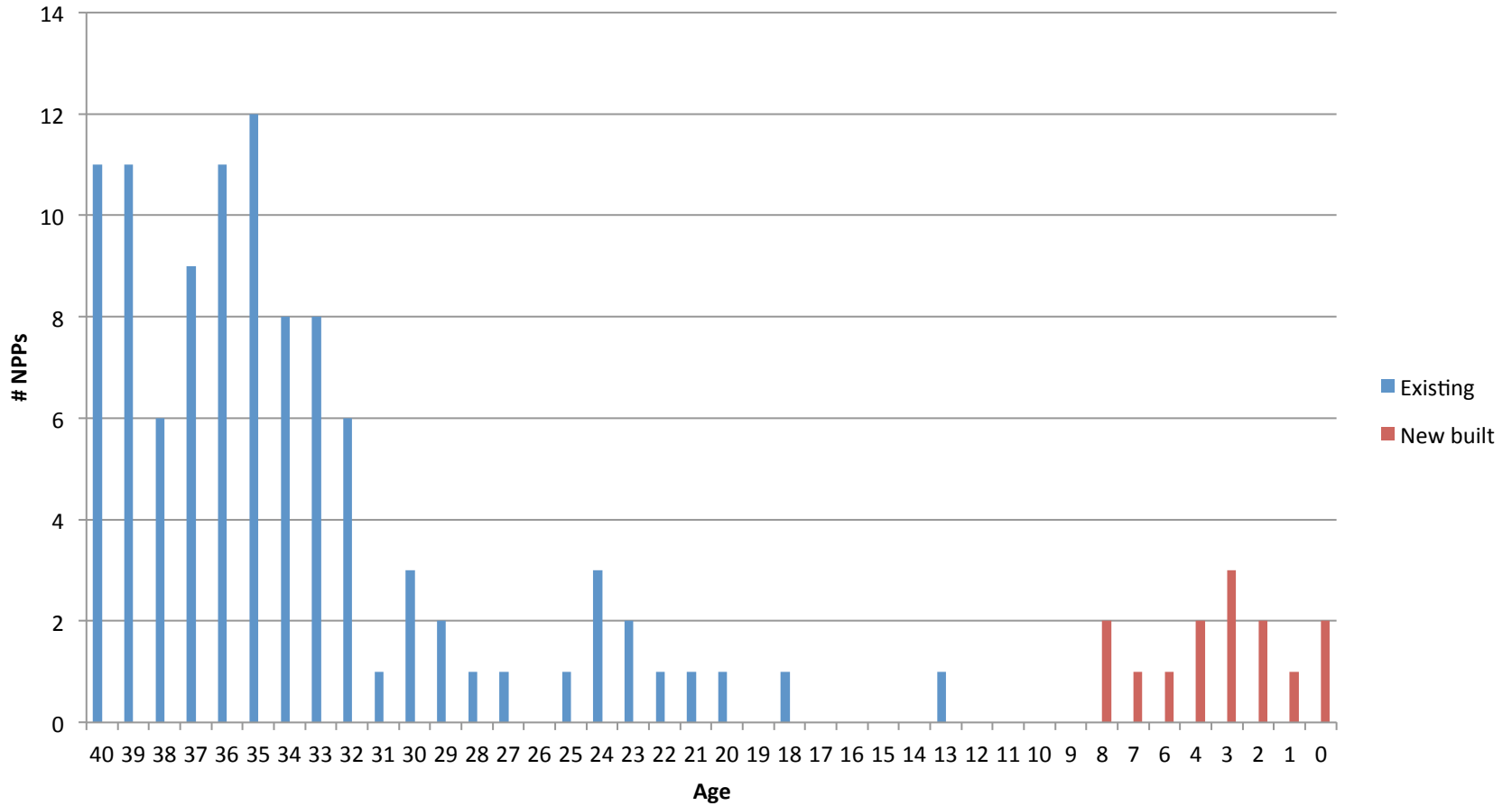
Scenario 1

Country	Nb NPPs	Capacity (Gwe)
Bulgaria	2	2120
Finland	1	1600
France	1	1600
Slovakian Republic	2	880
United Kingdom - EDF Energy	3	4800
Romania	2	1440
Baltic states + Poland	1	1600
Finland (after 1st EPR)	1	1600
Slovenia	1	1600
Total	14	15120

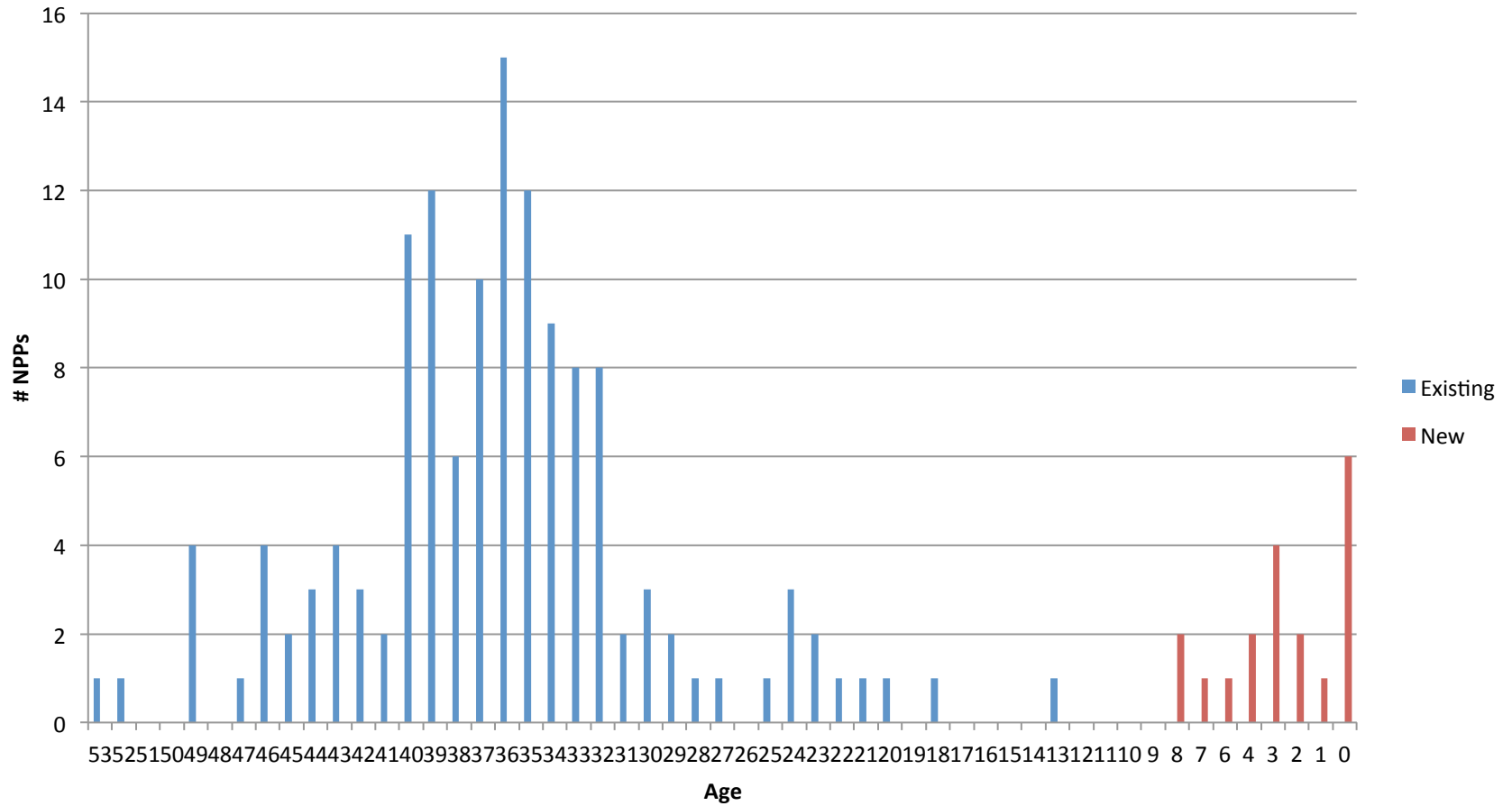
Scenario 2

Country	Nb NPPs	Capacity (Gwe)
Bulgaria	2	2120
Finland	1	1600
France	2	3200
Slovakian Republic	2	880
United Kingdom - EDF Energy	3	4800
United Kingdom – RWE / EON	3	4800
Romania	2	1440
Baltic states + Poland	1	1600
Finland (after 1st EPR)	2	3200
Slovenia	1	1600
Total	19	23120

Scenario 1 (Total by 2020 = 115)



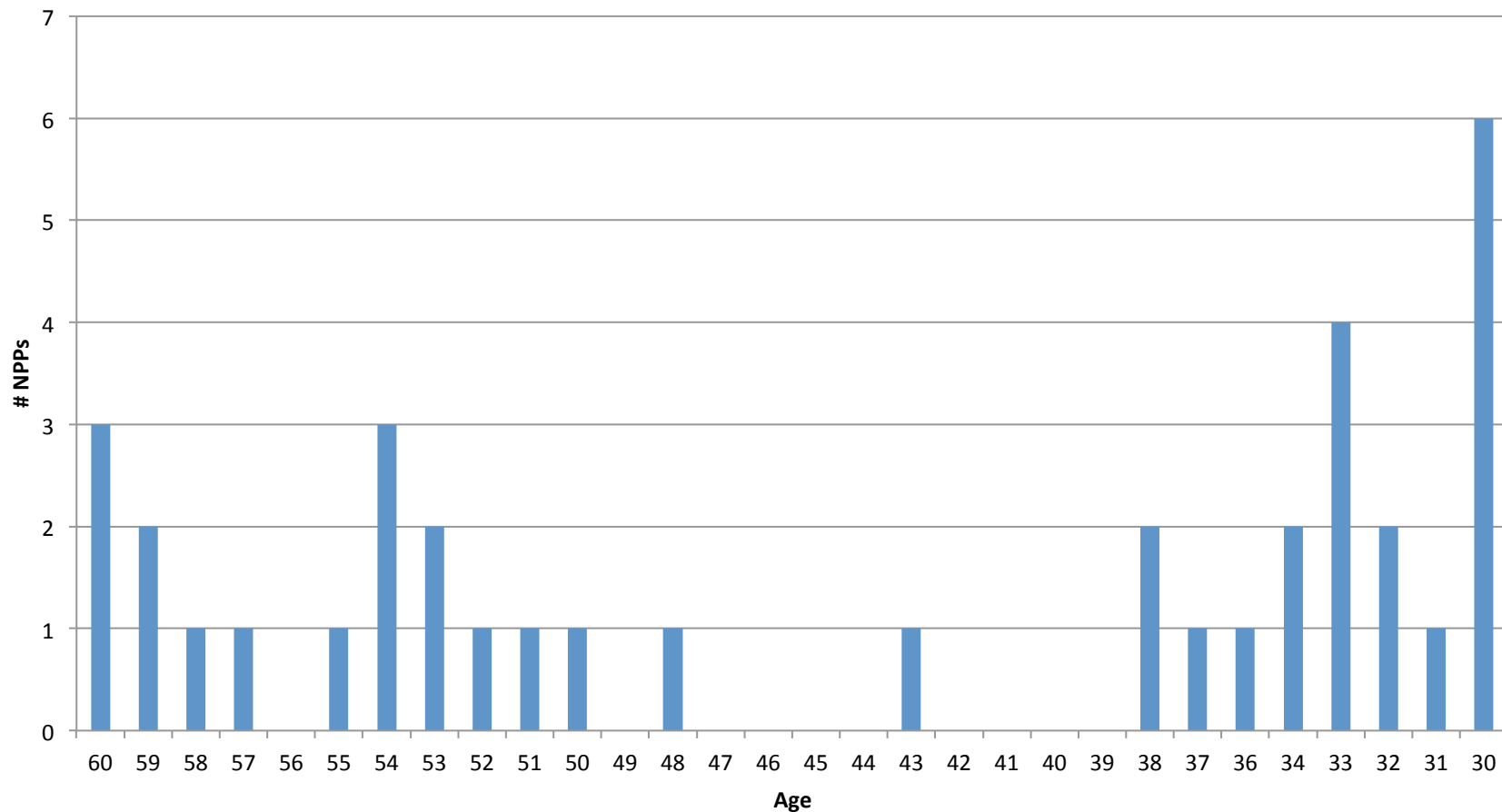
Scenario 2 (Total by 2020 = 155)



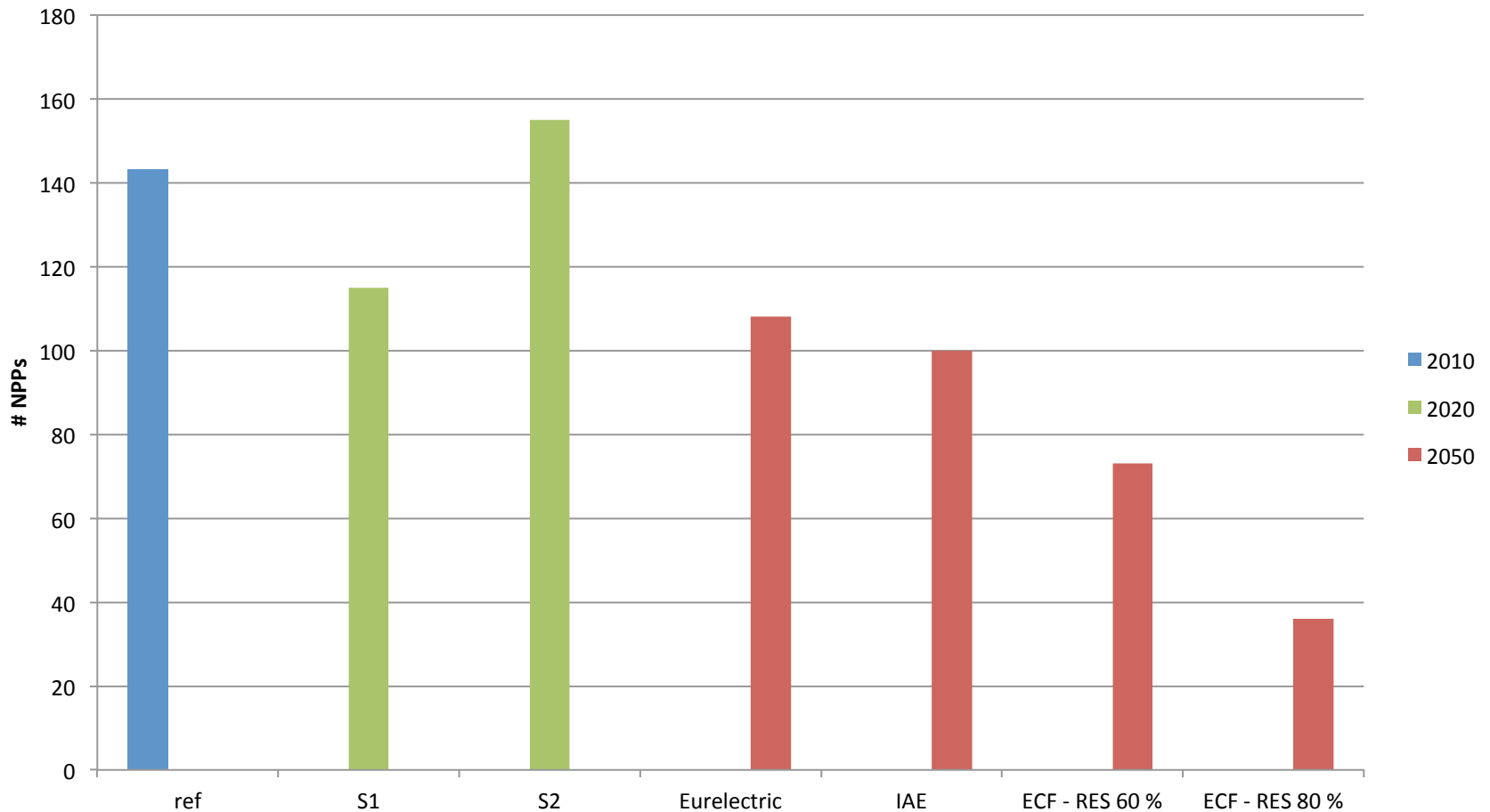
Nuclear outlook in the EU by 2050

- Four scenarios:
 - Eurelectric
 - Final electricity consumption = 4776 TWh
 - Nuke = 28.4 %
 - IAE (Blue Map)
 - Final electricity consumption = 4306 TWh
 - Nuke = 29.3 %
 - European Climate Foundation (ECF) with RES = 60%
 - Final electricity consumption = 4600 TWh
 - Nuke = 20 %
 - ECF with RES = 80%
 - Final electricity consumption = 4600 TWh
 - Nuke = 10 %
- Nuke share will have to come from NPPs built after 1990 (resp. 2010) with a lifetime of 60 (resp. 40) years.

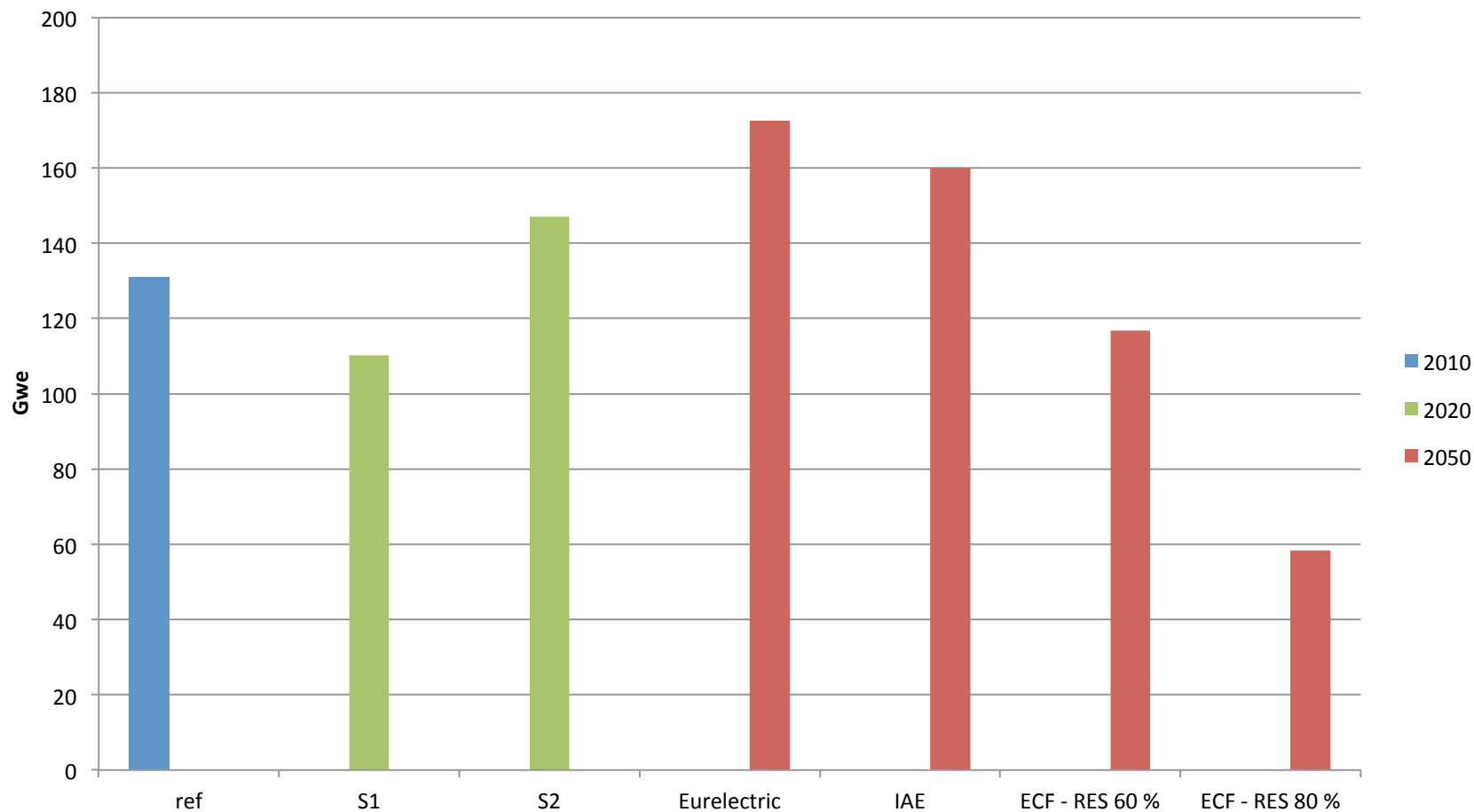
NPPs by 2050 (Without new built after 2020 & lifetime = 60y) : Total = 37



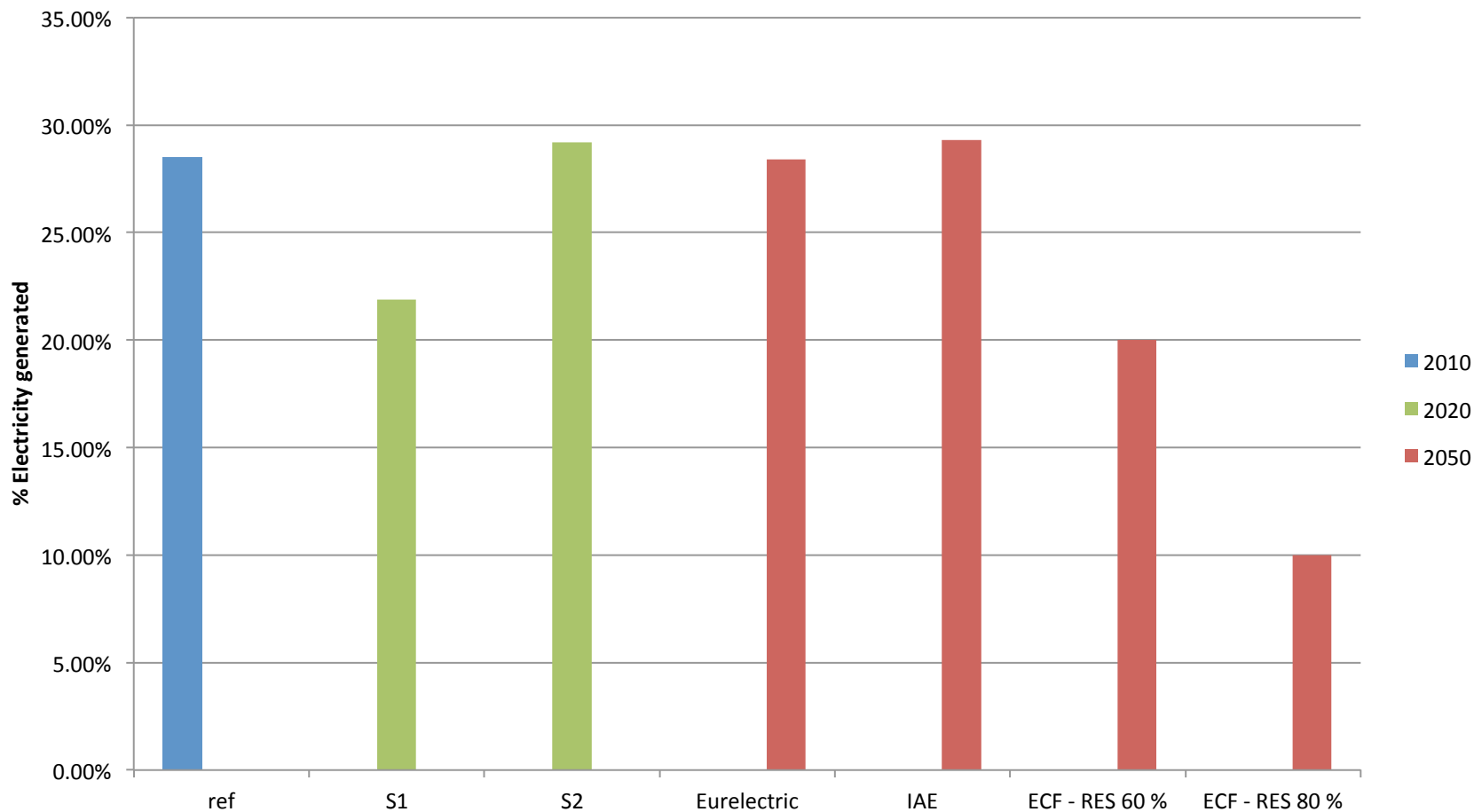
Number of NPPs in 2010, 2020 & 2050 (with LF = 90 % and 1600 MW new NPPs)



Nuclear capacity (Gwe) in 2010, 2020 & 2050 (with LF = 90 % and 1600 MW new NPPs)



Nuclear electricity generated (in % of final electricity consumption) in 2010, 2020 & 2050



The impact of 2050 forecasts for nuclear generation and the number of NPPs

	Eurelectric	ECF		IAE
		RES - 60 %	RES - 80 %	
TWh	1361	920	460	1262
GWe With LF = 80 %	194	131	66	180
Number of NPPs (1600 MW)	121	82	41	113
GWe With LF = 90 %	173	117	58	160
Number of NPPs (1600 MW)	108	73	36	100

Conclusions

- Scenario 1 and 2 by 2020 can be respectively seen as prospective scenarios after and before Fukushima
 - The Fukushima expected effects: accelerating of nuclear phasing-out, delaying of new builds and life-reduction of NPPs
 - These effects would result in a decrease between 2010 and 2020 of nuclear power generation in the EU regarding the size of the fleet, the nuclear power installed capacity and the share of nuclear power in final electricity consumption
- By 2050, the size of nuclear power generation in the EU energy mix is mainly determined by the extent of future new build
 - Assuming no new built after 2020, a life-time of 60 years for the current fleet and scenario 2 new-built up to 2020, the fleet by 2050 will amount to 37 reactors
 - The four 2050 scenarios lead to contrasted results for new built after 2020 (with a 60 y lifetime, 80 % LF and 1600 MW for new reactors):
 - Eurelectric: 84 NPPs
 - IAE: 76 NPPs
 - ECF (RES 60 %): 45 NPPs
 - ECF (RES 80 %): 4 NPPs