

EPS in the European electricity supply system

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Aim:

- Influence of EPS
 - Capital stock turn over
 - Interplay with EU ETS

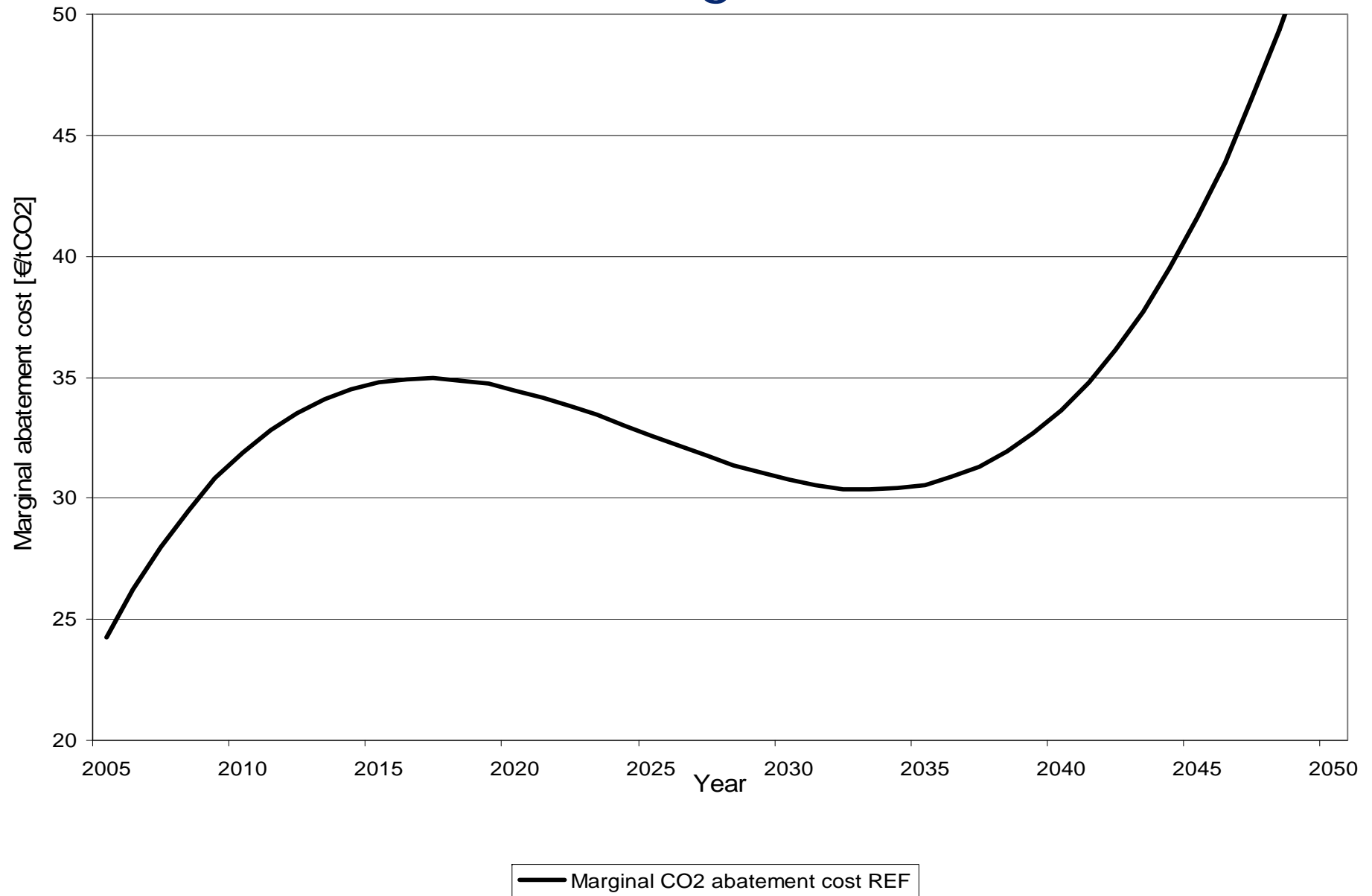
Scope:

- EPS levels
 - 500gCO₂/kWh
 - 350gCO₂/kWh
 - 150gCO₂/kWh
- Limited to current top six emitters (Germany, UK, Spain, Italy, Netherlands and Poland)

Outline of study

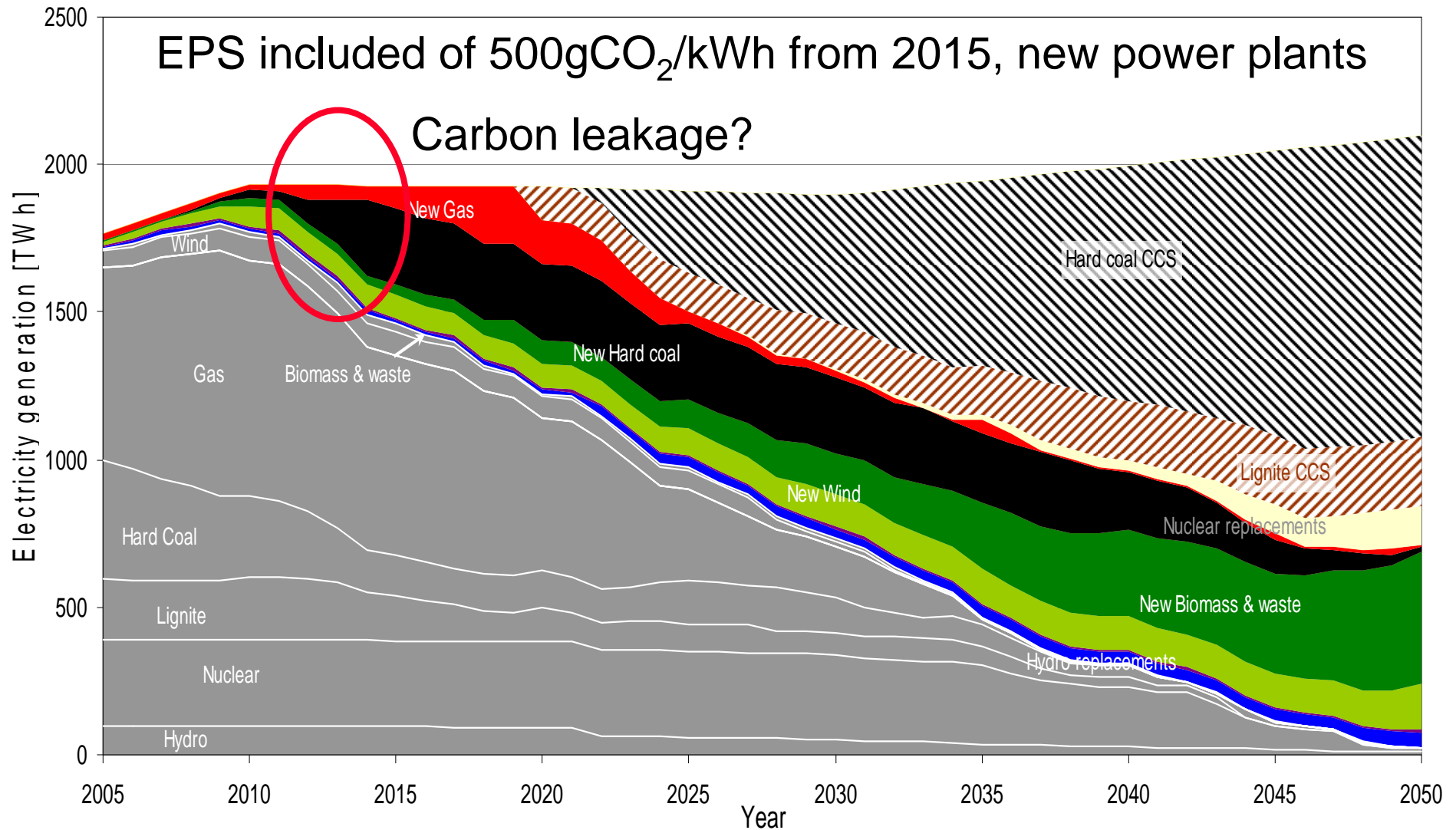
- Modeling with the ELIN-model
- 13 scenarios investigated
 - Reference scenario, meeting EU-20-20-20-2020 and 85% CO₂ emission reduction by 2050
 - Different combinations of the EPS-levels
 - Only new power plants
 - All power plants
 - Lifetime extensions on present power plants
 - Delayed availability of CCS

The REF scenario – Marginal abatement costs



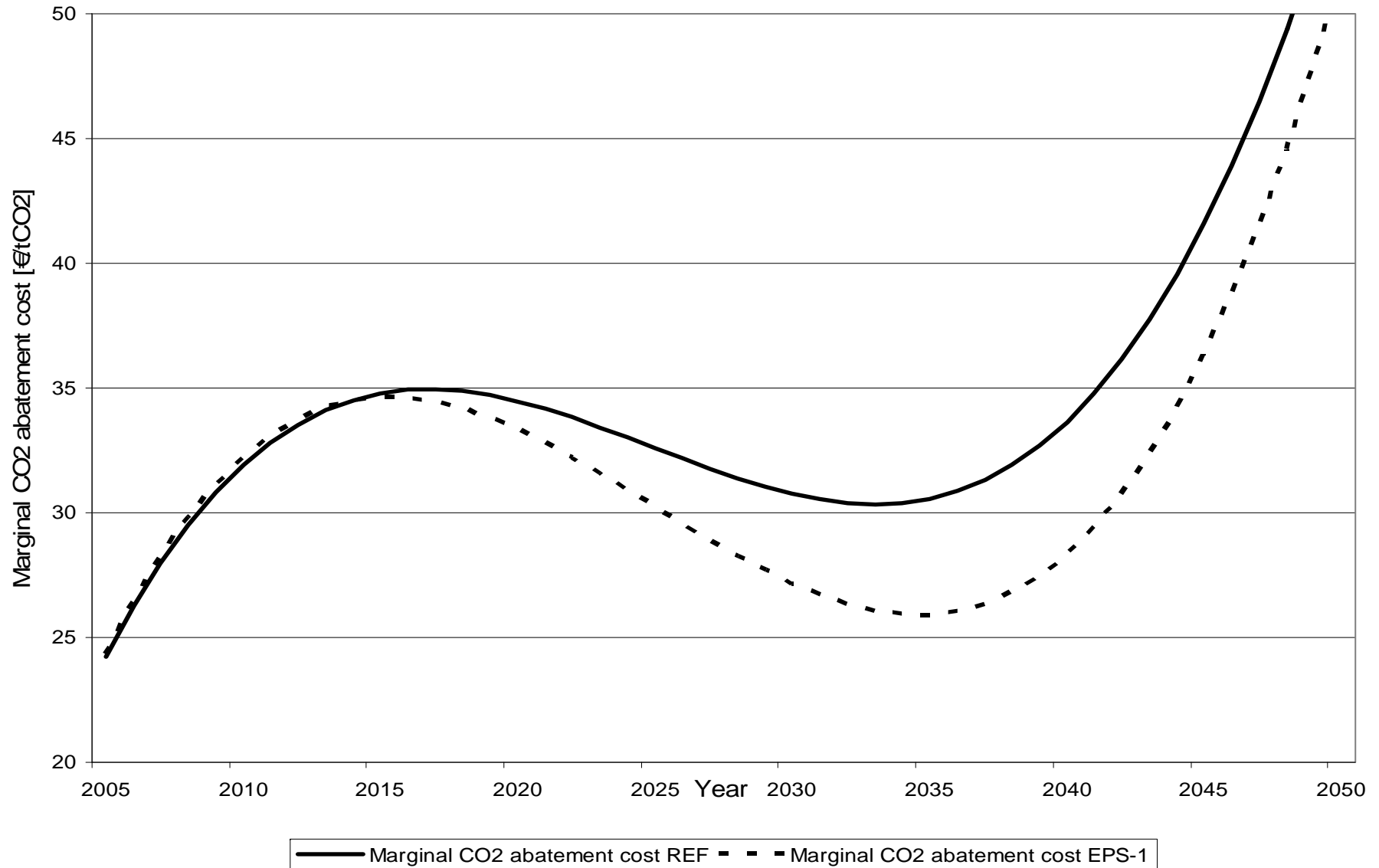
EPS on new power plants, example EPS-1

(the same cap applied 30% CO₂ emission reduction by 2020 and 85% by 2050)



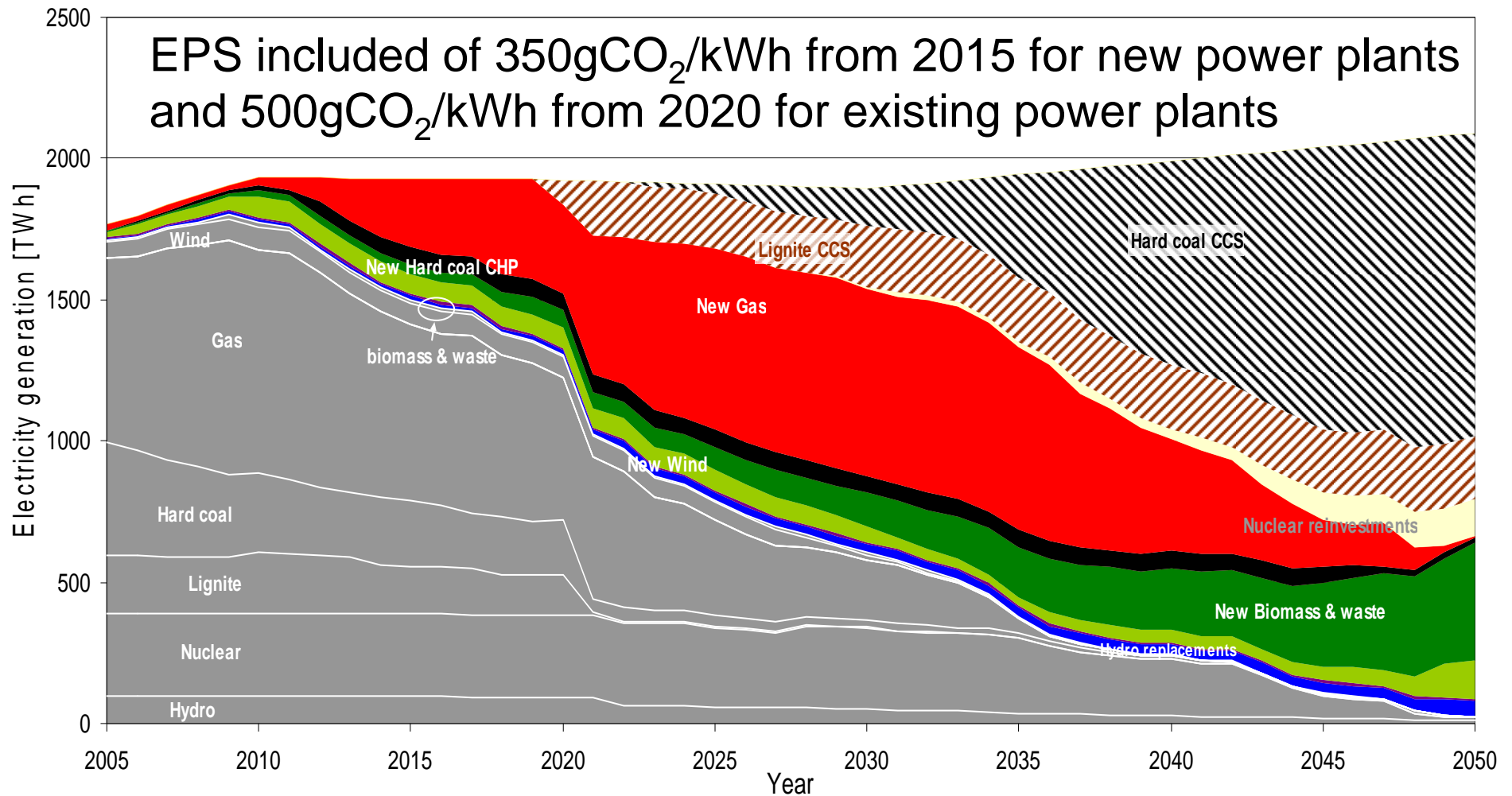
EPS on new power plants – Marginal abatement costs

(the same cap applied 30% CO₂ emission reduction by 2020 and 85% by 2050)



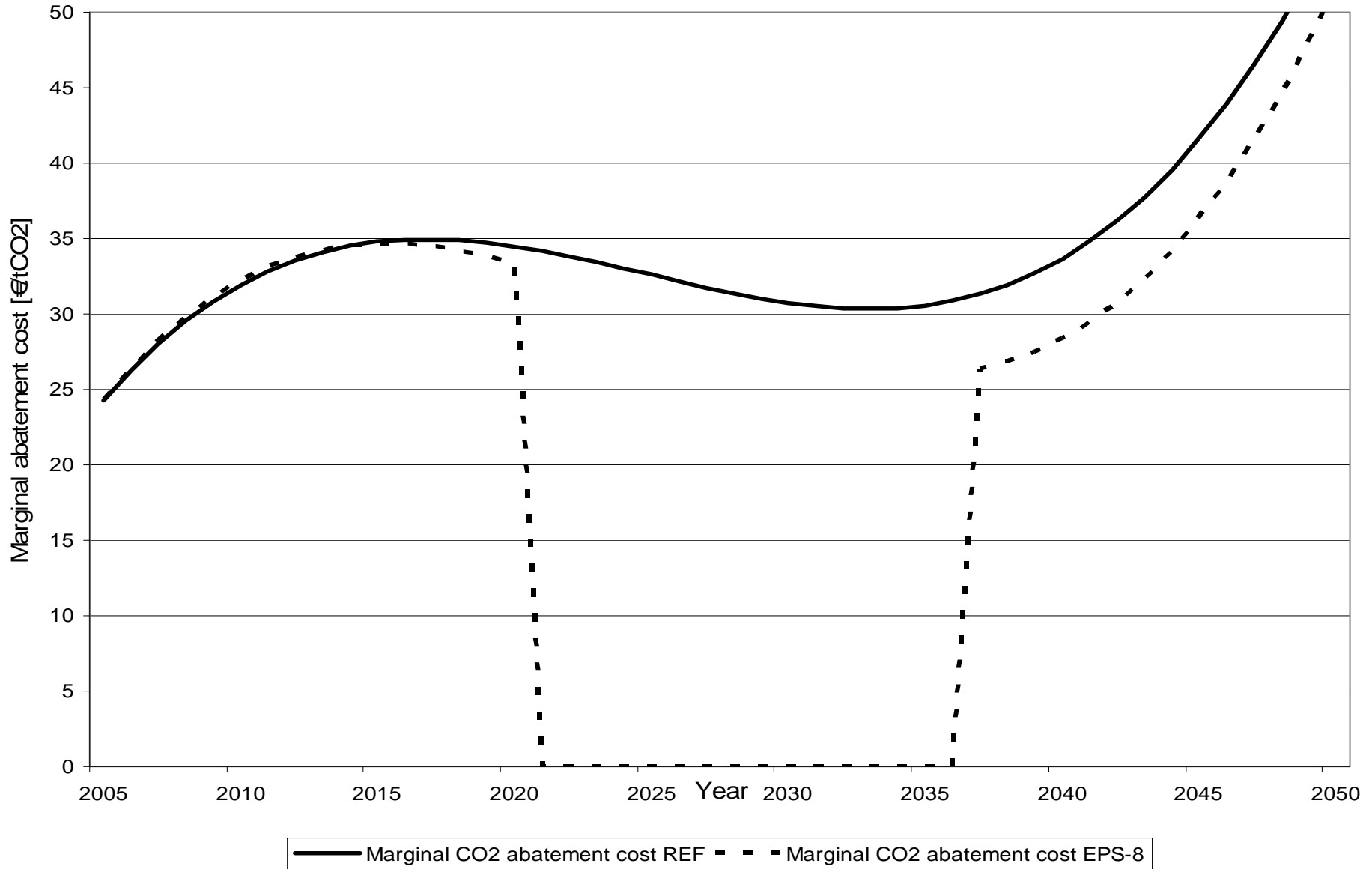
EPS on all power plants, example EPS-6

(the same cap applied 30% CO₂ emission reduction by 2020 and 85% by 2050)

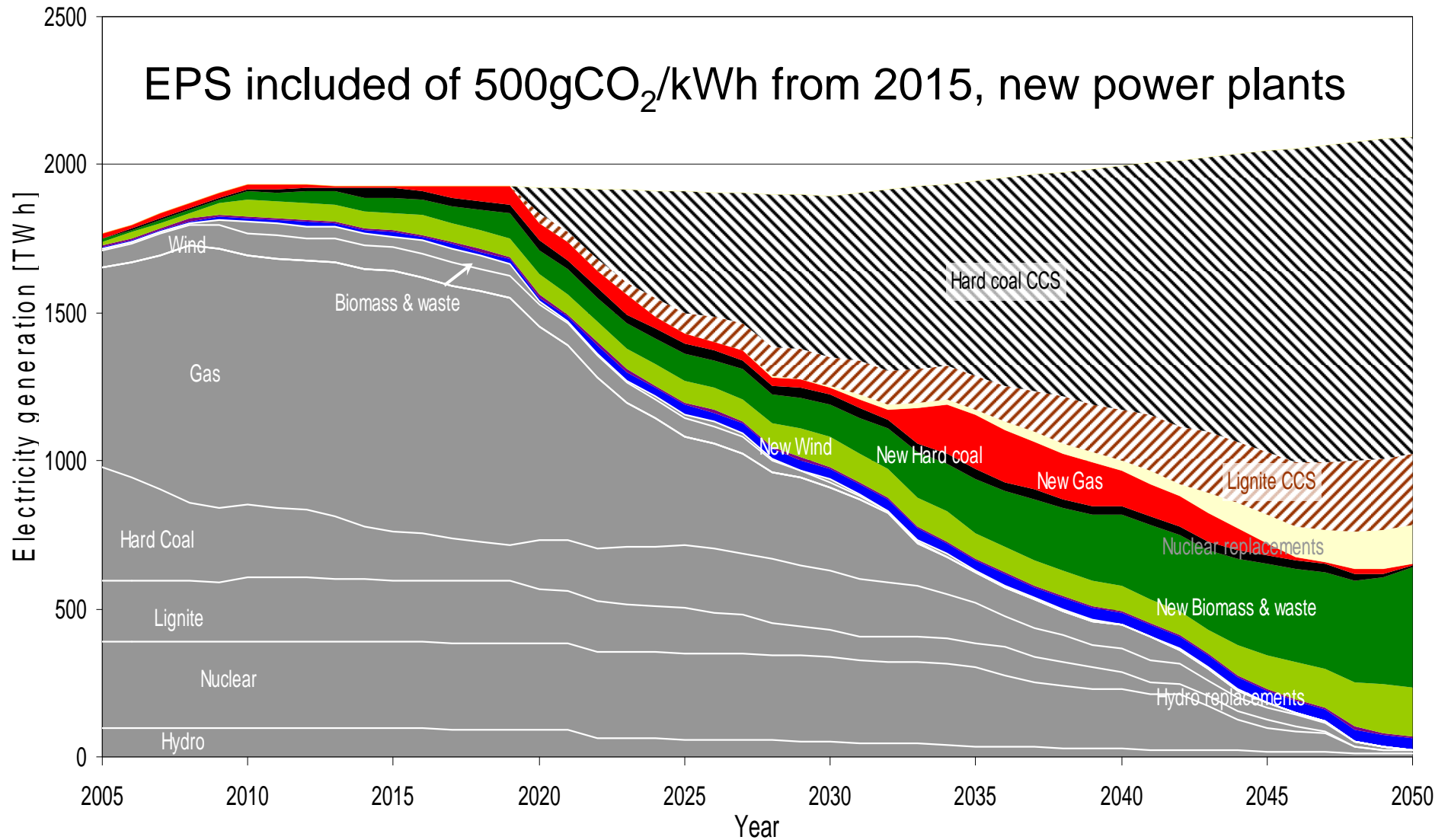


EPS on all power plants – Marginal abatement costs

(the same cap applied 30% CO₂ emission reduction by 2020 and 85% by 2050)

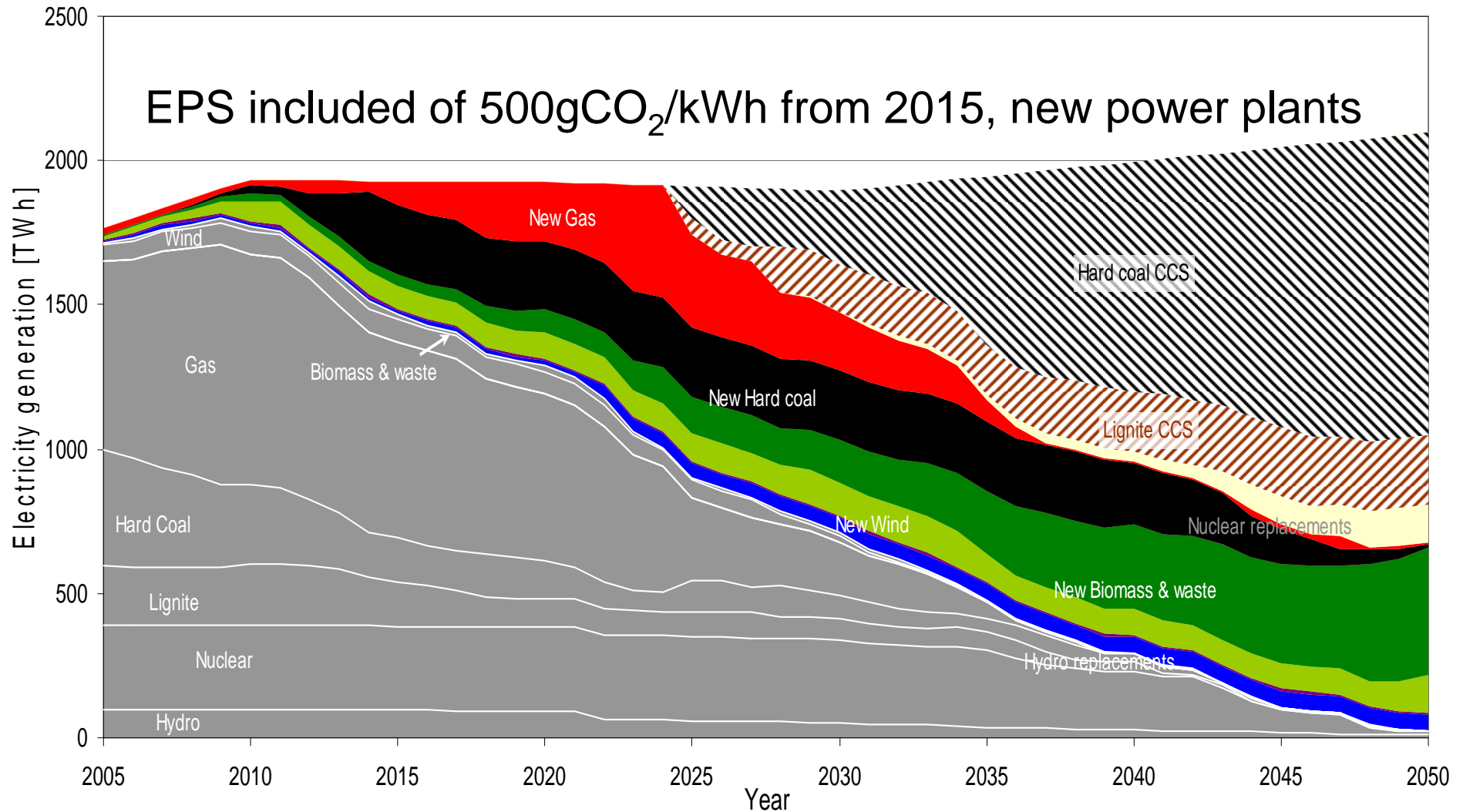


Lifetime extension on existing power plants by 10 years (the same cap applied 30% CO₂ emission reduction by 2020 and 85% by 2050)



Deferred CCS – availability of CCS delayed by 5-10 years

(the same cap applied 30% CO₂ emission reduction by 2020 and 85% by 2050)

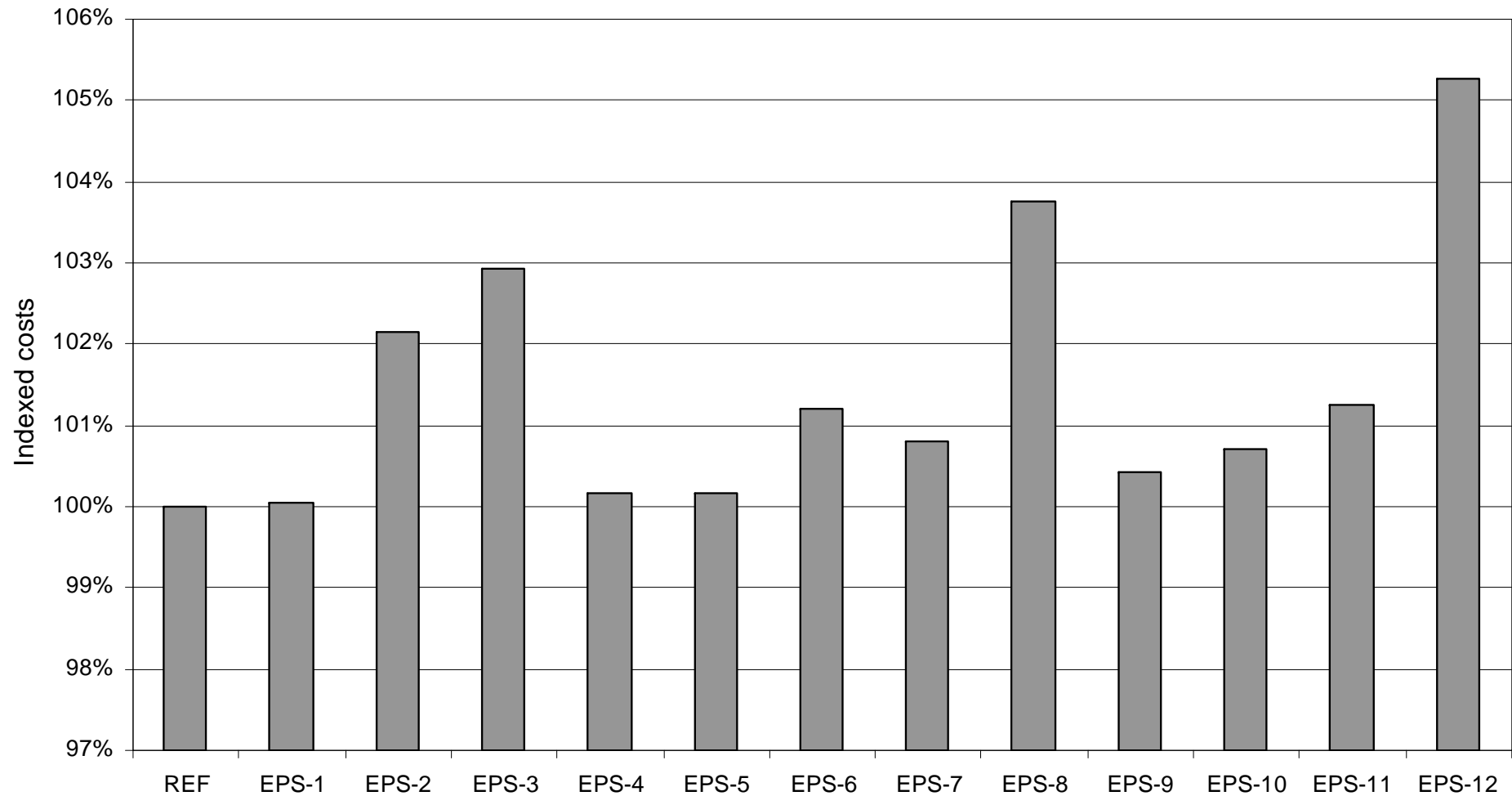


Conclusions

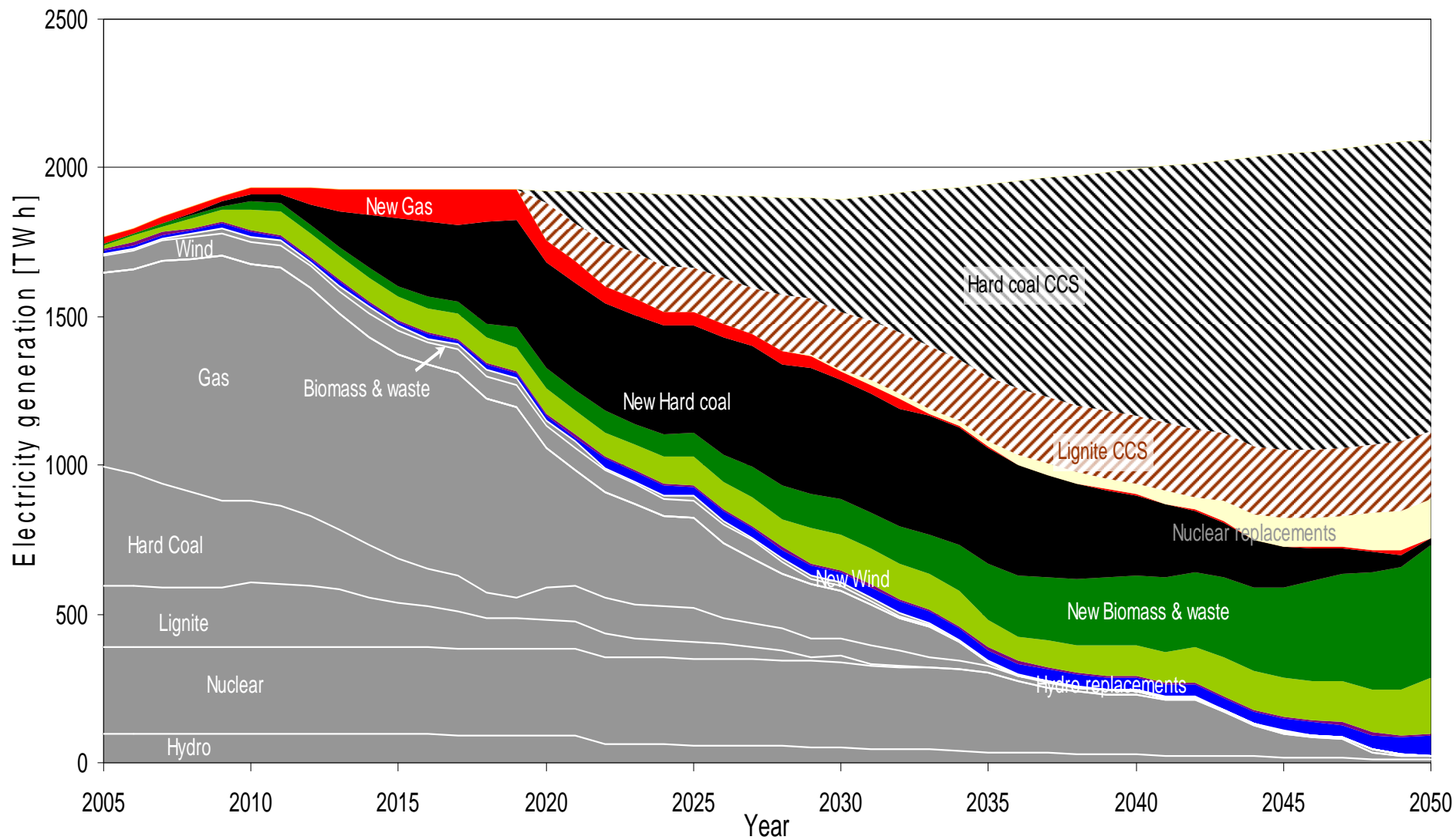
- EPS on new power plants have marginal effect on choice of technology (Gas up to 2020 and CCS thereafter)
- EPS on existing power plants may lead to rapid replacement strategy
- EPS on all plants may cause EU ETS to "fail", i.e. zero prices on emission permits
- EPS can cause larger imports of gas to Europe and higher cost of reaching emission targets (limiting technology choice)

Scenario	Power plants	Time line										
		2010	2015	2020	2025	2030	2035	2040	2045	2050		
REF	Existing											
	New											
	Remarks	Reference scenario, No EPS, EU-20-20-20-2020 targets										
EPS-1	Existing											
	New		EPS level 500gCO ₂ /kWh									
	Remarks											
EPS-2	Existing		EPS level 500gCO ₂ /kWh									
	New		EPS level 500gCO ₂ /kWh									
	Remarks											
EPS-3	Existing											
	New		EPS level 500gCO ₂ /kWh									
	Remarks	10 year lifetime extension on existing thermal power plants										
EPS-4	Existing											
	New		EPS level 350gCO ₂ /kWh									
	Remarks											
EPS-5	Existing											
	New		EPS level 350gCO ₂ /kWh									
	Remarks											
EPS-6	Existing			EPS level 500gCO ₂ /kWh								
	New		EPS level 350gCO ₂ /kWh									
	Remarks											
EPS-7	Existing											
	New		EPS level 150gCO ₂ /kWh									
	Remarks											
EPS-8	Existing			EPS level 350gCO ₂ /kWh								
	New		EPS level 150gCO ₂ /kWh									
	Remarks											
EPS-9	Existing											
	New		EPS level 500gCO ₂ /kWh									
	Remarks	CCS introduction year delayed by 5 years (from 2020 to 2025)										
EPS-10	Existing											
	New		EPS level 500gCO ₂ /kWh									
	Remarks	CCS introduction year delayed by 10 years (from 2020 to 2030)										
EPS-11	Existing			EPS level 500gCO ₂ /kWh								
	New		EPS level 350gCO ₂ /kWh									
	Remarks	CCS introduction year delayed by 5 years (from 2020 to 2025)										
EPS-12	Existing			EPS level 350gCO ₂ /kWh								
	New		EPS level 150gCO ₂ /kWh									
	Remarks	CCS introduction year delayed by 5 years (from 2020 to 2025)										

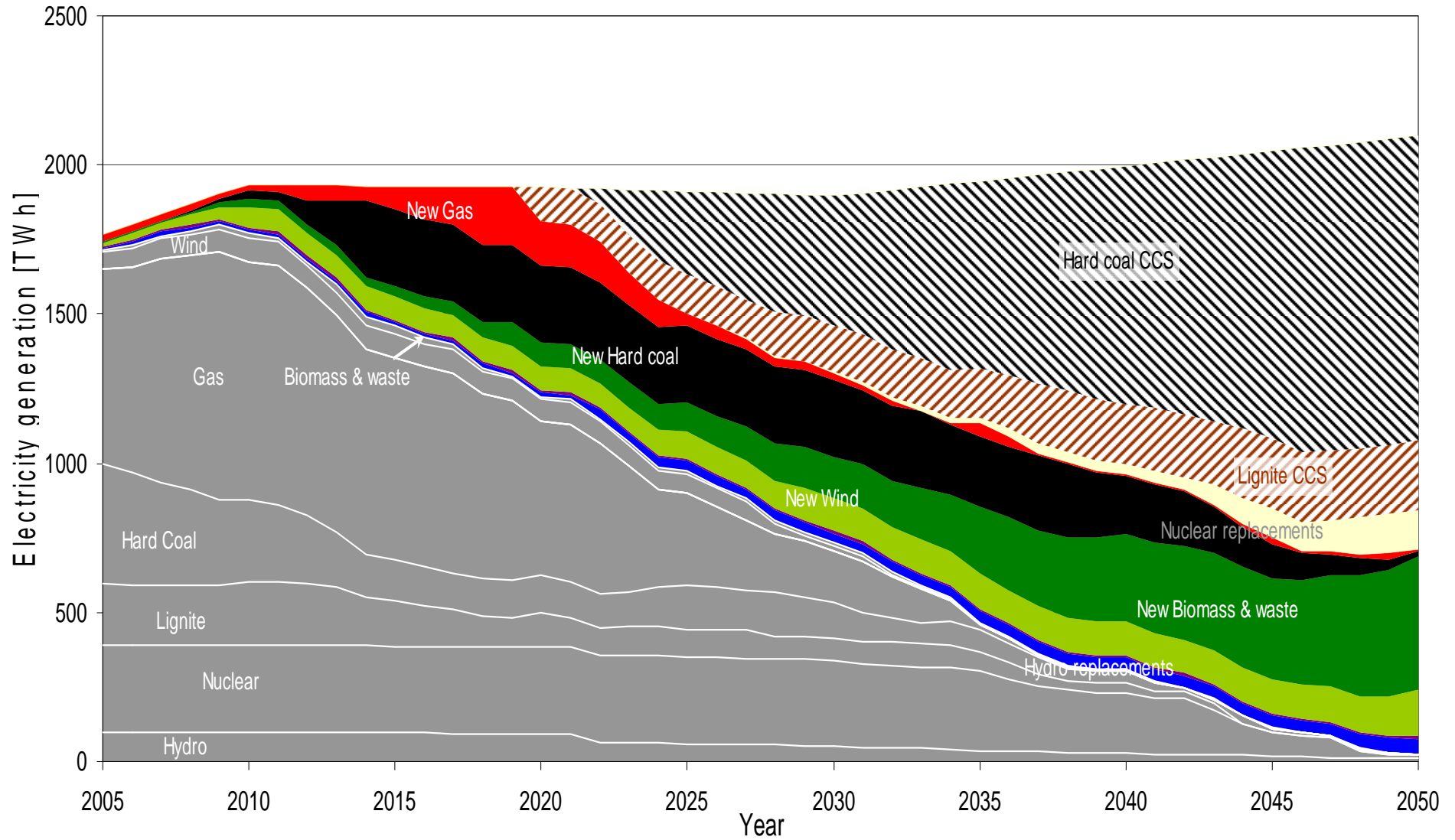
System cost comparison



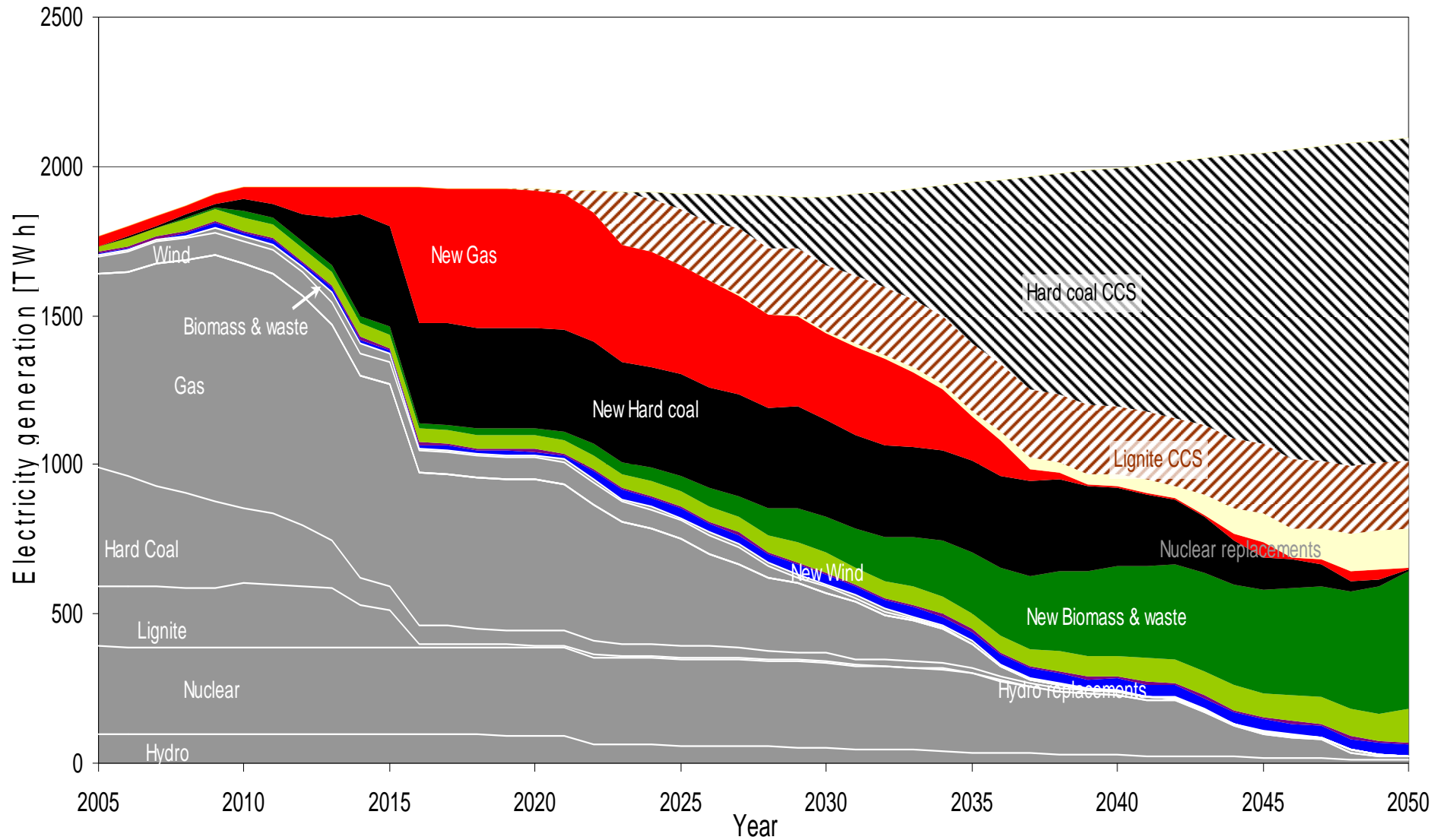
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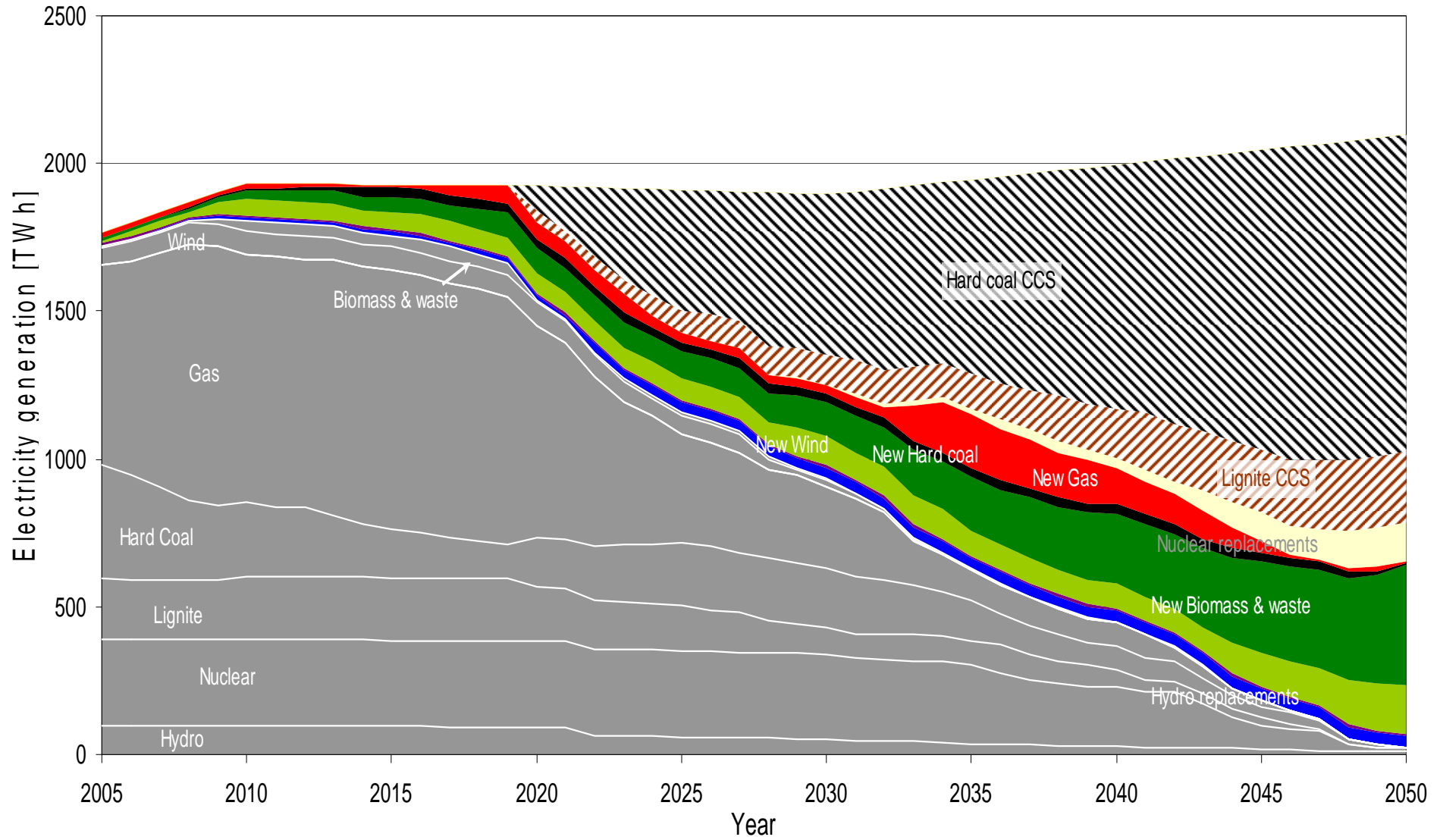
EPS-1



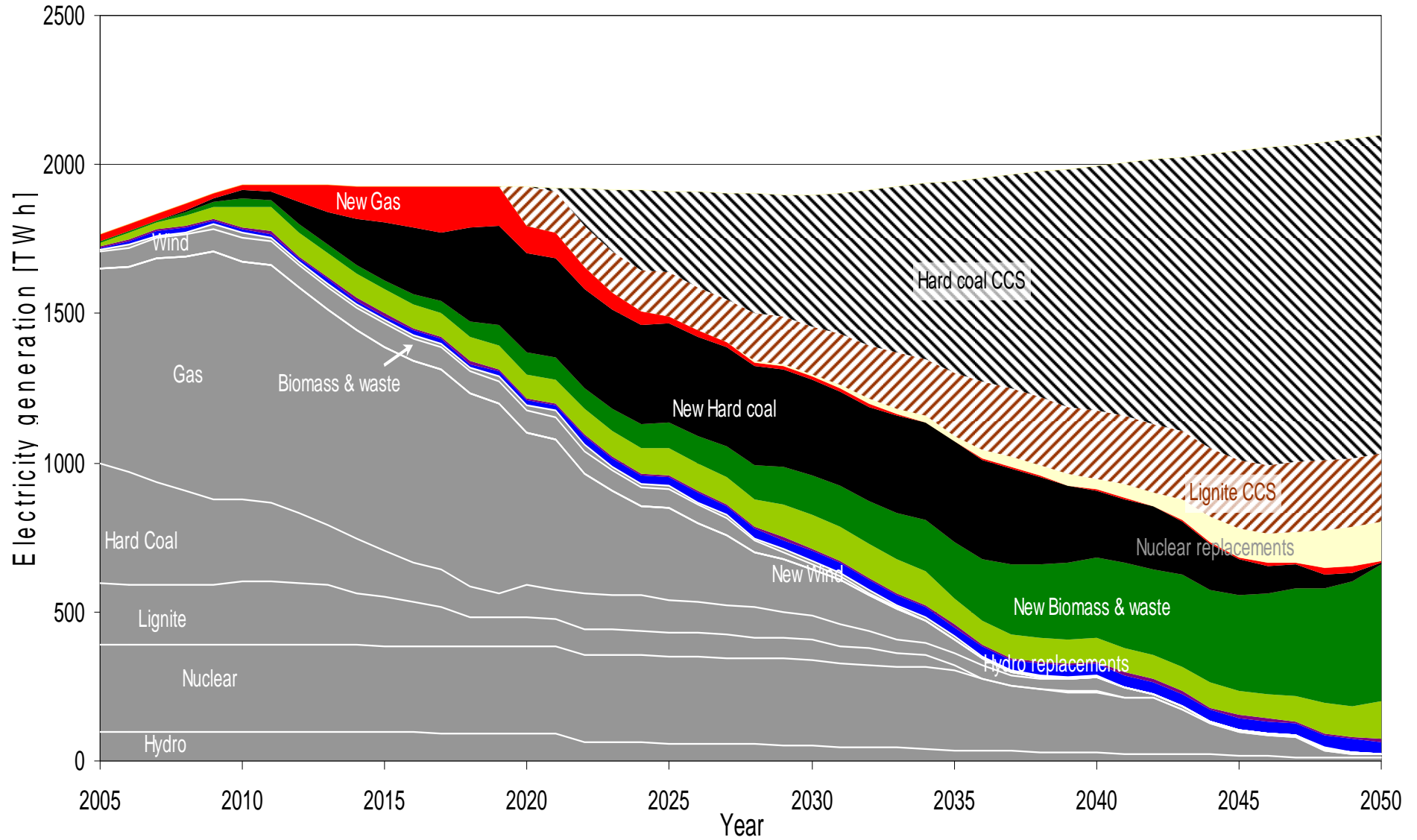
EPS-2



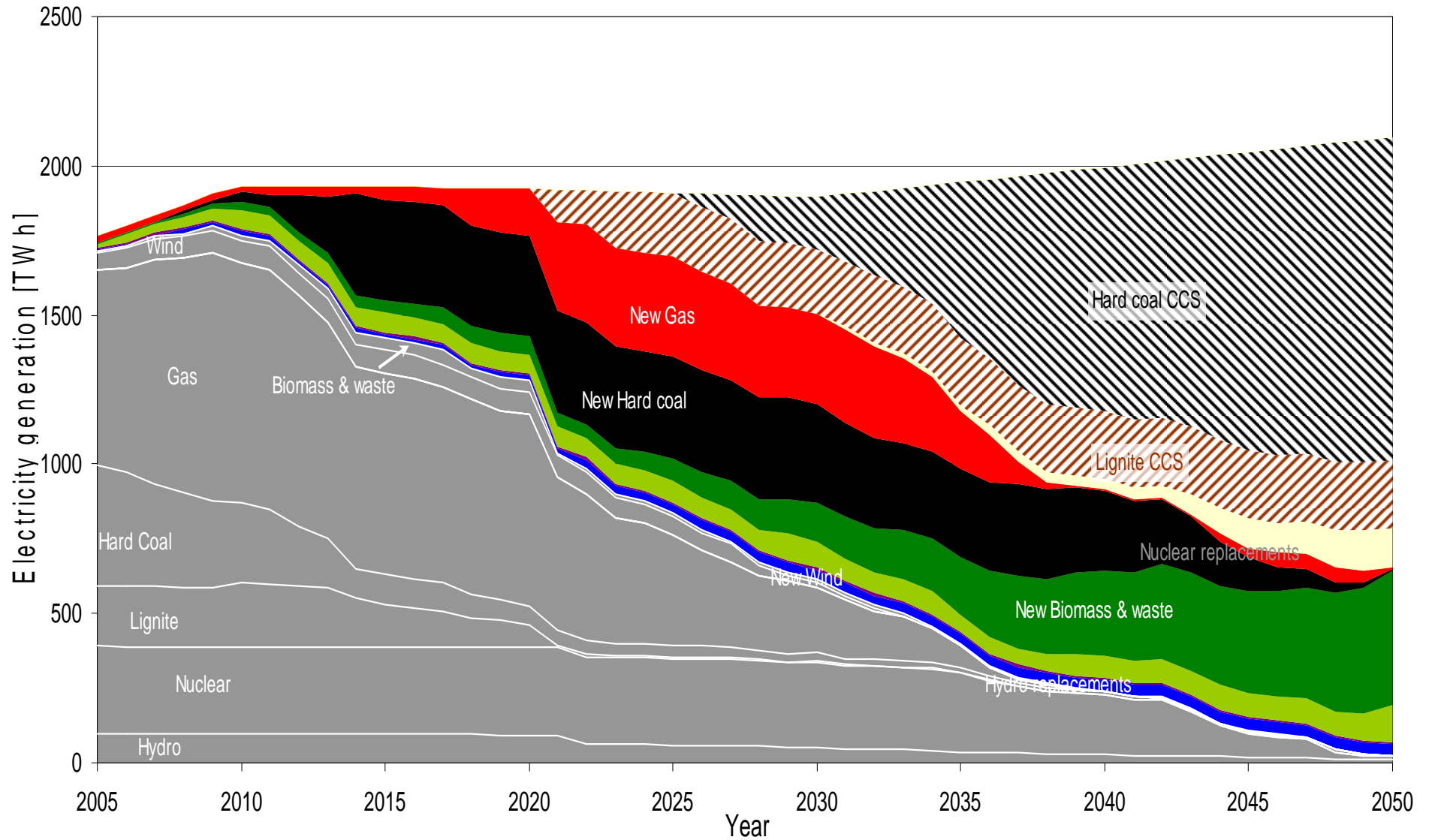
EPS-3



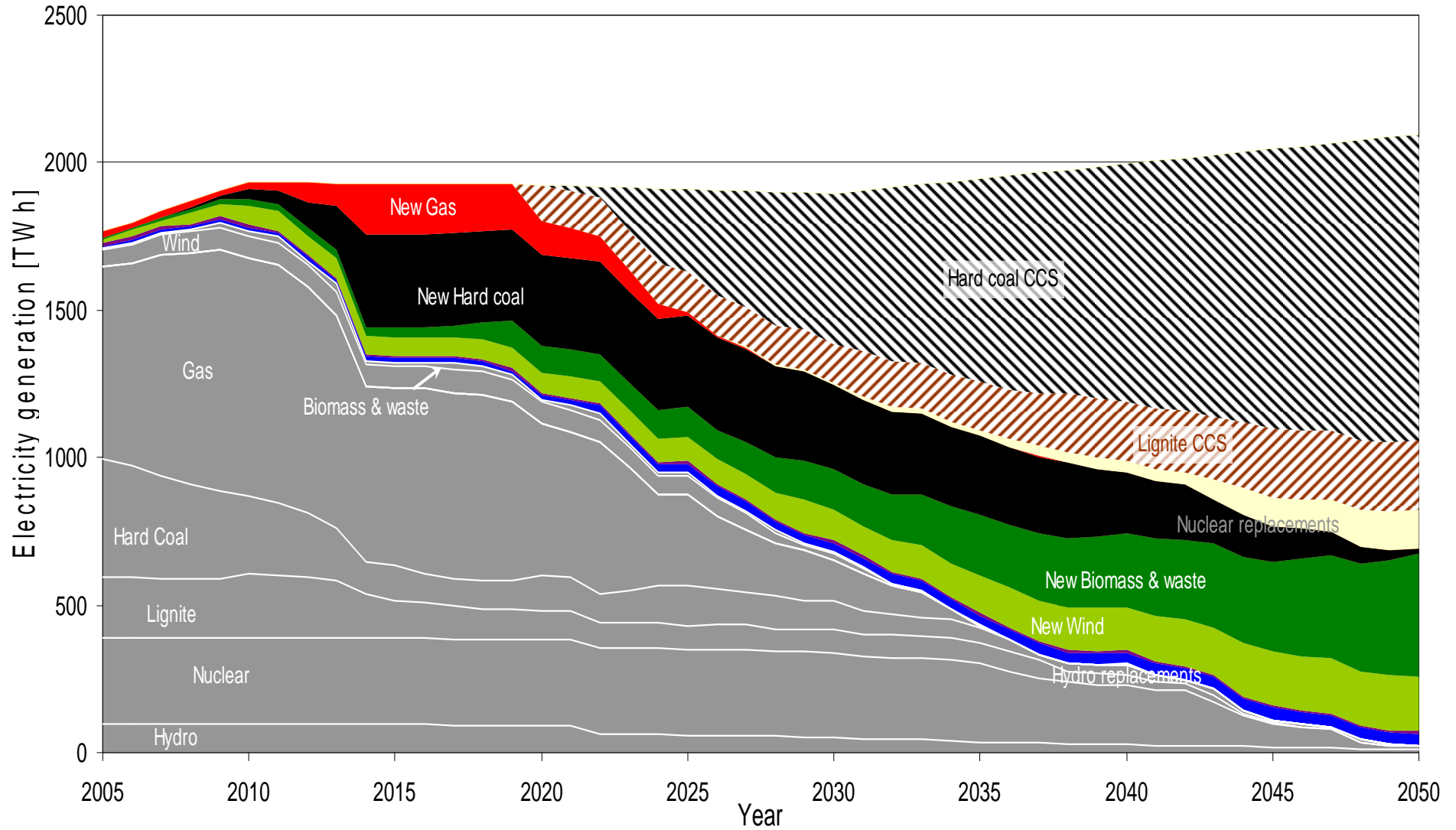
EPS-5



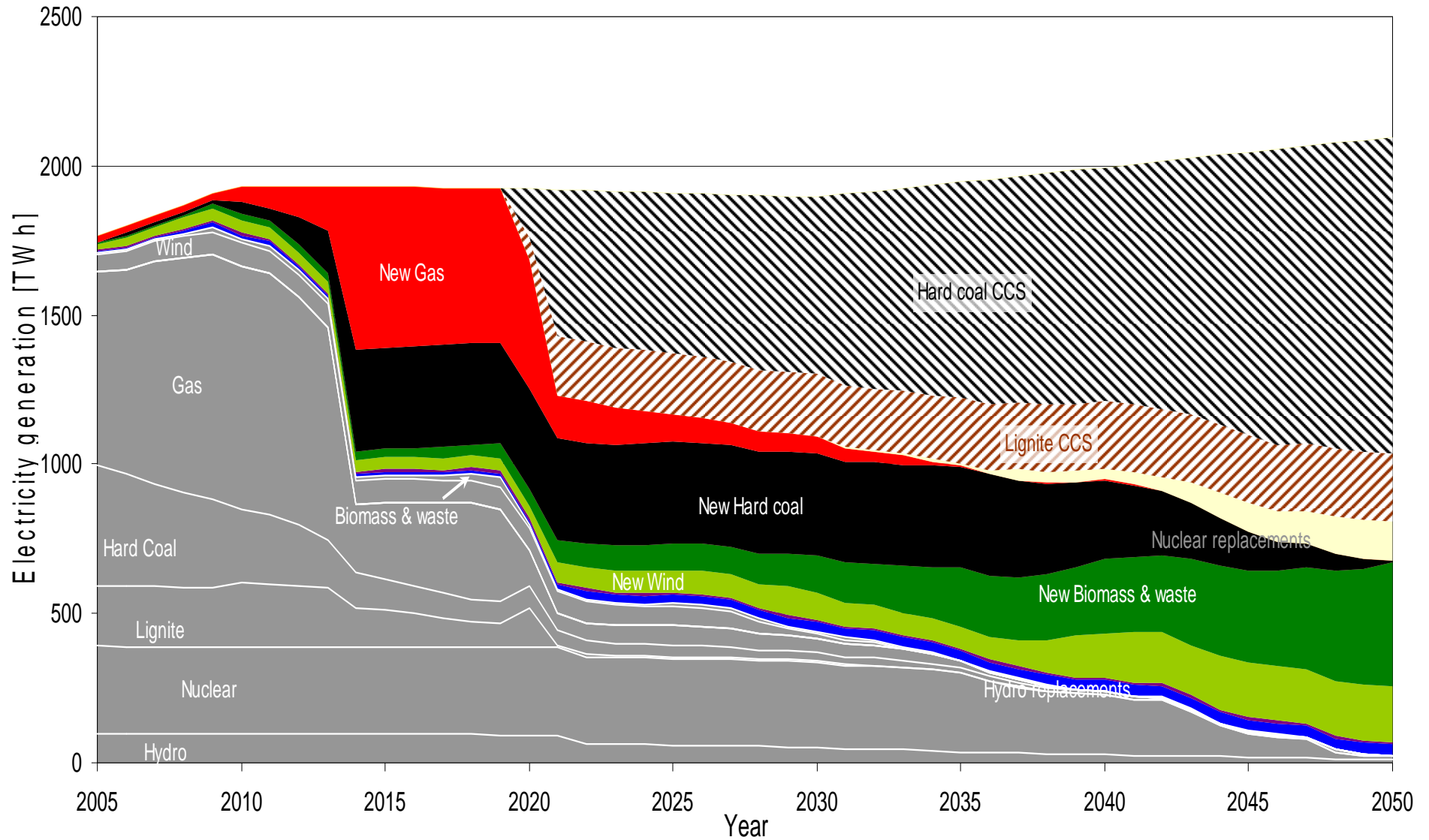
EPS-6



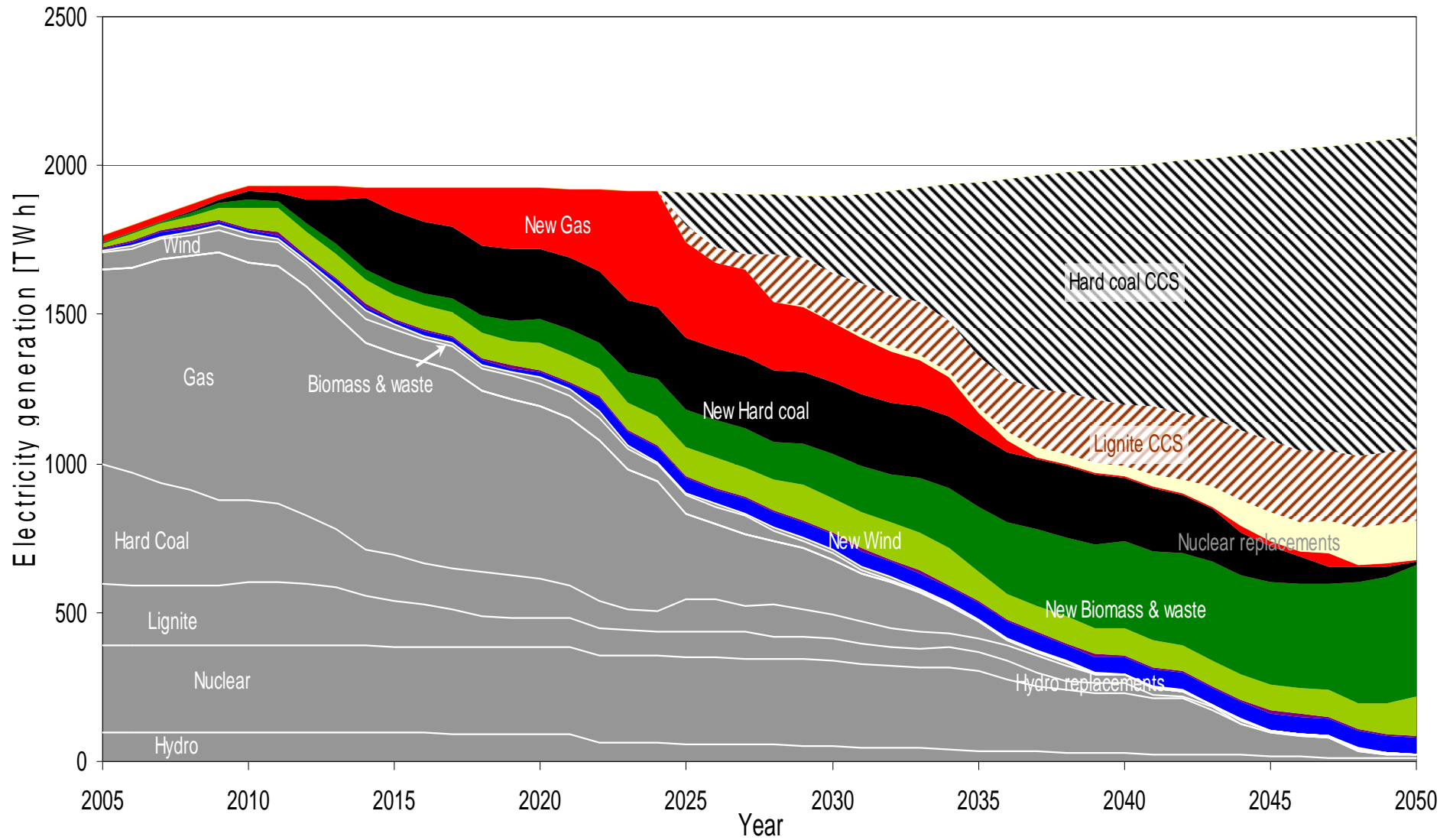
EPS-7



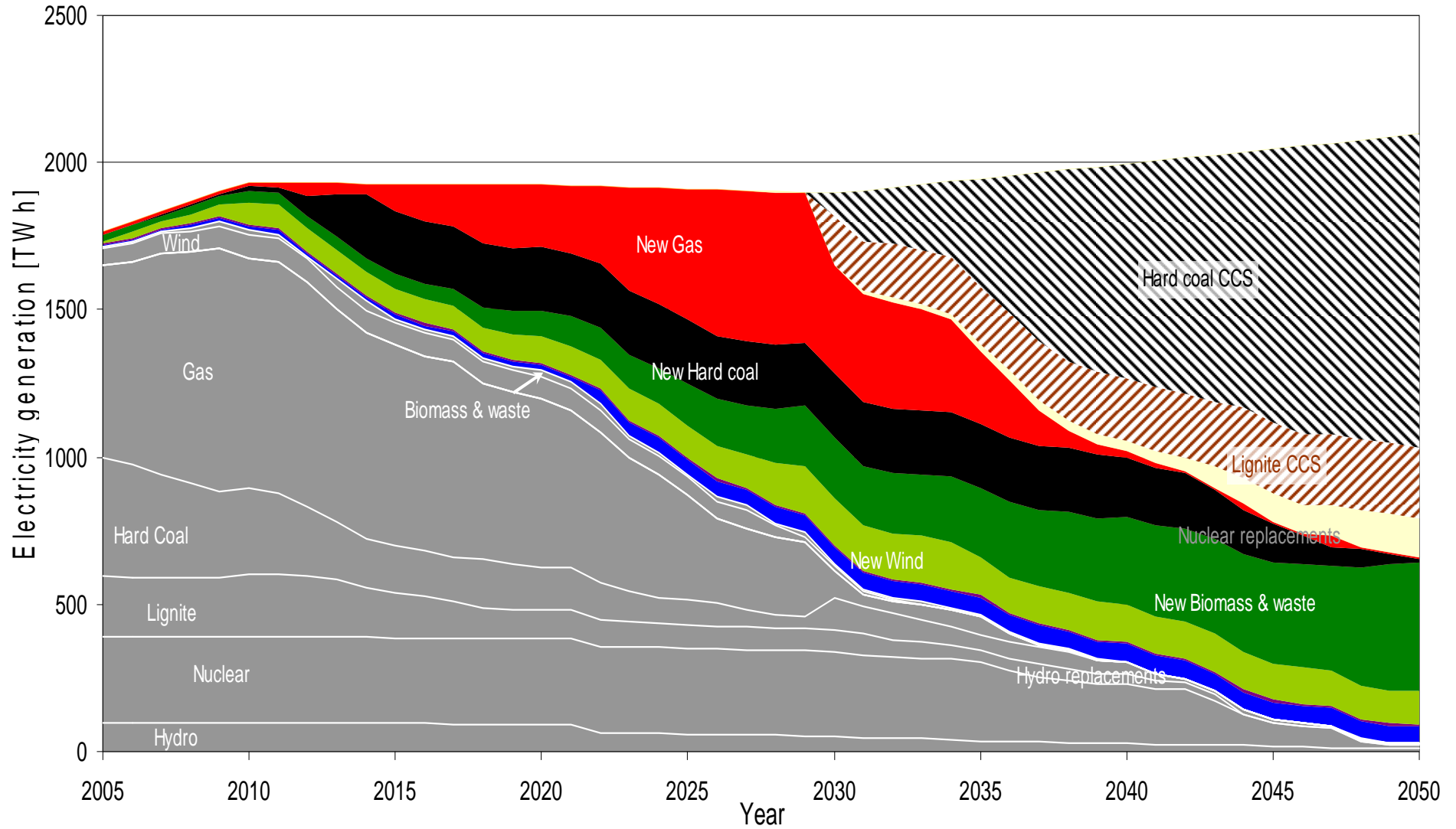
EPS-8



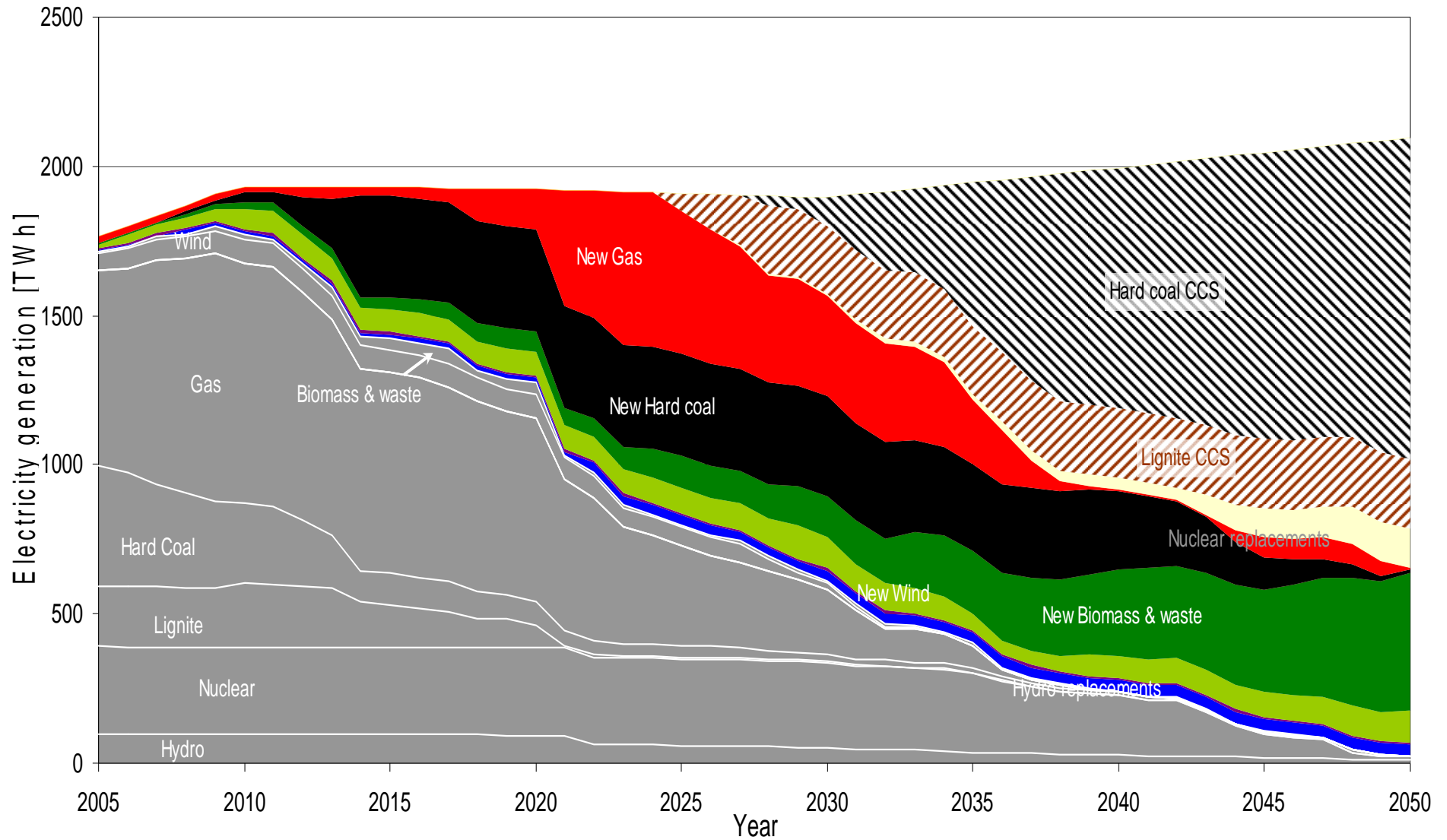
EPS-9



EPS-10



EPS-11



EPS-12

