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Low-carbon energy system transformation: the role of markets

Mike Bostan

PhD candidate, University of Maastricht
Energy Markets Coordinator, EFET – European Federation for Energy Traders

Contents

PhD Research questions

Ambition of the EU electricity policy

Empirical research

Outcome

Role of markets

PhD research questions

- How **ambitious** is the European electricity policy regarding each of the pillars of energy policy (affordability, environment, security of supply, + internal market)?
- What factors are influencing this ambition?

identifying the consecutive goals that are set for the main pillars of the EU electricity policy

quantifying all available binding goals of the European Union in the field of electricity, in a selected period of time

comparing goals against each other to see their evolution in time.

Ambition of the EU electricity policy (1)

identifying the consecutive goals that are set for the main pillars of the EU electricity policy

- To **start with 1986**, widely taken as a starting point for a true EU policy by much of the literature, to latest year (2018)

Take **only binding legislation** (Directive, Regulation, Decision), leaving aside non-binding (Resolution, Conclusion, Information and Recommendation)

- Select from **electricity-related fields** (Energy and Environment Directory Code), NOT from energy-related (*i.e.* oil)

- **Single research point**: European Council Registry

Ambition of the EU electricity policy (2)

quantifying all available binding goals of the European Union in the field of electricity, in a selected period of time

- Look at literature for similar stocktaking exercises
- **Policy density** (number of policies put in place to reach a policy goal) + *policy intensity* (focuses on the content of the policy instruments) - BOTH
- **Policy outcome** (if the policy solved the problem that was supposed to solve) vs. *policy output* (looks at actions taken in response to the law) – policy outcome chosen, to simplify research
- Binding goals tagged by pillar, category, importance, stage, year, etc.

Ambition of the EU electricity policy (3)

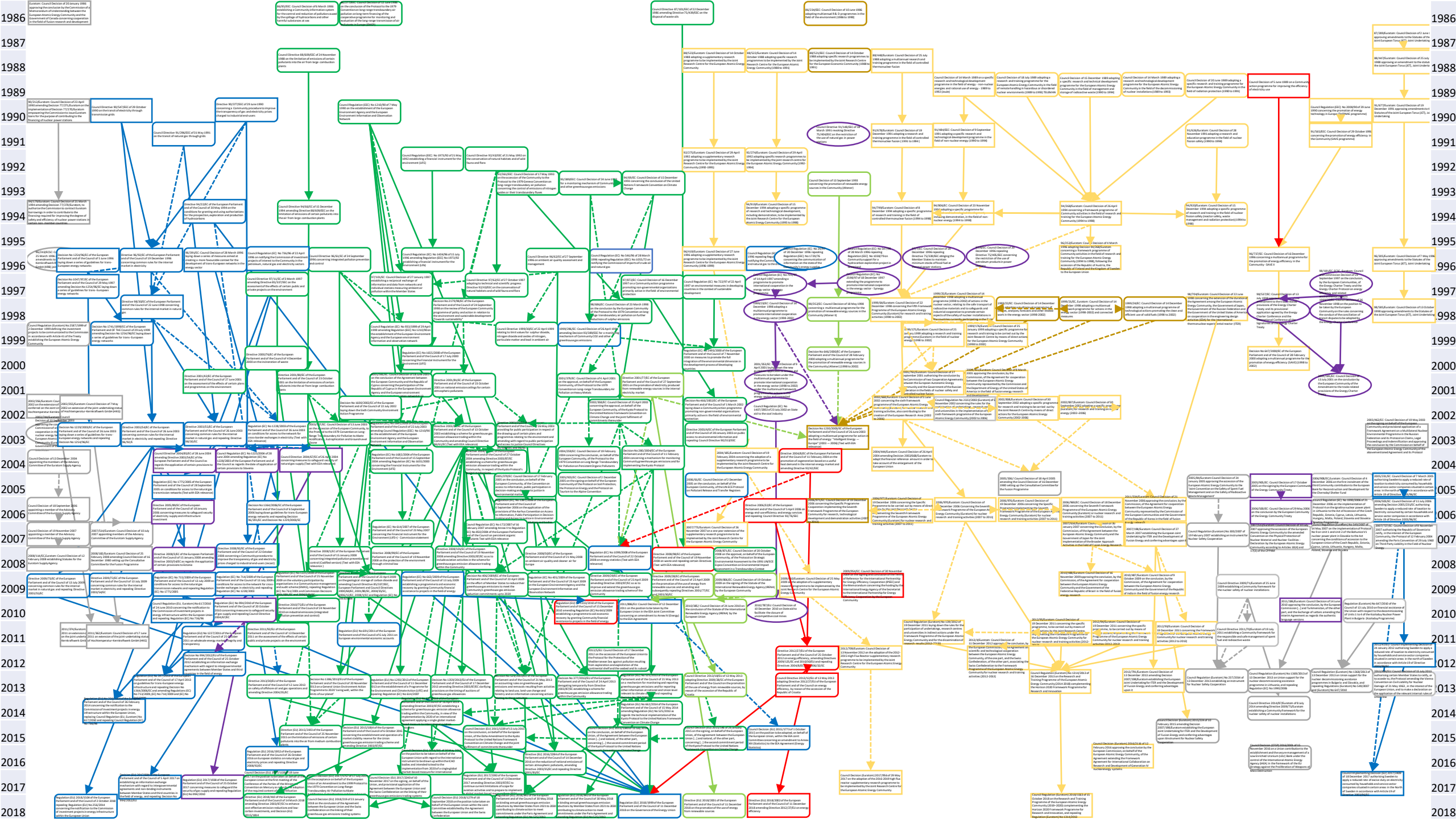
comparing binding goals against each other to see their evolution in time.

- What pillars/categories have high/low policy **density/intensity**
- Are the four main objectives of energy policies **pursued equally?** (i.e. one objective having progressively tightening targets, while another kept at same level)
- Is there a **pattern on policy failure** (i.e. targets for an energy objective consistently not achieved)
- Is there a **pattern on policy success** (i.e. targets for an energy objective consistently achieved)

Empirical research (1)

- About 700 binding obligations/targets
- About 3,000 tags that we can work with

Binding obligations/ targets	Quantifiable/ Not quantifiab	A	New binding obligations/ targets	Pillar	Category	Provisions	Importance (1min-4max)	Legislation	Link	Stage	Year	ture	Repealed by (follow up)
Cooperation with Canada in nuclear fusion research	not quantifiable			affordability	Nuclear Energy	*Cooperation in the field*	1-foreign affairs	Euratom: Council Decision of 20 January 1986 approving the conclusion by the Commission of a Memorandum of Understanding between the European Atomic Energy Community and the Government of Canada concerning cooperation in the field of fusion research and development	https:	1986-1989	1986		In force
Higher costs for oil burning, due to better disposal	not quantifiable			environment	Environmental Protection	*Member States shall ta*	1-minor development	Council Directive 87/101/EEC of 22 December 1986 amending Directive 75/439/EEC on the disposal of waste oils	https:	1986-1989	1986		No longer in force, Date of end of validity: 11/12/2010; Implicitly repealed by 32008L0098
Commission makes an inventory of measures that can be taken in case of oil spills	not quantifiable			environment	Environmental Protection	*An information system*	3-expansion of duties	86/85/EEC: Council Decision of 6 March 1986 establishing a Community information system for the control and reduction of pollution caused by the spillage of hydrocarbons and other harmful substances at sea	https:	1986-1989	1986		No longer in force, Date of end of validity: 27/12/2000; Repealed by 32000D2850
EU signs the protocol on long-range pollution	not quantifiable			environment	Environmental Protection	*The Protocol to the 197*	3-important development	86/277/EEC: Council Decision of 12 June 1986 on the conclusion of the Protocol to the 1979 Convention on long-range transboundary air pollution on long-term financing of the cooperative programme for monitoring and evaluation of the long-range transmission of air pollutants in Europe (EMEP)	https:	1986-1989	1986		In force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Legend

Pillar

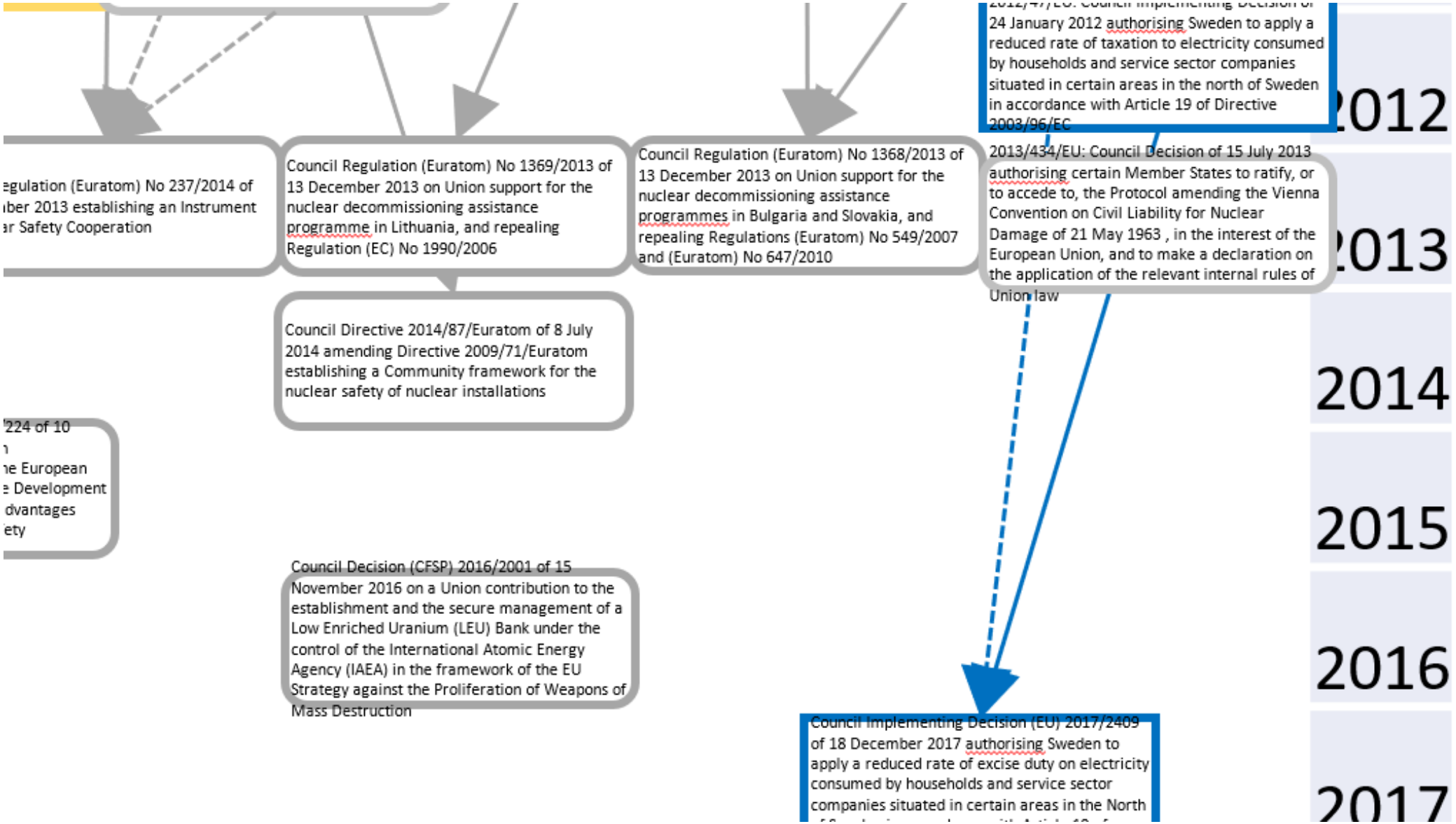
- Affordability
- Security of supply
- Environment
- Internal market

Category

- Renewable Energy
- Energy Efficiency and Savings
- Internal Energy Markets
- Security of Energy Supply
- Environmental Protection
- Nuclear Energy
- Nuclear Research
- Research and Development

Lines

- Direct reference (repeal, update, part of a framework, etc.)
- Referred (connected to) or related


24 January 2012 authorising Sweden to apply a reduced rate of taxation to electricity consumed by households and service sector companies situated in certain areas in the north of Sweden in accordance with Article 19 of Directive 2003/96/EC
2012
egulation (Euratom) No 237/2014 of
ber 2013 establishing an Instrument
r Safety Cooperation
Council Regulation (Euratom) No 1369/2013 of 13 December 2013 on Union support for the nuclear decommissioning assistance programme in Lithuania, and repealing Regulation (EC) No 1990/2006
Council Regulation (Euratom) No 1368/2013 of 13 December 2013 on Union support for the nuclear decommissioning assistance programmes in Bulgaria and Slovakia, and repealing Regulations (Euratom) No 549/2007 and (Euratom) No 647/2010
2013/434/EU: Council Decision of 15 July 2013 authorising certain Member States to ratify, or to accede to, the Protocol amending the Vienna Convention on Civil Liability for Nuclear Damage of 21 May 1963 , in the interest of the European Union, and to make a declaration on the application of the relevant internal rules of Union law
2013
Council Directive 2014/87/Euratom of 8 July 2014 amending Directive 2009/71/Euratom establishing a Community framework for the nuclear safety of nuclear installations
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2015
Council Decision (CFSP) 2016/2001 of 15 November 2016 on a Union contribution to the establishment and the secure management of a Low Enriched Uranium (LEU) Bank under the control of the International Atomic Energy Agency (IAEA) in the framework of the EU Strategy against the Proliferation of Weapons of Mass Destruction
2016
Council Implementing Decision (EU) 2017/2409 of 18 December 2017 authorising Sweden to apply a reduced rate of excise duty on electricity consumed by households and service sector companies situated in certain areas in the North
2017

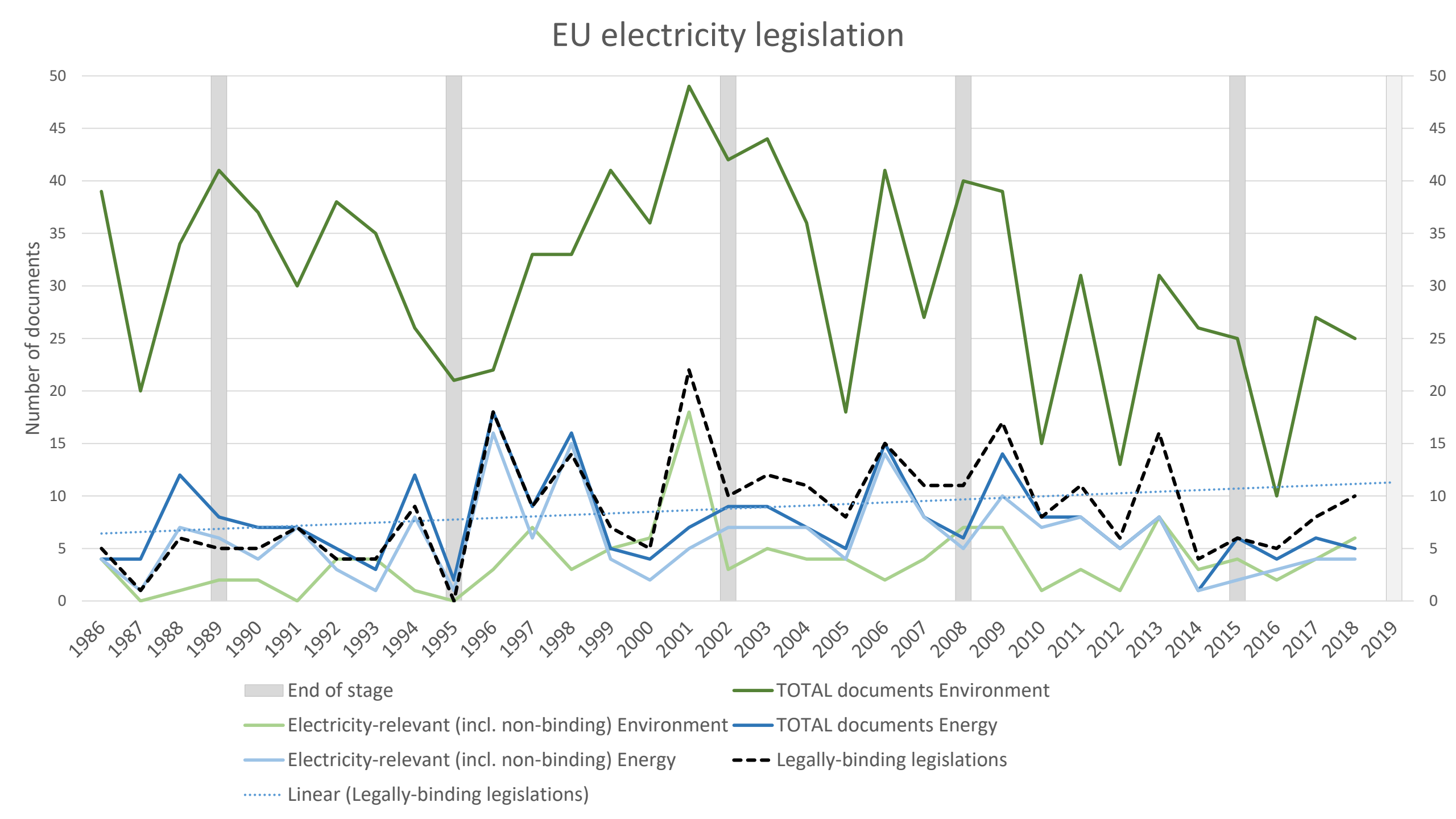
Empirical research (2) - consistency

- Great attention given to consistency:
  - **Mapping exercise** allows seeing similar branches of legislation, for consistent tagging
  - **Set of rules defined** (*i.e.* Nuclear Energy is on pillar affordability, because it is not publicly perceived as environment-friendly; and EU has little uranium, so cannot be security of supply)
  - **Each legislation followed** (if repealed, expired, in force, etc.) to make sure no legislation is missed*
  - **Checksums calculated**, to make sure all identified legislation is included (see next slide)

*some are missing indeed (not in Energy and Environment)

Early results

- Few programmes ever closed
- Some years see very high number of new legislation (new Commission?)
- Binding legislation increasing with every phase
- MS reporting data to the Commission on issue==>(guidelines?)==>issue gets environmentally limited (emissions, permits, etc)
- Fission getting large finance since 1988
- CO_2 emissions an issue since early 1990s
- Gradual expansion of EU institutions (EEA, ENTSO-E, Eurostat)
- Electricity across borders since 1990s
- Hard to "catch" all environmental legislation because of unknown effects
- Sometimes legislation in both Energy and Environment fields
- Never a reduction of Commission's duties


EU electricity legislation
Number of documents
50
45
40
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25
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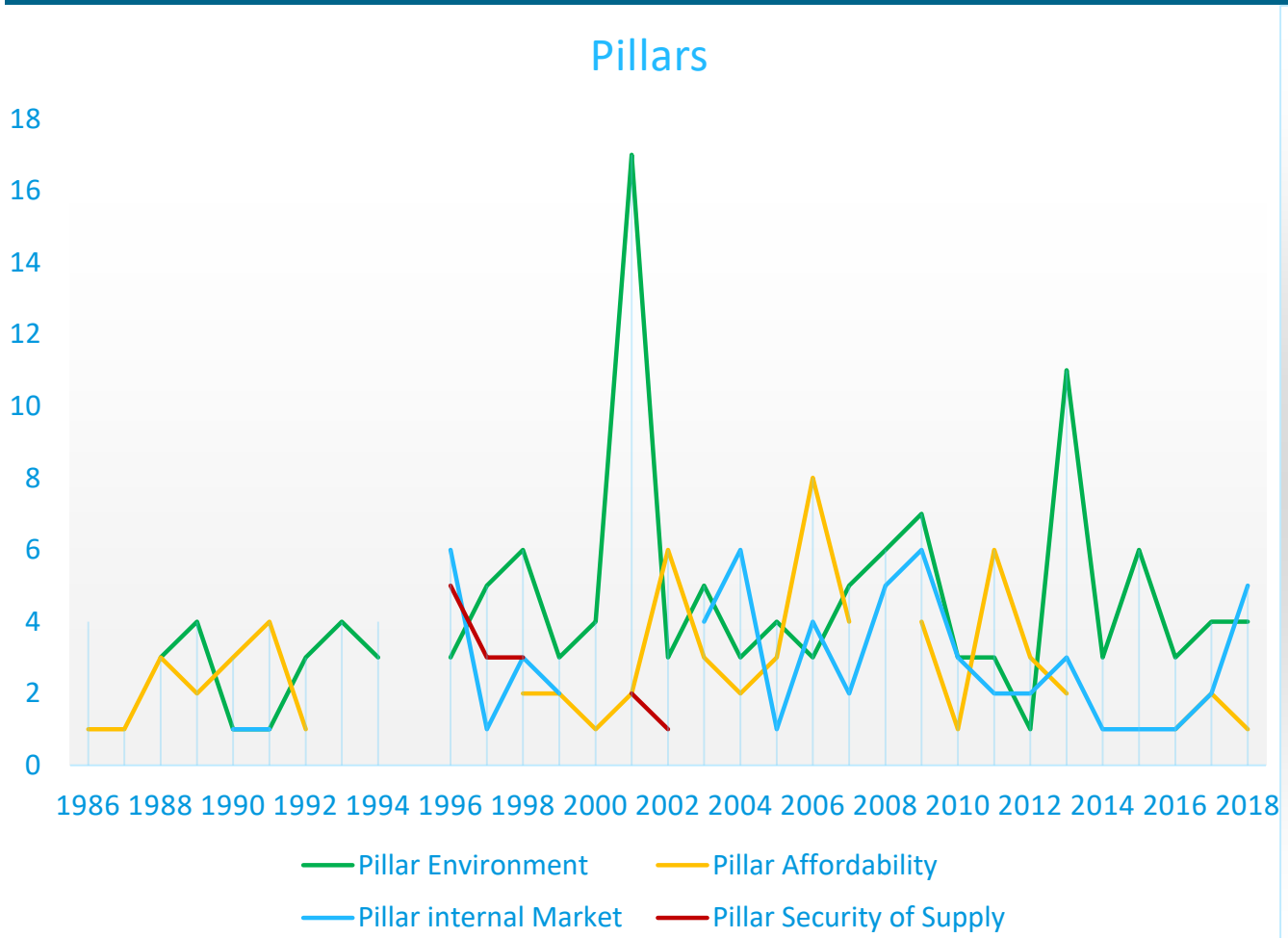
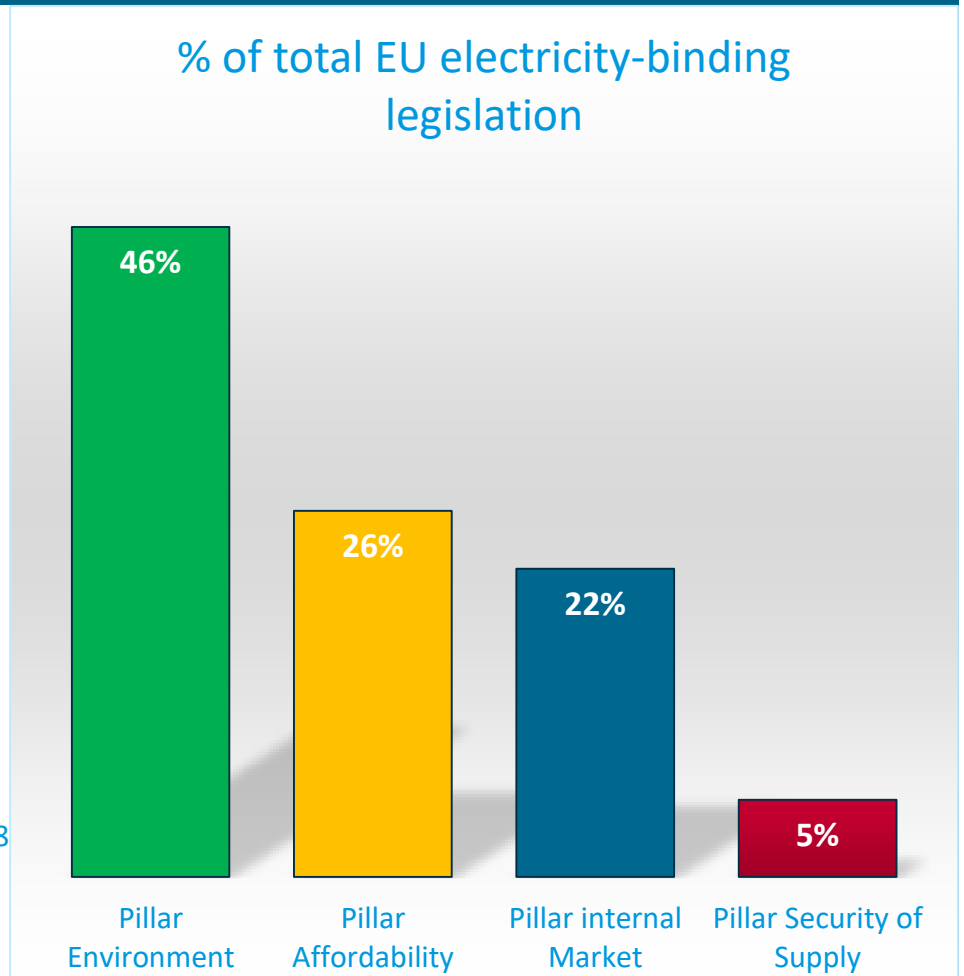
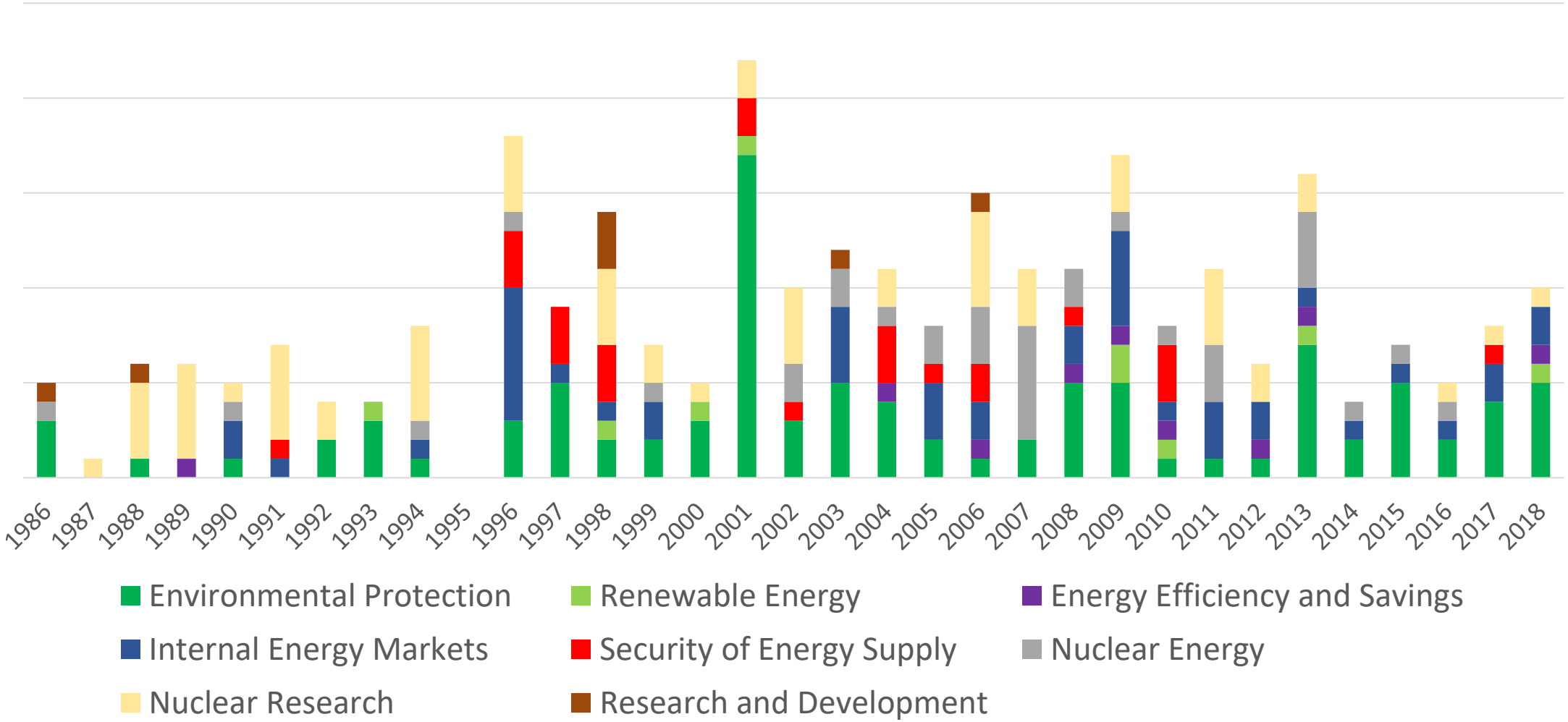
2019
End of stage
TOTAL documents Environment
Electricity-relevant (incl. non-binding) Environment
TOTAL documents Energy
Electricity-relevant (incl. non-binding) Energy
Legally-binding legislations
Linear (Legally-binding legislations)

Division I: Pillars

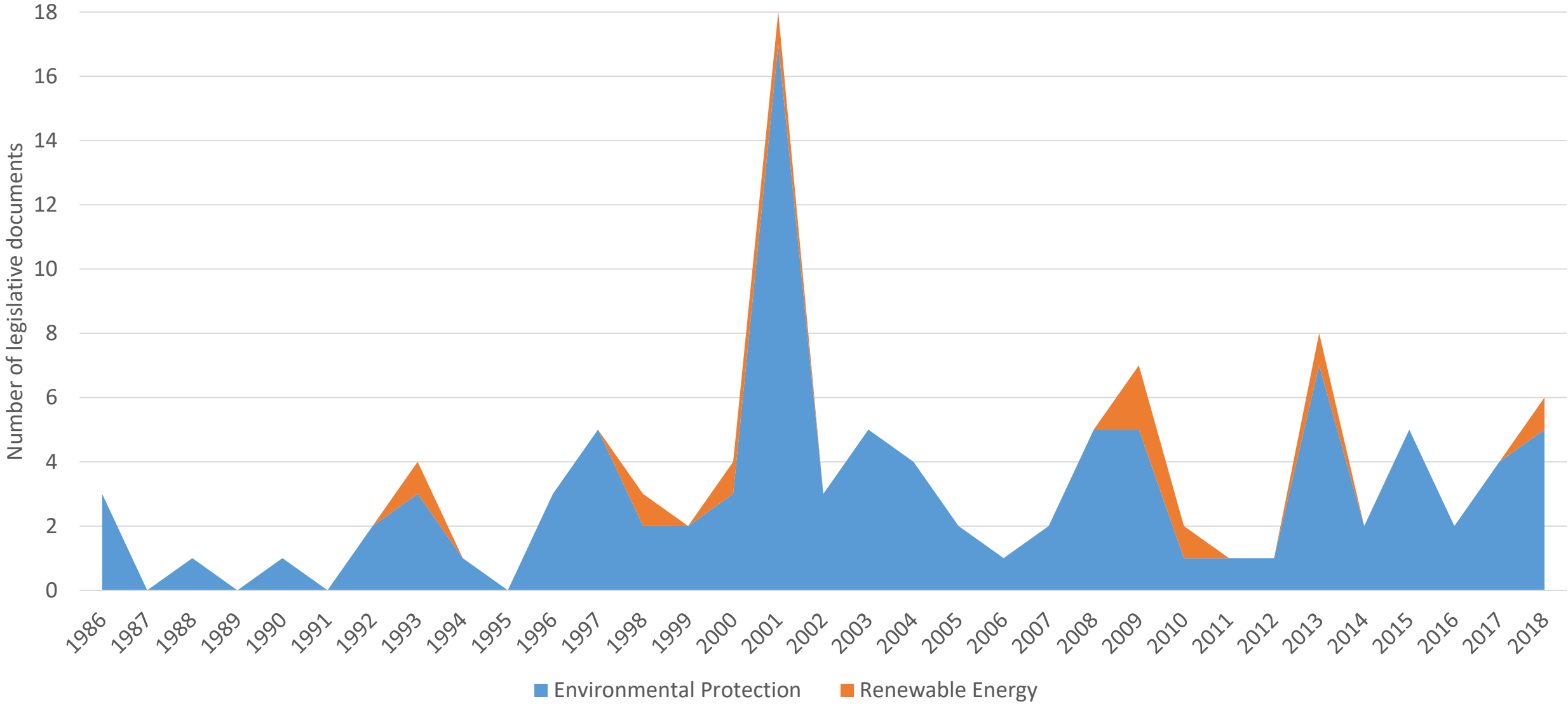




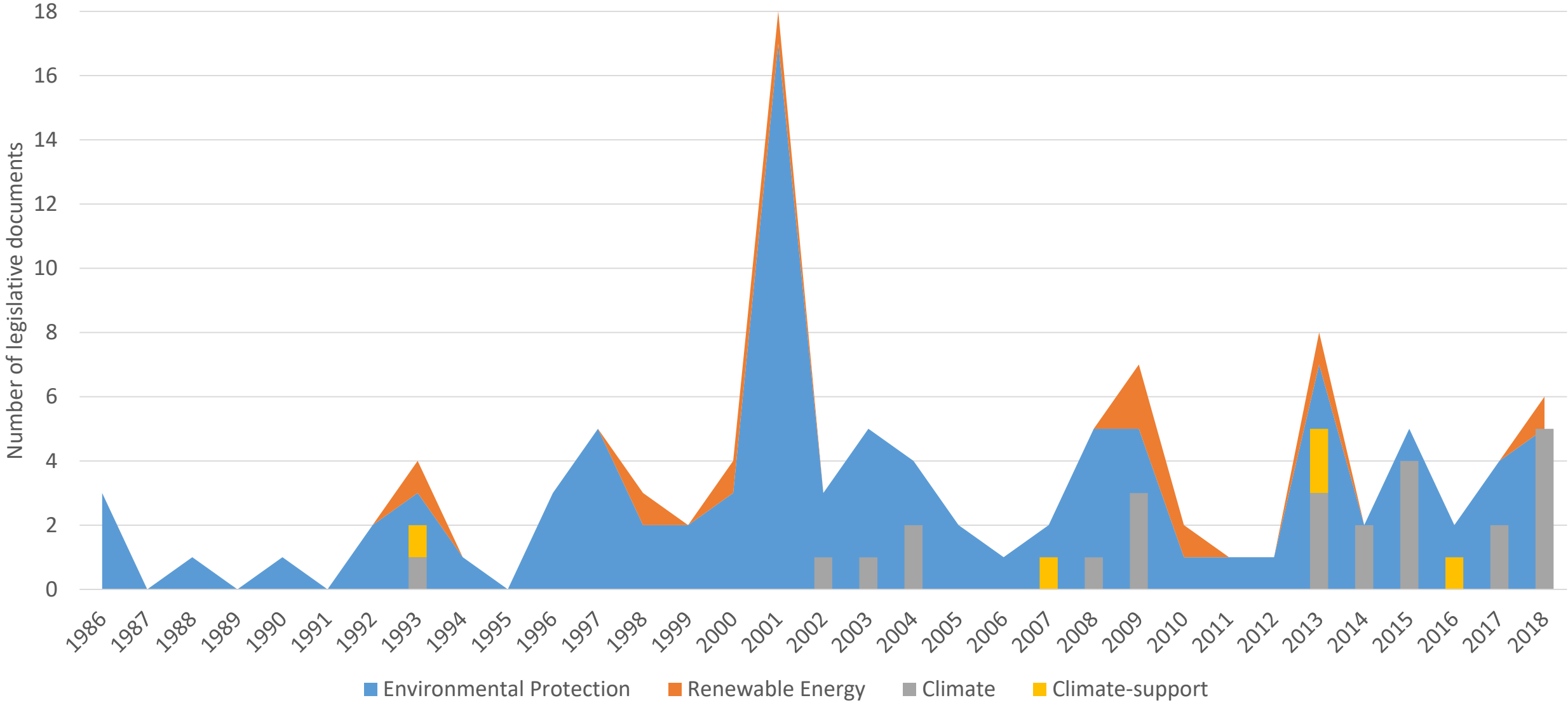
Division II: Categories of EU electricity binding legislation



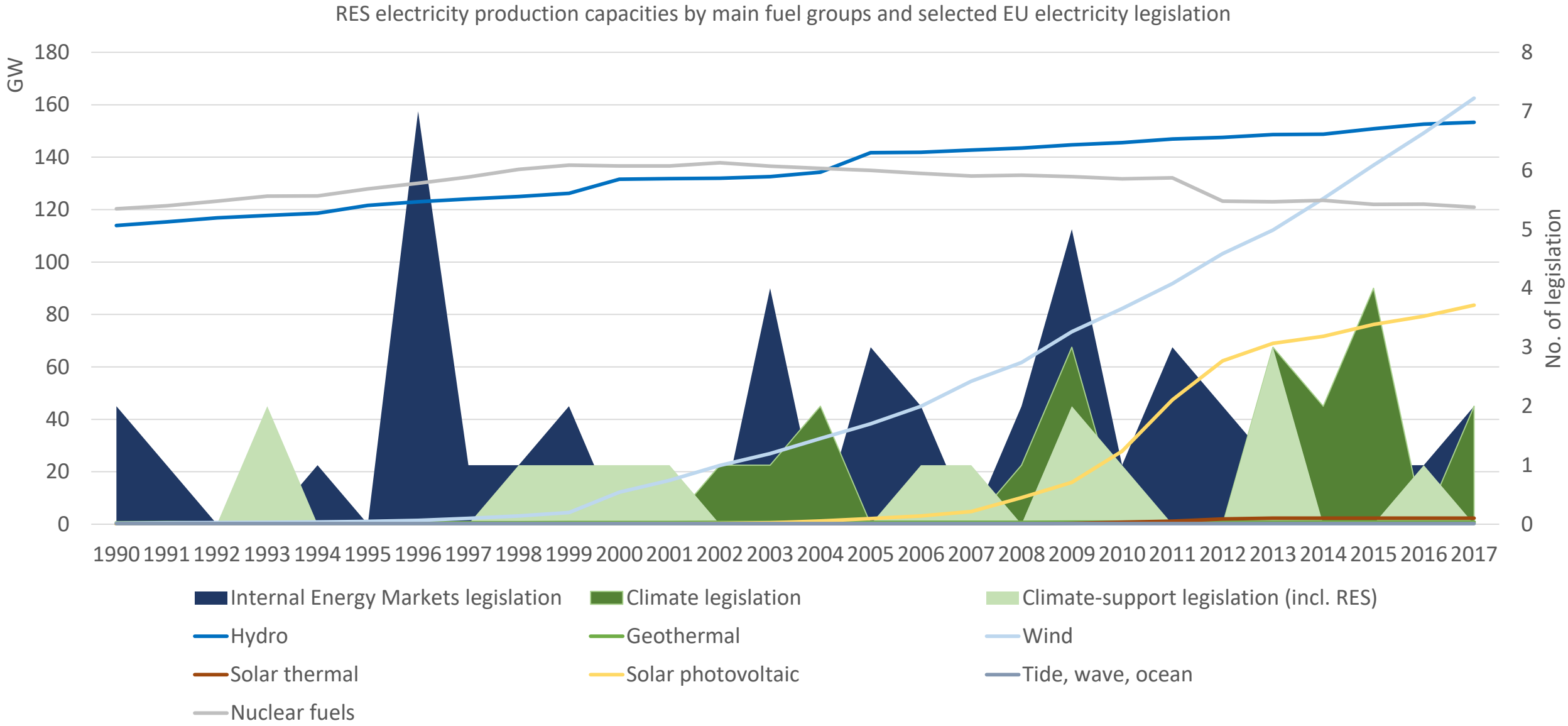
EU environment-legislation…



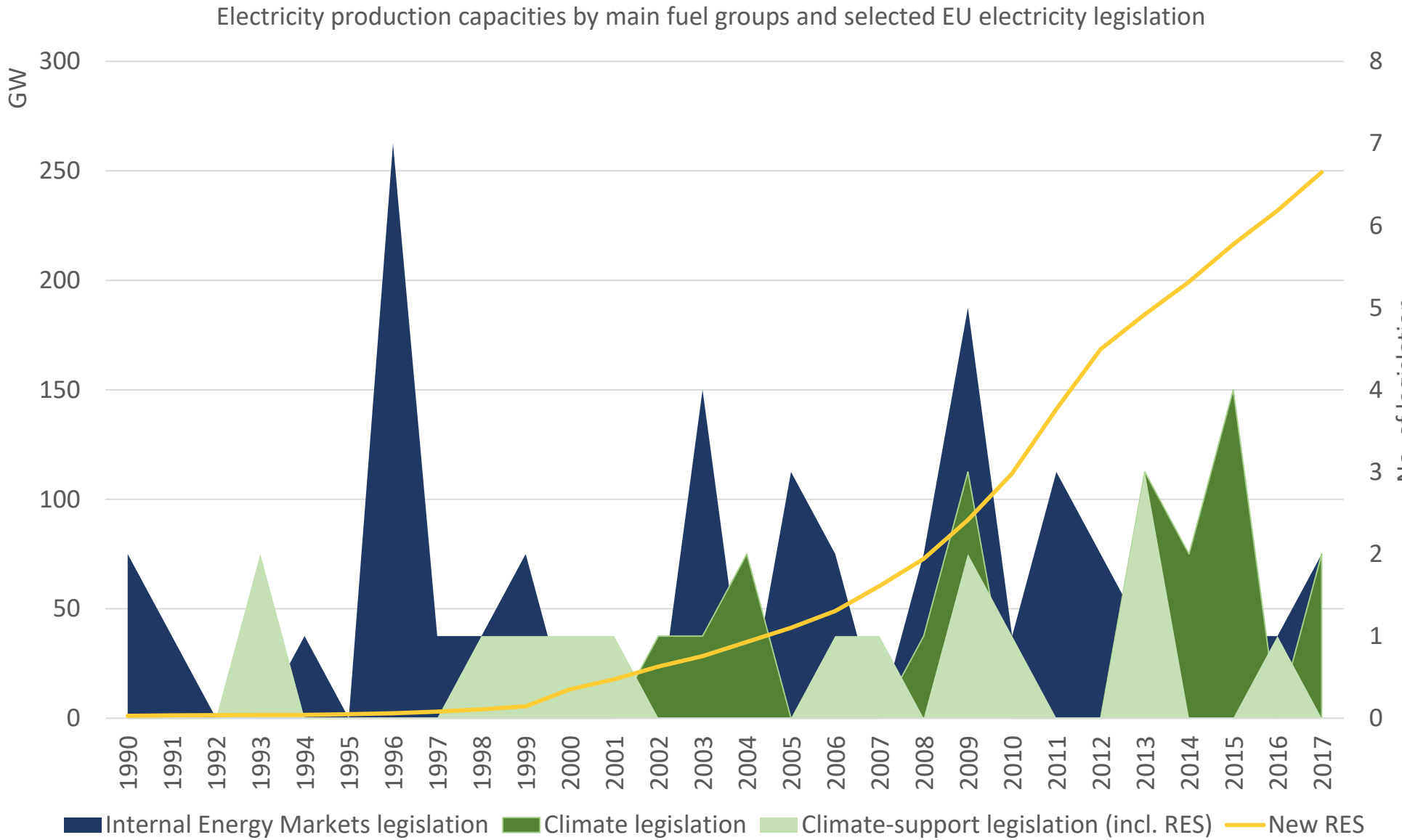
EU environment-legislation is increasingly climate-legislation



Internal market legislation…



Internal market legislation…no linear relationship with new RES dev.



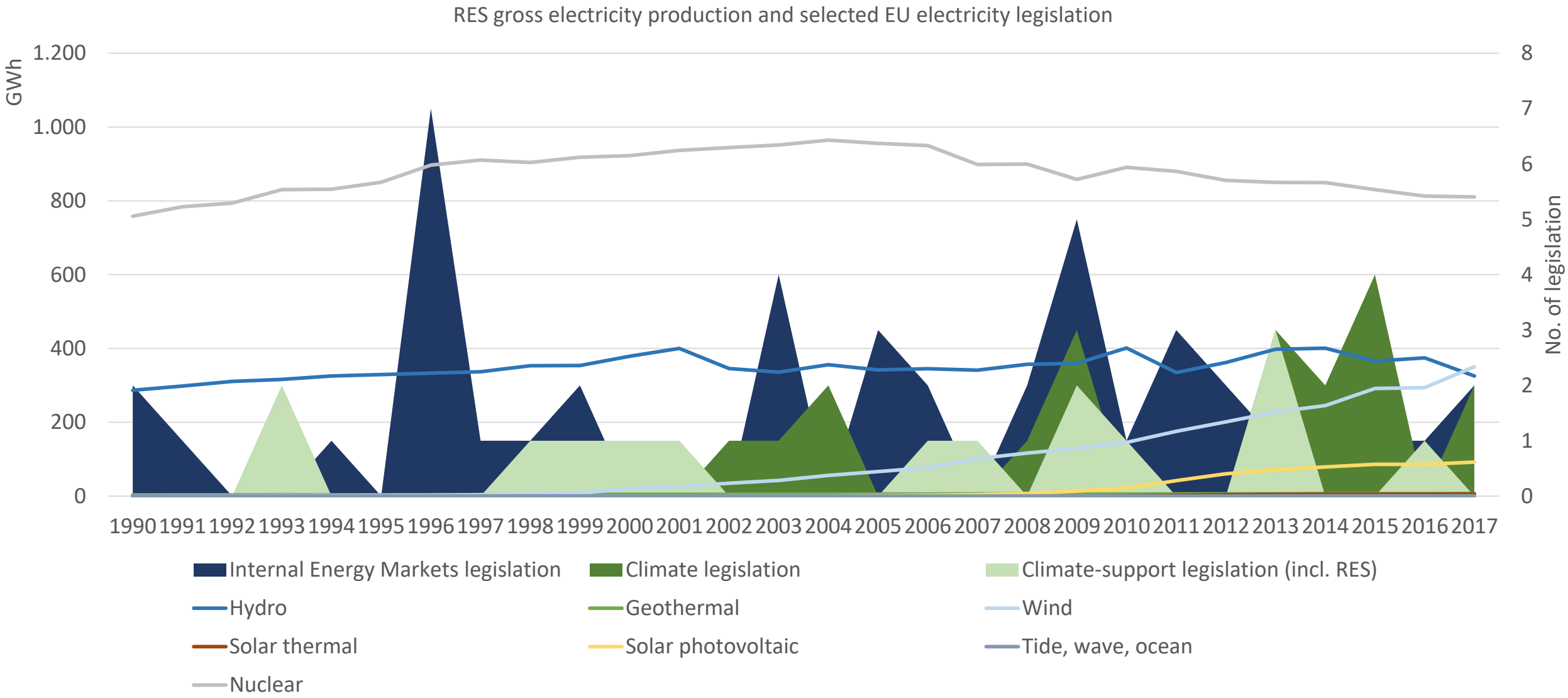
Correlation magnitude (CORREL function)

New RES-Internal market legislation	0,045
New RES-climate legislation	0,451
New RES-climate+internal market	0,340

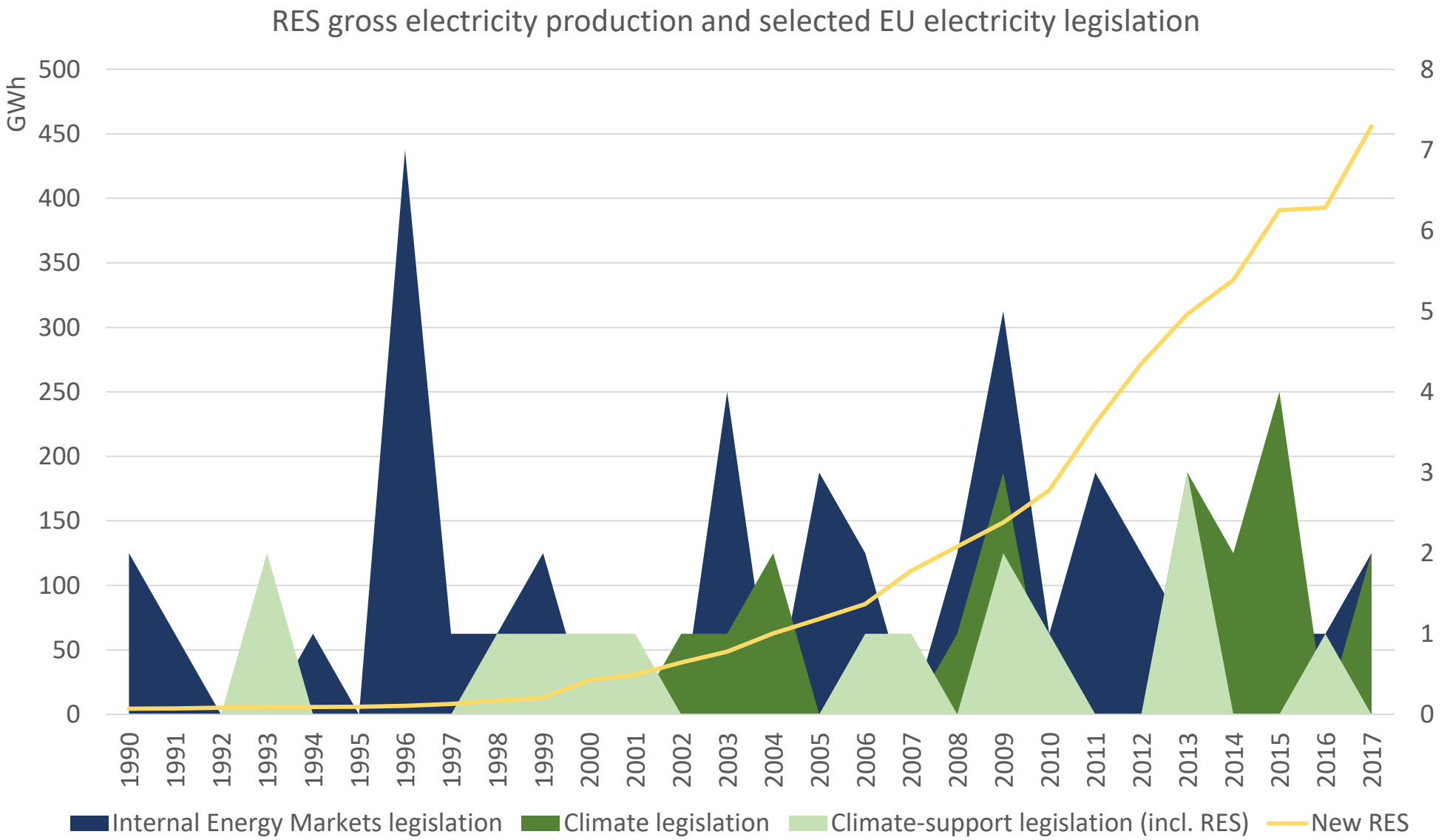
RES dev. delayed 2 years

New RES-Internal market legislation	0,044
New RES-climate legislation	0,550
New RES-climate+internal market	0,302

Internal market legislation…



Internal market legislation…no linear relationship with new RES dev.



Correlation magnitude (CORREL function)

New RES-Internal market legislation	0,037
New RES-climate legislation	0,457
New RES-climate+internal market	0,338

RES dev. delayed 2 years

New RES-Internal market legislation	0,048
New RES-climate legislation	0,548
New RES-climate+internal market	0,303

Role of markets: conclusions

- EU electricity policy **largely focused on environment**
- EU environment-legislation is **increasingly climate-legislation**
- Development of **the internal electricity market** did not inhibit the climate policy
- RES development **moderately driven** by climate policy
- **Markets should be more involved by legislators** in development of RES
- **RES development should be left more in the hand of the market**

Questions?