Renewable Energies in the EU
- historic trends and future expectations from an energy policy perspective

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Content

(1) Historic developments in RES deployment
– how have renewable energies progressed in the past decade(s)?

(2) Energy policy trends
- a closer look at market incentives for renewables in the electricity sector

(3) Future perspectives
- future targets … what do/can we aim for?

(4) Concluding remarks

Looking back … (EU28)

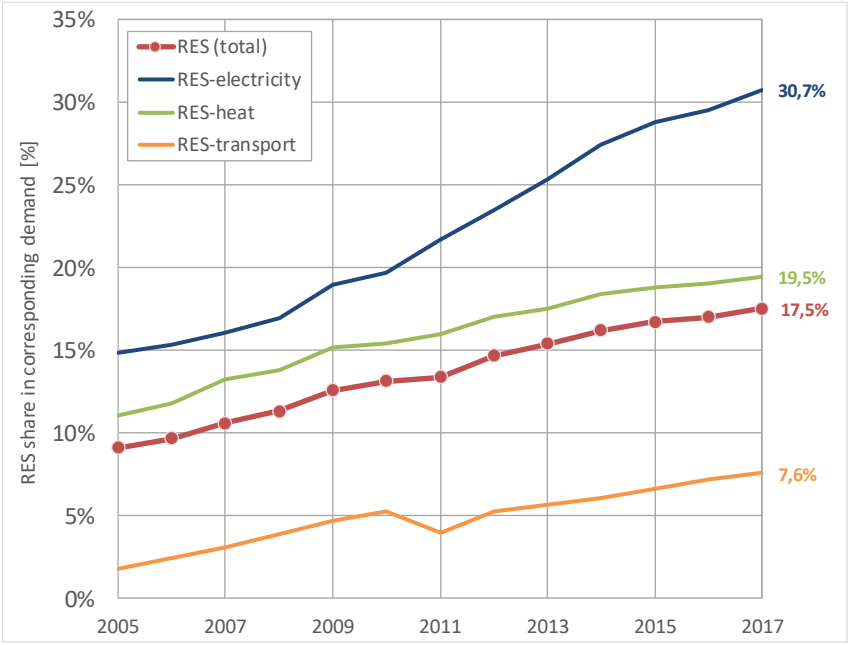

***Figure:** RES shares in corresponding demand(s) (EU28)*
(Source: Eurostat)

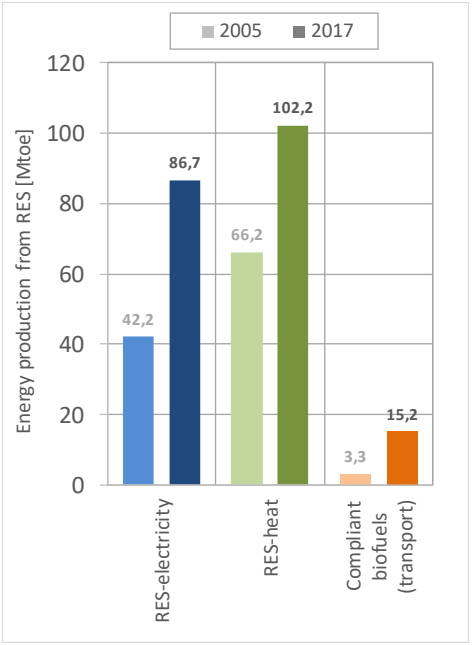

***Figure:** 2005 vs. 2017: RES growth in absolute terms by sector (EU28)*
(Source: Eurostat)

- A **strong (policy-driven) RES uptake** took place in the past decade(s) within Europe
- The **heat sector (biomass) is still of dominance** but **impressive growth has been achieved in electricity** (and in transport)

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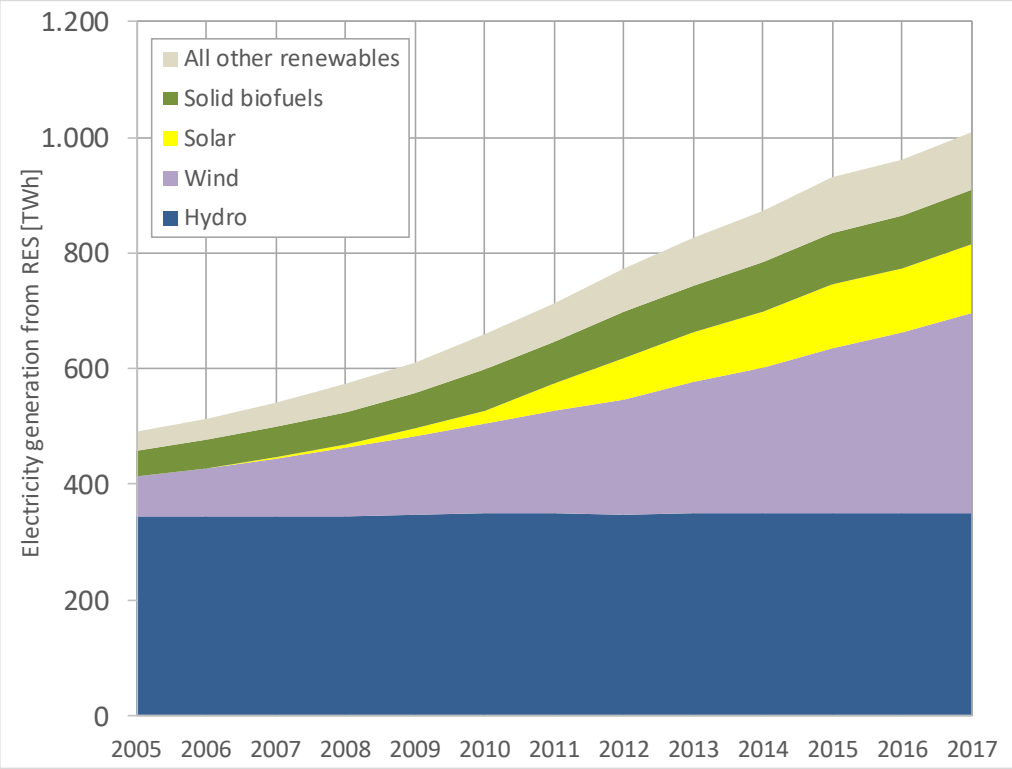
Looking back at RES in the **electricity** sector… (**EU28**)



- Hydropower – still a key source, **but new RES technologies substantially increased in the last decade …**
  - **Wind power is now in lead** at EU level
  - **Impressive growth of solar PV** post 2010

***Figure:* (Normalised) Electricity generation from RES by technology (EU28)**
(Source: Eurostat)

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From the "first-best" option …

CO_2 Tax / Emission Trading

- **Market failures require policy intervention – Key problem today: climate change –** Energy markets do not – or in a too limited extent – incorporate the externality "carbon emissions" and corresponding costs
- Solution: **Internalising the external cost of climate change** → Monetarize carbon emissions via taxation or through the introduction of an emission cap (& trade)
  (EU Emission Trading Scheme (ETS))
- ***Why do we need additional (policy) interventions (for Renewables)?***

From the "first-best" option … to the "second-best" solution

CO_2 Tax / Emission Trading

- **Market failures require policy intervention – Key problem today: climate change –** Energy markets do not – or in a too limited extent – incorporate the externality "carbon emissions" and corresponding costs
- Solution: **Internalising the external cost of climate change** → Monetarize carbon emissions via taxation or through the introduction of an emission cap (& trade)
  (EU Emission Trading Scheme (ETS))
- ***Why do we need additional (policy) interventions (for Renewables)?***

Dedicated support for renewable energies / Proactive RES policy interventions

Additional market failures are of (key) relevance:

- Risk-averse Investors require further security/stability ,
- knowledge spill-over,
- market prices do not allow (any) **investments in new generation facilities** ("over supply"),
- supply security as a public good …
- A more practical argument: High transfer payments from the consumer to the (RES) producer can be avoided / **limiting societal distributional effects**

→ A rapid transition of our energy system (to combat climate change) requires proactive (RES) policy interventions

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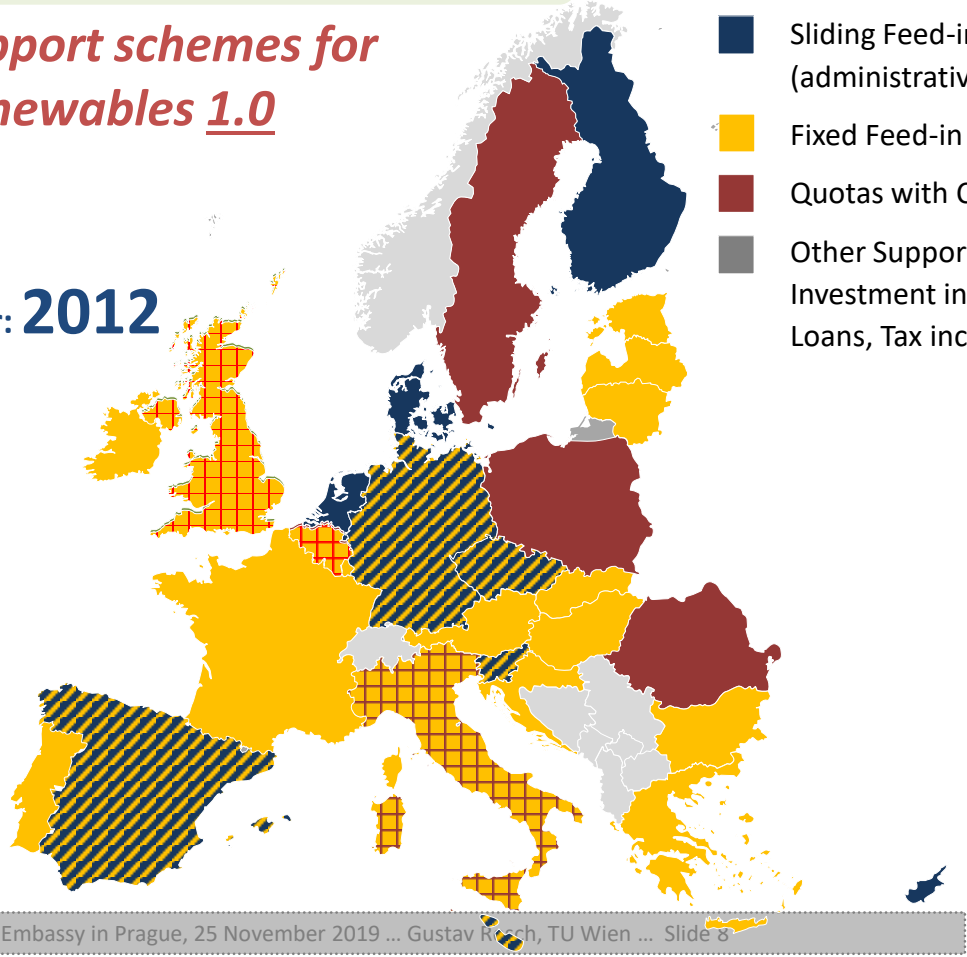
A historical excurse …

Support schemes for Renewables 1.0

Year: 2012



- Sliding Feed-in Premium (administrative price-setting)
- Fixed Feed-in Tariffs
- Quotas with Certificate Trading
- Other Support Schemes (i.e. Investment incentives, Cheap Loans, Tax incentives)

- **A "patchwork" of approaches / instruments has been implemented in EU Member States**
- 13 MSs used Fixed Feed-in Tariffs as key instrument for RES support
- 6 MSs implemented Quotas with Certificate Trading
- 4 MSs have favoured Feed-in Premium Schemes

Support schemes for Renewables 1.0

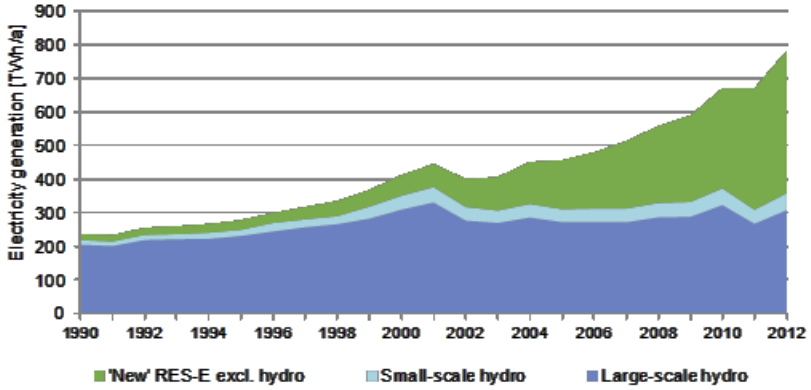


***Figure:** Electricity generation from RES 1990-2012 (EU28)*
(Source: Eurostat)

◄ **Support has been EFFECTIVE**

A substantial Uptake of „New Renewables“ (Wind energy, Photovoltaics, Biomass, etc.) has been achieved

◄ **… and partly EFFICIENT (from an economic viewpoint)**

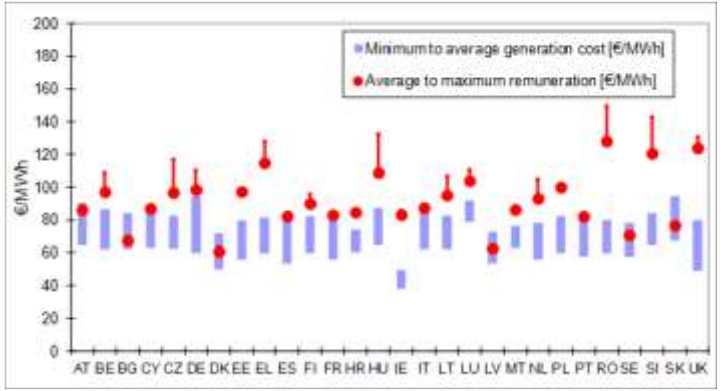


***Figure:** Comparison of remuneration (incl. support) and costs for wind onshore in the year 2013*
(Source: DIA-CORE project)

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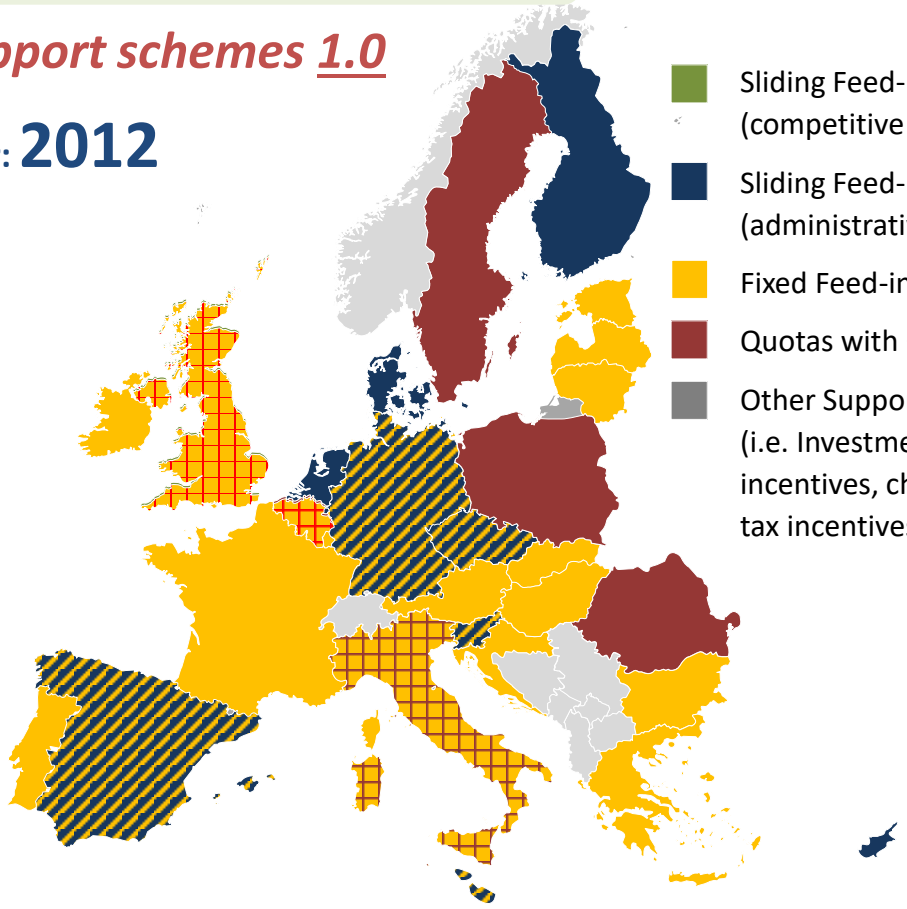
Support schemes 1.0

Year: 2012



- Sliding Feed-in Premium (competitive price-setting via **Auctions**)
- Sliding Feed-in Premium (administrative price-setting)
- Fixed Feed-in Tariffs
- Quotas with Certificate Trading
- Other Support Schemes (i.e. Investment incentives, cheap loans, tax incentives)

Support schemes 2.0

Year: 2017

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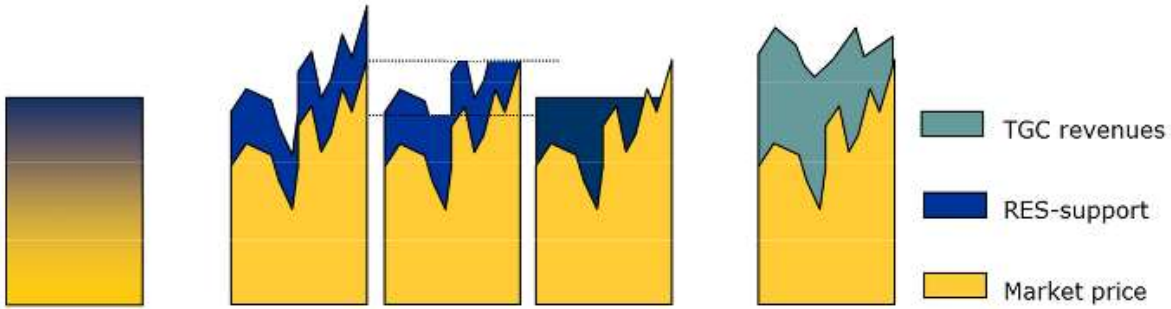
Feed-in Premium Systems – different design options



Fixed Feed-in Tariff

Feed-in Premium Systems

Quotas / Green Certificate Trading

- All design options provide **incentives to foster market integration** (demand-orientation, direct marketing / sell of the generated electricity)
- **Difference in risk allocation**:
  - **Fixed Premium increases risk for investor** (uncertainty on future revenues)
  - **Sliding Premium increases risk for regulators** (on support expenditures)

Source: based on Ecofys (2014)

Auctions for Renewable Energies

(to determine support levels in the case of Feed-in Premium schemes)

Legal framework at EU level:

- **EU "Guidelines on State aid** for environmental protection and energy 2014-2020" (No. 2014/C 200/01)
  „require" by 2017 **a competitive determination of support levels**
- **Exceptions are feasible (theoretically)** (in case of too low market size, strategic behaviour, higher cost…)
- **Technology-neutral design is preferred**
- **Exceptions are feasible** (if well argued – e.g. to maintain actor diversity or a balanced technology portfolio) and they are "common practice"

Auctions for Renewable Energies
(to determine support levels …)

Status: 2016

- Many countries have started pilot projects for using auctions
- **Different auction designs come into play**

Figure: ***Status of implementation in 2016***
(Source: Ecofys (2016): Status of RES-E support schemes in Europe, Corinna Klessmann, 2016.)

State-of-play (2019)

- **Auctions as "common practice"**

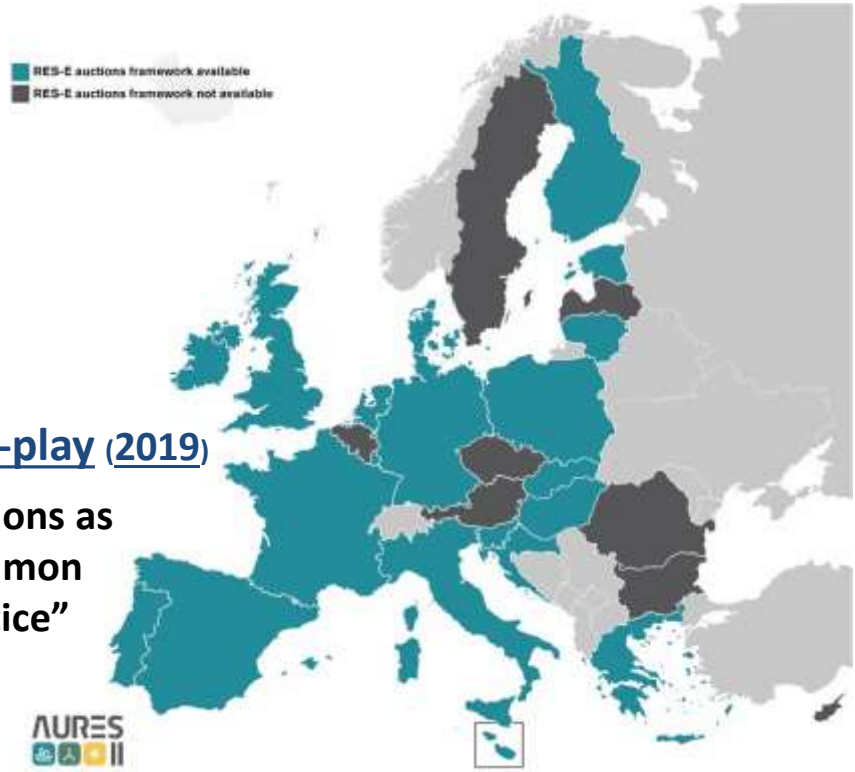


Figure: ***Status of implementation in 2019***
(Source: AURES2 project … http://aures2project.eu)

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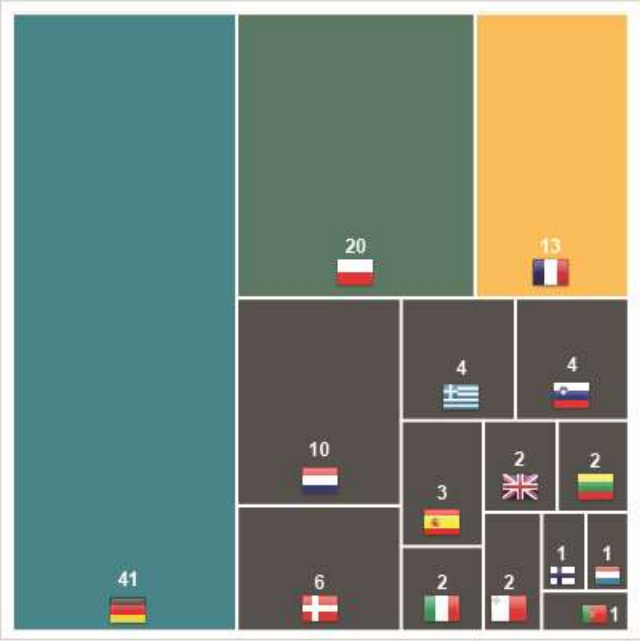
Auctions for Renewable Energies

(to determine support levels …)

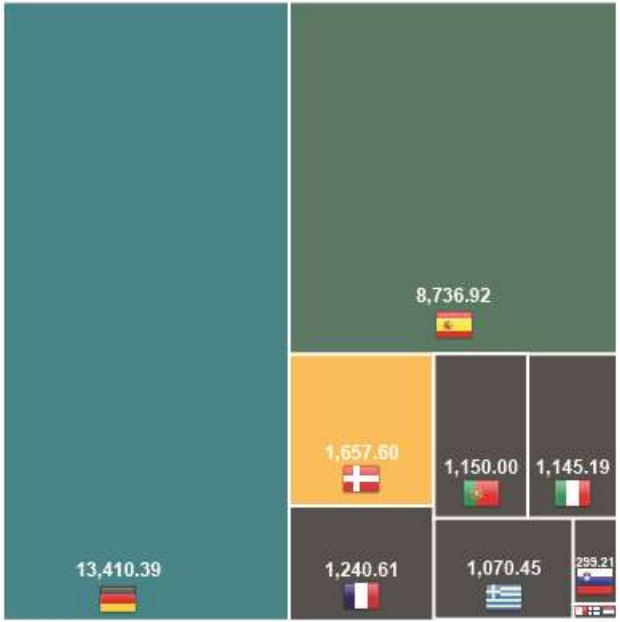


Number of auction rounds per country

(105 in total (2015 to April 2019))

Awarded volumes in MW per EU MS*

*only for countries stating the results in capacity (UK, FI, PL, NL excluded)



Figures: ***Status of implementation in 2019***

(Source: AURES2 project … http://aures2project.eu)

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Auctions for Renewable Energies

(to determine support levels in the case of Feed-in Premium schemes)

Auctions for Renewables - WHY?

- **Filling the information gap (asymmetric information)**; regulators can learn on cost/prices
- **Support costs can be capped** (and better controlled)
- **Allocative efficiency**
- **BUT: Design needs to be adapted to market conditions!**

PROBLEMS – What needs to be taken care of?

- **Strategic behaviour of market actors**
- **Reducing variety of actors (large player typically benefit)**
- … and more general: **Target might be missed / low implementation rate**

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2020 and 2030 Target Setting at EU & MS level

	Renewable Energy Targets	GHG Emission Reduction Targets	Energy Efficiency Targets
2020	**Top-down approach:** • EU target set • Binding MS targets are set according to a **Flat rate / GDP based** approach	**Top-down approach:** • Split between ETS (EU bubble) and Non-ETS (national targets) • Allocation of national targets reflects difference in economic welfare	**Mix of top-down and bottom up allocation:** • EE Directive prescribes strong measures to be implemented • National allocation plans reflect country-specifics / preferences
2030	• **Only EU target set** by now, bottom-up approach followed (“*EU Guidance*”)	• Same approach as used for 2020	• Only EU targets set by now (but overall approach is kept)

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Looking back & **forward** … (EU28)

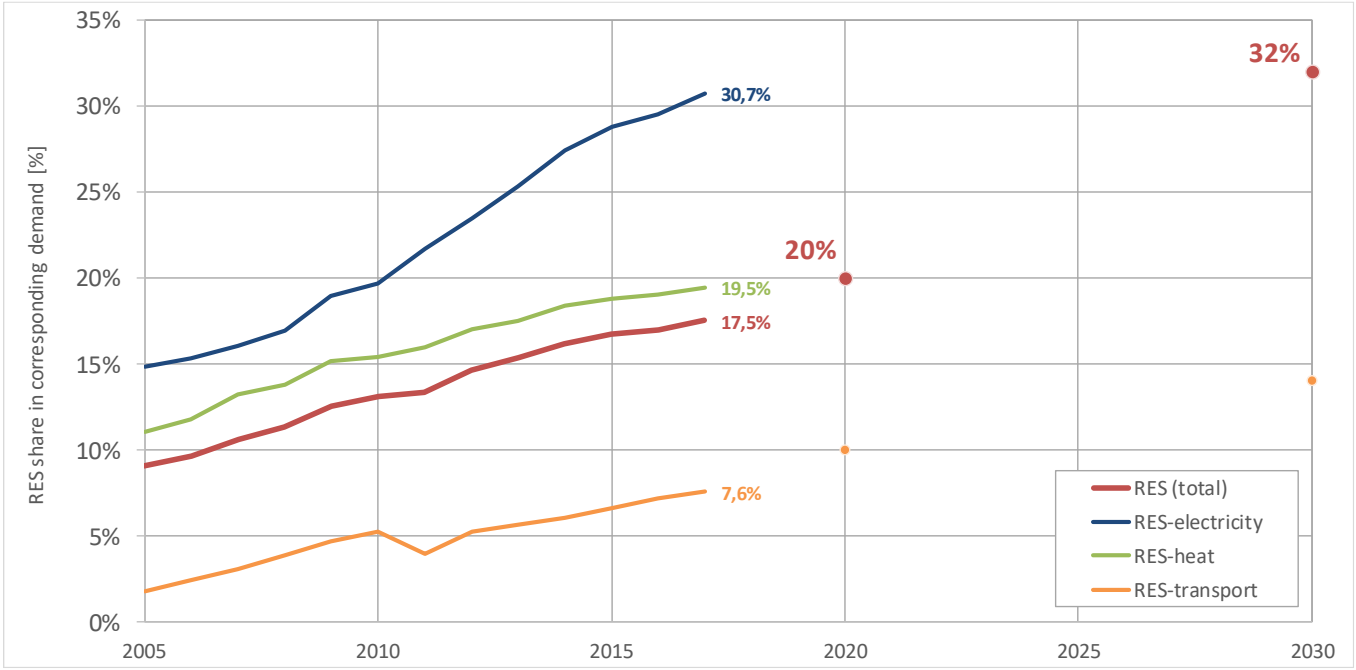

***Figure:** Historic RES shares and future targets in corresponding demand(s) (EU28)*
(Source: Eurostat)

- A **strong (policy-driven) RES uptake** took place in the past decade(s) within Europe
- The **pace of deployment needs to be maintained** if future RES targets shall be met

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Looking back & **forward** … (EU28)

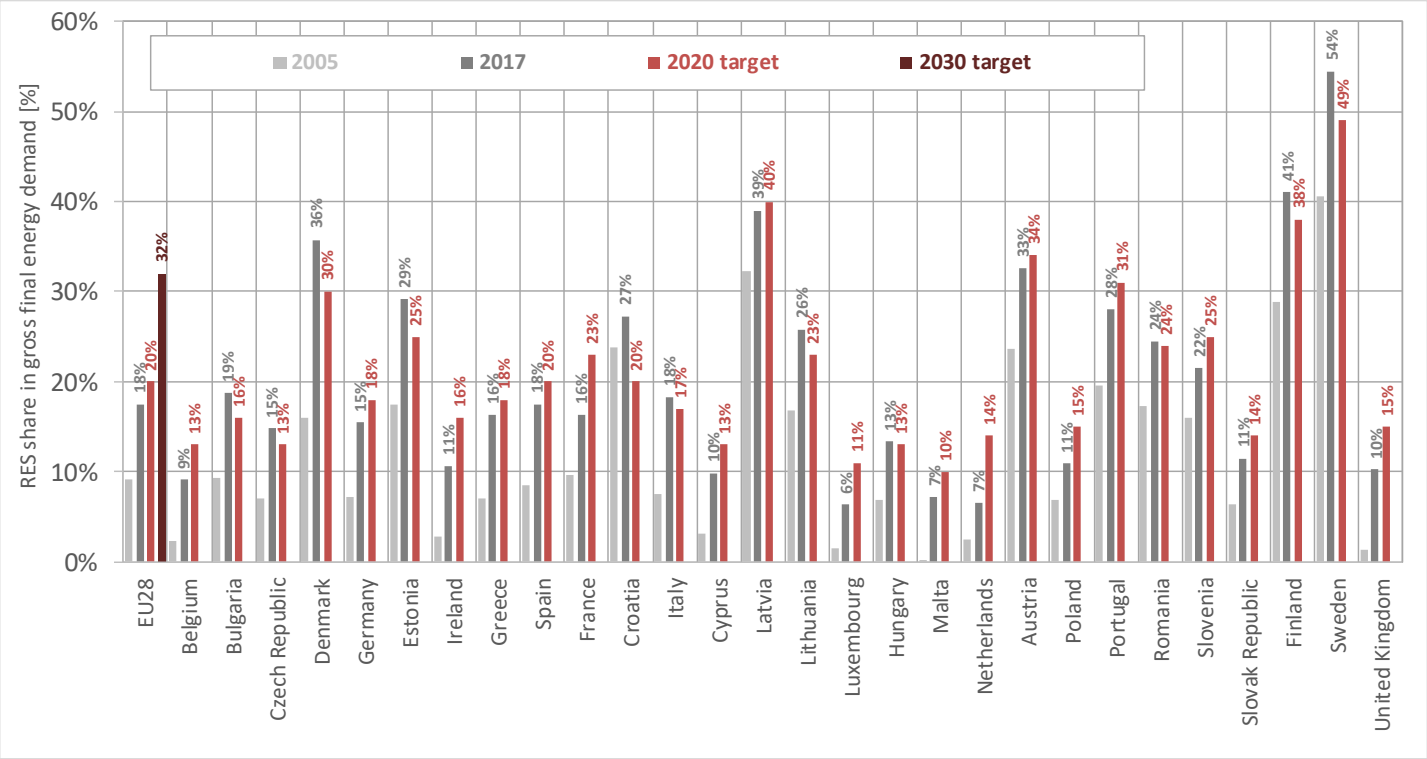

***Figure:** Historic RES shares and future targets at Member State level*
(Source: Eurostat)

◄ **National policies & targets** have been of **key relevance for the overall RES progress**

Approach for **2030 RES target setting** within the EU

EU level

- On **30 November 2016** the European Commission published a package of proposals for legislative measures for the time horizon from 2020 to 2030 called **"Clean Energy for all Europeans"** commonly referred to as the winter package. It aims at further promoting the clean energy transition while developing the internal market for electricity and thus fostering the Energy Union.
- An ambitious political agreement on increasing renewable energy use in the EU has been taken later on: In a Statement of the European Commission (STATEMENT/18/4155) it was declared that the new regulatory framework includes **a binding renewable energy target for the EU for 2030 of 32%** with an upwards revision clause by 2023.
- The questions arises **how to distribute the overall RE effort at EU level across individual MSs?**

  → For that purpose Annex II of Regulation (EU) 2018/1999 on *the Governance of the Energy Union and Climate Action* introduces a methodology for establishing **benchmarks concerning the national contributions for the share of energy from renewable sources** in gross final energy consumption in the 2030 context at EU level.

Benchmarks for distributing the EU RES effort across Member States …

MS level

- This approach follows an integrated concept that takes into account the **differences in economic development, the potential for cost-effective RE deployment and the interconnection level in the European Network of Transmission System Operators for Electricity** (ENTSO-E) across the EU and its Member States, respectively.
- A *brief recap of the calculation* formula:

$$RE\%_{2030} = RE\%_{2020} + C_{Flat} + C_{GDP} + C_{Potential} + C_{Interco}$$

Annex II of the Governance Regulation:
National contributions for the share of energy from renewable sources in gross final consumption of energy in 2030

The following indicative formula represents the objective criteria listed in […] Article 5(1), each expressed in percentage points:
(a) the Member State's national binding target for 2020 as set out in the third column of the table Annex I to Directive COM(2018)2001 ("$RE\%_{2020}$")
(b) a flat rate contribution ("C_{Flat}");
(c) a GDP-per-capita based contribution ("C_{GDP}");
(d) a potential-based contribution ("$C_{Potential}$");
(e) a contribution reflecting the interconnection level of the Member State ("$C_{Interco}$").
Remark: The resulting RE target for 2030 ("$RE\%_{2030}$") is consequently the sum of the different contributions listed above and explained in further detail below, cf. formula (1). The 2030 RE target prescribes the minimum share of energy from renewable sources in gross final consumption of energy in 2030.

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Benchmarks for distributing the EU RES effort across Member States …

MS level

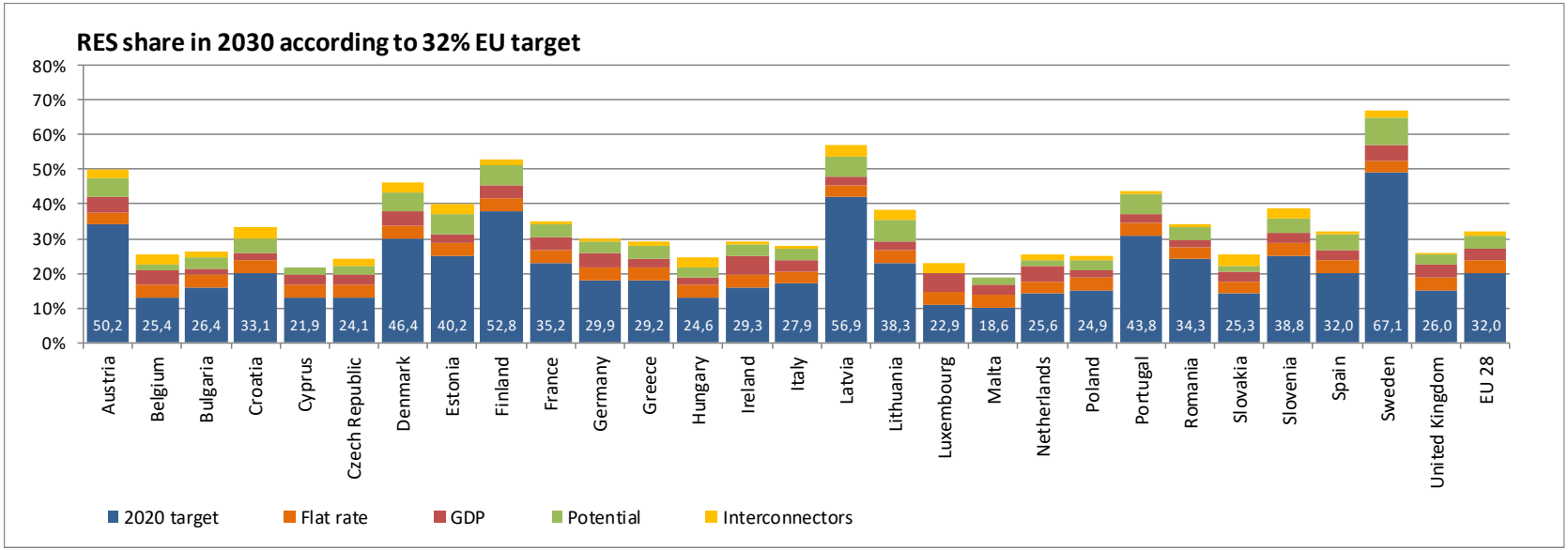

***Figure:* Benchmarks for 2030 RES shares at MS level**
(Source: Own approximation)

Conclusions (1/2)

- **EU regulation acted as *key top-down driver for Renewable Energies***
  - **…** serving as **"stick for Member States to take action"**
  - **…** but th**e "carrots" have been provided at National level** (i.e. national support schemes and measures)

- **Renewable energies require today and** (probably) **tomorrow dedicated market incentives**, if one aims for **achieving the desired transition in our energy system in a timely manner**.

- The **focus in the choice and design of support instruments has changed over the years** - in the past decade, a focal point has been *effectiveness*, i.e. rapid market entry, linked to the achievement of high *economic efficiency* ... today ***market integration / market opening / competition*** appears of key relevance.

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Conclusions (2/2)

- **Legal EU regulations severely restrict the choice of instruments** - auctions (for price determination in market premium systems) are accepted and seen as common practice that would be difficult to circumvent.

- The **design of the auctions** appears (as usual) **of key relevance**:
  - There are many options to achieve different goals (not just cost reduction) through auctioned RES support
  - For designing auctions suitable for a particular country or region one needs to take into account the respective **target criteria** and **national specifics** (potentials, actors, ...)

Many thanks for your attention!

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