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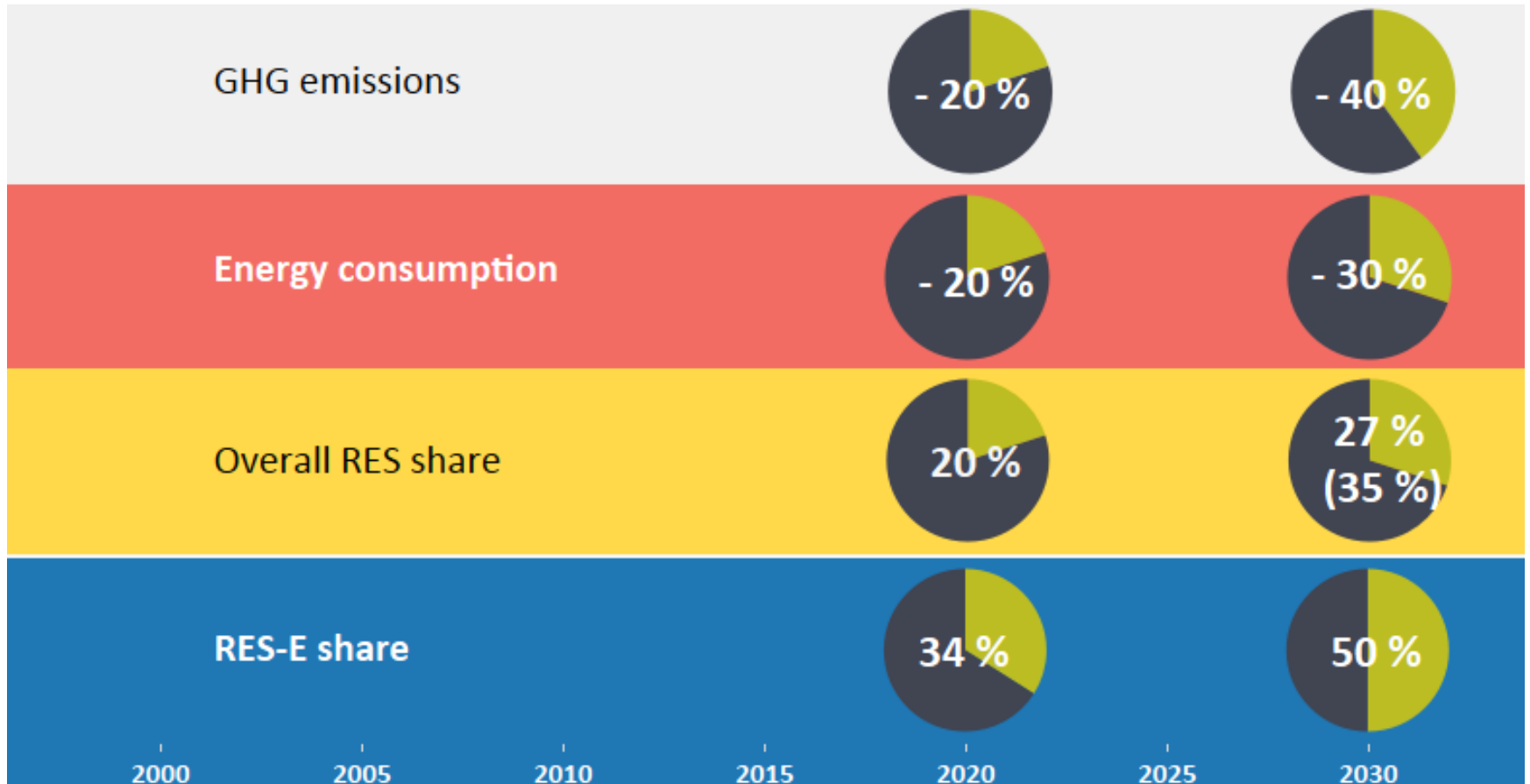
Renewables in the EU The support towards a single energy market

EU countries reporting
under Article 22(1) (b), (e)
and (f) of the Renewable
Energy Directive

Martin Jégard (Trainee)
Manjola Banja

Ispra, 01.02.2018

EU Climate and Energy Framework





Database RES policy support (2010-2014)

Electricity – Heating/Cooling – Transport

Overall support measures (economic, administrative, financial, regulatory) in EU countries for RES deployment

Art.22 (1) b, e, f of Directive 2009/28/EC

Support schemes, Administrative procedures, Transmission

Type

Unit support

Overall support

~ 10.000 entries in the database

Key points

Support schemes → major drivers for RES-E investment in the EU

Most used schemes → **Price driven schemes** (feed-in-tariffs, etc)

Major policy trends → **more feed- in premiums and tenders**
→ **mainly technology-specific support**

For almost all EU countries **the incentive** seems high enough **to cover the cost of the electricity produced**



Outline

- 1. Progress of renewables in the EU**
- 2. Support schemes for RES**
- 3. Who applies what? – focus on Solar PV & Wind**
- 4. Key Takeaways & Policy challenges**

Appendix - Case studies – Germany, Italy, UK, Denmark

1. Progress of renewables in the EU

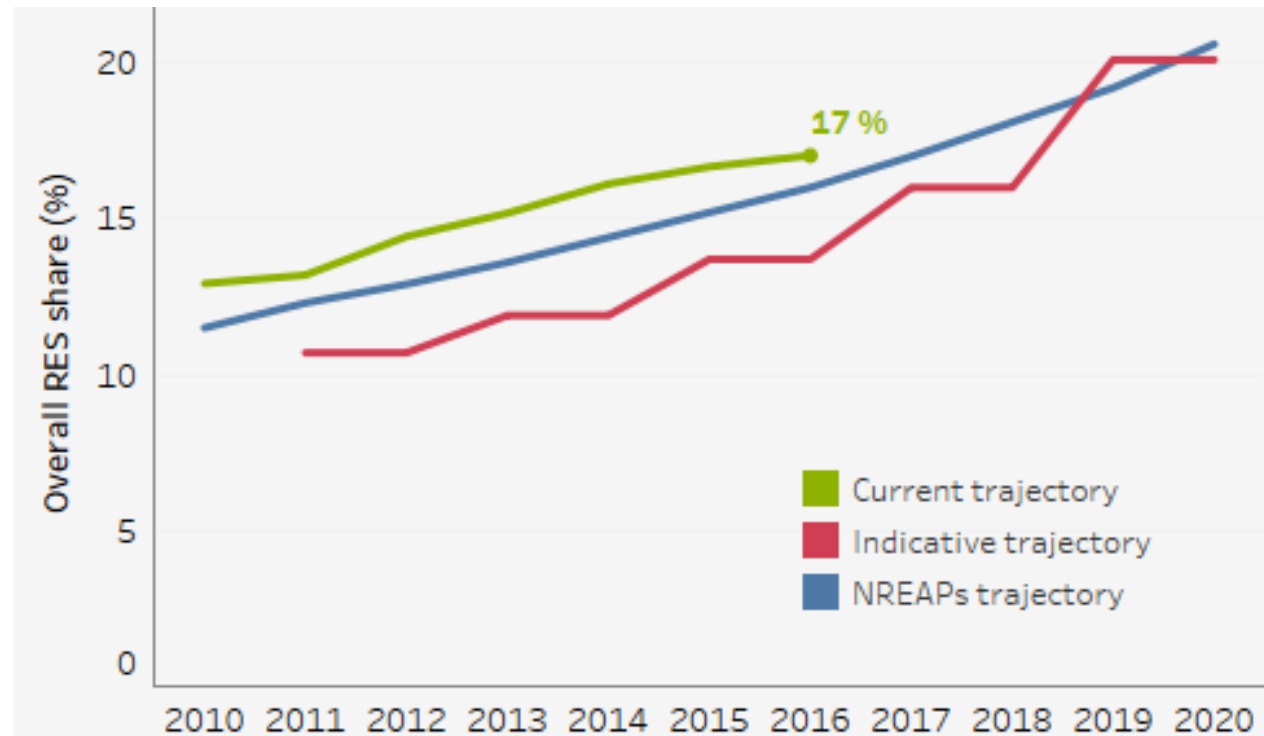
Progress of renewables in the EU, 2016

Overall RES share **17%** of Gross Final Energy Consumption

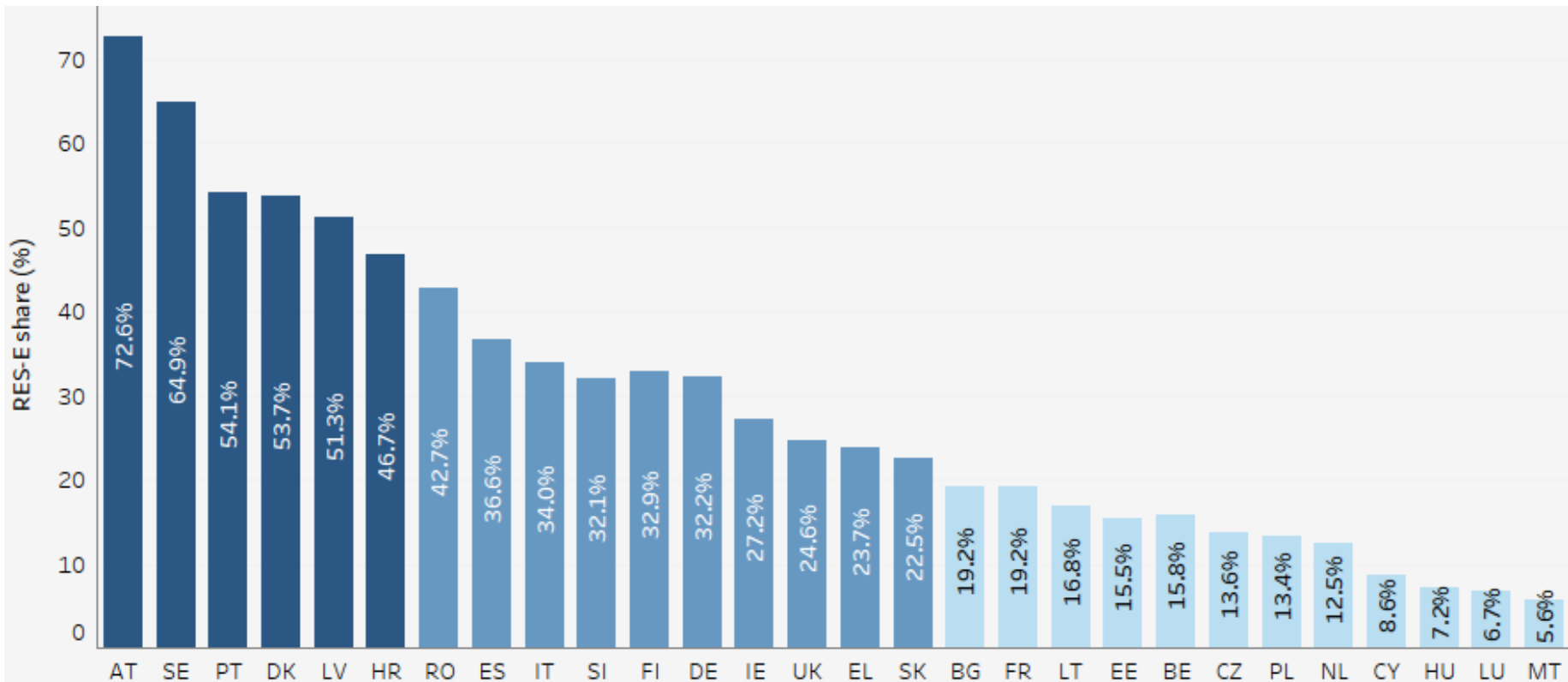
RES-E → **29.6%**

RES-H&C → **19%**

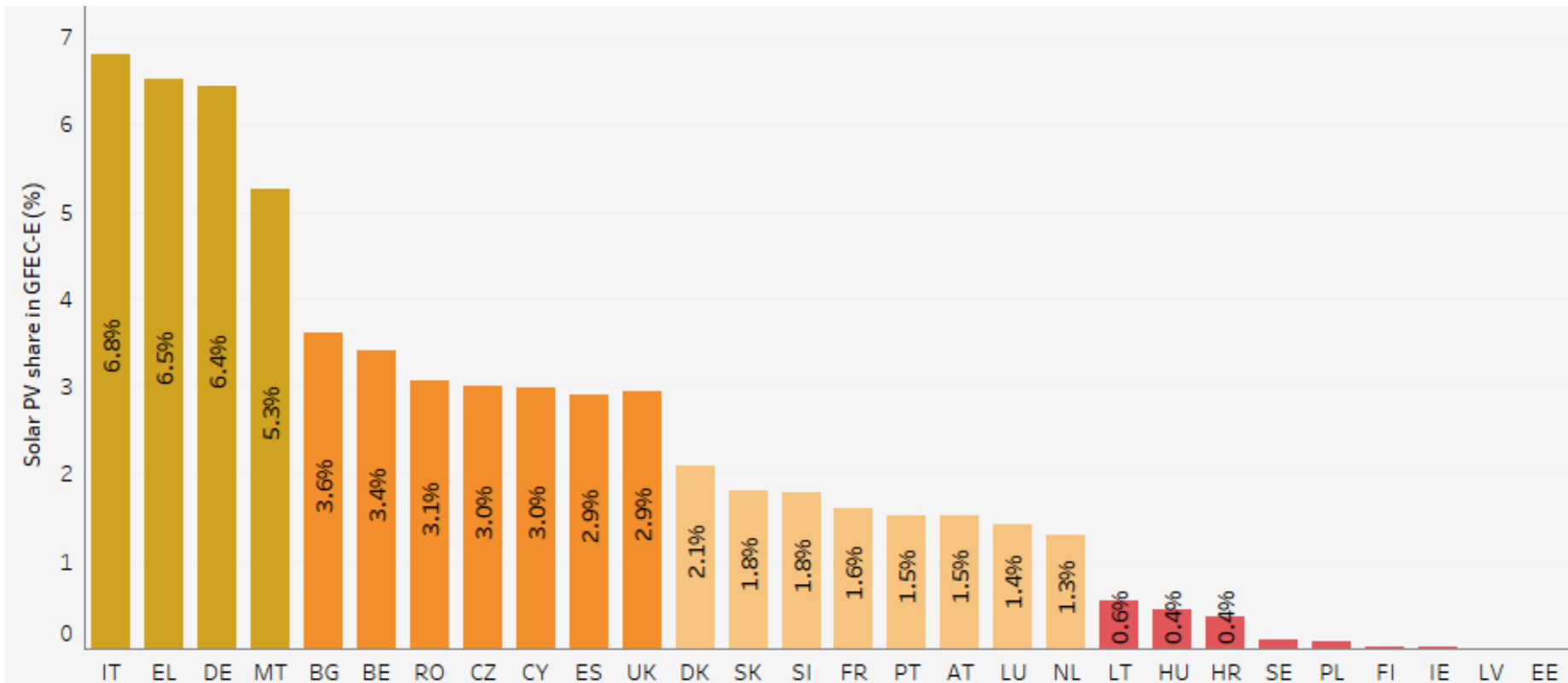
RES-T → **7.1%**



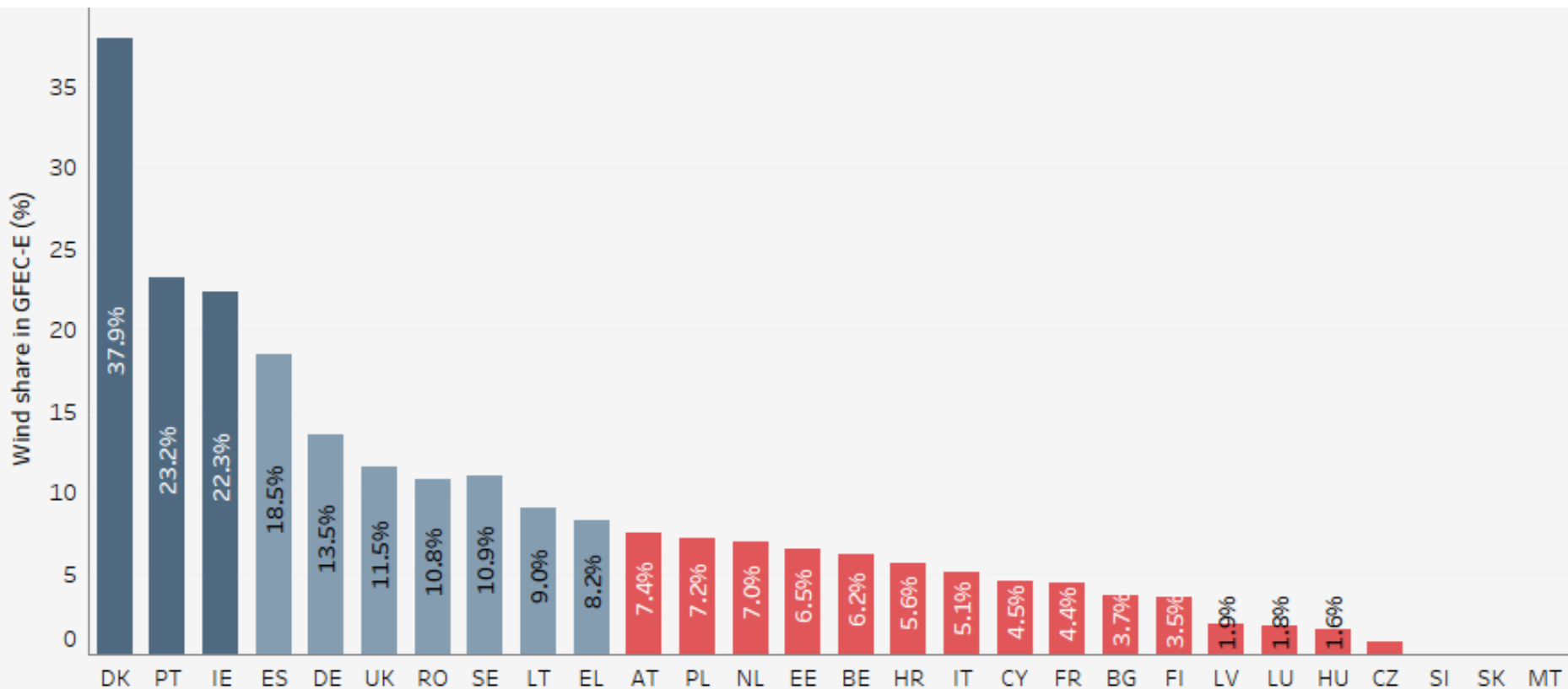
RES-E share in the EU countries Gross Final Electricity Consumption , 2016



Share of solar PV in the EU countries Gross Final Electricity Consumption, 2016



Share of wind in the EU countries Gross Final Electricity Consumption, 2016



2. Support schemes for Renewables

Support Schemes for Renewables

Idea :

Cost of RES-E Generation > Market Prices

Support schemes need for to cover this difference

General requirements – *EU Guidelines SWD(2013) 439 final*

- ➔ **Flexible** and freedom of choice;
- ➔ **Responsiveness** to reductions of technology cost;
- ➔ **Removed** when RES technologies became cost competitive;
- ➔ Incentivising market instruments gradually;
- ➔ **Stability** of regulatory framework (to strengthen of investor confidence)
- ➔ Ensuring **efficiency** of RES deployment using cooperation mechanism

Support Schemes for Renewables

Regulatory & Direct (either focused on investment or generation)

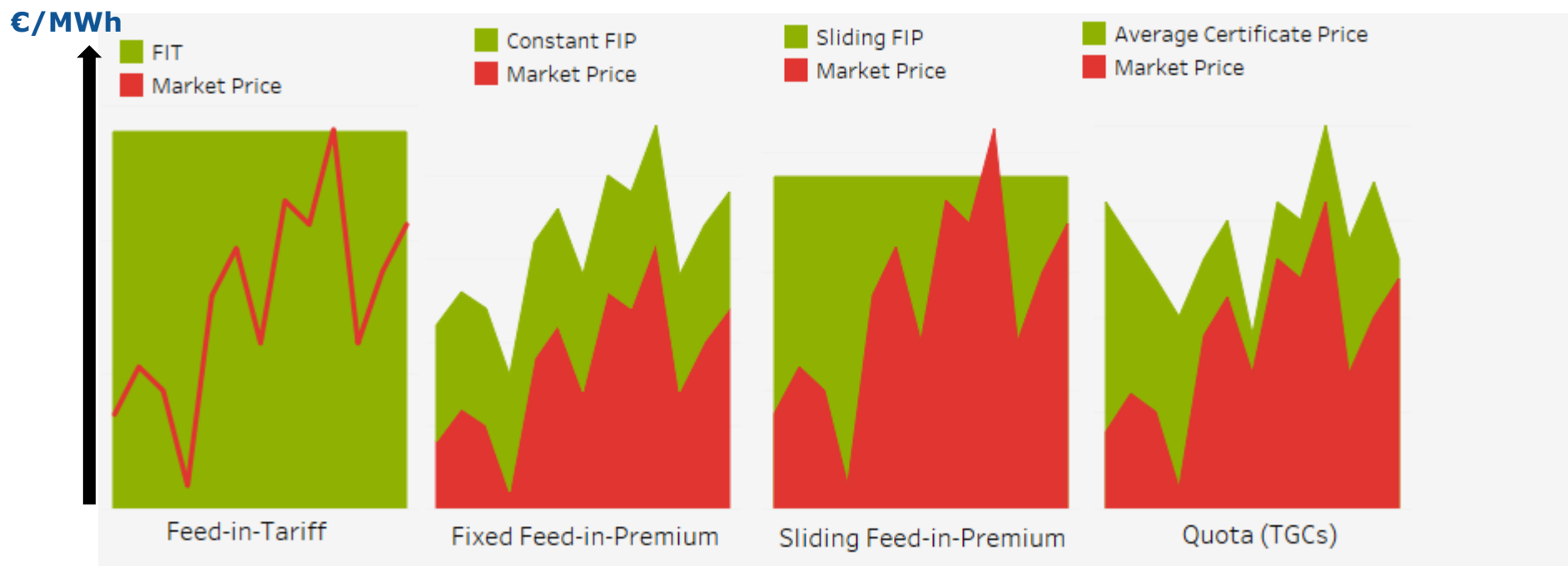
- **Price driven:** Investment Subsidies, Feed-in Tariffs, Premiums, Tax Incentives
- **Quantity driven:** *Tenders, Quotas obligation with Tradable Green Certificates (TGC)*

Regulatory & Indirect *Environmental taxes*

Voluntary *Green tariffs, agreements, contribution shareholders programs*

Support Schemes for Renewables

How do they work ?



Schematic representation of the support mechanism for the 4 main schemes

3. Who applies what ?

– focus on Solar PV & Wind

Support Schemes for RES : Who applies what?

Feed-in-tariff (FIT)

- Guaranteed access to the grid;
- Long-term purchase agreement to cover cost of RES-E generation
- Based on cost of RE generation.

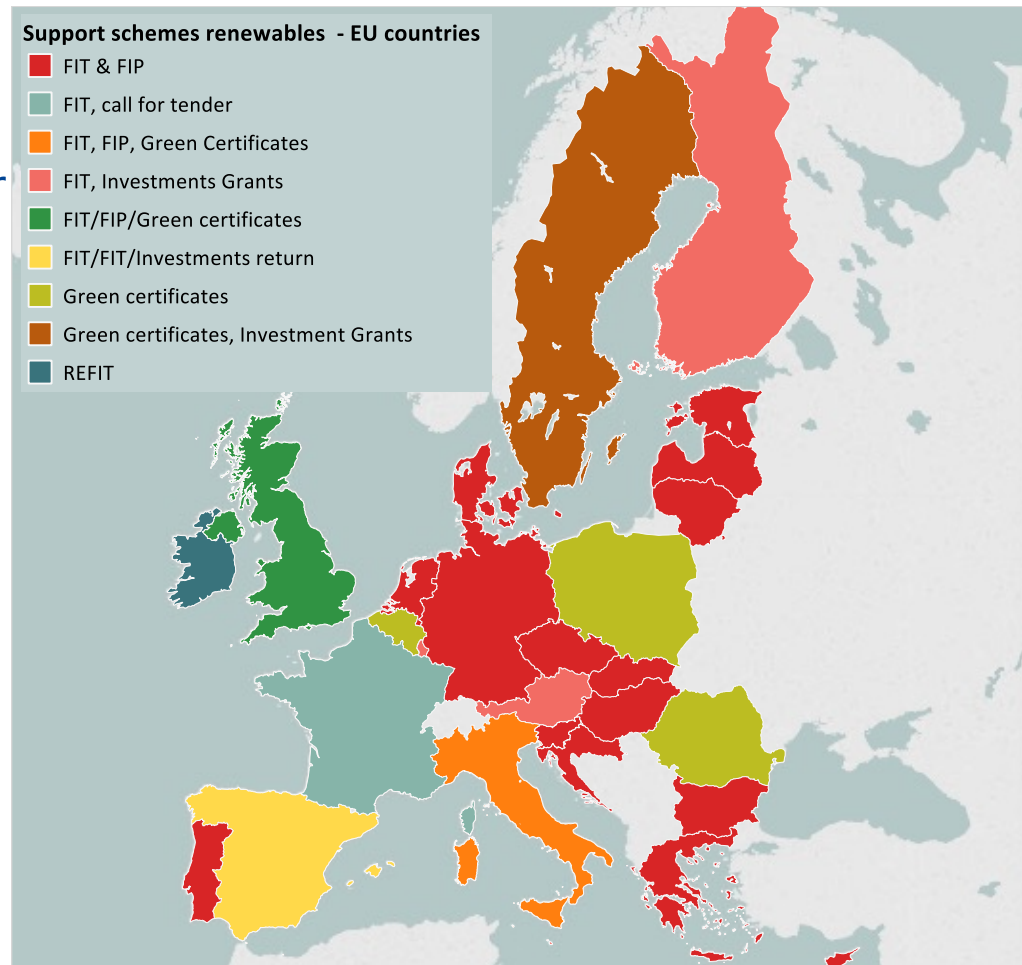
Feed-in-Premium (FIP) Constant/Cap & Floor/Sliding

Quota obligation + TGCs

- Compulsory share of RE for consumers
- Certificates for RES-E producers
- Market for certificates
- Penalties

Tendering procedures

- Maximum support level
- Quantity



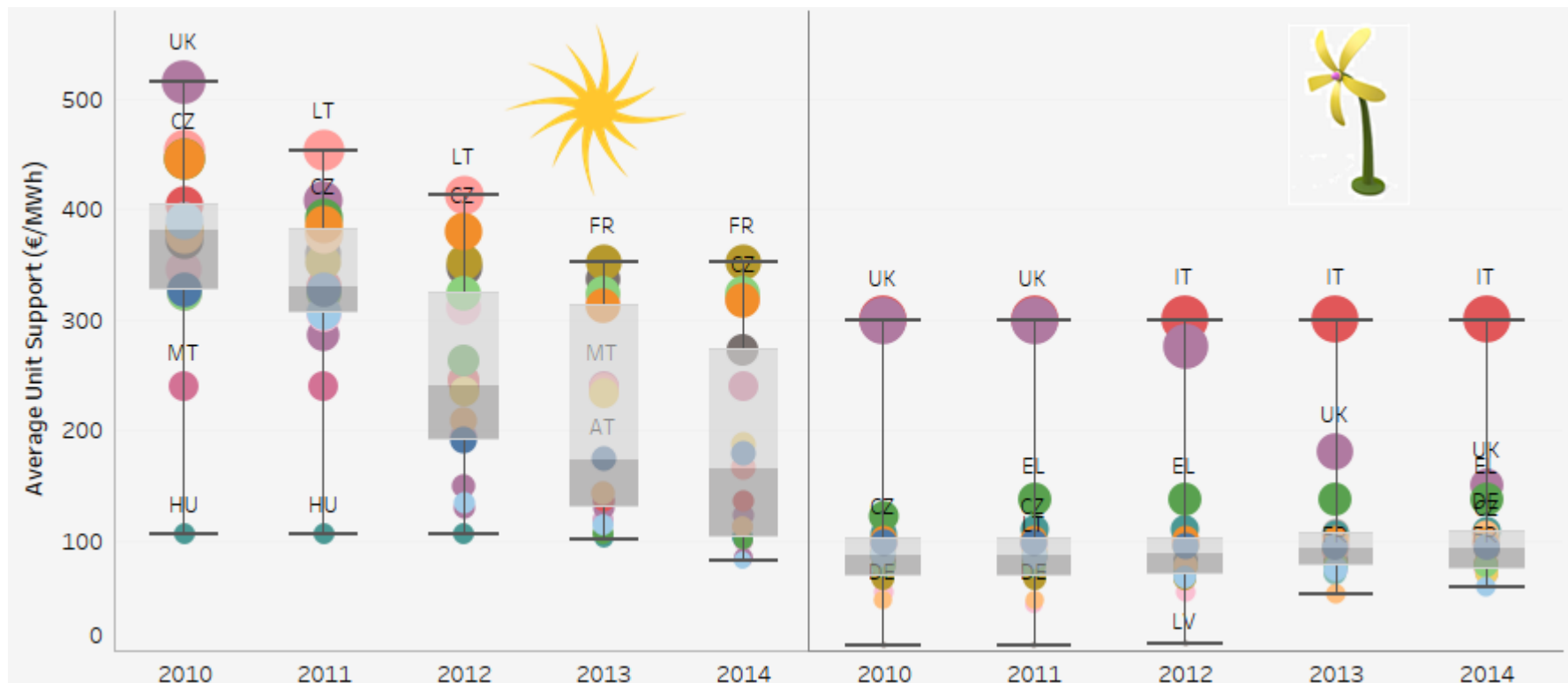
FIT Average support - PV & Wind (2010-2014)

Higher average support level for solar PV compared to wind

Larger dispersion of average support level for solar PV

Interquartile range of average support – greatest for solar PV

Larger decrease of average support level for solar PV



Solar PV

Feed-in-tariff - 16

**AT, BG, CZ, EL, ES, FR, HR,
LT, LU, MT, PT, SI, SK,
UK, HU, DE**

Constant FIP - 6

CZ, DE, EE, IT, NL, SI

Sliding FIP - 3

CY, DK, NL

Green certificates - 5

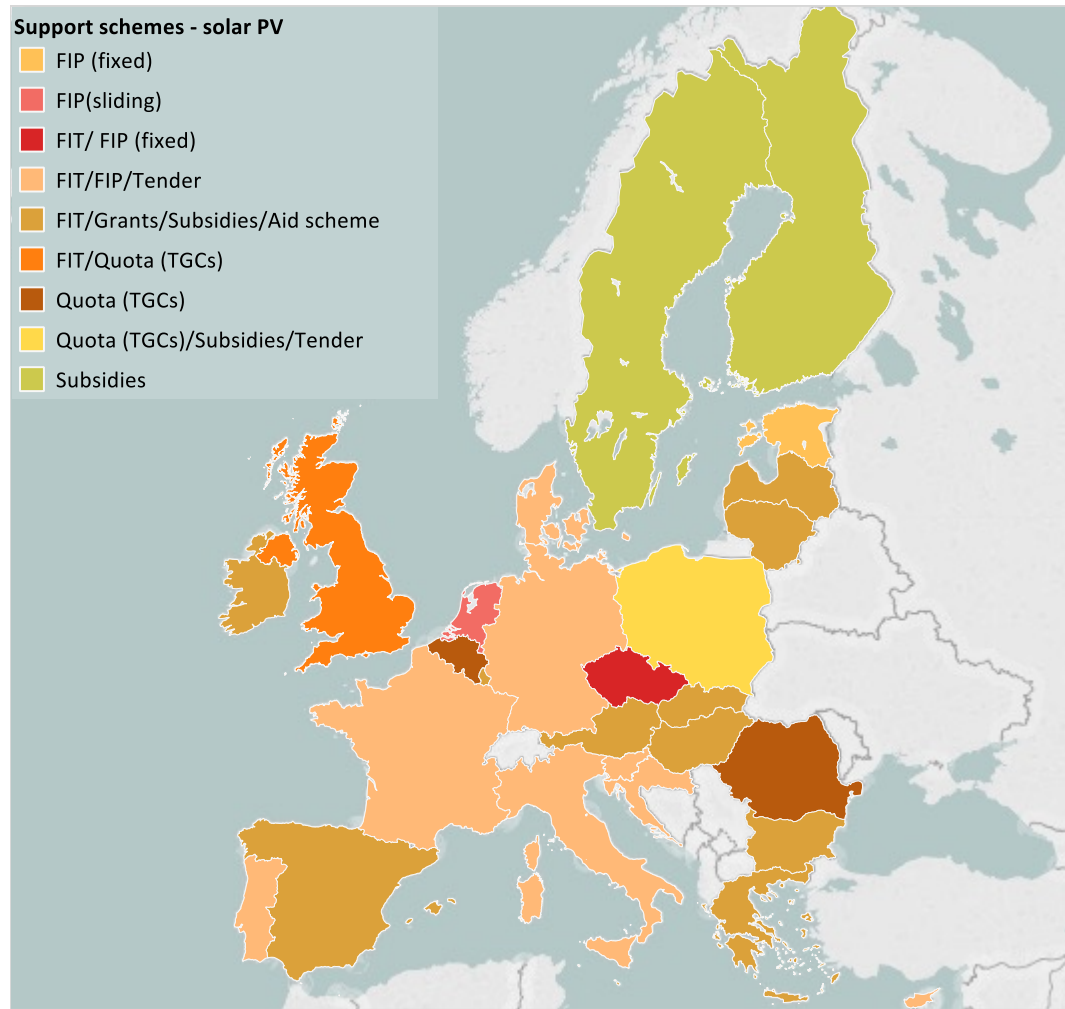
BE, PL, RO, SE, UK

Auctions - FR, DE, DK, IT,

CY, HR, PL, PT, SI

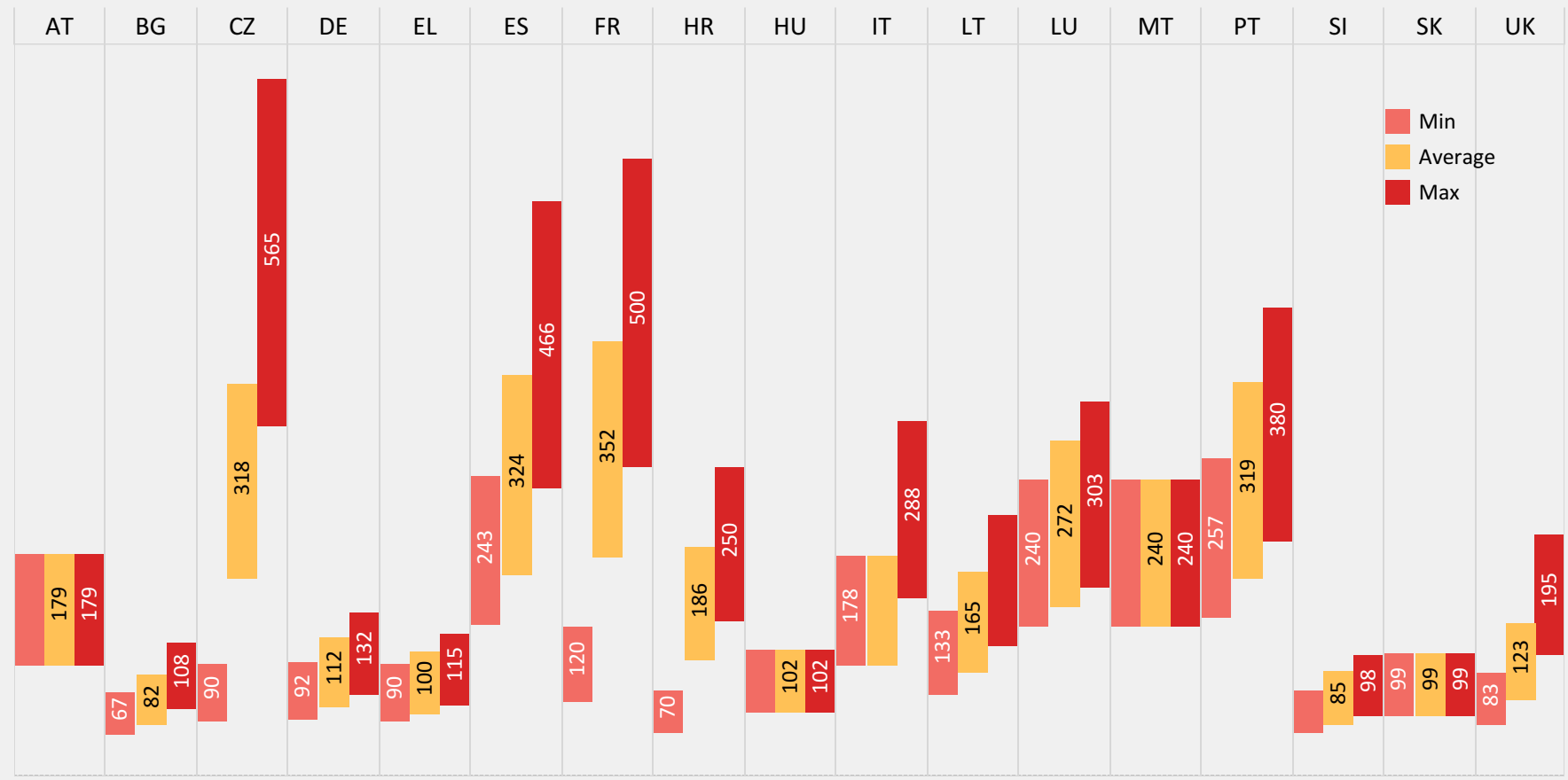
Support schemes - solar PV

- FIP (fixed)
- FIP(sliding)
- FIT/ FIP (fixed)
- FIT/FIP/Tender
- FIT/Grants/Subsidies/Aid scheme
- FIT/Quota (TGCs)
- Quota (TGCs)
- Quota (TGCs)/Subsidies/Tender
- Subsidies

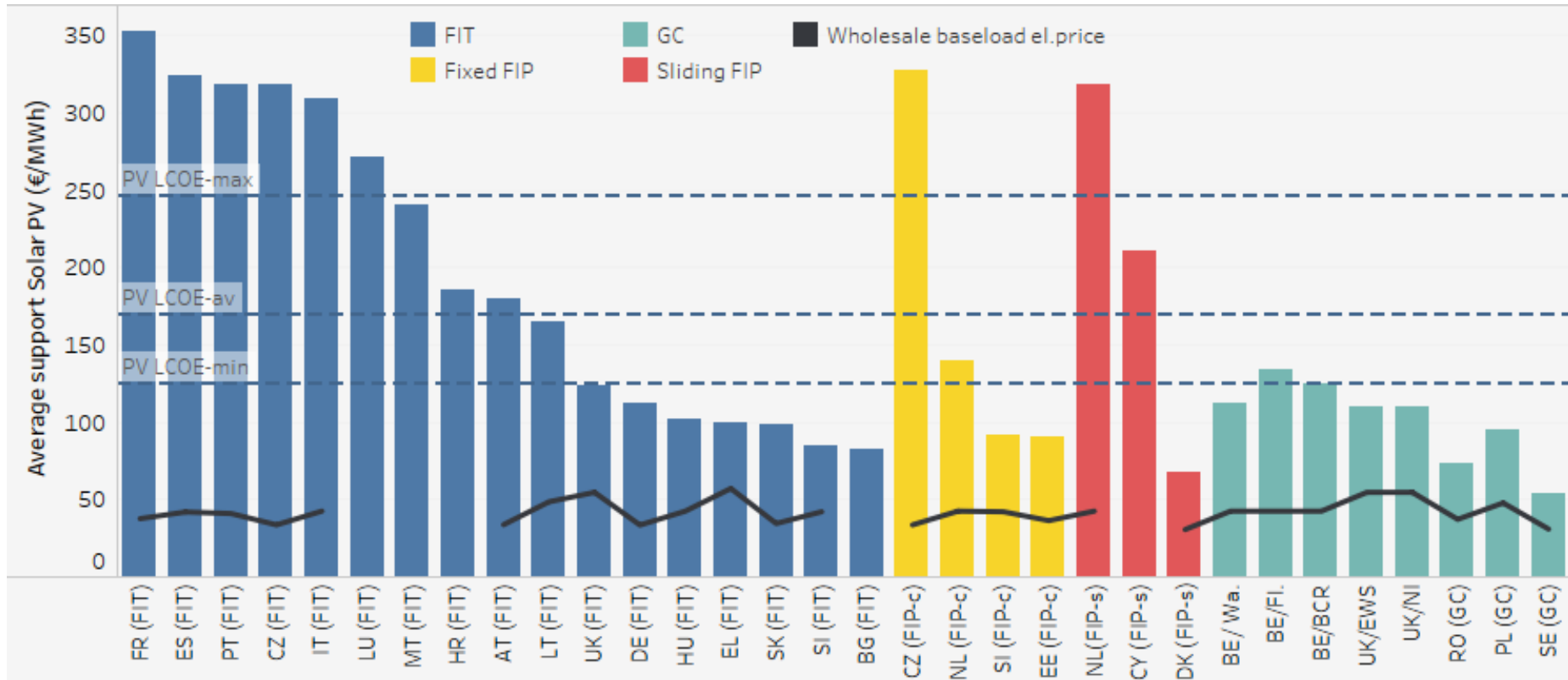


FIT - Solar PV, 2014

FIT - Solar PV support level, 2014 (€/MWh)



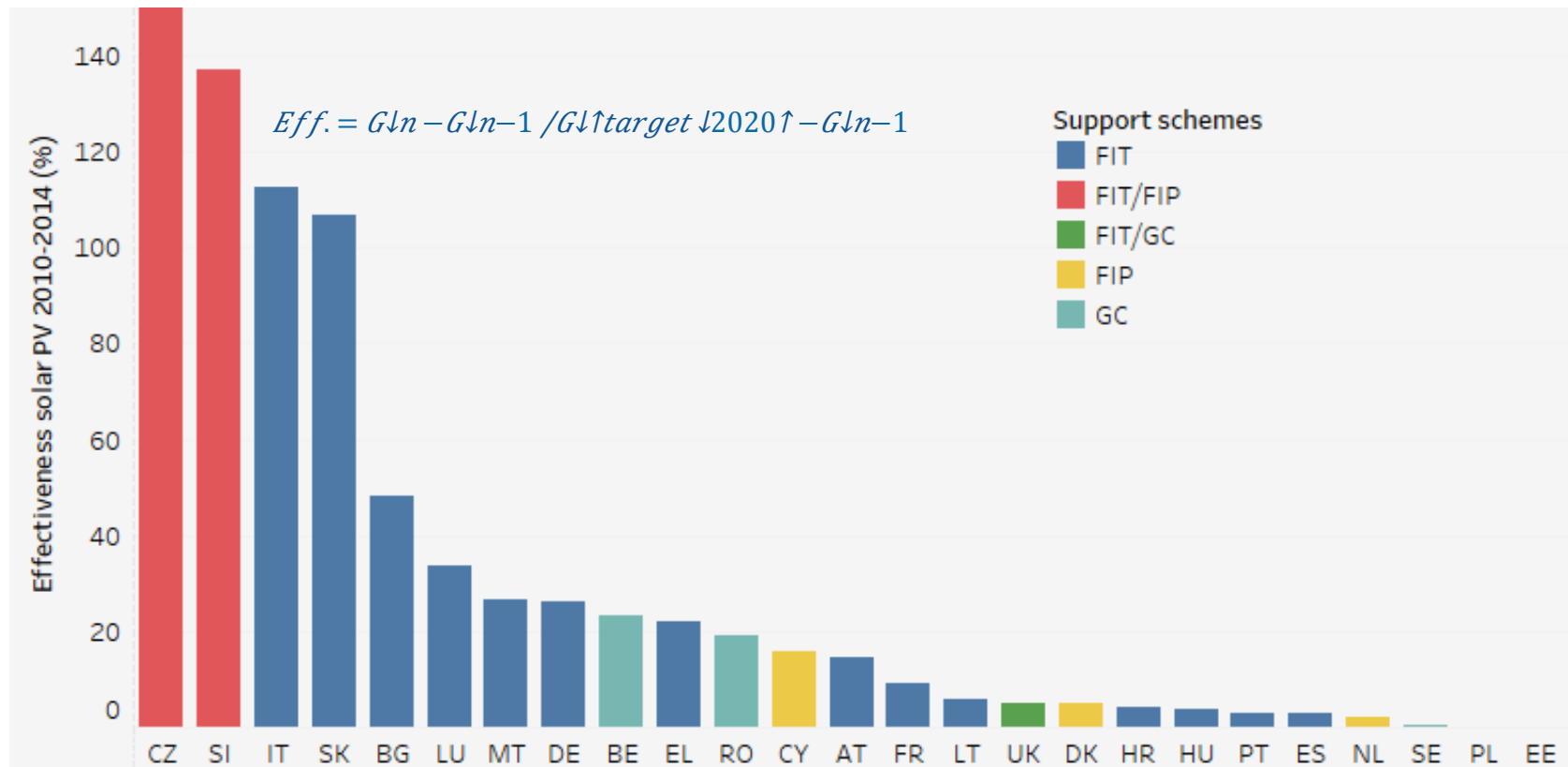
Average support solar PV & average baseload electricity price, 2014



Support is always above market price → "true" support

Effectiveness Indicator – Solar (2010-2014)

A clear pattern in "support schemes – deployment"



Who applies what?

Feed-in-tariff - 18

AT, BG, CZ, EL, ES, FR, HR,
IE, IT, LT, LU, LV, PT,
SI, SK, UK, HU, DE

Constant FIP - 5

CZ, DK, EE, NL, SI

Sliding FIP - 5

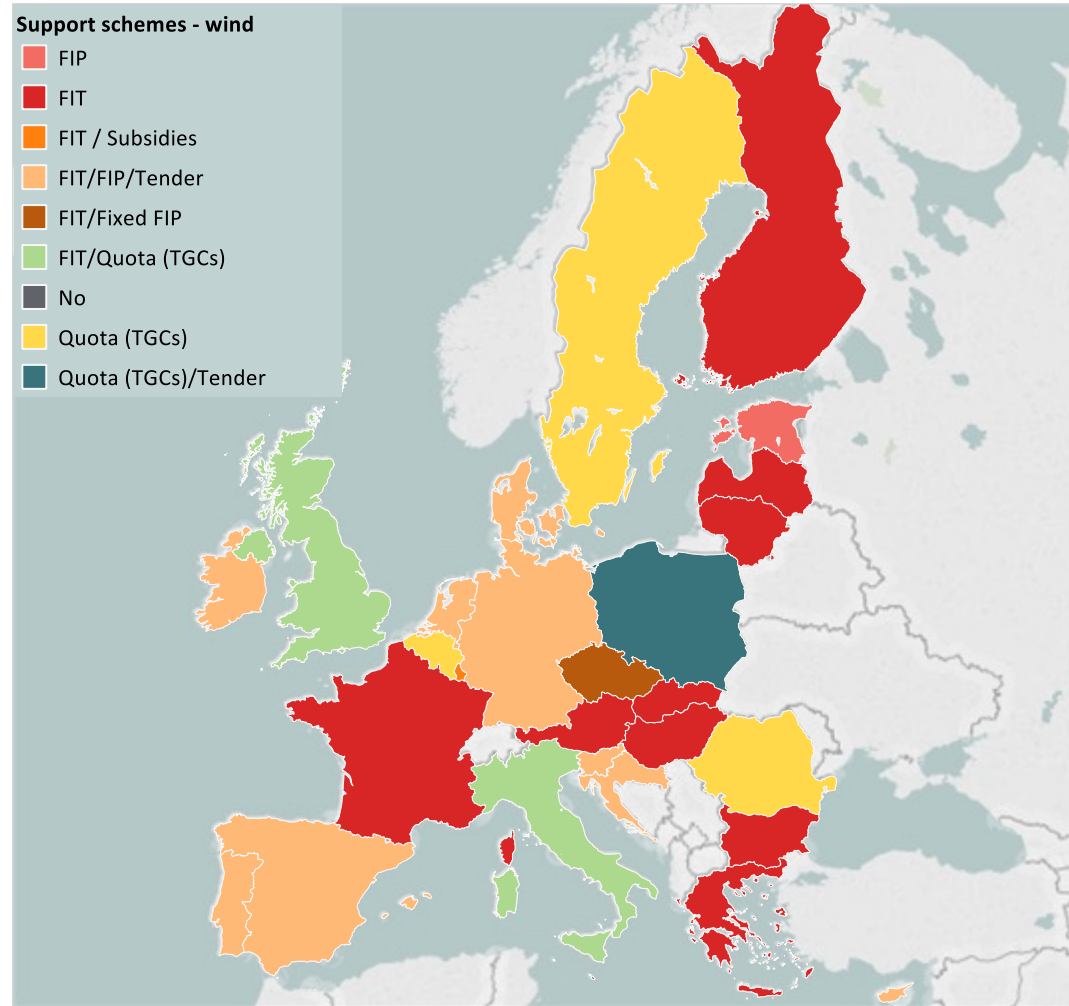
CY, DK, FI, ES, NL

Green Certificates - 6

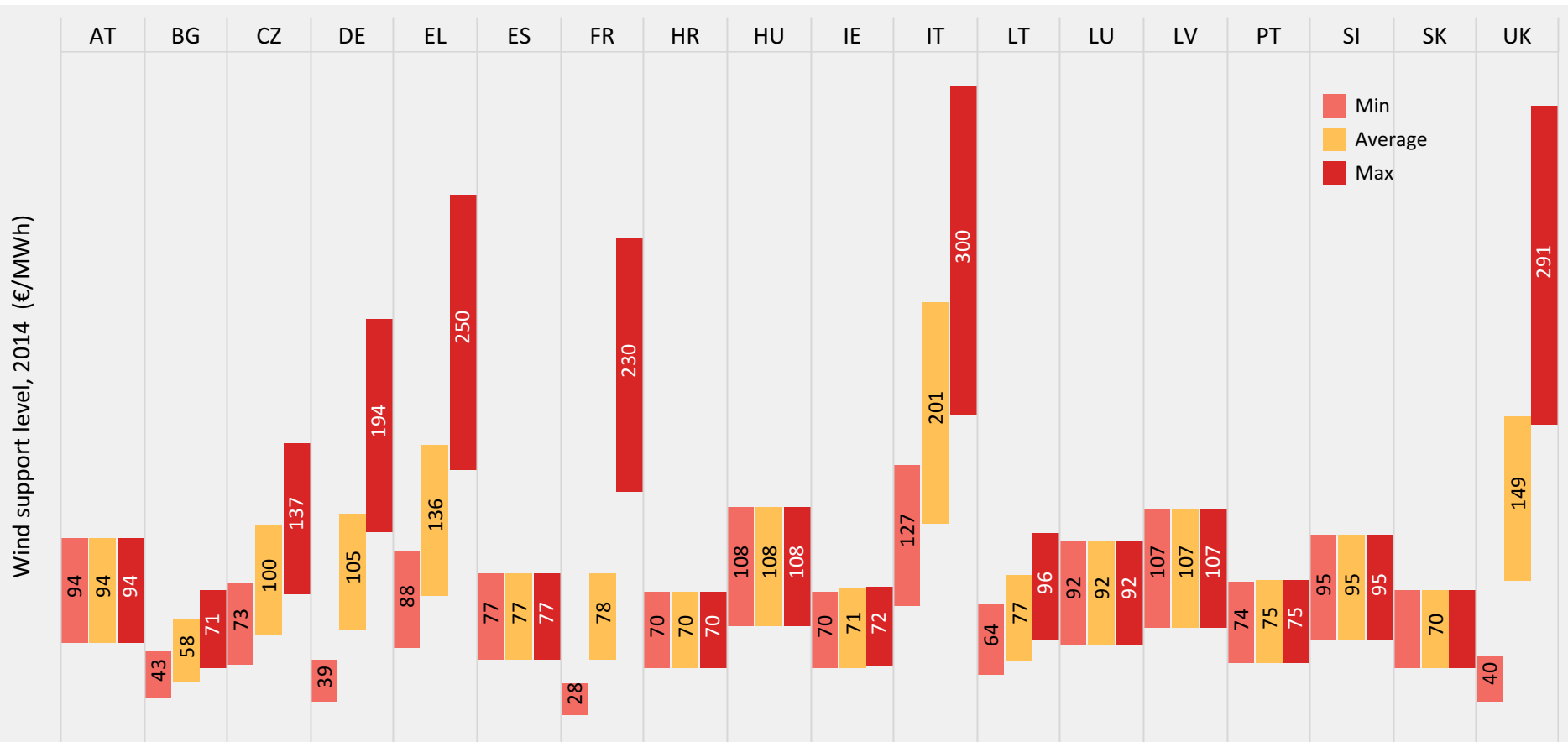
BE, IT, PL, RO, SE, UK

Auctions - DE, ES, NL, DK,
IE, HR, PL, PT, SI

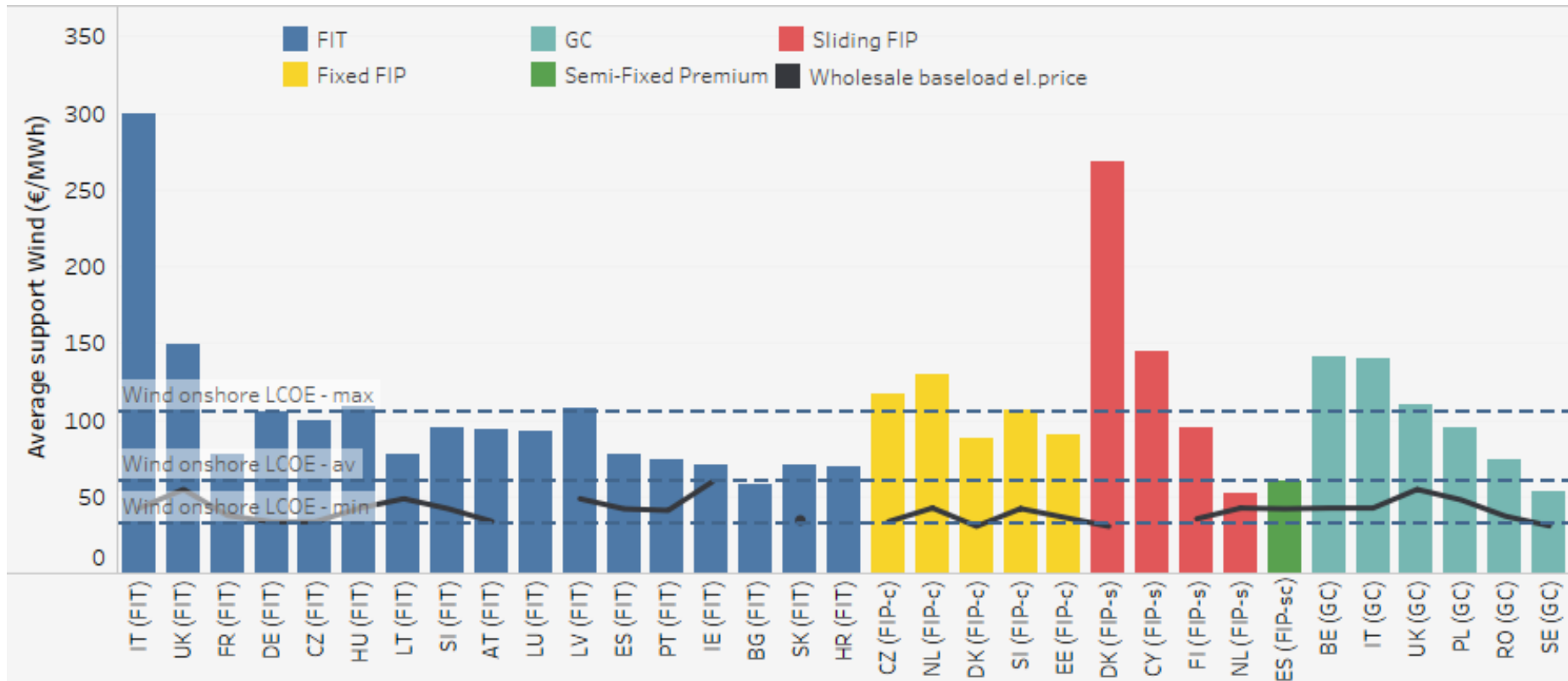
Wind



FIT - Wind, 2014



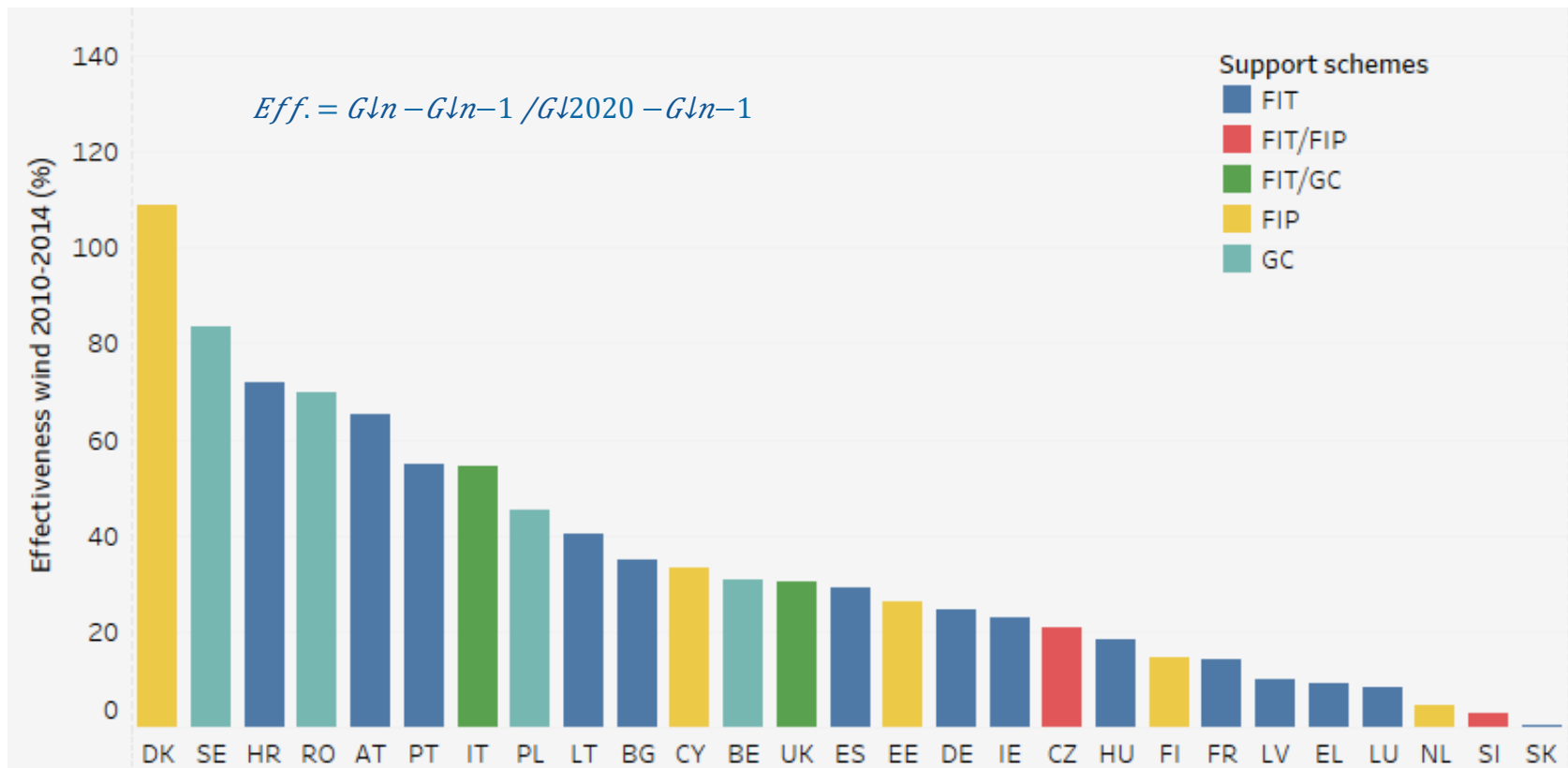
Average support Wind & average baseload electricity price, 2014



Support is always above market price → "true" support

Effectiveness Indicator – Wind (2010-2014)

No clear pattern in "support schemes – deployment"



Conclusion

Key takeaways & Policy challenges

Key takeaways & Policy challenges

based on the literature

Balance between budget control and investments security

- Better performances of FIT than those of GC ?
- Better integration of producers with FIP but risk of overcompensation
- Importance of strengthening investor confidence

Balance between production and innovation

- Technology-neutral support policies ?
- The advantages of auctions

Trends ? FIT + FIP and Auctions (EU State Aid Guidelines)

- Combination of FIT and FIP
- More market integration of producers
- Cost-effectiveness of auctions



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Appendix - Case Studies

- **Germany**
- **Italy**
- **UK**
- **Denmark**



Solar PV & Wind in Germany – FIT & Tendering

FIT – introduced in 2000 (monthly degressions)

Phased-in introduction of a "direct marketing" obligation
(~ sliding FIP with same rates + management premium) :

- Since 1st August 2014: IC higher than 500 kW
- Since January 2016: IC higher than 100 kW
- FIT still available for IC lower than 100 kW

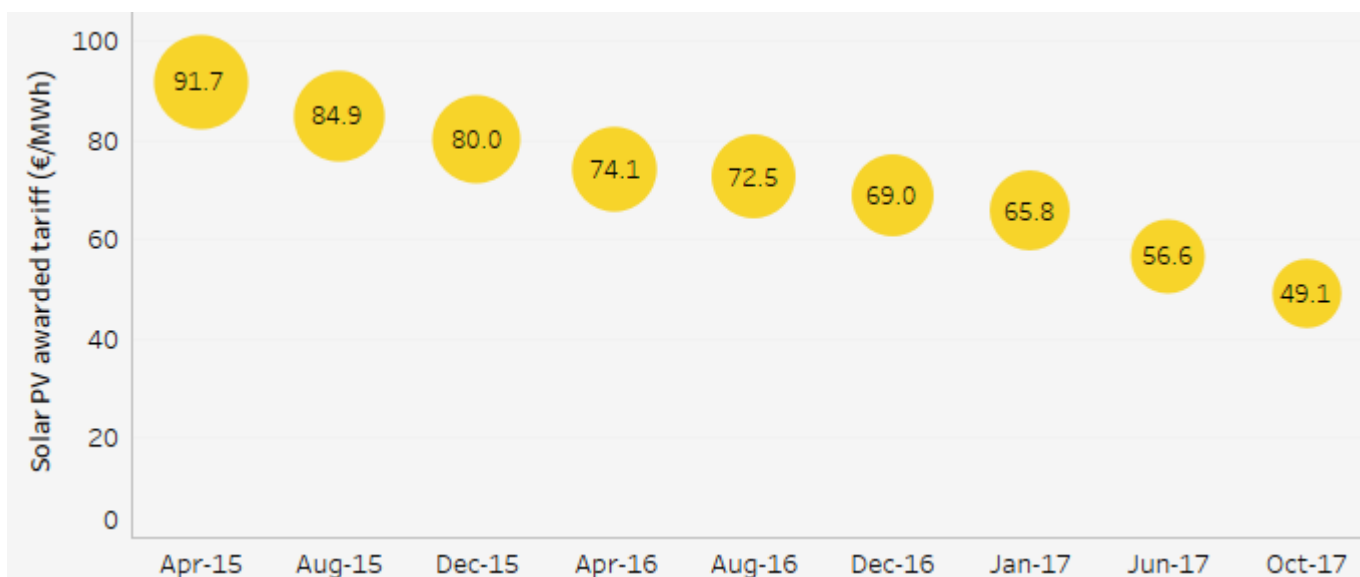
In June 2013, 80% onshore wind capacity and 100% offshore capacity were already using direct marketing

Solar PV & Wind in Germany – FIT & Tendering

Tendering system since 2014 (sliding FIP) for Wind

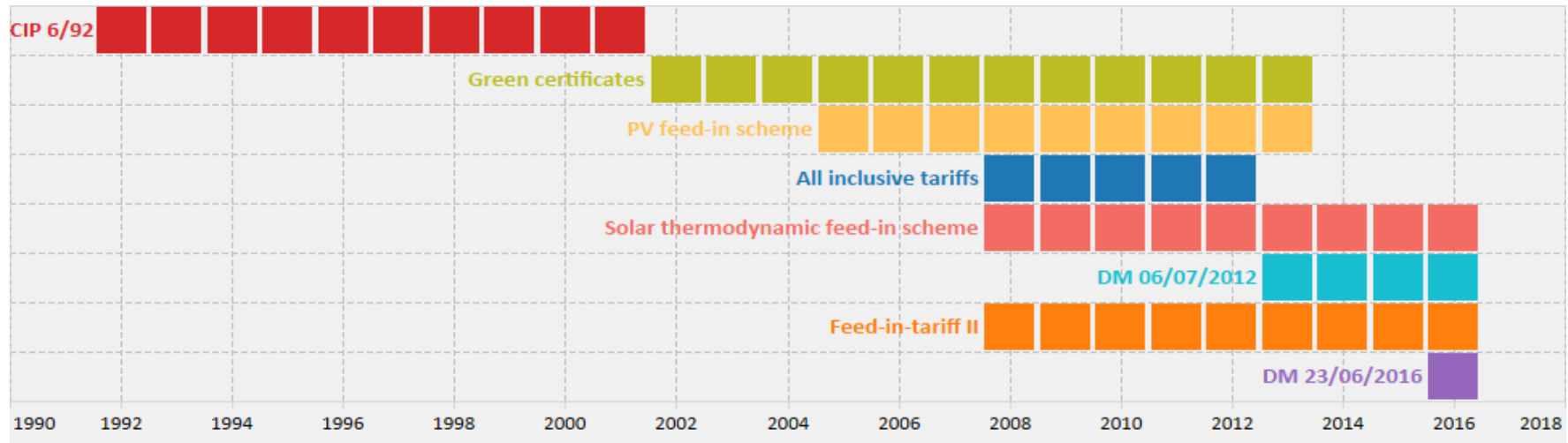
- August 2017 – 2nd onshore tender – 1.013 MW – 42.8 €/MWh
- 3rd round end of 2017 – target 1 GW – bidding cap 70€/MWh (unchanged)
- 4 rounds planned in 2014

PV tenders : the level of support awarded decreased



Next PV tender in 2018 : 200 MW – 88.4 €/MWh ceiling

Italy – solar PV



PV Feed-in scheme (>20yr)-5 incentive schemes 2005 -2013

Capacity > 1 MW Feed-in-premium

Capacity < 1 MW Feed-in-tariff

Feed-in scheme end 2014 - 17713 MW or 95% of PV capacity

Cumulative cost of incentives mid July 2013 – **6.7 €billion (the max annual)**

After 2013 - Feed-in-tariff II & Tender scheme (DM 6/7/12)

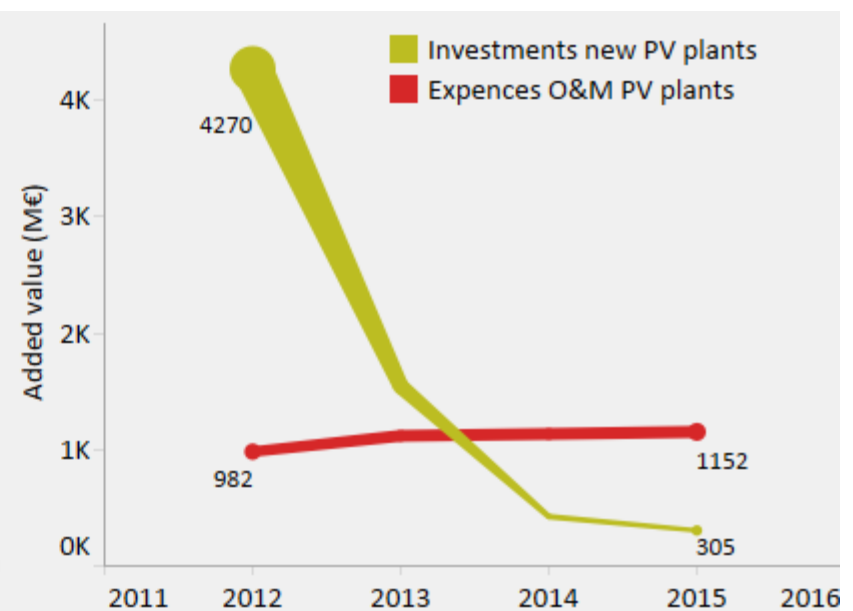
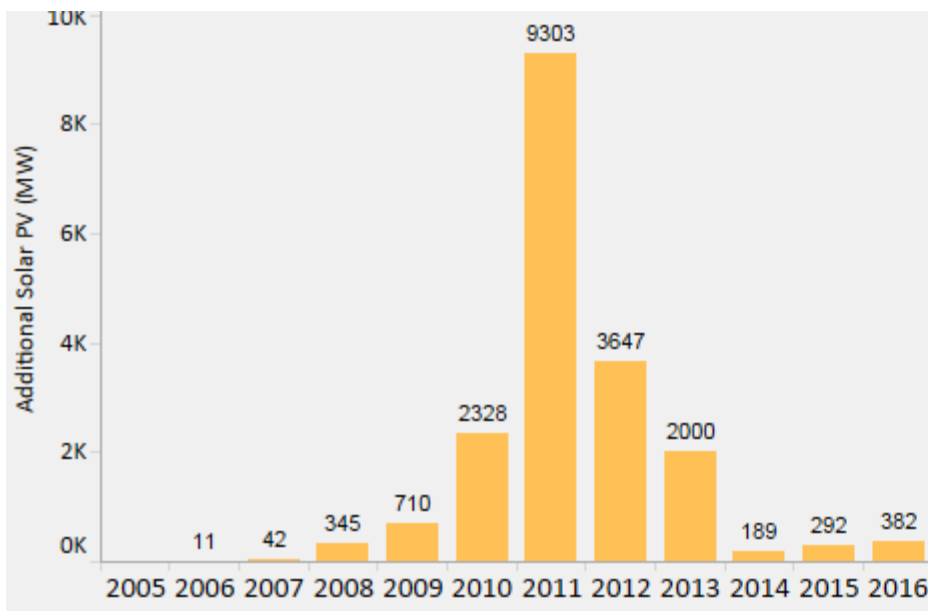
Italy – solar PV

9.3 GW added in 2011

0.38 GW added in 2016

90% drop added values investments new PV plants 2012 -2015

2016-2020 investments new PV plans - 440 M€ annually



Solar PV & wind in UK – FIT support

3 support schemes: FIT (2010), FIP (sliding), GC

FIT capacity end 2015 (commissioned) - 4010 MW

almost **20%** of UK additional capacity 2010-2015

Standard PV (<4 kW – 250 kW)

Standard large PV (250 kW- 5MW)

Standalone PV (< 5 MW)

min support 76.3 €/MWh – max support 172.2 €/MWh

wind (<100 kW – 5 MW)

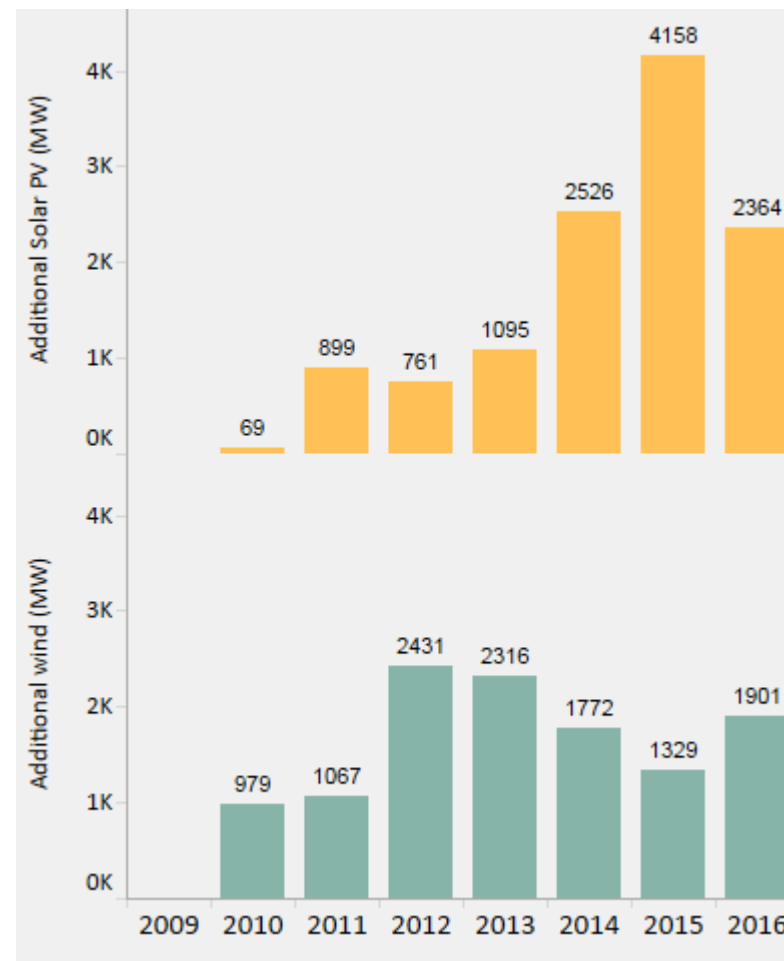
min support 36.8 €/MWh – max support 191.6 €/MWh

Solar PV & wind in UK – FIT support

Solar PV - 84% of FIT capacity

16% of additional RES-E capacity
2010-2015

Wind - 11% of FIT capacity



	2014	2015
<i>PV capacity (MW)</i>	2662	3374
<i>PV installations (thousand)</i>	599.4	755
<i>Wind capacity (MW)</i>	322.2	411.8
<i>Wind installations (thousand)</i>	6.6	7.0

Wind in Denmark

End 2013 – Constant FIP for onshore wind

Jan 2014 – Sliding FIP with max remuneration 77.8 €/MWh

Sliding FIP for wind domestic turbines :

up to 10 kW – 335 €/MWh

up to 25 kW – 201 €/MWh

Tendering system for offshore wind: 5 rounds (2004 to 2014)
(auctions for sliding FIP for 12 to 15 years)

Name	Period	Capacity	Suppl. Gen.	Unit support
<i>Horns Rev 2</i>	Feb. 2005	200 MW	10 TWh	69 €/MWh
<i>Rødsand 2, 1st try</i>	May 2006	200 MW	10 TWh	67 €/MWh
<i>Rødsand 2, 2nd try</i>	Apr. 2008	200 MW	10 TWh	85 €/MWh
<i>Anholt</i>	Apr. 2010	390-400 MW	20 TWh	141 €/MWh



Thank you for your attention !

Any question ?