ETIP Wind

EUROPEAN TECHNOLOGY & INNOVATION
PLATFORM ON **WIND ENERGY**

ETIPWind Executive Committee meeting

23 September 2019

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Disclaimer:

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Project details:

Duration:
Jan 2019 - Dec 2021 (36 Months)
Grant agreement:
No: 826042

Alexander Vandenberghe
Advisor Research & Innovation

TIMING	AGENDA ITEM
14:00 – 14:10	**Introduction** Aidan Cronin, Executive Committee Chair
14:10 – 14:30	**Keynote – Wind power outlook 2019** Shashi Barla, Wood MacKenzie
14:30 – 14:40	**Long term scenarios for wind energy** Ivan Komusanac, WindEurope
14:40 – 15:00	**Q&A** Discussion
15:00 – 15:15	**State of play on EU research policy** ETIPWind secretariat
15:15 – 15:25	**Coffee break**
15:25 – 16:20	**Technology Roadmap** Discussion and approval
16:20 – 16:35	**Dissemination of ETIPWind publications** ETIPWind secretariat
16:35 – 16:50	**Aligning the wind R&I community: IEA TCP, EAWE, EERA, ETIP** Discussion
16:50 – 17:00	**Coffee break**
17:00 – 17:15	**The ETS Innovation Fund: next steps** Iván Pineda, WindEurope
17:15 – 17:30	**How wind is going circular: next steps** Sabina Potestio, WindEurope
17:30 – 17:45	**Wind energy & the global market: EU trade policy** Joshua Gartland, WindEurope.
17:45 -18:00	**AOB**
18:00	**End of meeting**

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Keynote
–
Wind power outlook 2019

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Long term scenarios for wind energy

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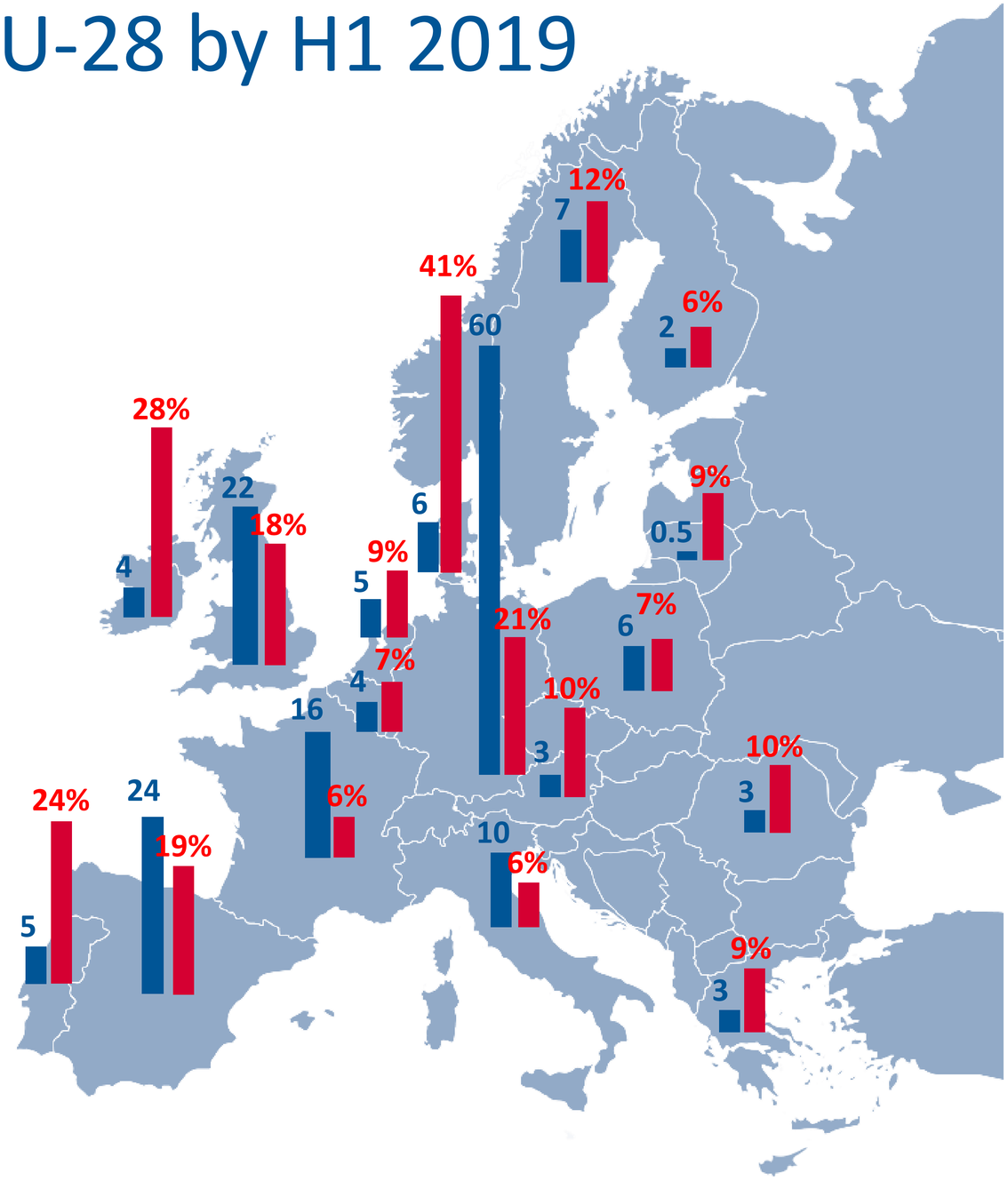
Wind capacity in EU-28 by H1 2019

183 GW

14%

of 2018 EU power demand

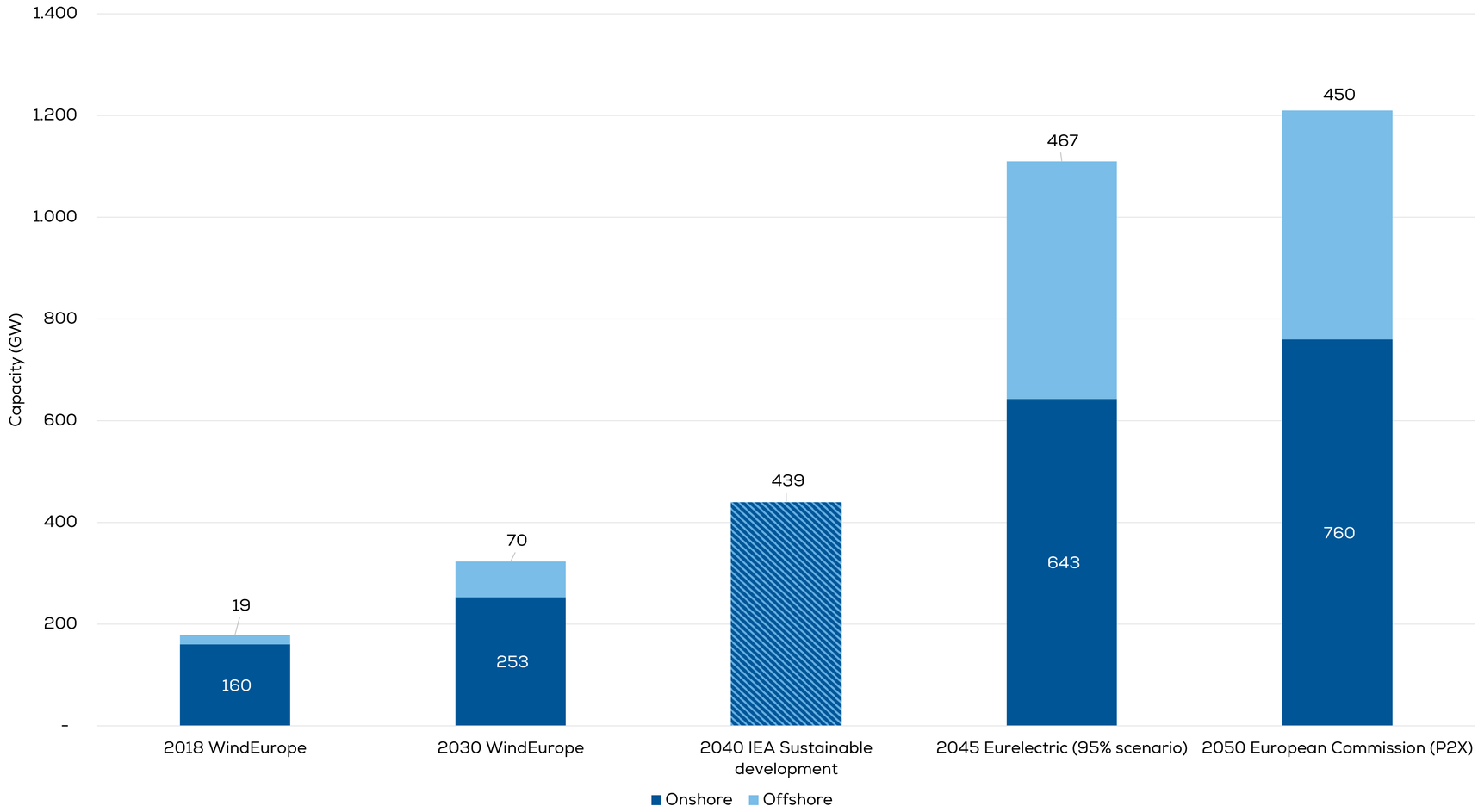
Source: WindEurope



Wind EUROPE

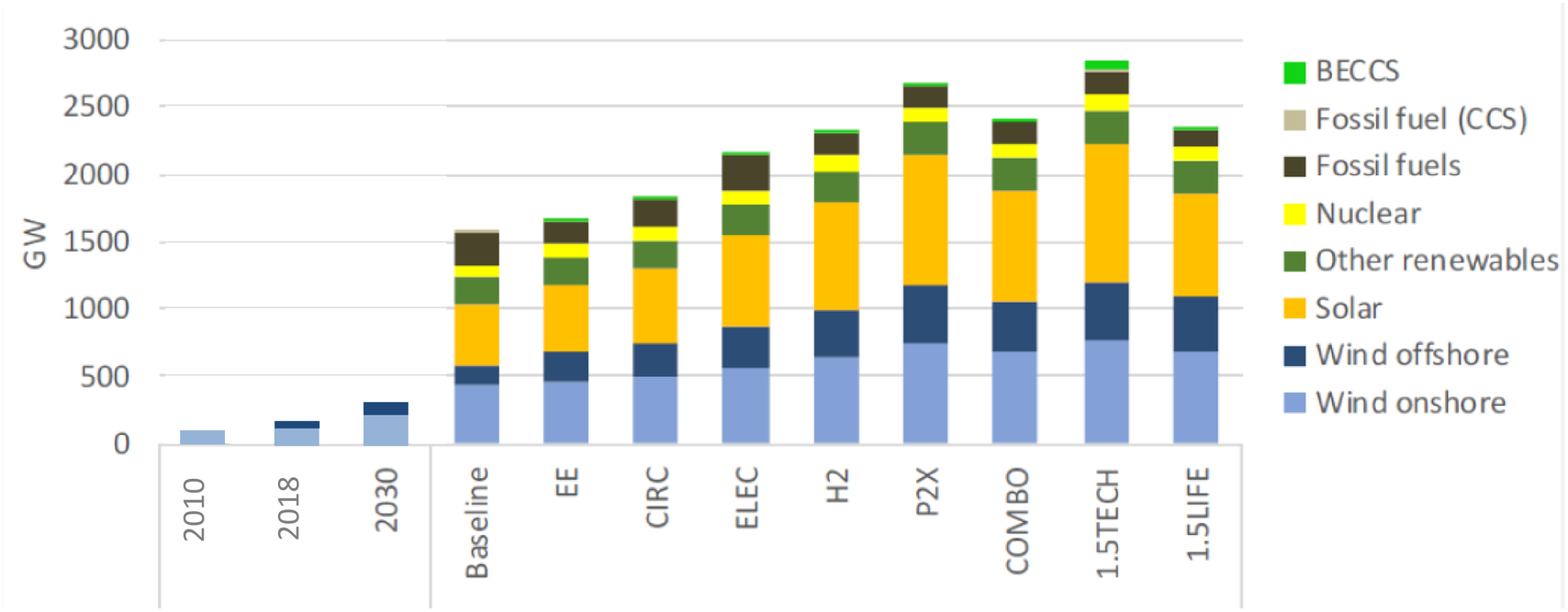
Wind capacity 2018 to 2050

Almost 50 GW pa between 2030 and 2050



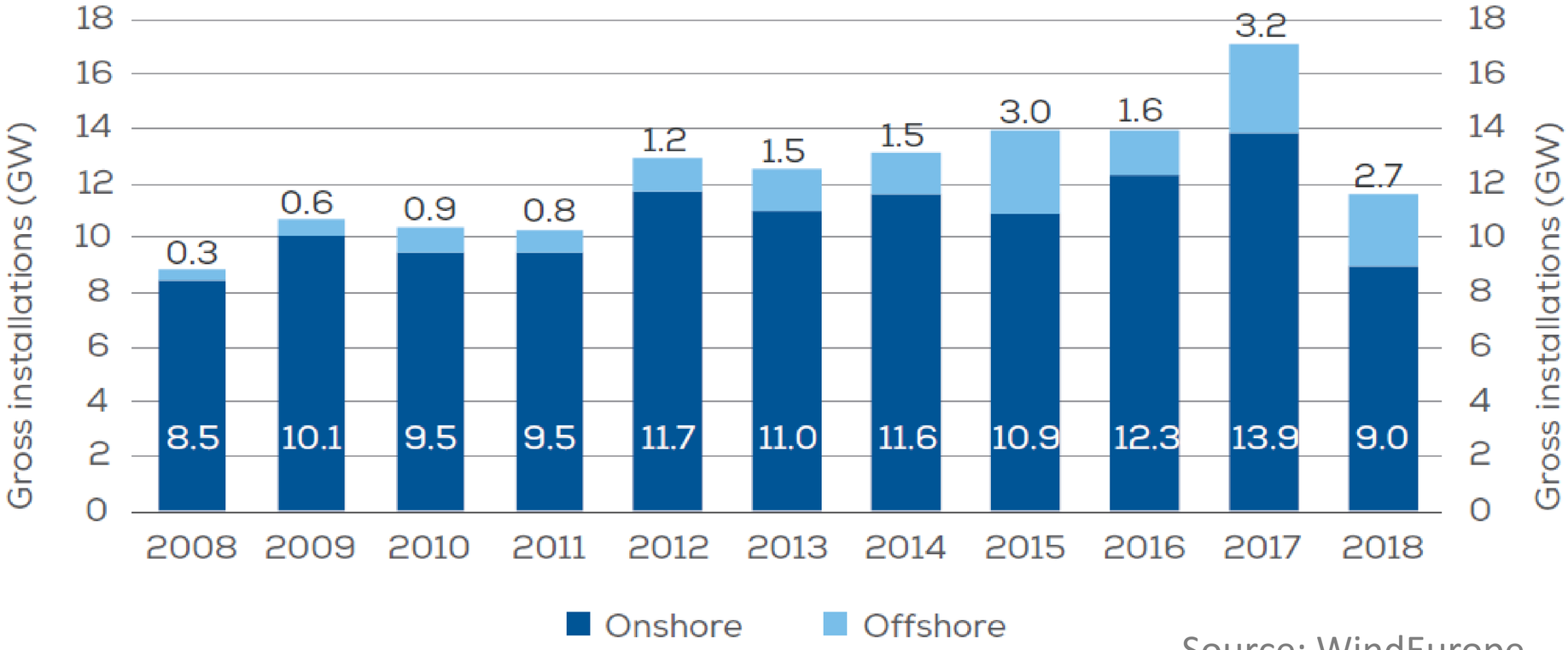
Sources: WindEurope, IEA, Eurelectric, European Commission

1.5 TECH is the scenario for net zero 2050



Source: European Commission decarbonisation strategy

Not even 18 GW per year



Source: WindEurope

Wind EUROPE

EU research policy
–
State of play

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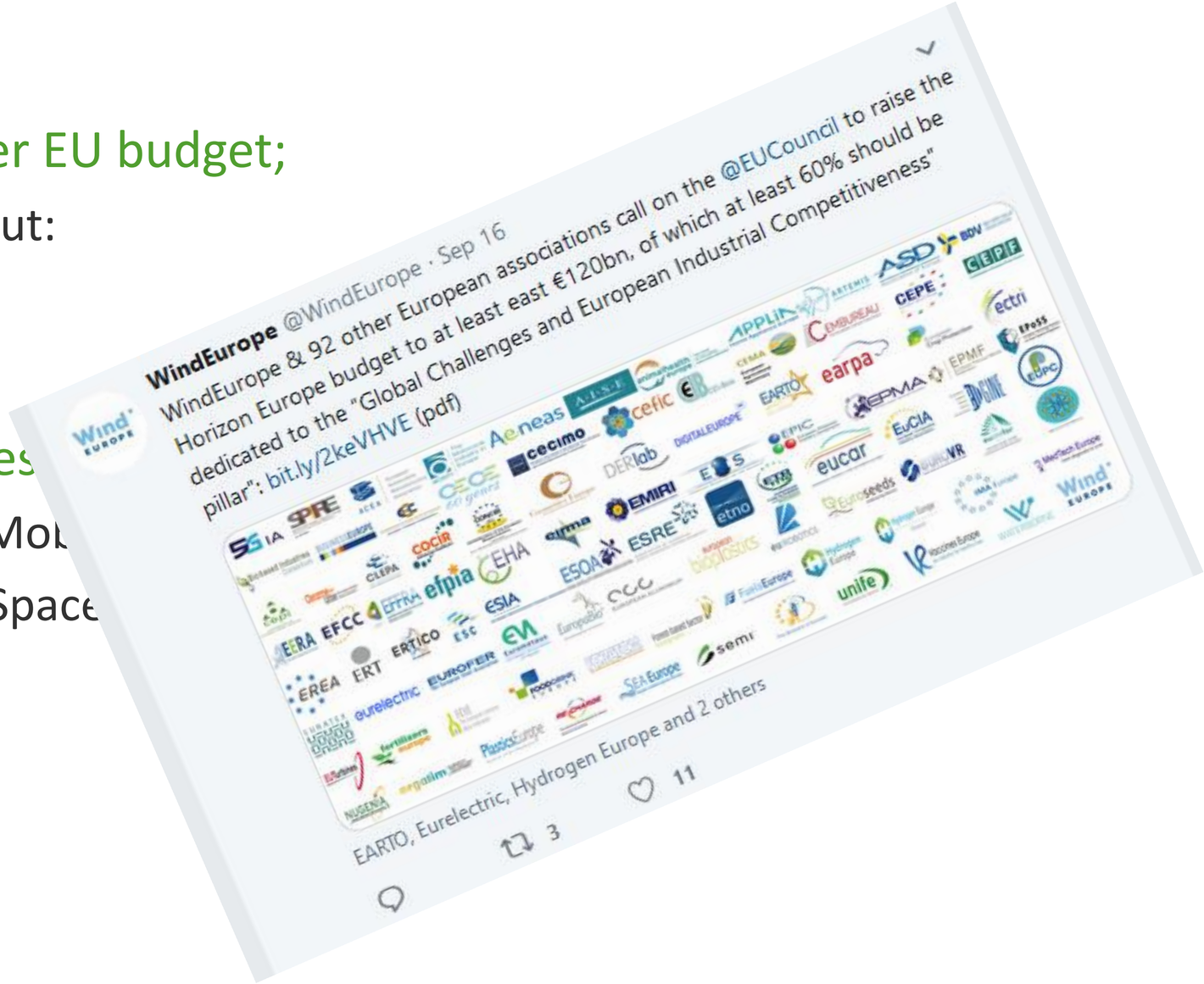
Horizon Europe – Structure

Source: European Commission

Horizon Europe – Budget

- Final numbers part of the wider EU budget;
  - Deal now expected in 2020, but:
- 35% earmarked for climate;
- [€94,1 bn] total budget;
- [€52,7 bn] for Global Challenges
  - [€15 bn] - Climate, Energy & Mob
  - [€15 bn] - Digital, Industry & Space



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Horizon Europe – indicative timeline

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Horizon Europe – where do we stand

- Strategic plan
  - 24-26 September EU R&I days;
  - Consultation on strategic planning - closed
  - Consultation on implementation - extended
  - Consultation on partnerships – open
  - Final document due by November (?)
- Missions
  - Mission boards elected;
  - Mix of policymakers, captains of industry, NGOs and ‘high potentials’,

Horizon Europe – ETIPWind response on strategic planning

- Based on ETIPWind SRIA and Technology Roadmap.
- Available on ETIPWind website
- 3 overarching challenges:
  - Sustaining the cost reduction trend in renewables and ensure delivery of the high volumes expected.
    - E.g. manufacturing, design, test and validation of components…
  - Enhancing overall circularity and sustainability of European industries.
    - E.g. recycling of composites, new materials…
  - Decarbonising the hardest to abate sectors.
    - E.g. direct electrification, hydrogen electrolysis…

Horizon Europe – ETIPWind response on implementation

- Based on previous positions (H2020) and ETIPWind discussions.
- Available on ETIPWind website.
- Main asks (non-exhaustive list):
  - Simplify reporting and administrative requirements;
  - Less prescriptive project consortium requirements;
  - Open calls with multi-annual deadlines,
  - Clear description of possible pathways and expected impacts, including TRL indications; and
  - Stakeholder involvement (ETIPs) in Work Programmes.
  - …

Horizon Europe – proposed Clean Energy Transition partnership

- Co-funding with Member States (~ ERA NETs)
- So far, 11 MS expressed interest (incl. BE, DE, ES, IT, NL, SE, NO)
- DK not interested in partnership (!)

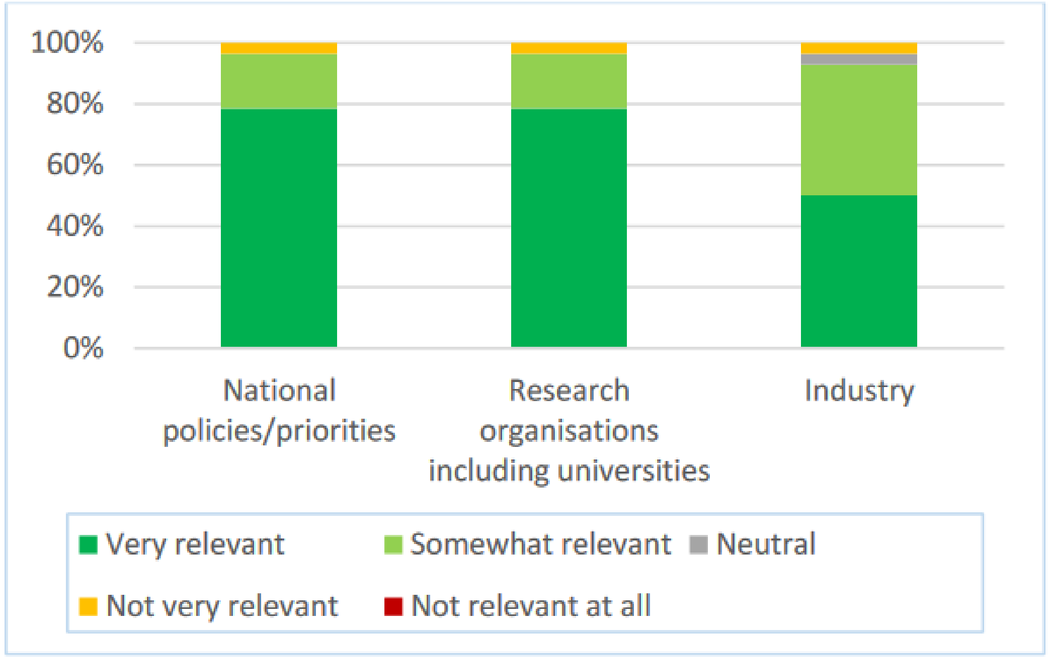

Figure 49: Relevance of the European Partnership on Clean Energy Transition in the national context

Source: European Commission, European Partnerships under Horizon Europe: results of the structured consultation of Member States, June 2019

Technology Roadmap

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Technology Roadmap – changes

General part

- Removal of “technology basics”, “avian mortality” and “heat waves”; and
- Breaking up of globalisation part.

Research priorities

- Grid & system integration
  - Merging of “long term storage” topics; and
  - Clearer focus on research vs. deployment / market aspects.
- Offshore Balance of plant
  - Removal of “site conditions” & “innovative pathways” topics.
- Floating wind
  - Merging of design priorities in floating wind; and
  - Addition of “lean production” challenge.

Technology Roadmap – discussion points

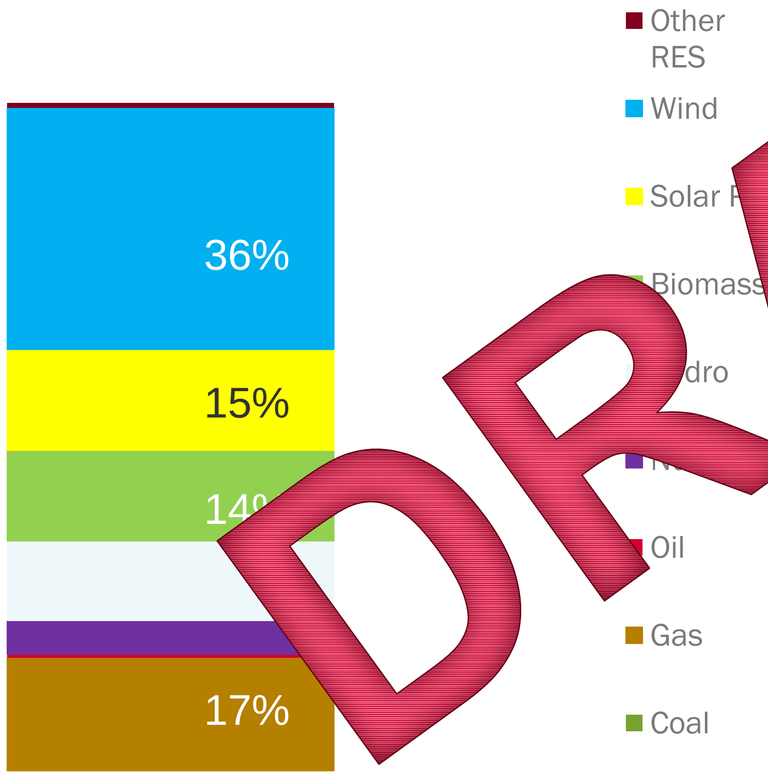
1. Projection of the electricity system;

2. EU energy subsidies; and

3. Projection of the external cost of the energy system.

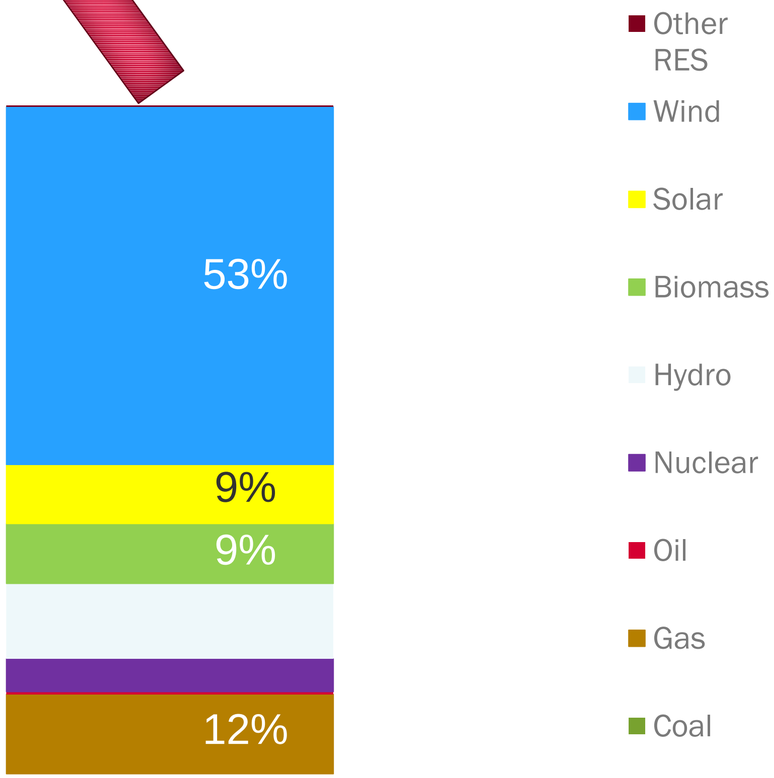
Projected electricity mix comparison (shares in 2050)

Breaking new ground scenario



Source: WindEurope, Breaking new Ground (2018)

Wind energy optimal scenario

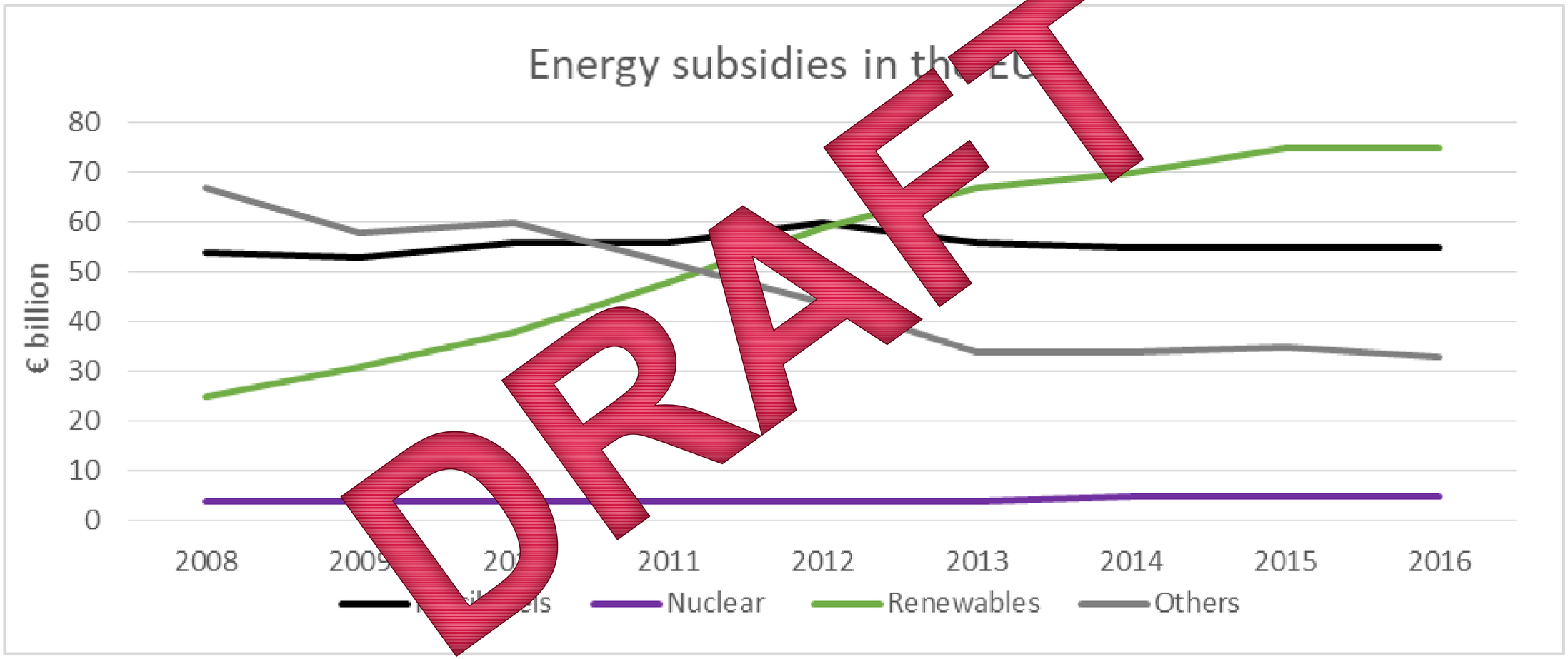


Source: WindEurope analysis

Projected power mix comparison

- Solar capacity drops with 42%
- Gas (incl. peaking) capacity increases 24%
- Gas share in power mix decrease 5%
- Total capacity drops with 6.2%
- Further 16% carbon emissions reduction

Technology Roadmap – energy subsidies



Source: Trinomics e.a., Energy prices, costs and subsidies and their impact on industry and households, 2018

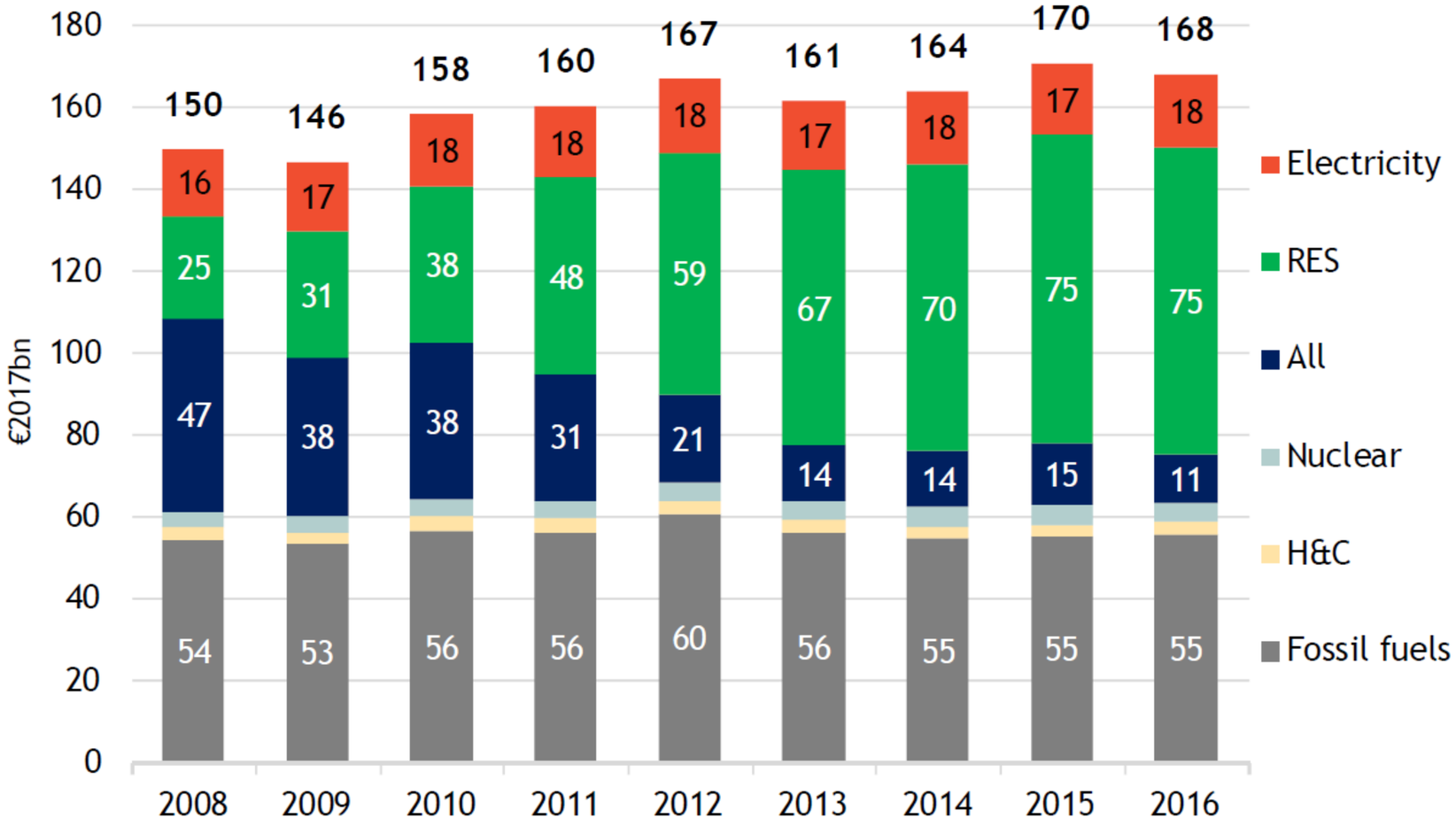
Technology roadmap – energy subsidies

"Overall European **energy subsidies have increased** in recent years, from EUR 148 bn in 2008 to EUR 169 bn in 2016 (…) The increase was driven by the **growth in renewable energy subsidies** which reached EUR 76 bn in 2016 (…) **fossil fuel subsidies** in the EU have not decreased and are estimated to be EUR 55 bn, **remaining roughly stable** across sectors and implying that EU and national policies might need to be reinforced to phase out such subsidies."

Source: REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS, Energy prices and costs in Europe, 2019

Technology Roadmap – energy subsidies

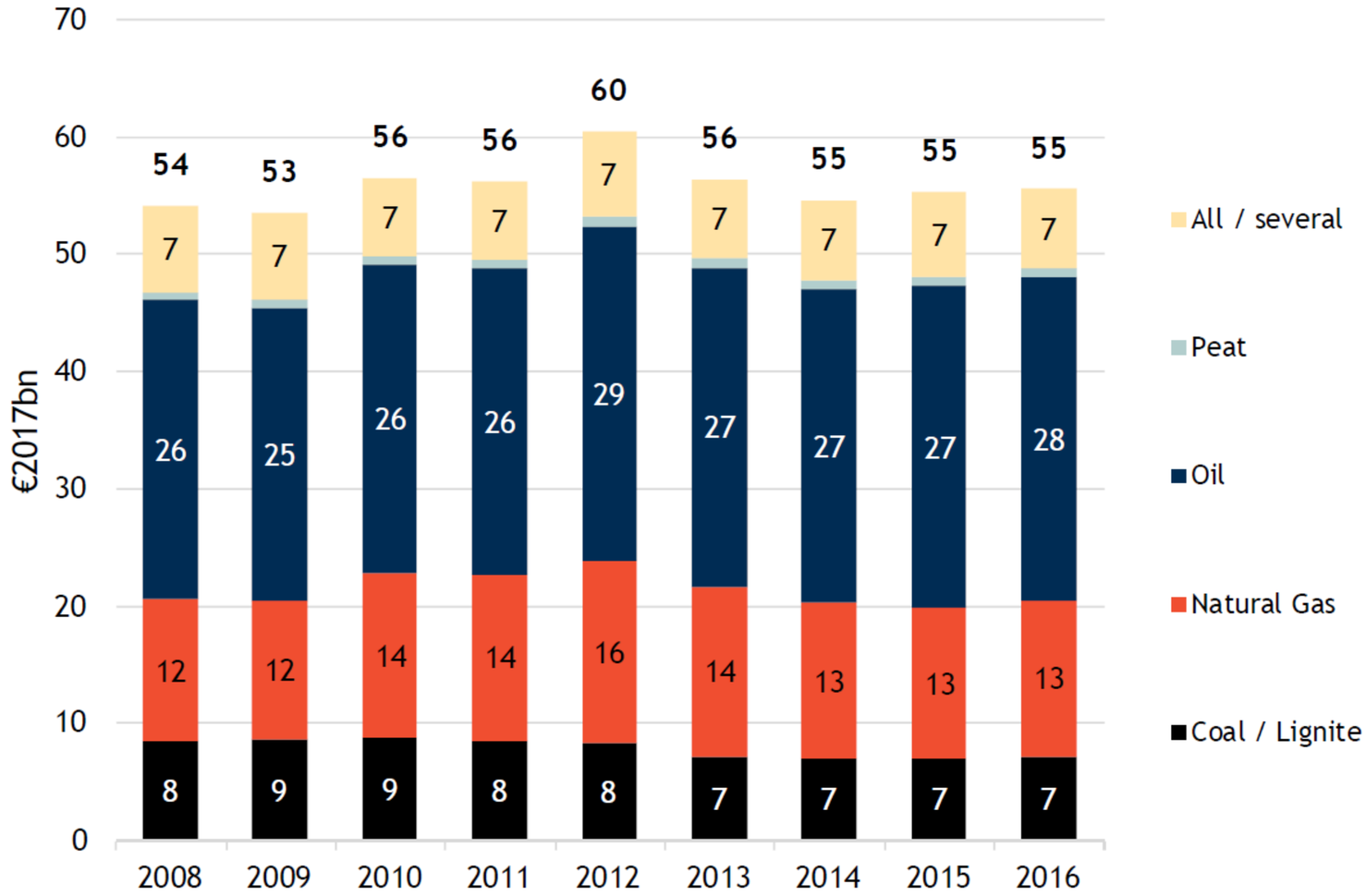
Figure 6-9: Financial support by energy (2008-2016, €2017bn)



Source: Trinomics e.a., Energy prices, costs and subsidies and their impact on industry and households, 2018

Technology Roadmap – fossil fuel subsidies

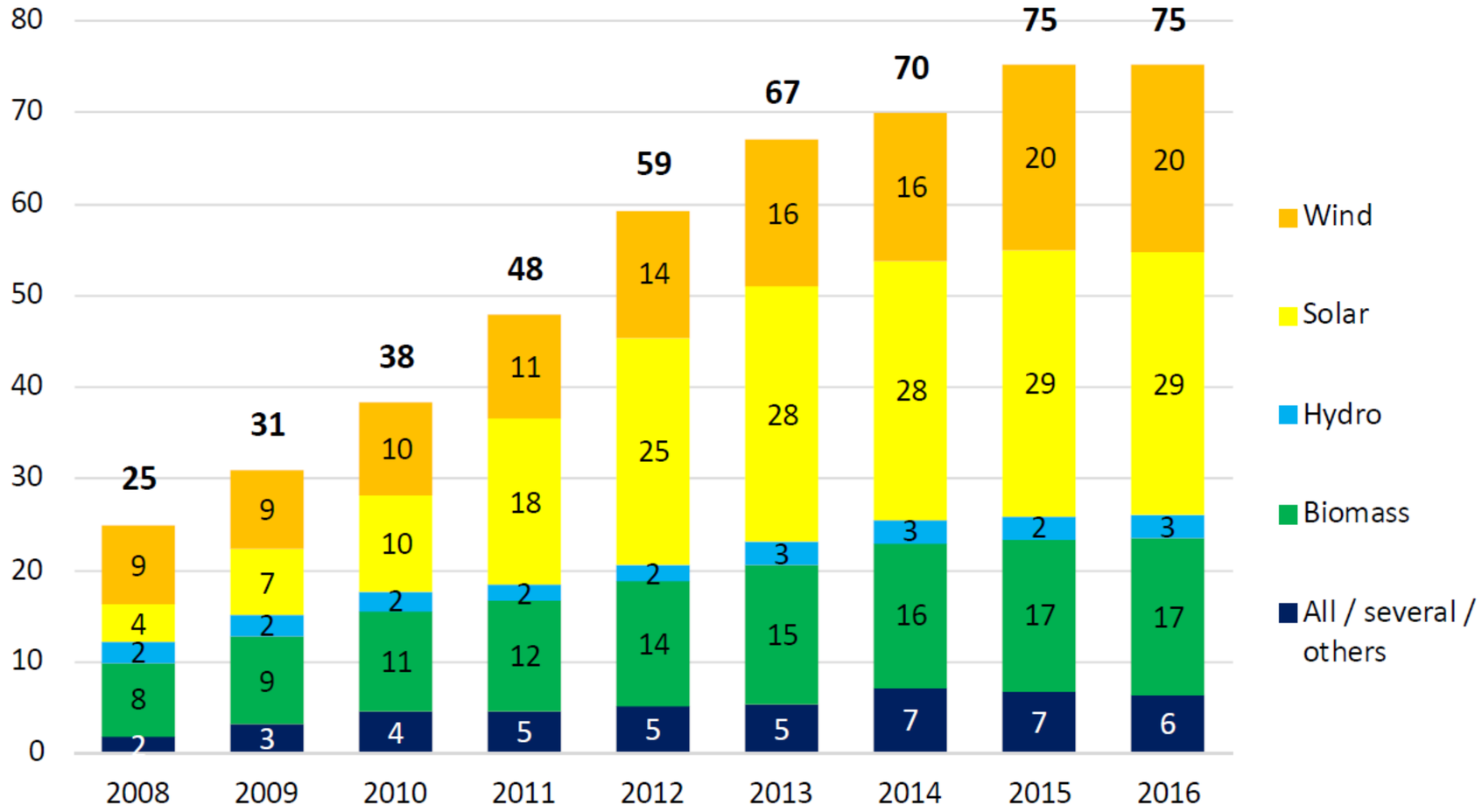
Figure 6-13: Financial support for fossil fuels - split by energy source (2008-2016, €2017bn)



Source: Trinomics e.a., Energy prices, costs and subsidies and their impact on industry and households, 2018

Technology Roadmap – RES subsidies

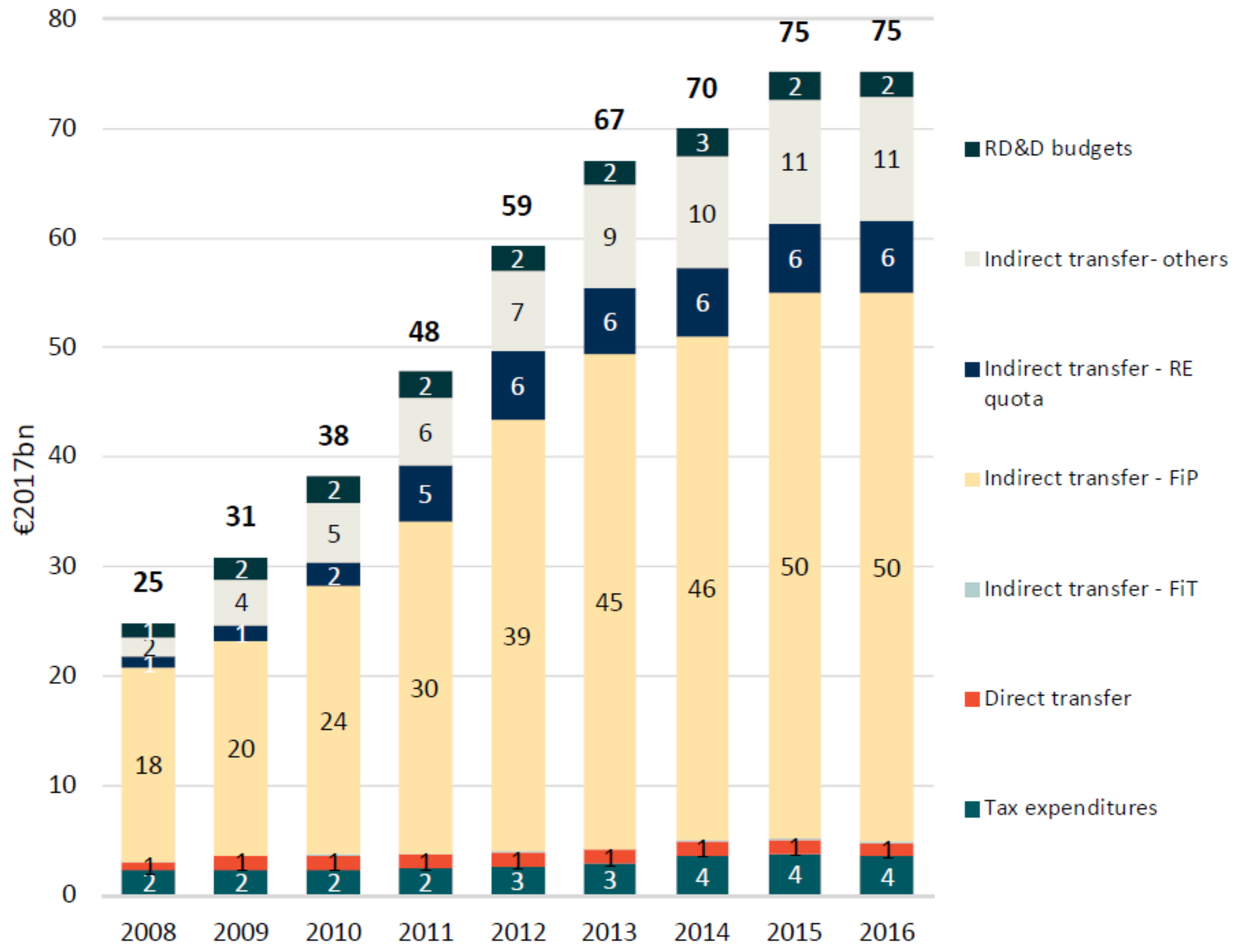
Figure 6-21: Financial support to RES by energy source (2008-2016, €2017bn)



Source: Trinomics e.a., Energy prices, costs and subsidies and their impact on industry and households, 2018

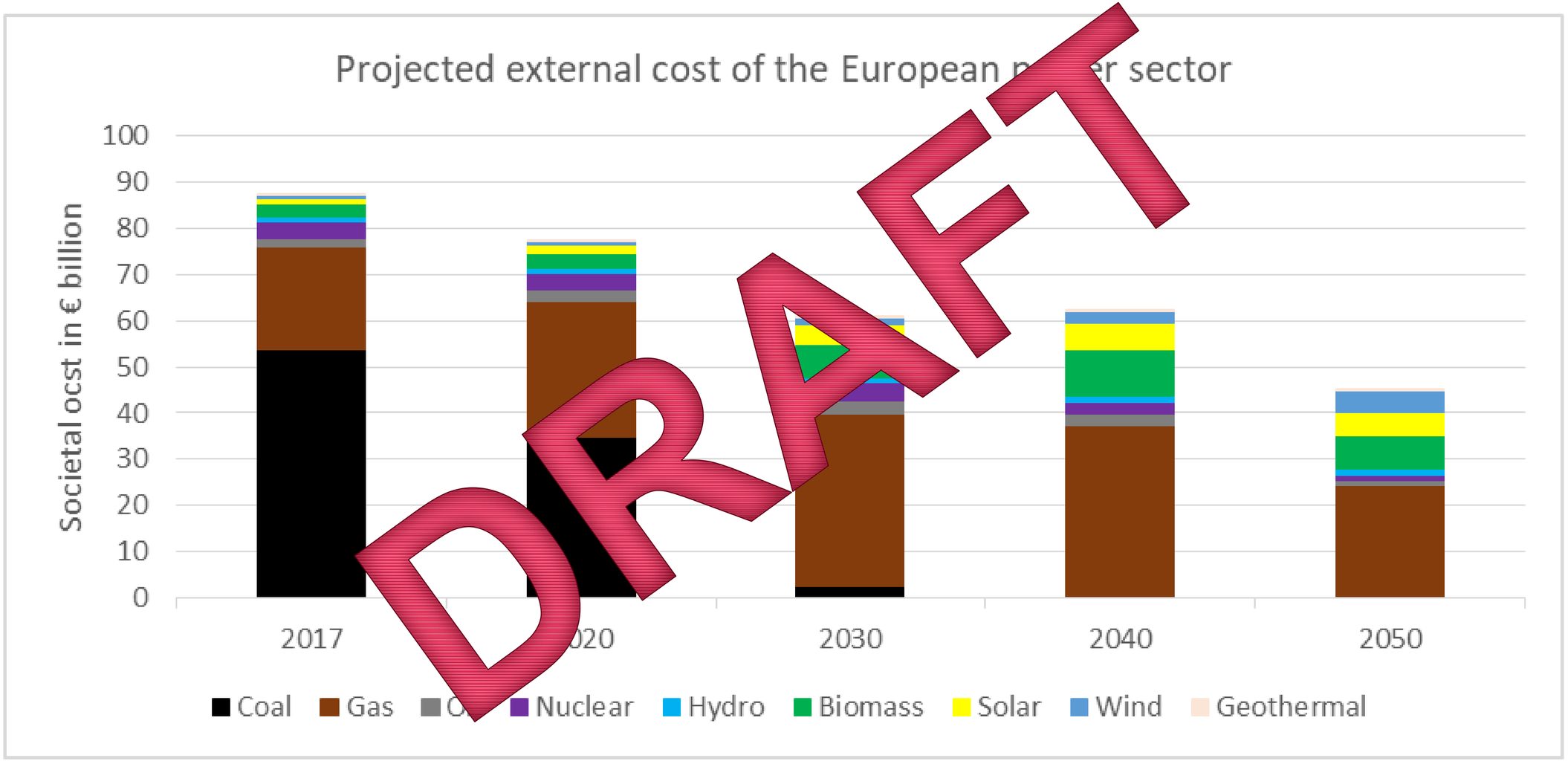
Technology Roadmap – RES subsidies

Figure 6-19: Financial support to RES by intervention type (2008-2016, €2017bn)



Source: Trinomics e.a., Energy prices, costs and subsidies and their impact on industry and households, 2018

Technology Roadmap – external costs



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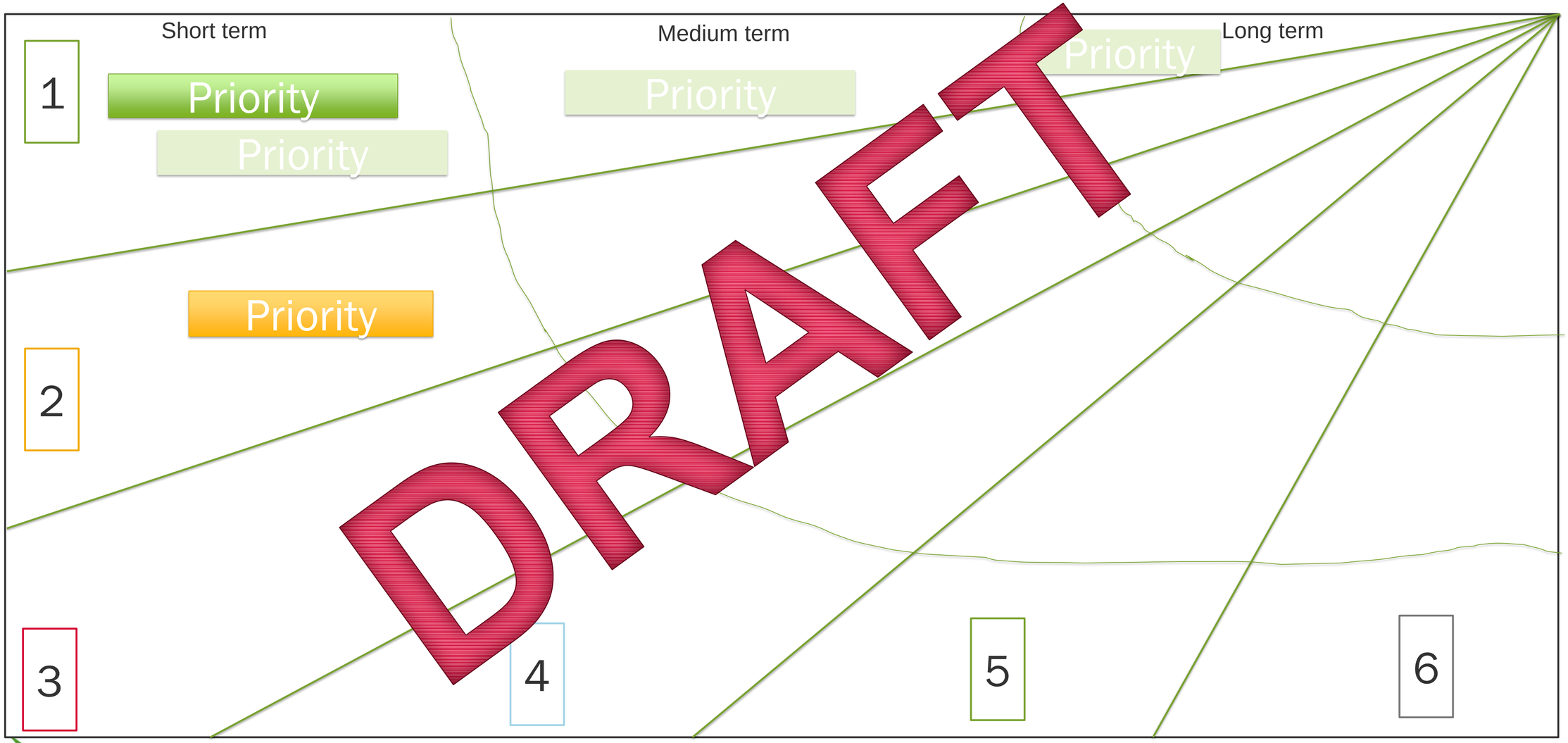
Technology Roadmap – roadmap graphic



Dissemination of Technology Roadmap

- Pre-launch @ SET Plan conference, 13-15 November, Helsinki
  - Decarbonisation of industry;
  - Sector coupling and developments in renewable energy;
  - Financing of low-carbon technologies; and
  - The role of women in clean energy.
- Official launch @ WindEurope Offshore, 26-28 November, Copenhage
  - Conference session with SETWind; and
  - Promotion at WindEurope stand.
- SET Plan Steering committee
- Commission Expert group "shadow" Strategic Configuration of the Horizon Europe Programme Committee

Aligning the wind R&I community

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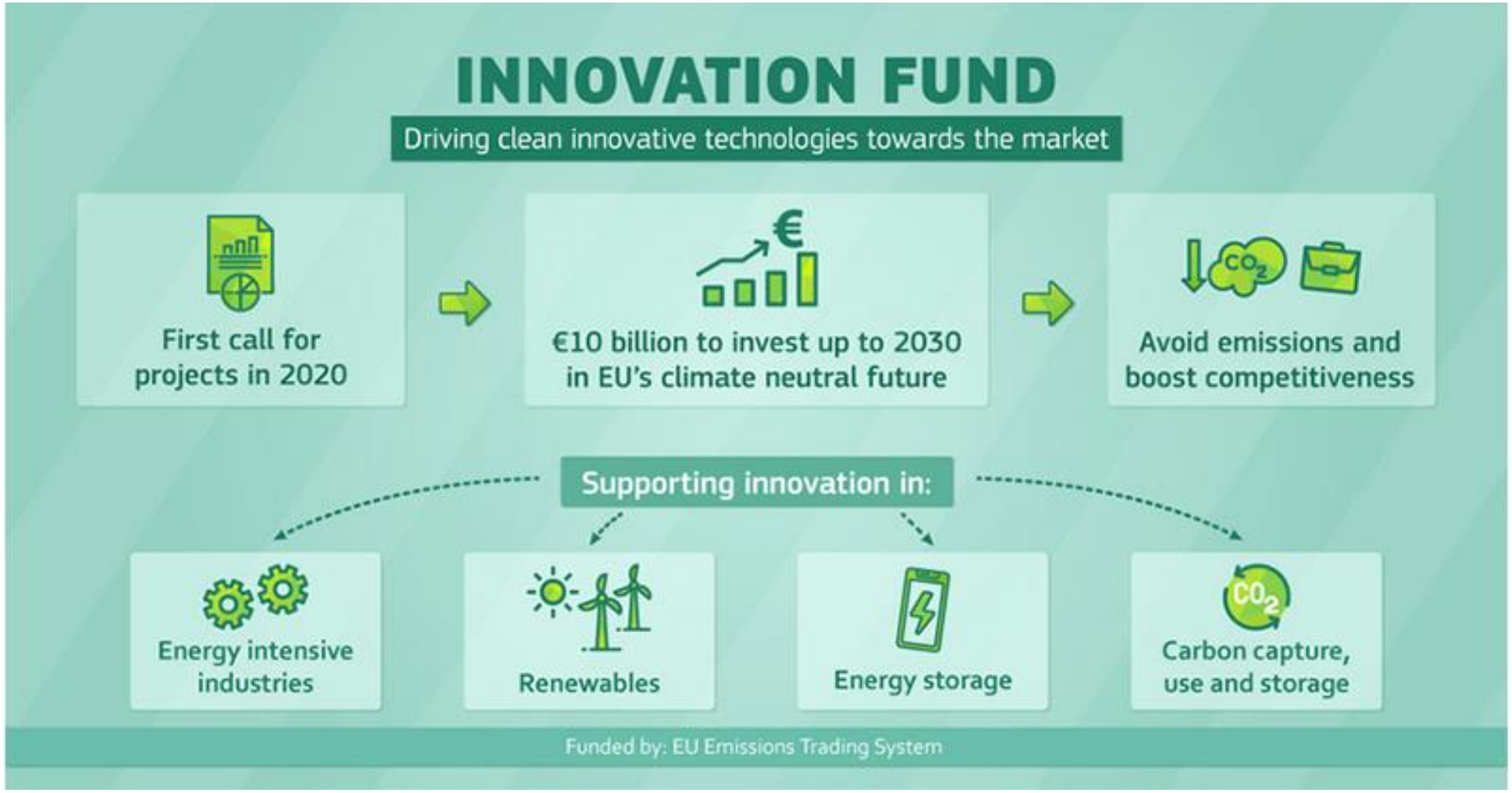
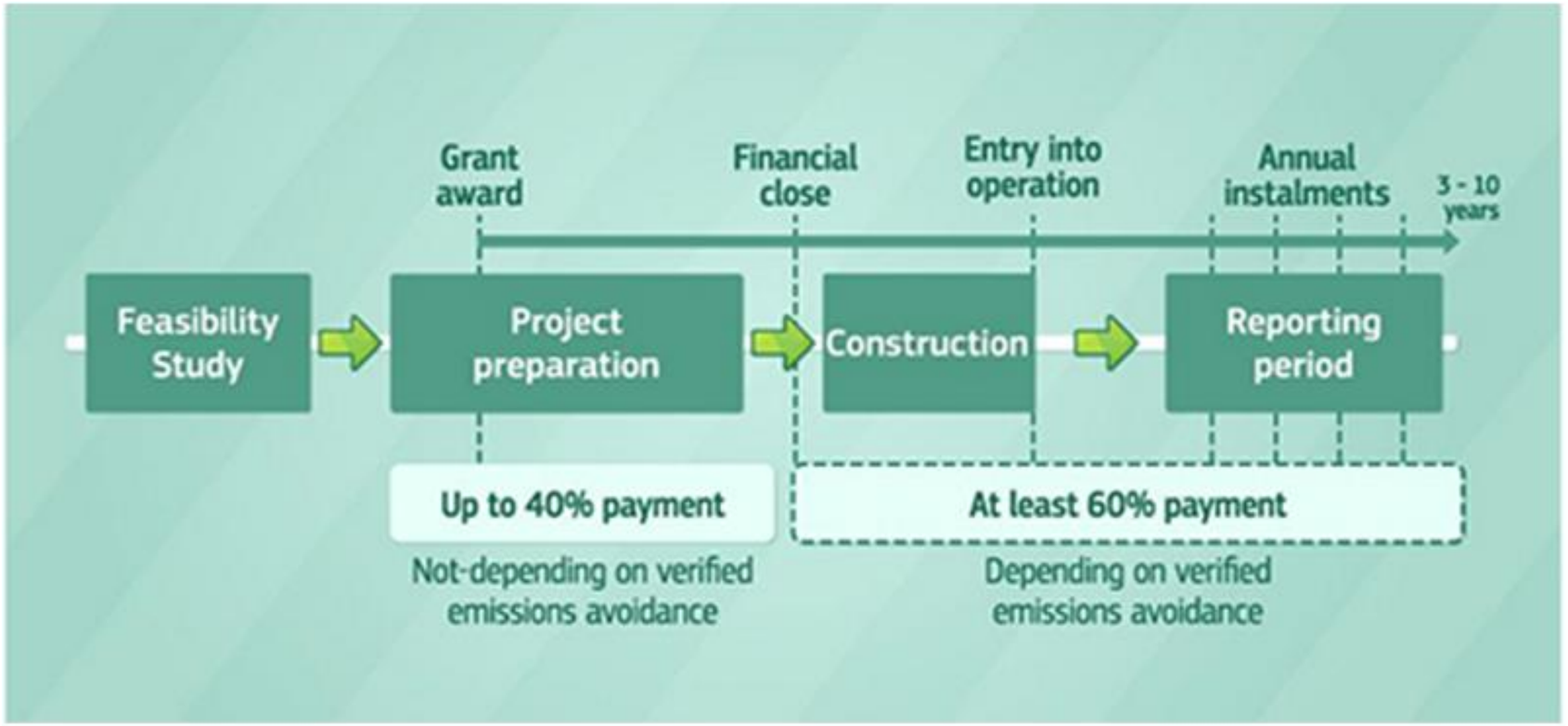
Scope and eligibility



Source: European Commission, DG CLIMA

- Regular calls during next 10 years; and
- Explicitly aims to support the development of **floating offshore wind farms** and **next generation wind turbines**.

Funding characteristics



Source: European Commission, DG CLIMA

- Mostly grants;
- Disbursement based on milestones; and
- Applicants to provide their preferred financial arrangement.

03 July workshop

- The main objective of the workshop was for the industry to provide input to the design elements for the first call of proposals in 2020.
- Five main recommendations:
  1. Projects have to be aligned to the wind industry's strategic research and innovation agenda (SRIA);
  2. Funding should address the so-called "valley-of-death" in financing (the period between demonstration and final investment decision);
  3. Fit-for-purpose upfront investment as early as possibly in the project;
  4. Project calls with thresholds for funding; and
  5. Focus on replicable projects that boost industrial competitiveness.

Next steps

- Ongoing stakeholder workshops
  - 19/09 Carbon Capture and Use (CCU)
  - 23/09 Geothermal energy
  - 30/09 Hydrogen
- In-depth consultation through external consultants
  - DG CLIMA would appreciate a list of projects and contact details of the companies who are willing to be contacted for the follow-up stage.

How wind is going circular
–
ETIPWind factsheet

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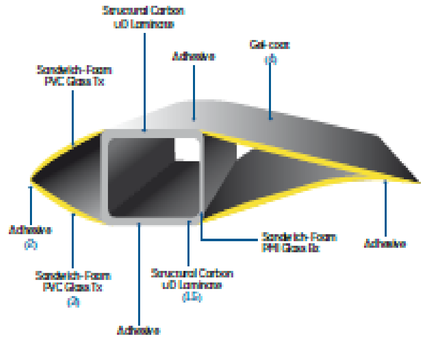
Blade composition and upcoming volumes of composite waste in the industry

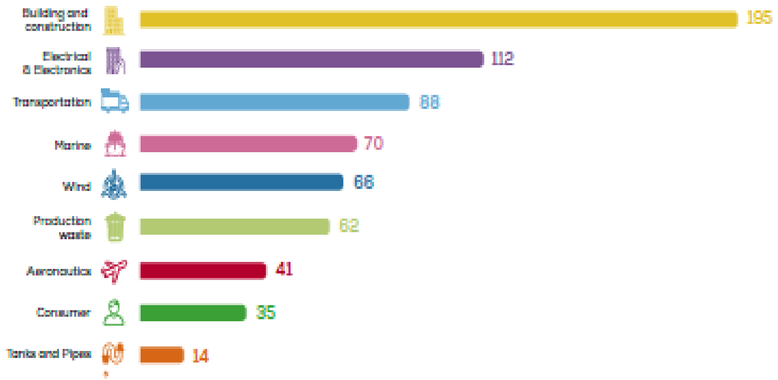
Generic composition of a wind turbine blade



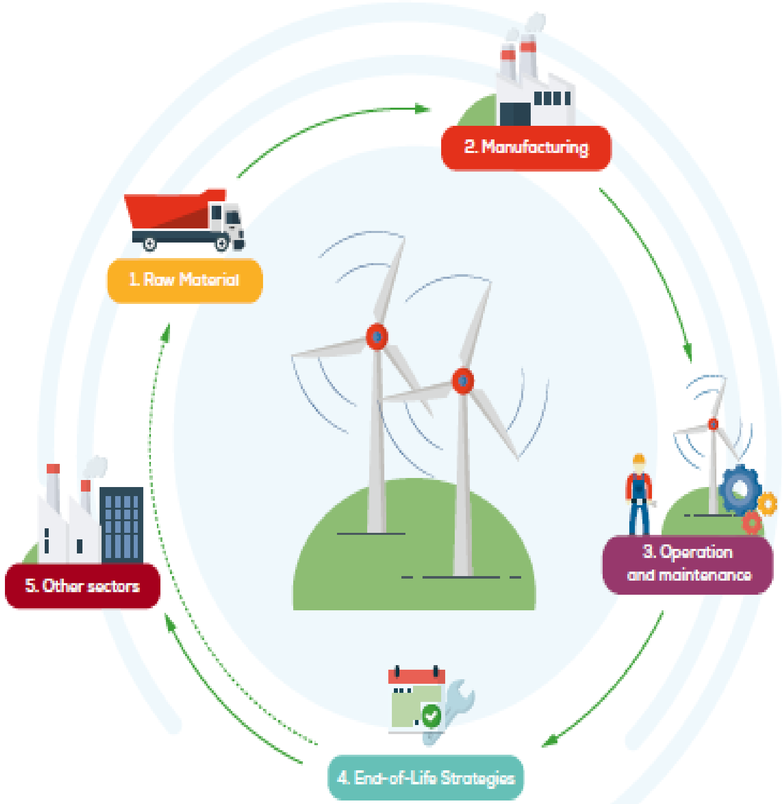
Wind turbine blades are considered a composite structure, consisting of various materials with different properties. The material compositions vary between blade types and blade manufacturers, but blades are generally made of:

1) Reinforced fibres (glass, carbon, aramid or basalt)
2) A polymer matrix (thermosets such as epoxies, polyesters, vinyl esters, polyurethane, or thermoplastics)
3) A sandwich core (balsa wood or foams such as polyvinyl PVC, PET)
4) Coatings (PE, PUR)
5) Metals (copper wiring, steel bolts, etc.).

Estimated composite waste per sector in thousands of tonnes in 2025

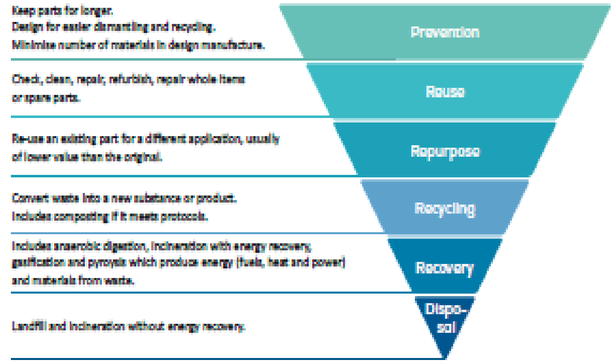


The life cycle of a wind turbine blade

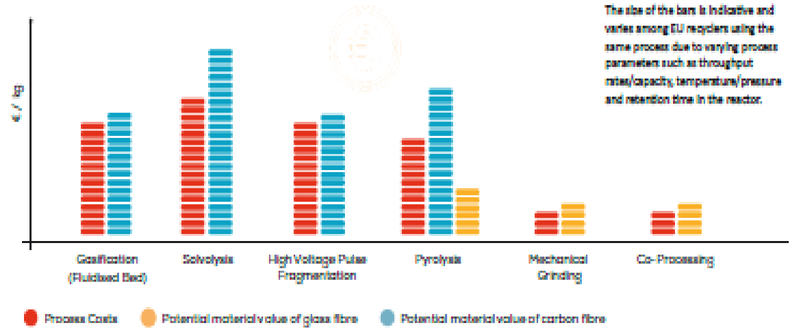


End-of-Life strategies for composite materials

Waste treatment hierarchy



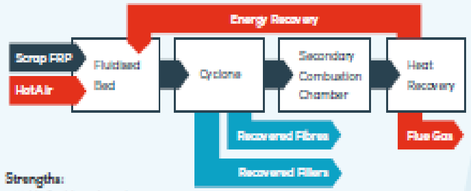
Estimated relative costs and values of composite recycling technologies



Composite recycling technologies and technology readiness level (TRL)

Gasification (Fluidised Bed)

Current TRL 5/6



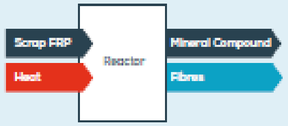
Strengths:
- Highly flexible and simple process;
- Recovery of energy and potential precursor chemicals;
- High efficiency of heat transfer.

Limitations:
- Recovery of low-quality material;
- Economically viable at > 10,000 t/year;
- Fluidised bed can locally collapse.

Point of attention:
- Process-related emissions.

Solvolysis

Current TRL 5/6



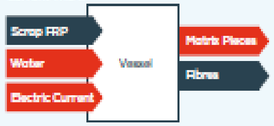
Strengths:
- Recovery of clean fibres in their full length;
- Recovery of resin which can be re-used.

Limitations:
- Low efficiency;
- High energy consumption due to the high-temperature and high-pressure;
- Large amounts of solvents required.

Point of attention:
- Human health impacts and ecotoxicity from gas emissions.

High Voltage Pulse Fragmentation

Current TRL 6



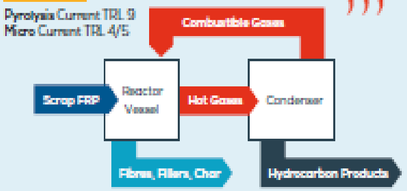
Strengths:
- Scalable to treat large amounts of waste;
- Low investments required to reach the next TRL.

Limitations:
- Only laboratory- and pilot-scale machines are available;
- Heavily decreased modulus of glass fibres.

Point of attention:
- Technology might be suboptimal to recycle the current stock of wind turbine blades.

Pyrolysis

Pyrolysis Current TRL 9
Micro Current TRL 4/5



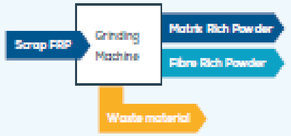
Strengths:
- Pyrolysis gas and oil can be used as energy source in the same process or in chemicals production;
- Easily scaled up;
- Microwave Pyrolysis: easier control. Lower damage to the fibre.

Limitations:
- Fibre product may retain oxidation residue or char;
- Degradation of the chemical structure of fibres;
- Not yet economically viable.

Point of attention:
- Potential leaks of gases from waste treatment chambers.

Mechanical Grinding

GFRP Current TRL 9
CFRP Current TRL 6/7



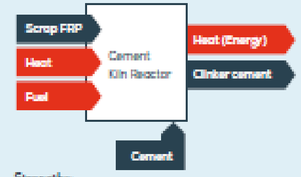
Strengths:
- Efficient and high throughput rates.

Limitations:
- Cost efficiency;
- Low quality of recyclate. High content of other materials;
- Up to 40% material waste.

Point of attention:
- Requires dedicated facilities with closed protective area to limit environmental impacts.

Co-Processing

Current TRL 9



Strengths:
- Highly efficient, fast and scalable;
- Large quantities can be processed;
- No ash left over.

Limitations:
- Loss of original material form;
- Additional energy needed to reach high processing temperatures.

Point of attention:
- Pollutants and particulate matter emissions.

An overview of composite recycling in the wind energy industry

Wind turbine blades are made up of composite materials that boost the performance of wind energy by allowing lighter and longer blades. Today 2.5 million tonnes of composite material are in use in the wind energy sector.

The wind industry is committed to sustainable waste management in line with the multi-step approach put forward by the EU. In this approach waste prevention is regarded as the most favourable option followed by repurposing, recycling and disposal.

Wind turbines already have a recyclability rate of 85% to 90%. Most components of a wind turbine – the foundation, tower, components of the gear box and generator – are recyclable and are treated as such. Wind turbine blades represent a specific challenge due to the complex nature of materials used to manufacture them.

15,000 wind turbine blades will be decommissioned in the next five years. Dealing with this significant volume requires logistical and technological solutions for the collection, transportation and waste management of the relevant material.

Today composite materials are commercially recycled through cement co-processing. Further development and industrialisation of alternative technologies like solvolysis and pyrolysis will provide the wind industry with additional solutions for end-of-life.

The EU must prioritise R&I funding to diversify and scale up recycling technologies as part of the next R&I framework programme, Horizon Europe. This is critical to Europe's technology leadership as we embark on a global sustainable energy transition.

In parallel, national governments should harmonise their implementation of EU regulations on waste treatment to help develop a pan-European market for recycled composites.

Recommendations for policymakers: research and innovation focus

Composite recycling technologies of existing blades

Provide funding for a research study comparing the economic viability of new recycling technologies, including market barriers associated with different end-uses;

Set up a large-scale demonstration facility to industrialise and scale up new recycling solutions for wind turbine blades;

Provide funding to support new manufacturing processes using recycled materials from blades in other sectors;

Establish a European cross sectorial platform (including the building, transportation and energy sectors) to share best practices in recycling composites.

Development of new materials for blades

Earmark R&I funding for the development of new high-performance materials that are more easily recyclable;

Support a demonstration facility to test and integrate newly developed sustainable materials into next generation wind turbine blades;

Fund research into "smart" materials with embedded sensors to enable material health monitoring and health forecasting capabilities;

Establish a full-scale demonstrator of a next generation wind turbine using "smart" materials that help optimise maintenance and increase lifetime.

ETIPWind®, the European Technology and Innovation Platform on Wind Energy, connects Europe's wind energy community. Key stakeholders involved in the platform include the wind energy industry, political stakeholders and research institutions.

The ETIPWind was established in 2016 to inform Research & Innovation policy at European and national level. ETIPWind provides a public platform to wind energy stakeholders to identify common Research & Innovation (R&I) priorities and to foster breakthrough innovations in the sector.

Its recommendations highlight the pivotal role of wind energy in the clean energy transition. They inform policymakers on how to maintain Europe's global leadership in wind energy technology so that wind delivers on the EU's Climate and Energy objectives. As such, the platform will be key in supporting the implementation of the Integrated SET-Plan.

Author: ETIPWind Executive Committee
Content coordinator: Sabina Potestio
Design by: www.formasdopossivel.com

Sources: Bax & Company (2017), Cefic, ECP4 (2018), EMIRI (2019), ETIPWind (2018), EUCIA (2019), EuPC, PlasticsEurope, WindEurope (2019), Windpower engineering & development (2019).

Acronyms:
ETIPWind: European Technology & Innovation Platform on Wind Energy
FRP: Fibe Reinforced Polymer
PE: Polyethylene
PET: Polyethylene Terephthalate
PMI: Polymethacrylimide
PUR: Polyurethene
PVC: Polyvinyl Chloride
R&I: Research & Innovation
TRL: Technology Readiness Level

For more information check the ETIPWind website under https://etipwind.eu/publications/

ETIP Wind
EUROPEAN TECHNOLOGY & INNOVATION PLATFORM ON WIND ENERGY

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HOW WIND IS GOING CIRCULAR
blade recycling

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Recommendations for policymakers: research and innovation focus

Composite recycling technologies of existing blades

Provide funding for a research study comparing the economic viability of new recycling technologies, including market barriers associated with different end-uses;

Set up a large-scale demonstration facility to industrialise and scale up new recycling solutions for wind turbine blades;

Provide funding to support new manufacturing processes using recycled materials from blades in other sectors;

Establish a European cross sectorial platform (including the building, transportation and energy sectors) to share best practices in recycling composites.

Development of new materials for blades

Earmark R&I funding for the development of new high-performance materials that are more easily recyclable;

Support a demonstration facility to test and integrate newly developed sustainable materials into next generation wind turbine blades;

Fund research into "smart" materials with embedded sensors to enable material health monitoring and health forecasting capabilities;

Establish a full-scale demonstrator of a next generation wind turbine using "smart" materials that help optimise maintenance and increase lifetime.

Next steps

- Feed recommendations into Horizon Europe Work Programme

- Disseminate document to policymakers, wind industry and other sectors (e.g. EOLIS) both at EU and national level

- Early December joint publication WE- CEFIC- EUCIA on blade recycling to formalize collaboration
  - ✓ Regulatory mapping
  - ✓ Transportation issues

Wind energy & the global market: EU trade policy

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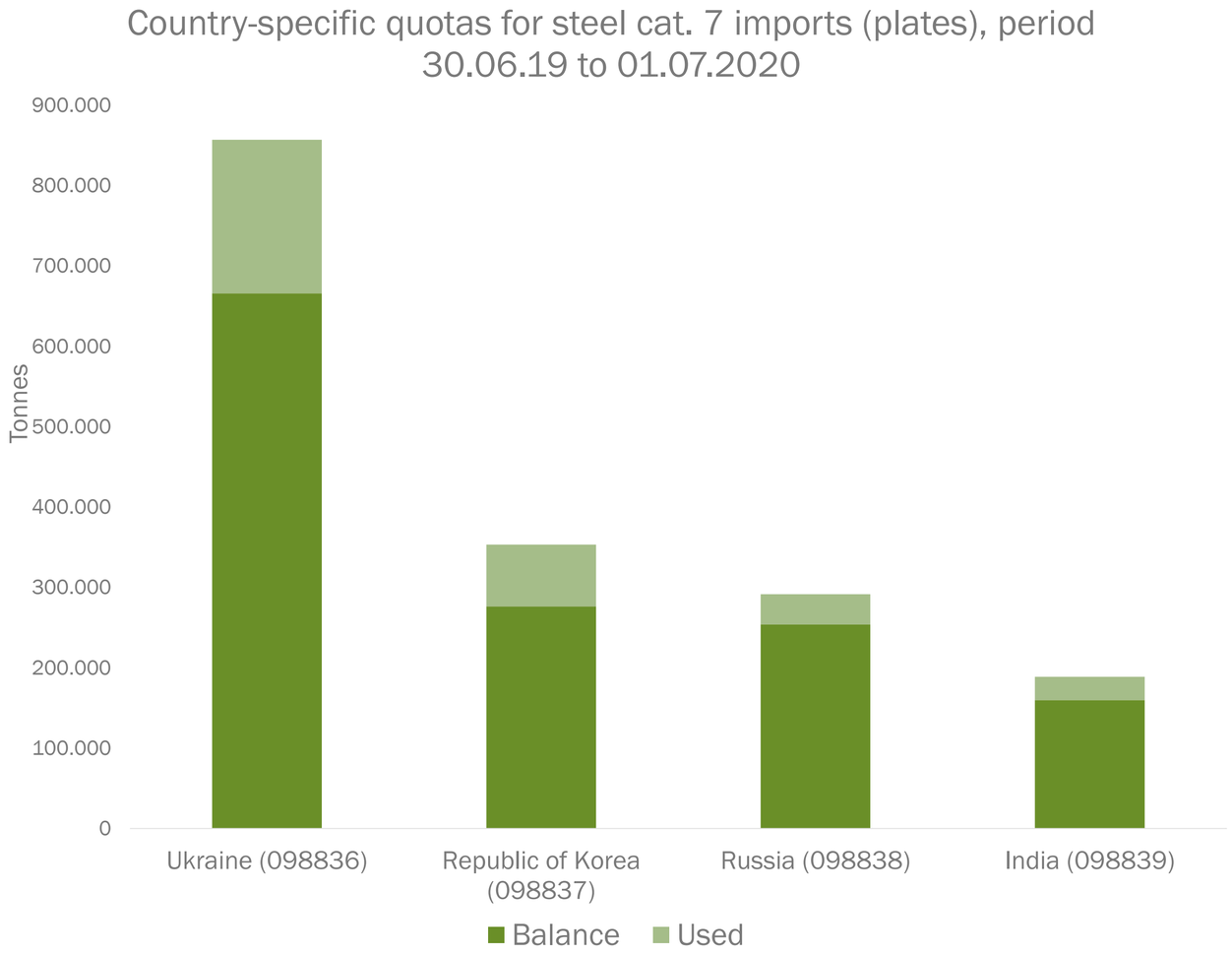
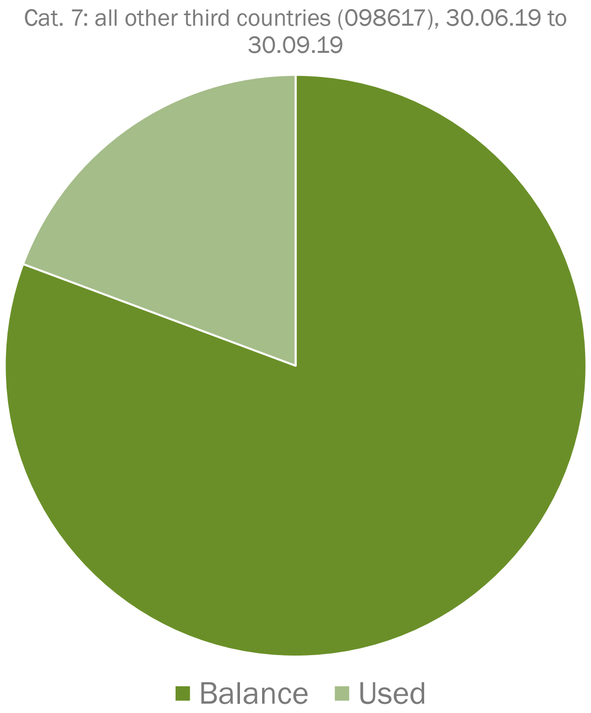
Steel safeguard measures

Steel safeguard measures

- A response to global over-supply and U.S. tariffs on Chinese steel imports.
- Country-specific import quotas for two steel categories of relevance to the wind industry:
  - Non-alloy & other alloy quarto plates (7)
  - Non-grain-oriented electrical steel (NGOES).
- Quota overshoot: 25% additional tariff.

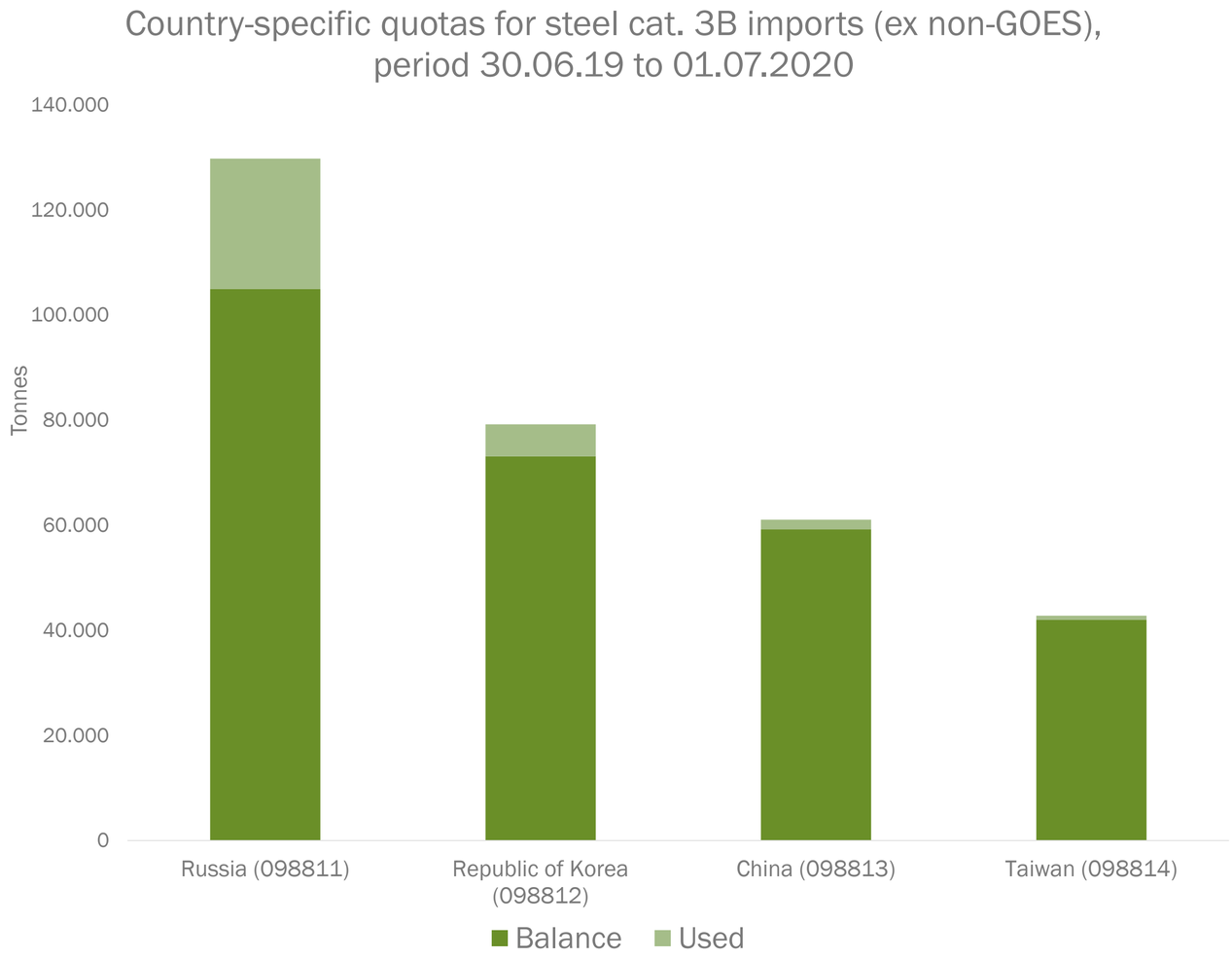
Category 7: steel plates

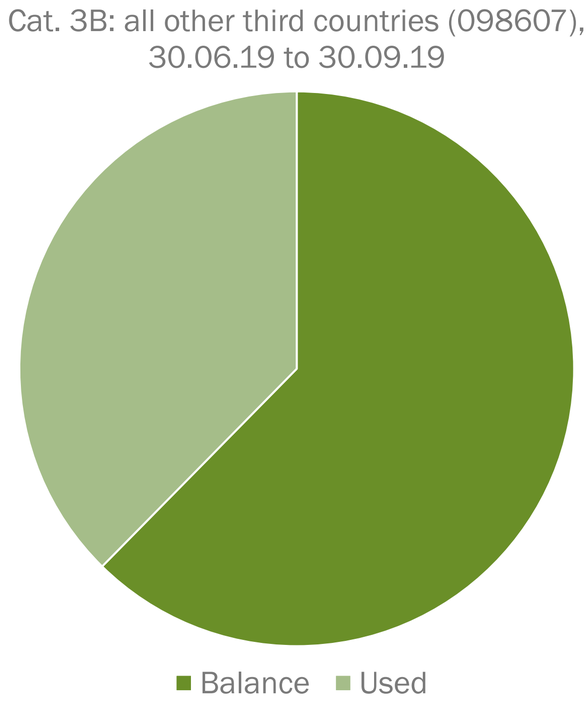




Data as at 17 September 2019. Source: DG TAXUD.

Category 3B: NGOES





Data as at 17 September 2019. Source: DG TAXUD.

Glass fibre fabrics: anti-dumping & anti-subsidy investigations

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Glass fibre fabrics

- Dual investigations into dumping and subsidy.
- Provisional anti-dumping measures likely to be applied from mid-October.
- Definitive duties: possibly from February 2020.

In the pipeline: WindEurope black box survey generator

- Online tool to collect confidential information from members in compliance with competition law.
- Collection and automatic aggregation of industry-wide costs figures.
- Other applications: aggregation of R&I spends, etc.
- Implementation: **October**.

Upcoming developments

More cases to come…

- Q3/4 2019: Anti-dumping investigation into imports of towers from China, Vietnam…
- Q1/2 2020: Review of anti-dumping measures on Chinese grain-oriented electrical steel (GOES), first imposed in 2014
- Q1 2020: Carbon Border Adjustment Tax proposal (part of the European Green Deal)

Thanks for your attention

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