



EU Bioenergy research and innovation policies in the Energy Union

**Dr Maria GEORGIADOU
Renewable Energy Sources
DG Research & Innovation
EUROPEAN COMMISSION**

ETIP Bioenergy Stakeholders Plenary Meeting, Brussels, 11-12 April 2018

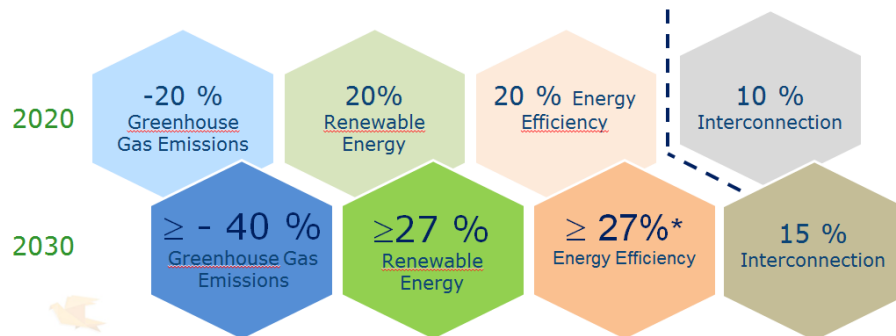
Policy Framework



"Clean Energy for all Europeans"

- Putting energy efficiency first
- Demonstrating global leadership in renewables
- Delivering a fair deal for consumers

Agreed headline targets



* To be reviewed by 2020, having in mind an EU level of 30%

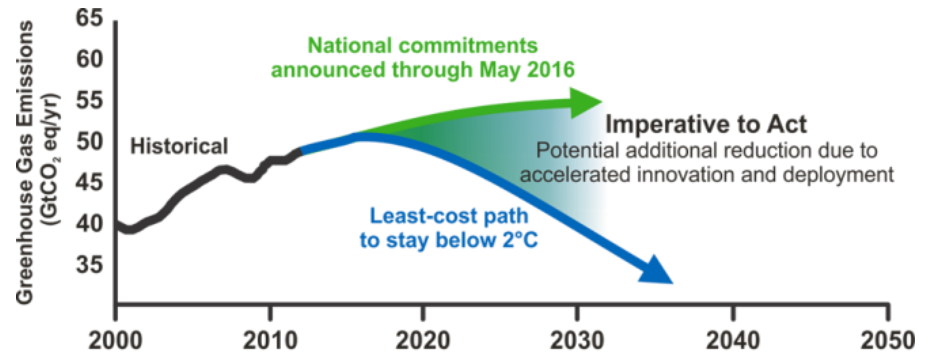
New governance system + indicators

NOT LEGALLY BINDING

Paris Agreement

Holding the increase in the global average temperature to **well below 2°C** above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels

Accelerating, encouraging and enabling **innovation** is crucial...



Adapted from UNFCCC, Synthesis report of INDCs, May 2016

Other EU policy priorities

- Digital Single Market
- Jobs, Growth and Investments
- EU as a strong global actor
- ...

*We need to strengthen the share of renewable energies on our continent. This is not only a matter of a responsible climate change policy. It is, at the same time, an industrial policy imperative if we still want to have affordable energy at our disposal in the medium term. **I therefore want Europe's Energy Union to become the world number one in renewable energies.** COM(2016) 110 Resilient Energy Union with a forward-looking climate change policy*



NOT LEGALLY BINDING

EU Regulatory Framework & updates

1. Renewable Energy Directive *RED 2009/28/EC*
2. The Fuel Quality Directive *FQD 2009/30/EC*
3. *Directive to reduce indirect land use change for biofuels and bioliquids (EU)2015/1513*
4. New Renewable Energy Directive *RED II* and Bioenergy sustainability legislation *COM(2016) 767*
5. New Electricity Market Design Legislation *COM(2016)861 862 864*
6. Revised Emissions Trading Directive ETS *COM(2015)337*
7. Revised Effort Sharing Decision and LULUCF *COM(2016) 482*
8. Strategy for Low-emission Mobility *COM(2016) 501*
9. Revised Directives on Energy Efficiency, Buildings, Energy Labeling, Security of electricity supply *COM(2016) 761 765 773*
EU(2017)2196
10. Accelerating Clean Energy Innovation ACEI *COM(2016)763*

Mission Innovation



Overall objective:

To reinvigorate global efforts in clean energy innovation, Mission Innovation members share a common goal to **develop and scale** breakthrough technologies and substantial **cost reductions**. MI members aim to seek to **double public clean energy research & development investment** over 5 yrs

EC is proactively engaged :

- 150 Million € on MI-relevant calls by 2020 in Horizon 2020
- Engaged in all the 7 Innovation Challenge (IC)
 - ✓ smart grids, off-grid access to electricity, CCS, biofuels, solar fuels, clean energy materials, H&C buildings
- Co-leading IC5 and IC7
- Chair of MI Steering Committee
- Co-host ministerial meeting in Malmo, Sweden 23-24 May 2018

NOT LEGALLY BINDING

The Strategic Energy Technology Plan (SET Plan) - *coordinating research and innovation across Europe*



Overall objective: Accelerating the development and deployment of low-carbon technologies through cooperation among EU countries, companies, research institutions, and the EU itself, based on **common priorities, targets and actions**.

Priority Actions:

- 1&2. Improving performance and reducing cost of renewable energy
3. Smart solutions for consumers
4. Smart Resilience and Secure Energy System
5. Energy Efficiency in Buildings
6. Energy Efficiency in Industry
7. Batteries and e-Mobility
8. **Renewable Fuels and Bioenergy**
9. Carbon Capture Utilisation and Storage
10. Nuclear Safety

Defining priorities

- SET-Plan Communication 2015

Setting targets

- Declaration of Intent

Implementation Plans (IP)

- Temporary Working Groups

Execution of IPs

NOT LEGALLY BINDING

Action 8 - Renewable Fuels and Bioenergy

- ✓ Targets in Declaration of Intend – November 2016
- ✓ Implementation Plan will be endorsed in June 2018
- ✓ R&I activities:
 1. Advanced liquid and gaseous biofuels
 2. Other renewable liquid and gaseous fuels
 3. Renewable hydrogen
 4. High efficiency large scale biomass CHP
 5. Solid, liquid and gaseous intermediate bioenergy carriers

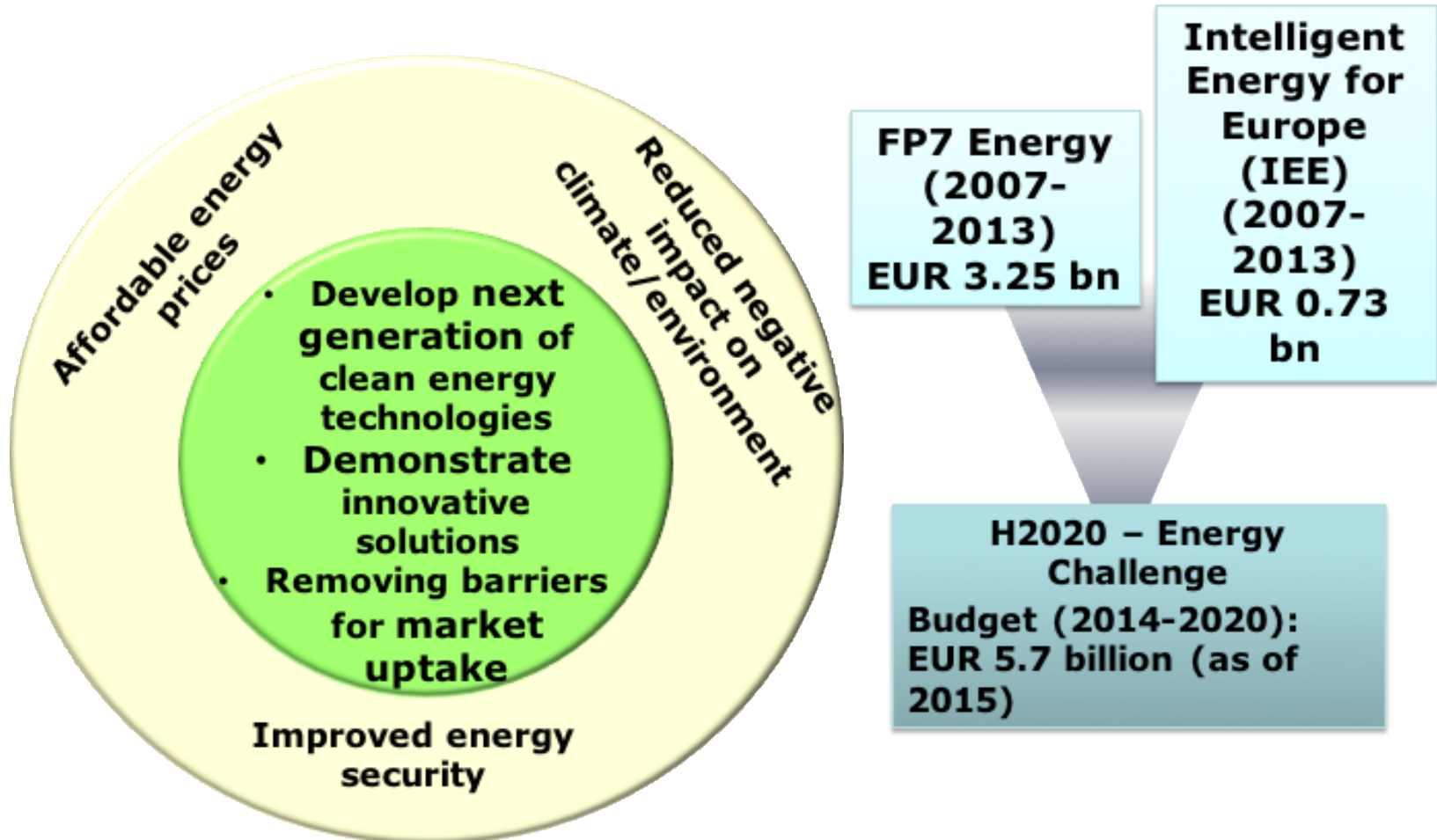
NOT LEGALLY BINDING

Energy Financing in the Energy Union

1. The Juncker Investment Plan and the European Structural and Investment Funds
2. **The EU Horizon 2020 research and innovation framework programme 2014-2020** with more than 30 billion euros climate related budget and the SMEs instrument
3. The **Innovfin EDP** facility for loans, guarantees or equity type investments to risky first-of-a-kind commercial scale energy demonstration projects
4. The **NER** Innovation Fund for first-of-a-kind investments in RES, CCS and low-carbon innovation in energy intensive industry with about 400 million allowances from 2021

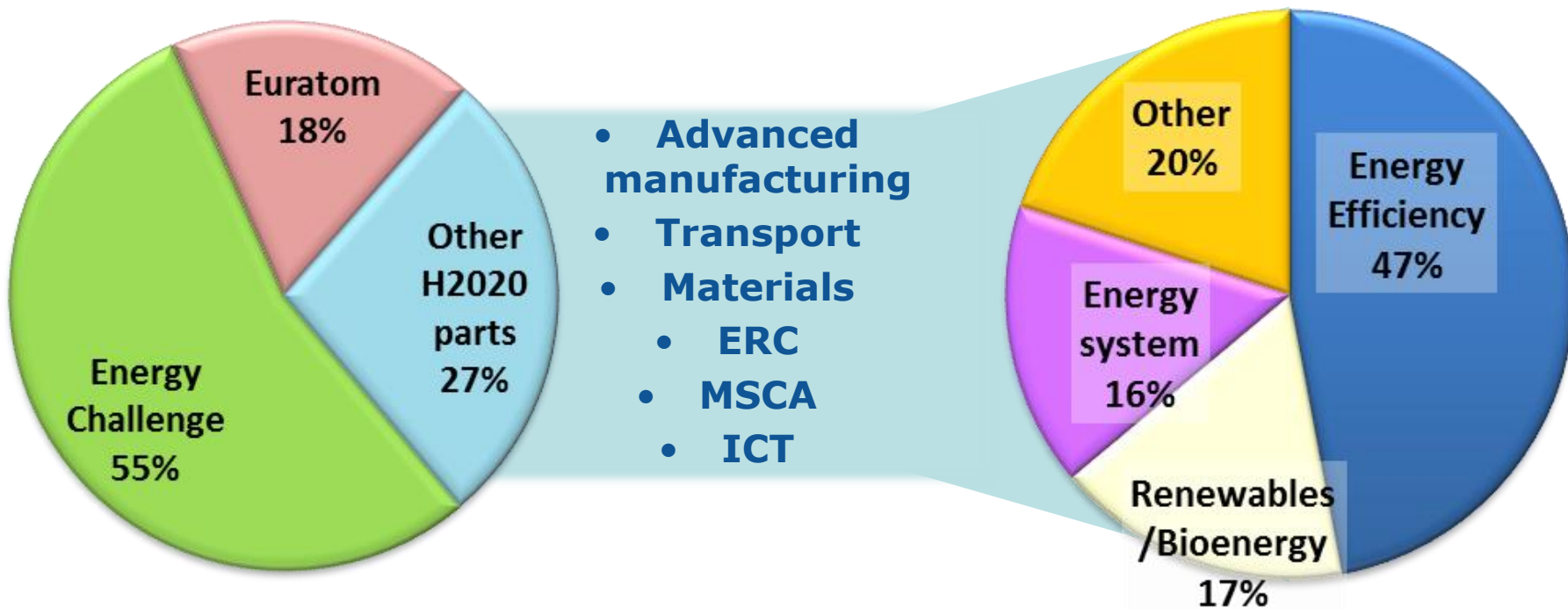
Research Policy Framework (1)

H2020 ENERGY Challenge



Research Policy Framework (2)

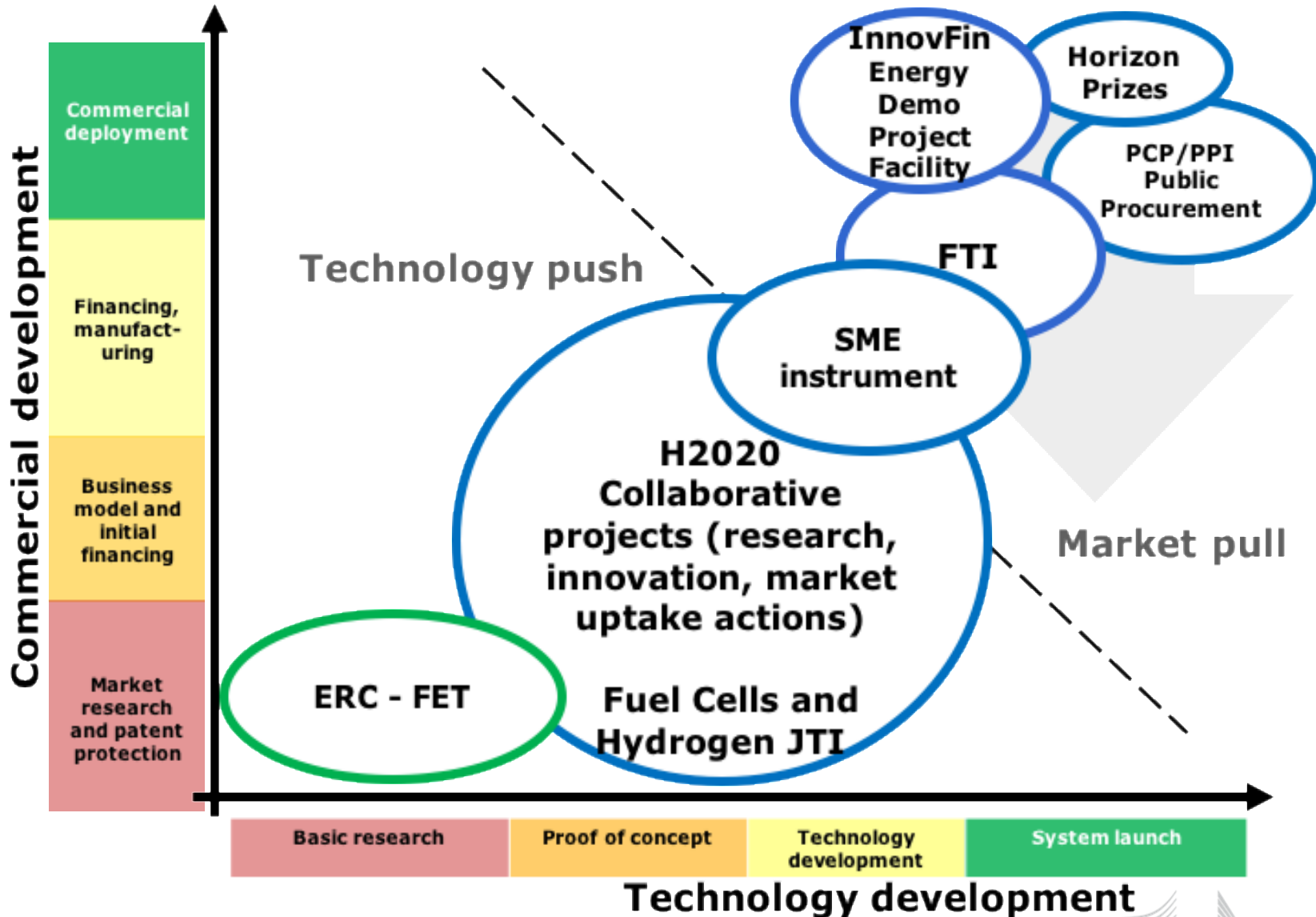
Energy in other parts of H2020



- ✓ Additional energy-related spending in H2020 outside Energy Challenge: ~ **50% of the Energy Challenge budget**
- ✓ Total budget for energy in H2020: ~ **EUR 8.5 billion** (11.4% of the total H2020 budget)

NOT LEGALLY BINDING

Research Financing Instruments



Commercial development

Commercial deployment

Financing, manufacturing

Business model and initial financing

Market research and patent protection

Technology push

FTI

SME instrument

H2020 Collaborative projects (research, innovation, market uptake actions)

ERC - FET

Fuel Cells and Hydrogen JTI

InnovFin Energy Demo Project Facility

Horizon Prizes

PCP/PPI Public Procurement

Market pull

Basic research

Proof of concept

Technology development

System launch

Technology development

NOT LEGALLY BINDING

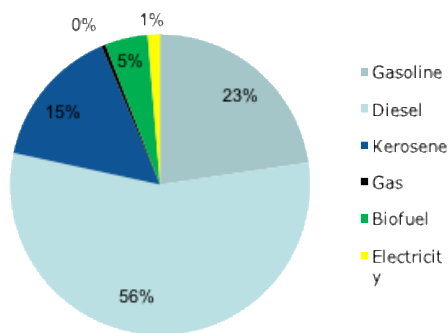
Opportunities and Challenges for Advanced Biofuels & Bioenergy

- Advanced biofuels and bioenergy intermediates essential for both **energy storage and use** (grid balancing, use in electricity, heat and transport)
- Growing market for advanced biofuels
- Biofuels are the medium term solution for road & maritime and the **long-term** solution for air transport
- Reaching **competitiveness** by lowering production costs of advanced biofuels and addressing feedstock constraints
- European leadership in advanced biofuels technologies but little deployment in Europe
- **R&I** needed to improve cost, performance and sustainability
- Coordinated R&I funding and risk-funding availability needed for **market-uptake**

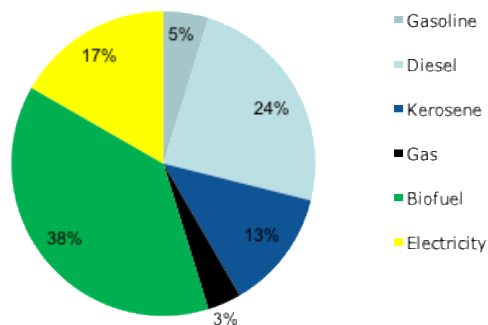
NOT LEGALLY BINDING

Share of Fuels in EU transport sector

Current share

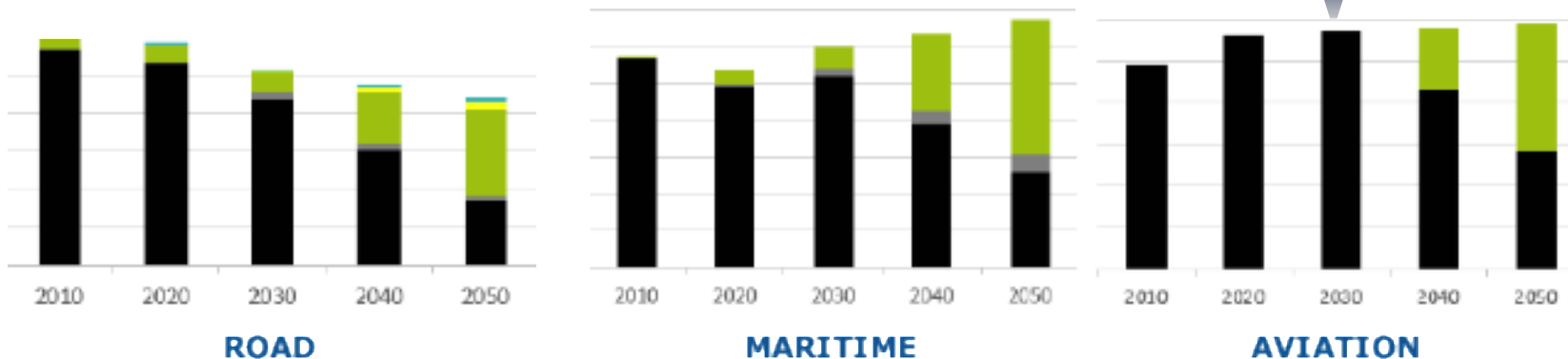


Projected share of transport fuels in 2050 (compatible with decarbonisation objectives)



Advanced biofuels dominate maritime and aviation in the long term. In 2050, cars run on batteries and fuels, ships on LNG and fuels but planes only on Advanced Biofuels

EC studies



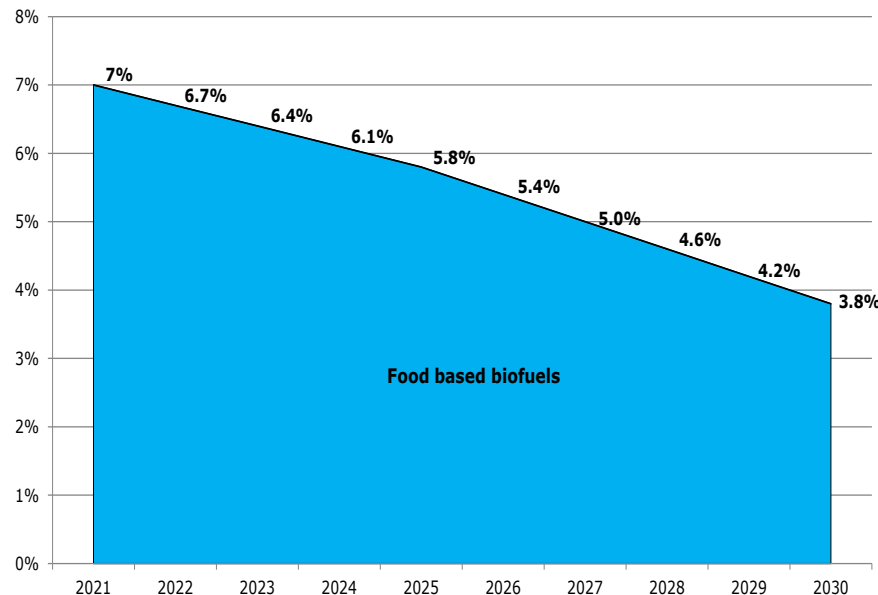
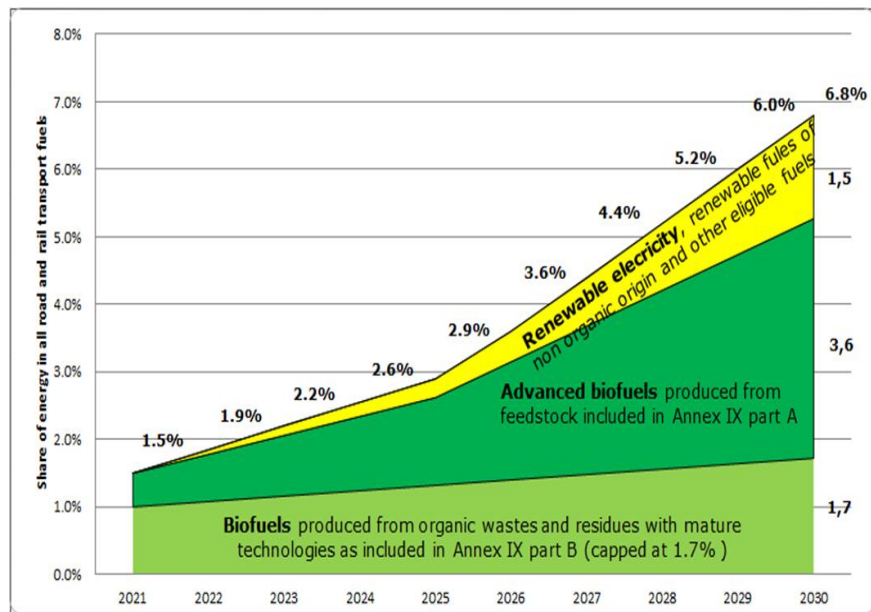
Total Oil Products
 Total Natural Gas
 Total Biomass
 Electricity

NOT LEGALLY BINDING

Biofuels Sustainability in EU

- All biofuels must comply to Articles 17 and 18 of Directive 2009/28/EC, i.e. with biofuel sustainability criteria
- Directive 2015/1513 sets 7% cap on first generation biofuels to 2020 and requires advanced biofuels to be produced from non-food feedstock in Annex IX
- Article 26 of RED II proposal reinforces EU sustainability criteria to cover biomass and biogas for heating and electricity

The RED II proposal for transport



Increasing share of renewable fuels in transport via an EU blending mandate (Article 25) while gradually reducing share of food-based biofuels by 2030 (Article 7)

NOT LEGALLY BINDING

Advanced Bioenergy in Horizon 2020 (1)

- Bottom-up approach to long-term research and technology development
- Advance and demonstrate the technology, reduce its costs, improve its performance and prove its reliability
- Technology-specific demonstration activities
- Support mechanisms for first-of-a-kind plants with a higher leverage than 'standard grants' (e.g. through the Innovfin EDP facility)
- Market up-take measures
- Breakthrough market-creating innovation
- EU contribution under ENERGY calls ~ €350 Mio

Advanced Bioenergy in Horizon 2020 (2)

Overall strategy is to target the following sector challenges

- Technology and cost competitiveness through technology improvement and diversification
- Feedstock availability through feedstock diversification
- Market up-take by focusing on particular transport sectorial needs and aligning market up-take measures
- Breakthrough research and market-creating innovation for alternative renewable fuels that outperform fossil
- International cooperation to reinforce knowledge and innovation link and tackle global societal challenges

in order to create

- Positive social and economic impact by targeting Europe's competitiveness, environmental benefits and energy security

Advanced Bioenergy in Horizon 2020 (3)

Next renewable energy solutions

- LC-SC3-RES-1-2019-2020: sustainable renewable fuels
- LC-SC3-RES-2-2018: the Bionic leaf technology

Market Uptake Support

- LC-SC3-RES-28-2018-2019-2020: bioenergy specific

Renewable energy solutions for energy system implementation

- LC-SC3-RES-11-2018: small/medium scale CHP
- LC-SC3-RES-12-2018: large scale CHP
- LC-SC3-RES-16-2019: bioenergy intermediate carriers
- LC-SC3-RES-17-2019: bioenergy intermediate carriers

Advanced Bioenergy in Horizon 2020 (4)

Renewable Fuels for transports

- LC-SC3-RES-21-2018: road transport
- LC-SC3-RES-22-2018: retrofitted industrial installations
- LC-SC3-RES-23-2019: aviation and shipping
- LC-SC3-RES-24-2019: pre-commercial production of advanced aviation biofuels

International cooperation

- LCE-22 WP2016: EU - Brazil on advanced biofuels

Joint actions and Cross-cutting issues

- LC-SC3-JA-1-2018: ERANET Cofund
- LC-SC3-JA-2-2018-2019: Implementation Plans of SET Plan
- LC-SC3-CC-4-2018: Support to Renewable Fuels and Bioenergy ETIP

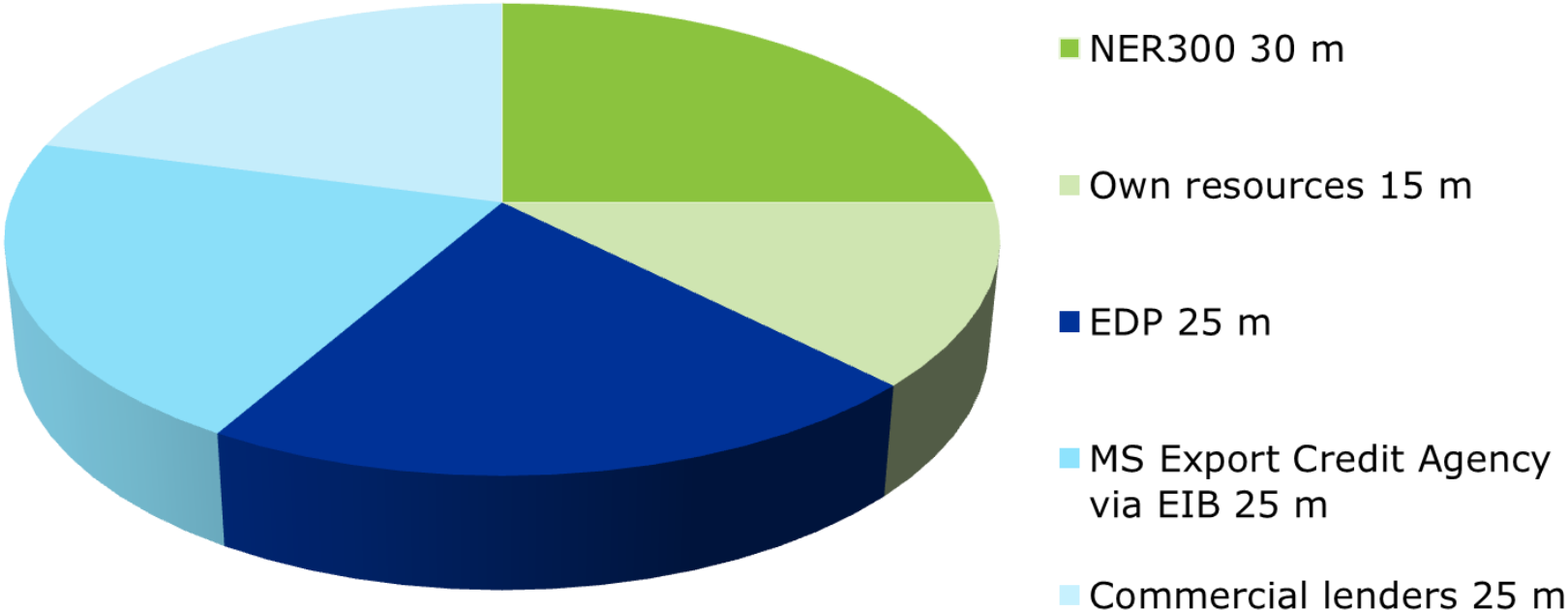
Basic features

- Risk-finance instrument (loans/loan guarantees) - Pilot launched in June 2015 focused on renewable energy but scope is now enlarged
- Implemented by the EIB
- Budget up to € 800 million
- Single proponents are the norm
- Criteria are Innovativeness, Replicability, Bankability during operations (revenue stream), Commitment by promoters

How it works

- Projects apply to the EIB
<http://www.eib.org/products/blending/innovfin/products/energy-demo-projects.htm>
- EIB process: Eligibility (EC confirmation) → due diligence → approval
- EIB provides loans with max 15 years & covering up to 50% of project costs
- EC (via Horizon 2020) provides guarantee on loan covering riskiest phase of the project

Example of financial engineering of First of a Kind Plant



Financial needs = EUR 120 million

NOT LEGALLY BINDING



**Thank you for
your attention!**

**CDMA 70,B-1049
Brussels/Belgium
Tel: +32 2 29 59846
maria.georgiadou@ec.europa.eu
<http://ec.europa.eu/research>**