



Energy Union, SET-Plan and framework Programmes: opportunities and needs for research, development and innovation in bioenergy

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

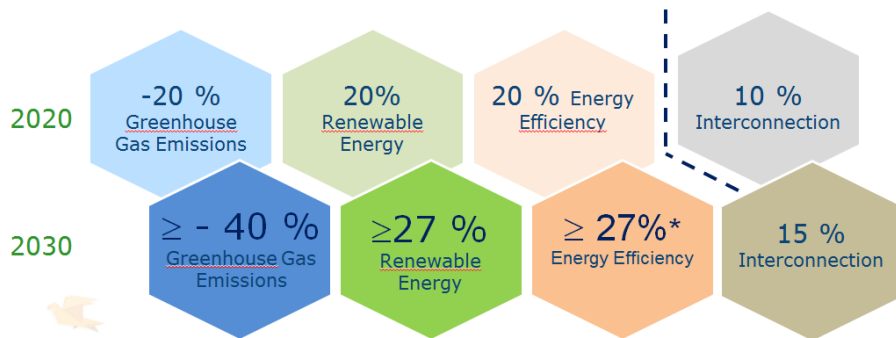
Policy Framework



"Clean Energy for all Europeans"

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

Agreed headline targets



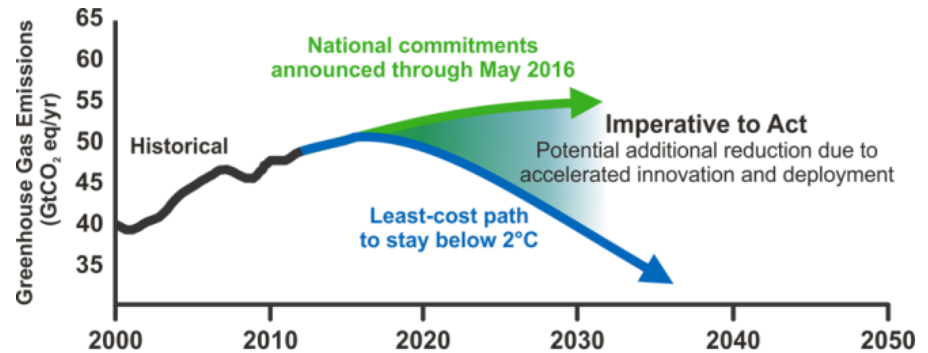
* To be reviewed by 2020, having in mind an EU level of 30%

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*

Accelerating Clean Energy Innovation

- ✓ R&I 5th pillar of the Energy Union
- ✓ New EU R&I strategy for the coming years
- ✓ Energy Union Winter Package/Clean Energy for all European 30.11.2016

- Mission Innovation
- EU-Africa cooperation

EU's global role



- Subsidies
- Innovation-principle
- Public Procurement
- Standards

Policy Signals

"Accelerating Clean Energy Innovation"
(COM(2016)763)

Funding Energy Science and Technology

> EUR **2.2 billion** in H2020 2018-2020

- Decarbonising EU building
- EU leadership in renewables
- Energy storage
- E-mobility
- European Innovation Council

- InnovFin EDP
- EFSI

Financial Instruments

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

Basic features

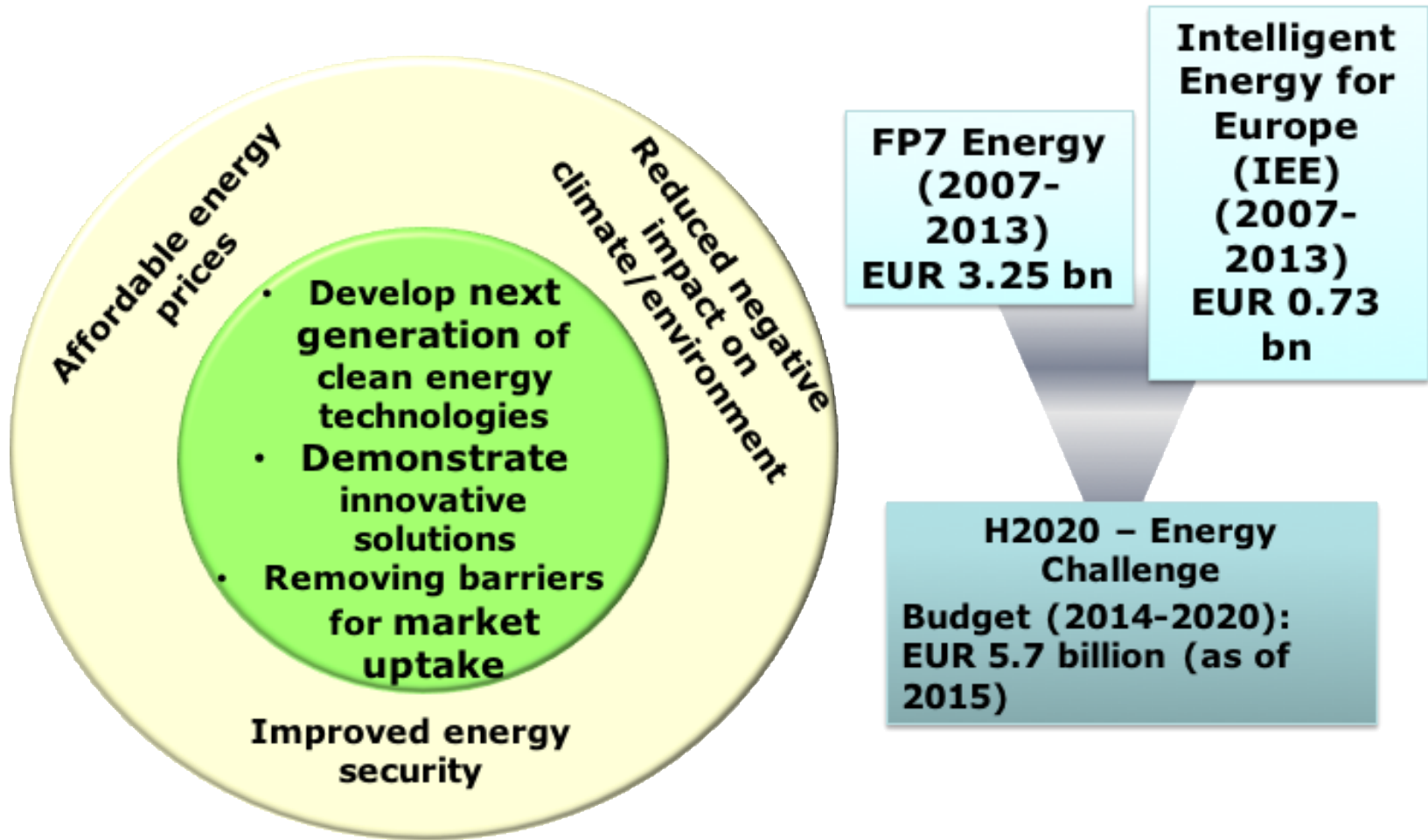
- Risk-finance instrument (loans/loan guarantees) - Pilot launched in June 2015 focused on renewable energy but scope is now enlarged
- Implemented by the EIB
- Budget up to € 800 million
- Single proponents are the norm
- Criteria are Innovativeness, Replicability, Bankability during operations (revenue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

Research Policy Framework

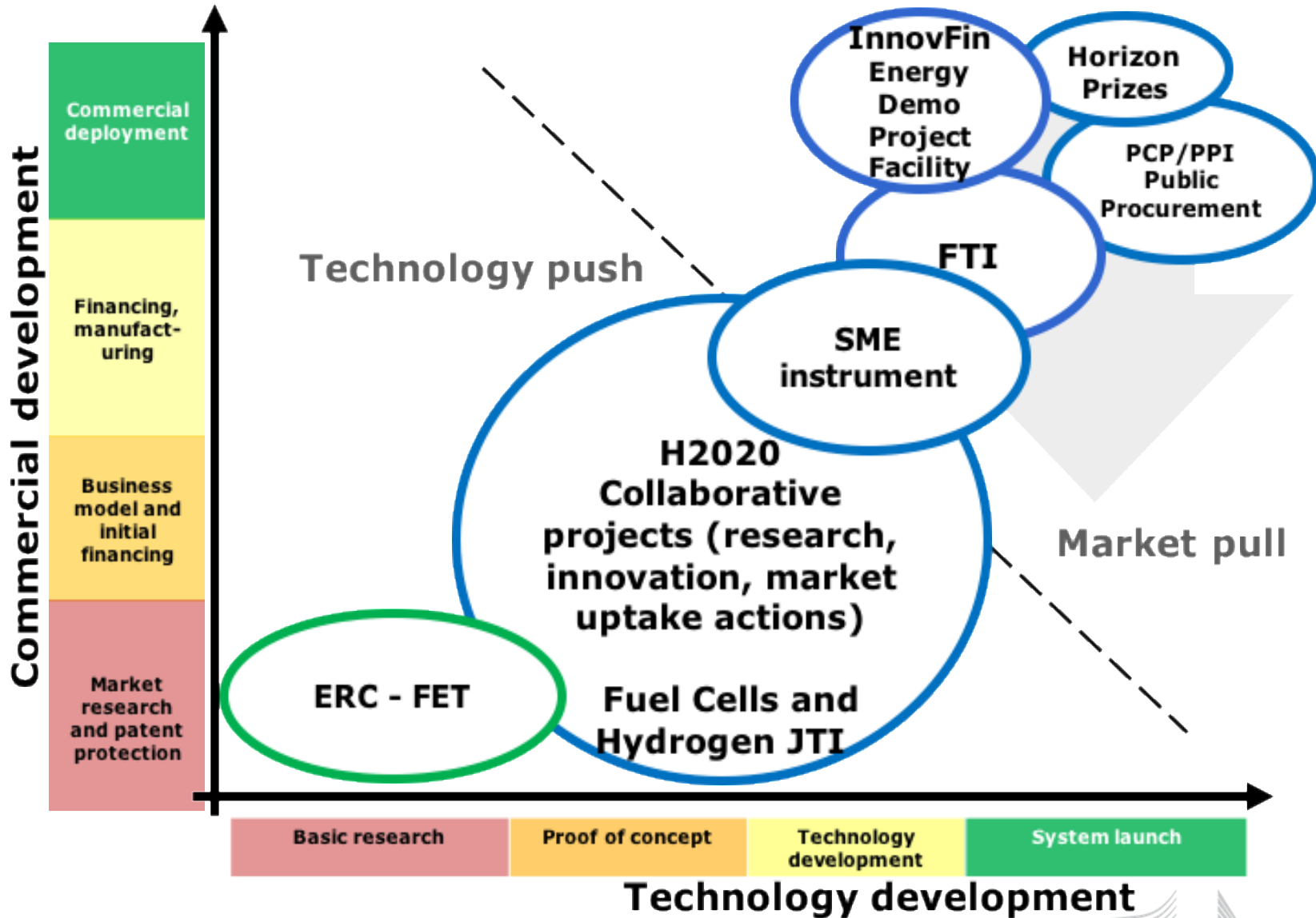
H2020 ENERGY Challenge



- 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



NOT LEGALLY BINDING

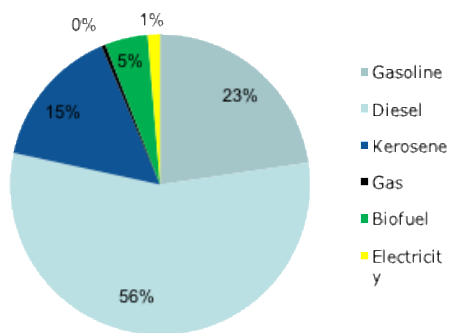
Opportunities and Challenges for Advanced Biofuels, Bioenergy & Renewable Fuels

- 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**
- R&I needed for **renewable fuels** that **outperform** fossil fuels

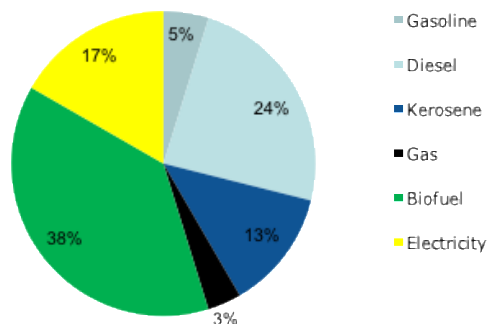
NOT LEGALLY BINDING

Share of Fuels in EU transport sector

Current share

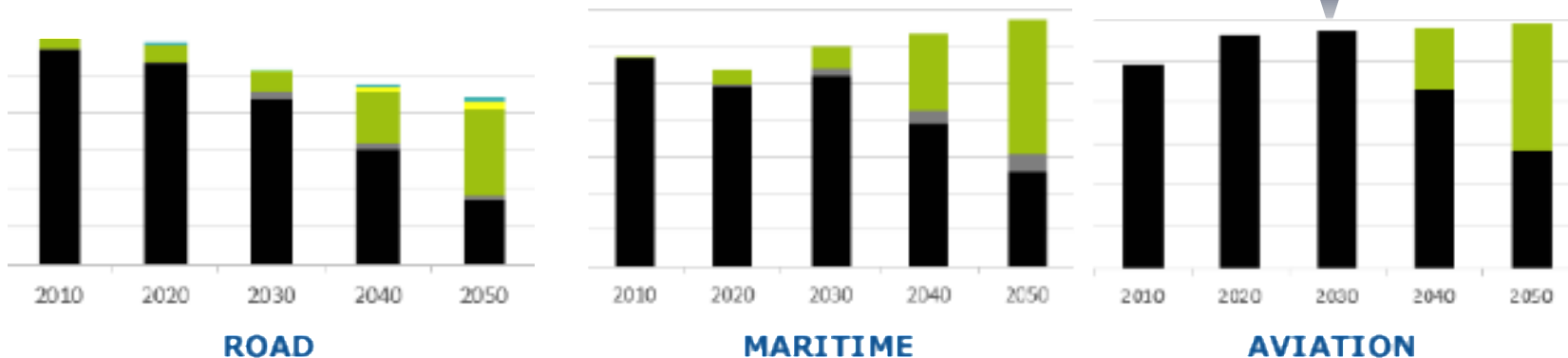


Projected share of transport fuels in 2050 (compatible with decarbonisation objectives)



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

Advanced Bioenergy, Biofuels and Renewable Fuels 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, Biofuels and Renewable Fuels 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, Biofuels and Renewable Fuels 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, Biofuels and Renewable Fuels 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

Horizon 2020 funded projects in advanced bioenergy, biofuels and renewable fuels under "Secure Clean and Efficient Energy"

H2020 Signed Grants

450,24%
of H2020

H2020 EU Contribution

204,2M0,65%
of H2020

H2020 Total Cost

244,7M0,63%
of H2020

Average Participation per Project

10,18

Average EU Contribution per Project

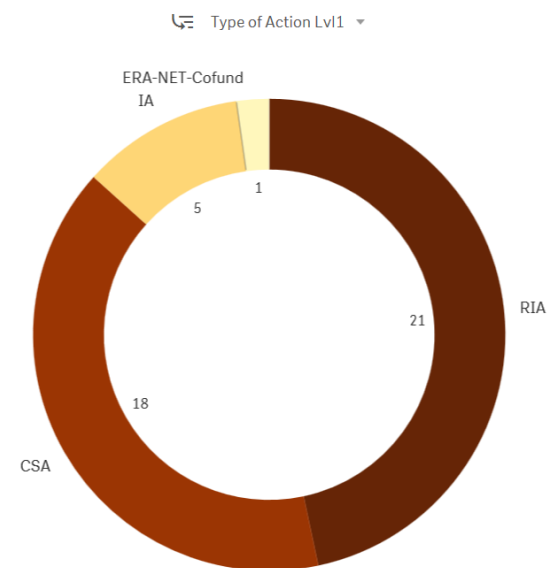
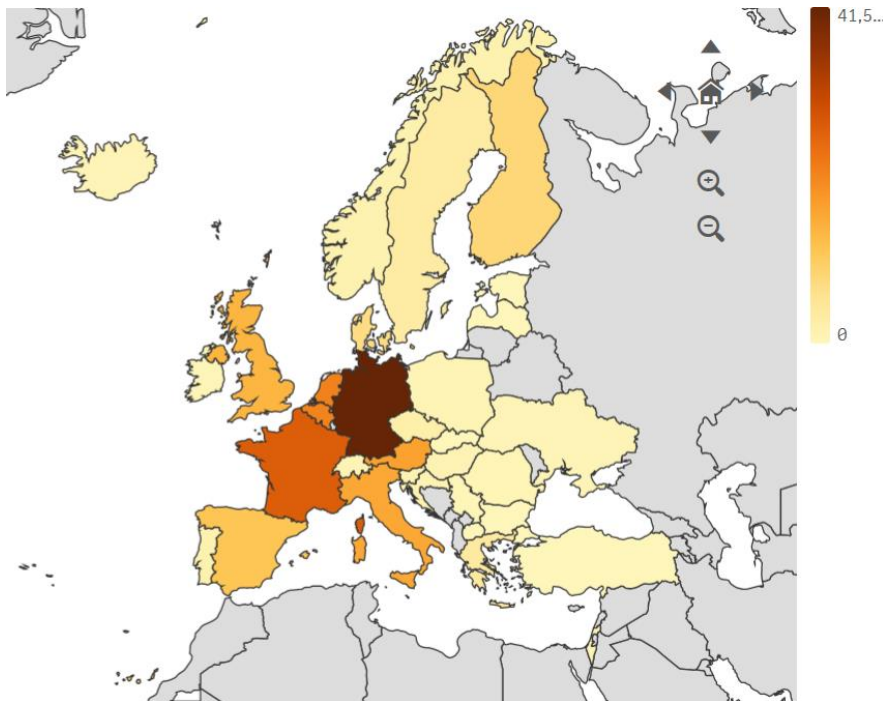
4,54M

Average Total Cost per Project

5,44M

Participant EU contribution by Country

Signed Grants by type of Action



(Selection of relevant projects in Cordis/Dashboard, excluding projects signed in 2018)

NOT LEGALLY BINDING

Horizon 2020 Workshop on Bioenergy, Advanced Biofuels and Renewable Fuels⁽¹⁾

Aim

- Identify progress made in research and innovation in the sector through support under Horizon 2020
- Discuss gaps and needs for further funding, as well as measures of pushing innovation to the market
- Provide input to the way forward in the area on future research, development and innovation needs, market up-take, and non-technological ways

Horizon 2020 Workshop on Bioenergy, Advanced Biofuels and Renewable Fuels⁽²⁾

Key messages

- A vast portfolio of technologies and value chains combining feedstock types to conversion processes exists now at different TRL and breakthrough technologies are emerging
- Support is necessary at all TRL stages and value chains including new
- Flexibility of installations to feedstock type and conversion technology needed for cost-effective products
- Collaboration across EU and internationally is key
- Understanding innovation potential needed at early development stage
- Ensuring financing at later stages of development is necessary engaging public and private bodies
- Regional approach and clustering of market players crucial for market uptake
- Value added from social and environmental benefits should be associated to products
- Communication and education essential for implementation of technologies

NOT LEGALLY BINDING

Future support

- Horizon 2020 Work Programme for 2020 in preparation
- MFF adoption on 2nd May 2018
- "Horizon Europe" is EU's 9th Framework Programme for R&I with proposed EUR 100 billion for 2021-2027
- Increased focus on impact of the Programme lifecycle and to policy, industrial competitiveness, knowledge
- Maximizing synergies with other relevant EU Programmes
- Reinforcing collegiality and efficiency in governance of programming
- Enhancing cooperation with Member States
- Intensifying interaction with society and stakeholders
- 3 Parts: Frontier Science, Global Challenges, Open to Innovation
- Strategic Programming end of 2018
- First Work Programmes in summer 2019



**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>**