



European R&I policy for renewable fuels and bioenergy

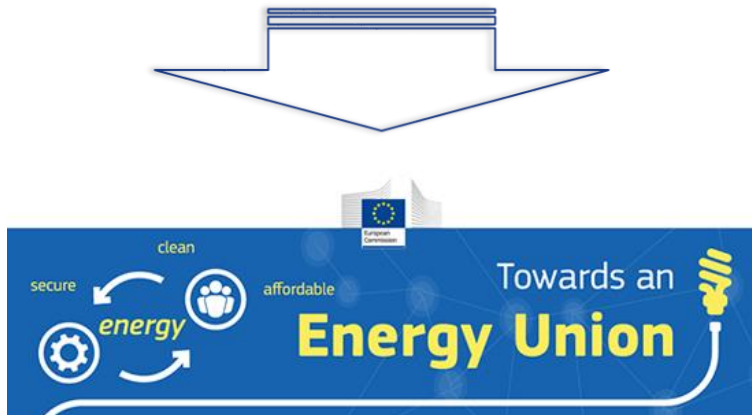
Dr Maria GEORGIADOU
Clean Energy Transition
DG Research & Innovation
EUROPEAN COMMISSION

Potential of HTL routes for biofuel production Expert Workshop, Brussels, 19 November 2019

Outline

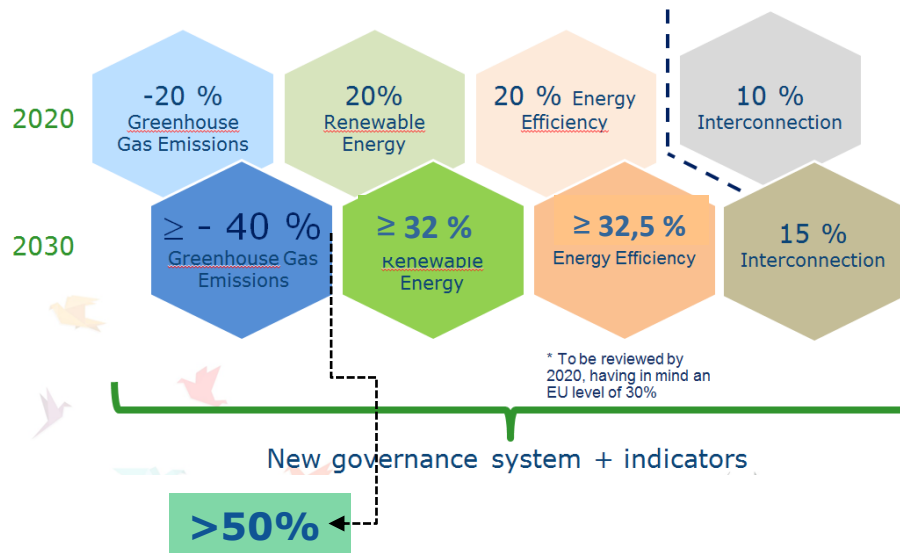
Energy Policy Framework
The European Green Deal
R&I Policy

"European Green Deal"



"Clean Energy for all Europeans"

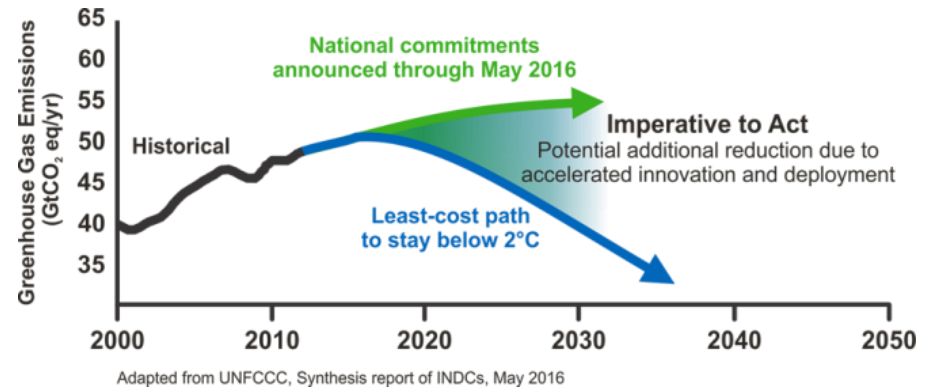
Agreed headline targets



Paris Agreement

Holding global average temperature to **well below 2°C** and limit its increase to **1.5°C**

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



Other EU policy priorities

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

*I want the **European Green Deal** to become Europe's hallmark. At the heart of it is our commitment to becoming the world's first **climate-neutral continent**. It is also a long-term **economic imperative**: those who act first and fastest will be the ones who grasp the opportunities from the ecological transition. I want Europe to be the **front-runner**. I want Europe to be the exporter of **knowledge, technologies and best practice***

President-elect Ursula von der Leyen announces distribution of portfolios



The European Green Deal

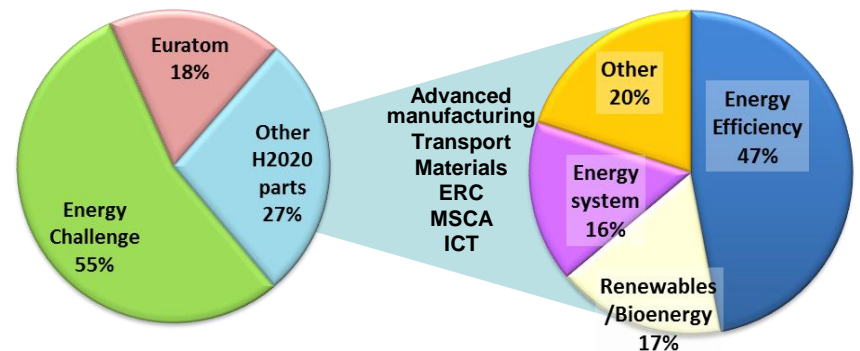
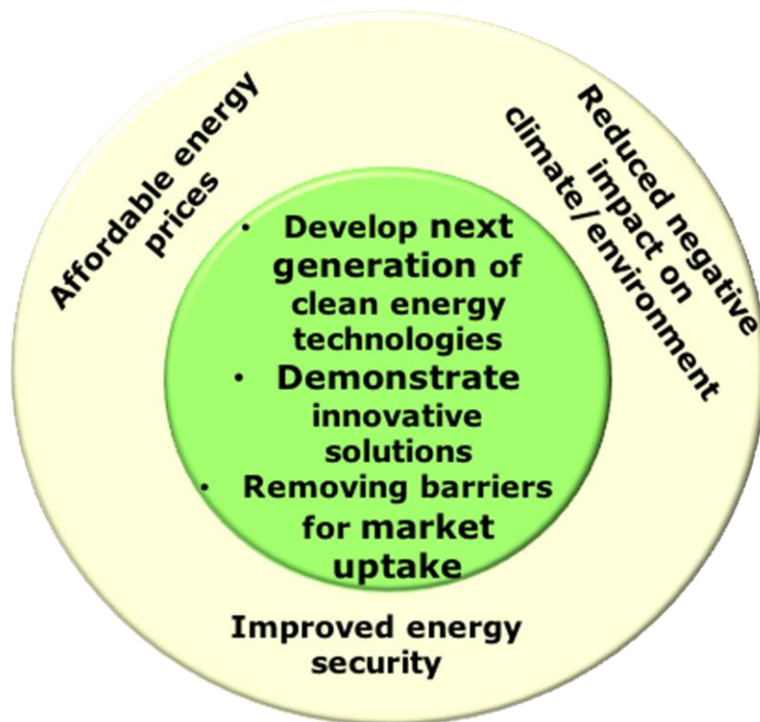
- 50% emission reduction target in 2030
- Lead international negotiations of major emitters by 2021
- Just Transition Fund
- Circular economy, blue economy
- Biodiversity
- Carbon footprint of EU transport
- Zero-pollution
- Carbon Border Tax
- Review of Energy Taxation Directive

Research Policy Framework

Horizon 2020 (2014-2020) €70,2 billion

H2020-Energy Challenge budget
EUR 5,7 billion

H2020 ENERGY Challenge

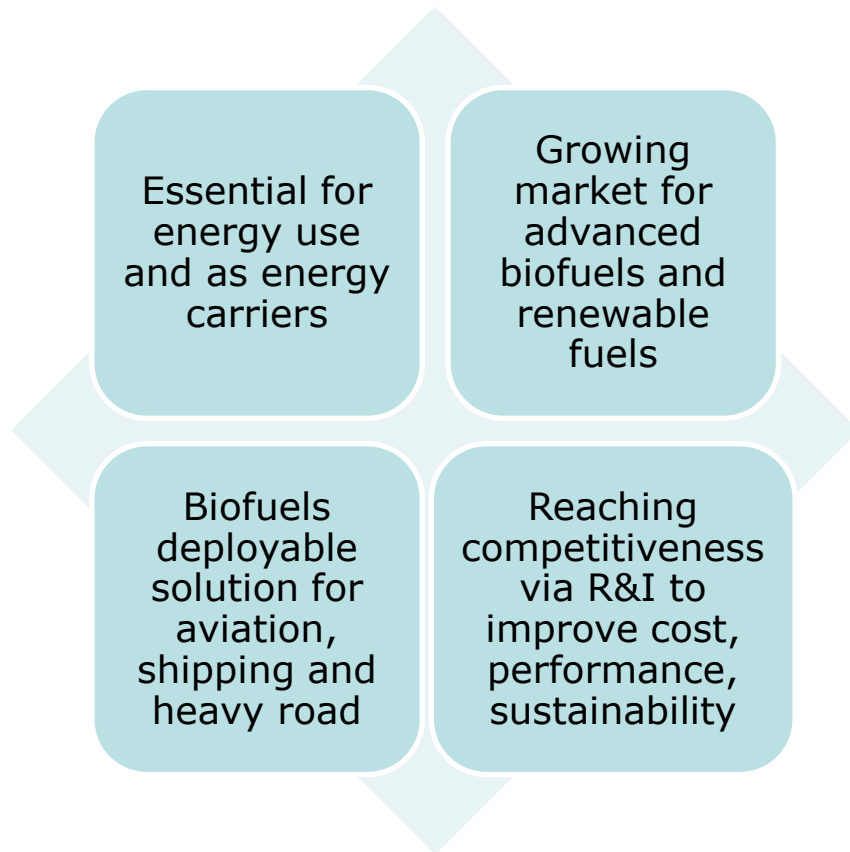


Additional energy-related spending in H2020 outside Energy Challenge:
~50% of Energy Challenge budget

✓ H2020 total Energy budget ~ **EUR 8.5 billion, 11,4%**

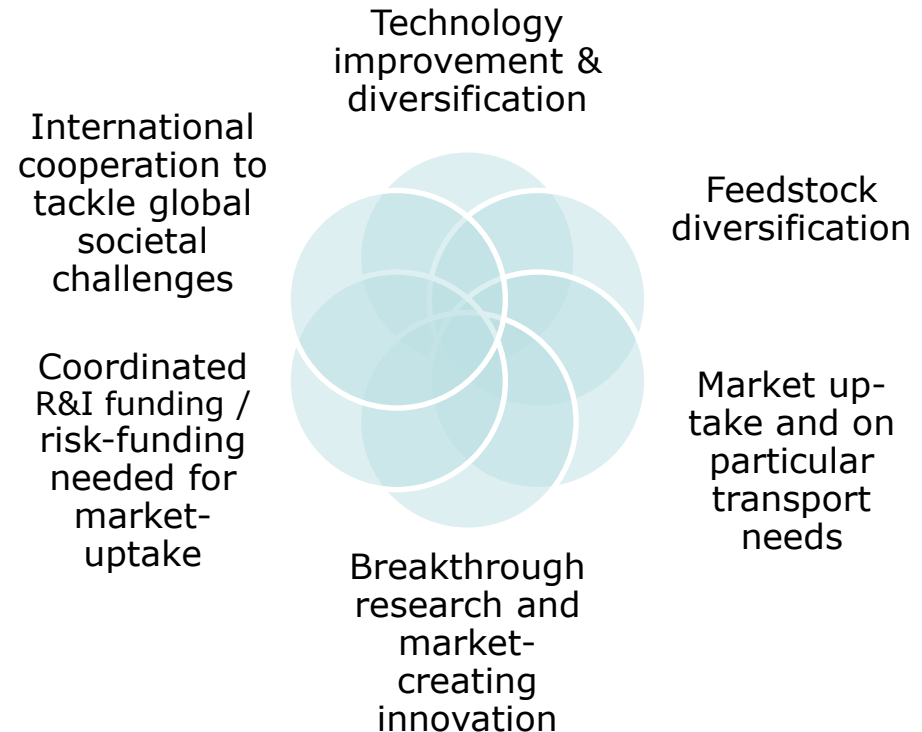
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Advanced Bioenergy, Biofuels and Renewable Fuels



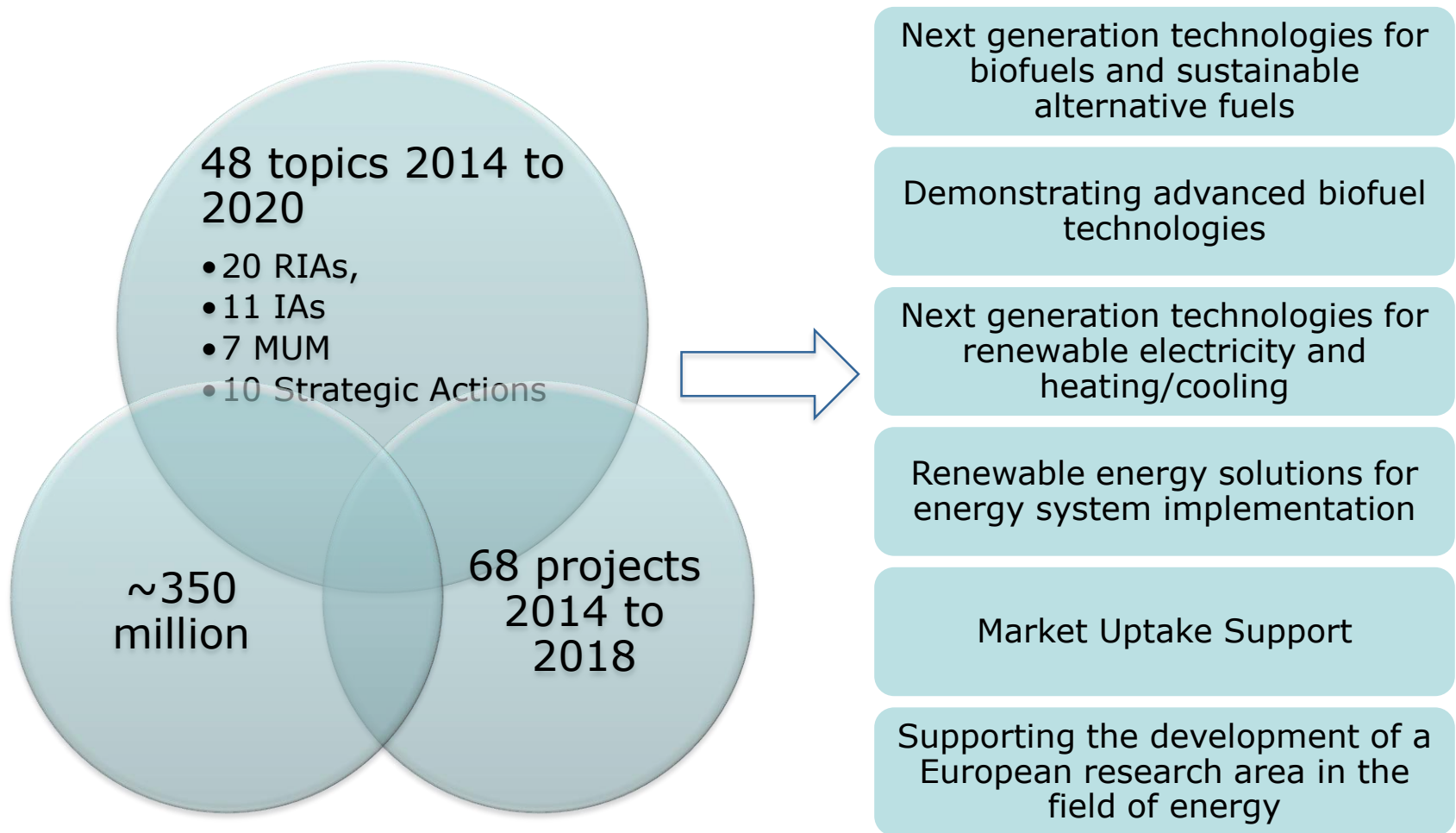
Opportunities & Challenges

R&I Policy



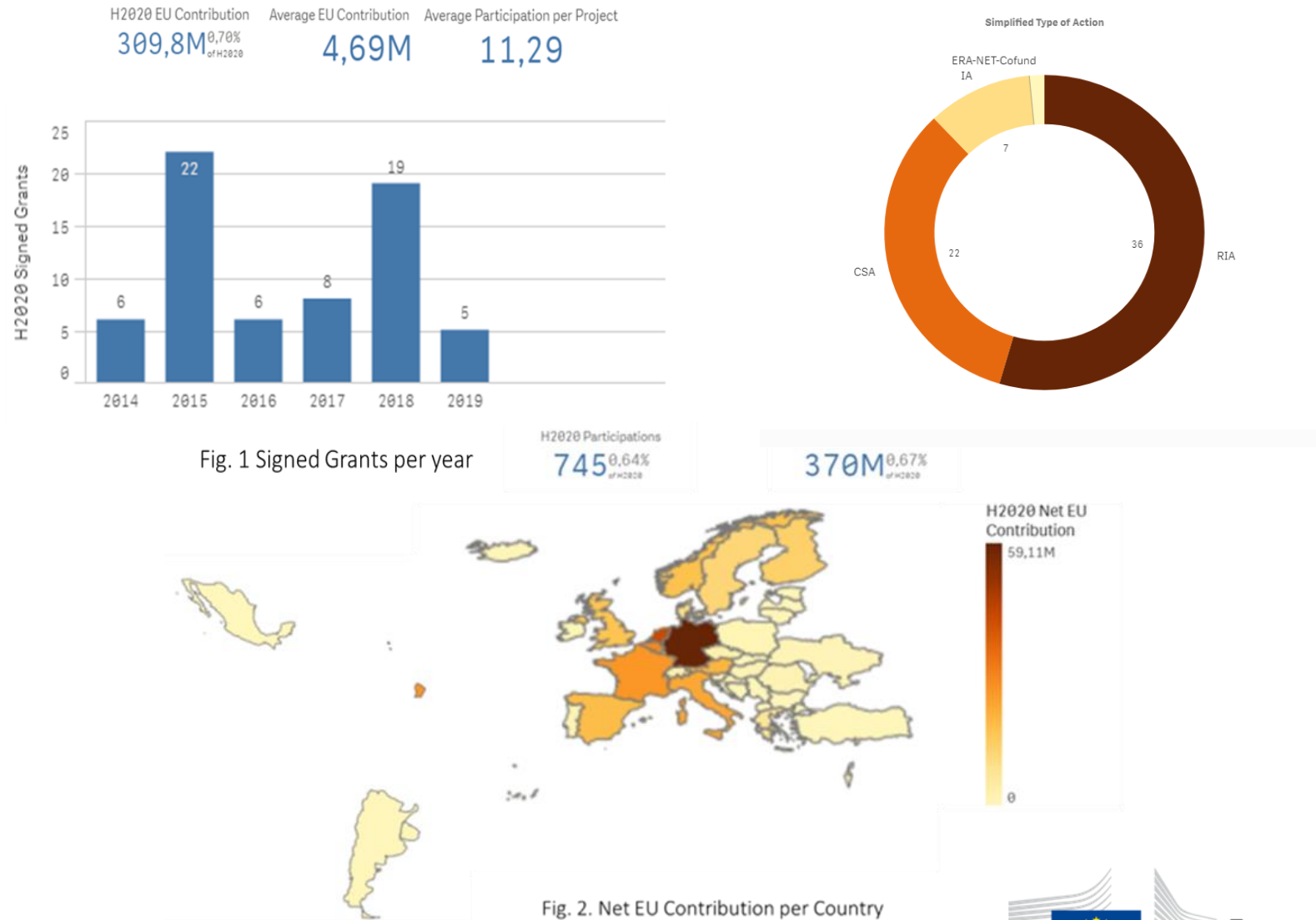
Horizon 2020 topics

Secure Clean and Efficient Energy

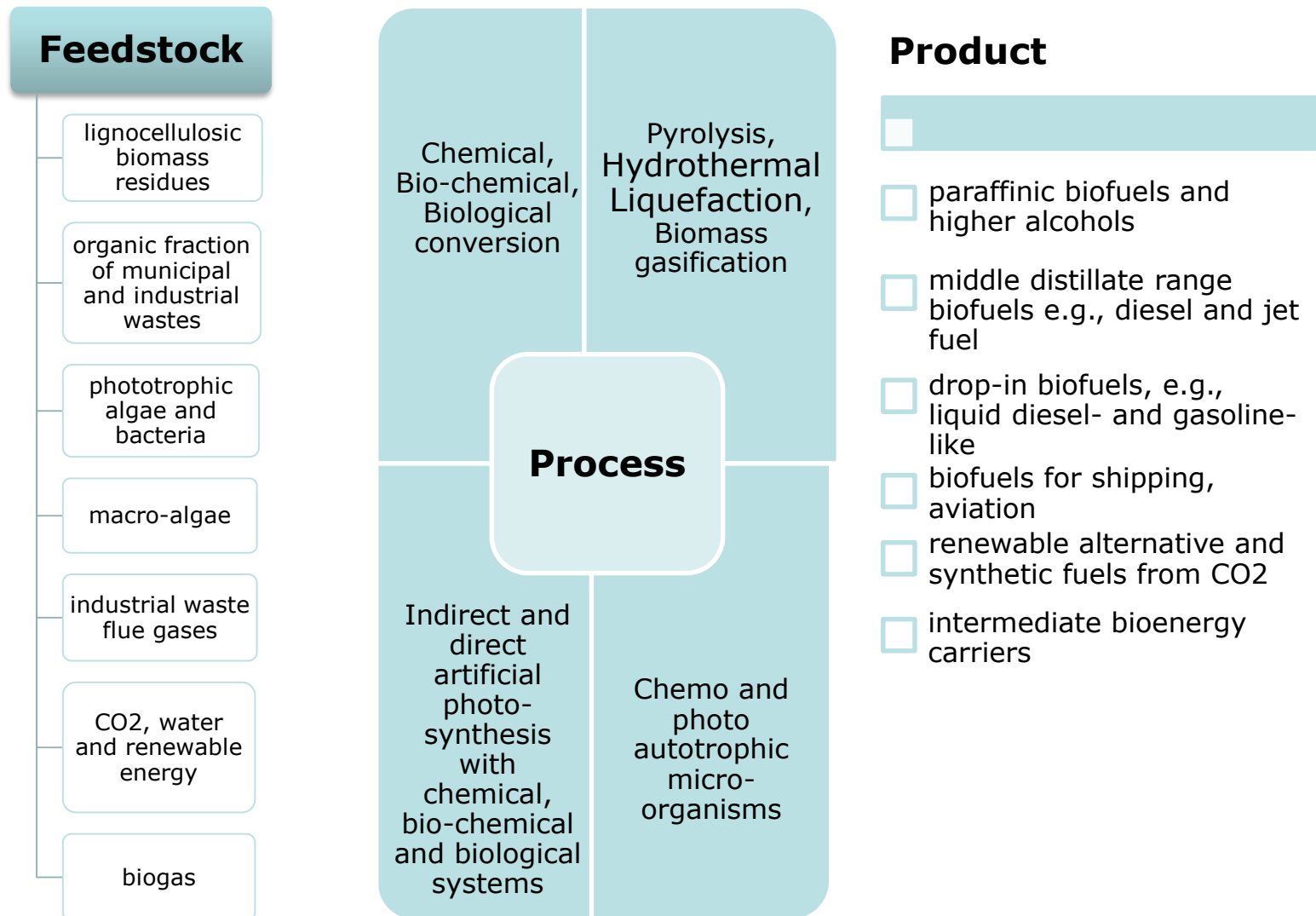


Horizon 2020 funded projects

"Secure Clean and Efficient Energy"



Thematic areas - Renewable fuels



Technologies of the EIBI
seven value chains

Biomethane through
gasification

Lignocellulosic ethanol

Bioenergy carriers by
pyrolysis, torrefaction

Biofuels for aviation

Demonstration of advanced biofuel technologies

~ € 100 million Investment

Biofuels from the carbon
content in flue gases

Biofuels from aquatic
biomass

Biofuels from wastes and
residues (forest,
agricultural, organic
fraction of municipal and
industrial wastes)

Thematic areas - Renewable power, H&C

Next generation technologies

- micro, and small-scale CHP systems
- residential-scale low emission boilers
- medium and large-scale biomass-based cogeneration
- renewable energy integration to biomass heating and cogeneration
- intermediate bioenergy carriers from biogenic residues and wastes and energy crops from marginal lands.

Demonstration of medium to large-scale biomass CHP

- retrofitting existing plants
- production of intermediate bioenergy carriers

Thematic areas - Cross cutting

**Market
up-take**

- supply chains
- sustainability, standards
- public acceptance
- communication, training
- biogas and bio-methane barriers
- supply and market barriers, logistics and trade centres for intermediates
- marginal lands
- stakeholders awareness and capacity building

Overarching

market
creating
innovation
Bionic Leaf

pre-
commercial
production
of advanced
aviation
biofuel

retrofitting
of existing
industrial
installations

international
cooperation

CEN-CENELEC Framework Partnership Agreement

Engine tests with new types of biofuels and development of biofuel standards

Objective : input to standardization work under CEN/TC 19

E20 in Euro 6c vehicles

Feasibility of a CI engine to high octane fuels

Robustness of FAME standard EN 14214

Quality requirements of paraffinic diesel blends and emissions benefits in engines

Feasible to move to an E20 fuel for infrastructure and vehicles

Gasoline in CI engine functions over the entire speed load range with an efficiency similar to a normal diesel engine

Results

Reliable FAME test methods predict fuel-related filter plugging in diesel vehicles

The density of diesel in the EN 590 fuel specification can be lowered without modifications and use more paraffinic fuels

BioEnergy Sustaining The Future

ERANET CoFund Actions

Demo Projects

BESTF1

BioSNG – UK/Germany - project complete – Development of an innovative process to convert gas and biomass into bio substitute natural gas to be used in existing gas network

BioProgress – Sweden/Germany – project complete – Demonstrate a novel technology to simplify gas clean-up following biomass gasification

BESTF2

CoryFee – Denmark/Sweden – project complete – Reduce production costs of cellulosic ethanol

BioWaterMethanisation – Spain/UK/Netherlands – project complete – Demonstrate feasibility of anaerobic membrane bioreactor to achieve sustainable wastewater treatment.

BESTF3

Pheonix – UK/Netherlands – on going – develop port injection gas engines to provide novel approach to power generation from syngas derived from biomass gasification.

Waste2Bio – Spain/UK – on going – Demonstrate a process for treatment of MSW via recovery of bioethanol and biogas to enhance valorisation of residues

SegraBio – Denmark/Sweden – on going - develop and demonstrate the production of bio-ethanol and biogas from second grade and low cost biomass

H2020 open calls

LC-SC3-RES-1-2019-2020

Developing the next generation of renewable energy technologies - Sustainable Fuels RIA TRL to 3-4

LC-SC3-RES-3-2020

International Cooperation with USA and/or China on alternative renewable fuels from sunlight for energy, transport and chemical storage RIA TRL to 3-4

LC-SC3-RES-25-2020

International cooperation for Research and Innovation on advanced biofuels and alternative renewable fuels –Japan RIA TRL to 3

LC-SC3-RES-26-2020

Development of next generation renewable fuel technologies from CO2 and renewable energy (Power and Energy to Renewable Fuels) RIA TRL 3-4 to 4-5

LC-SC3-RES-36-2020

International cooperation with Canada on advanced biofuels and bioenergy RIA TRL 3 to 5

LC-SC3-RES-37-2020

Combined clean biofuel production and phytoremediation solutions from contaminated lands worldwide RIA TRL 3-4 to 4-5

LC-SC3-RES-27-2020

Demonstration of advanced biofuels production from aquatic biomass IA

LC-SC3-RES-28-2018-2019-2020

Market Uptake support Bioenergy specific CSA TRL 5 to 6-7

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

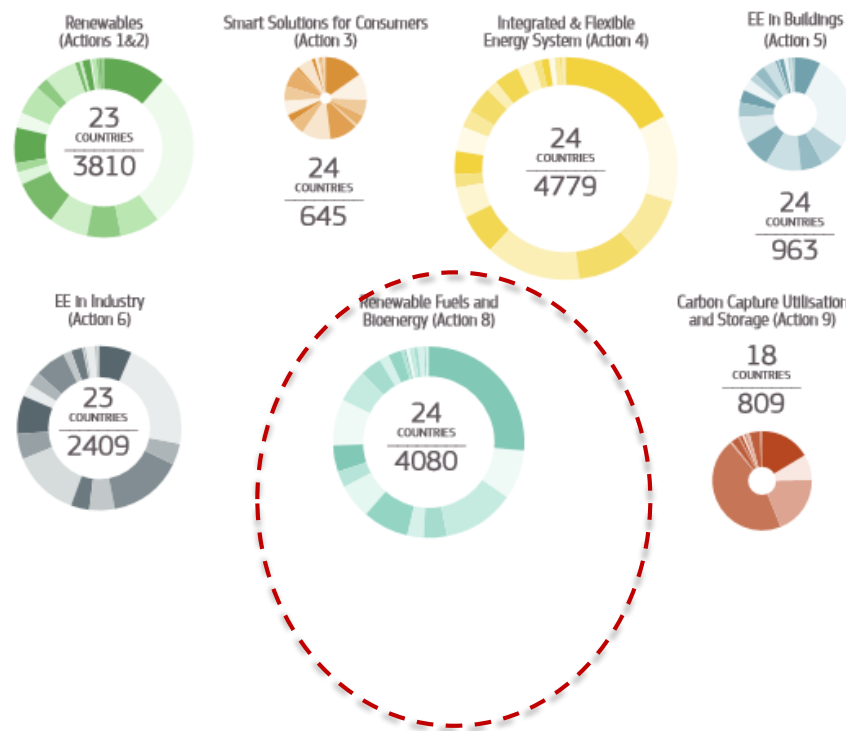


European
Commission

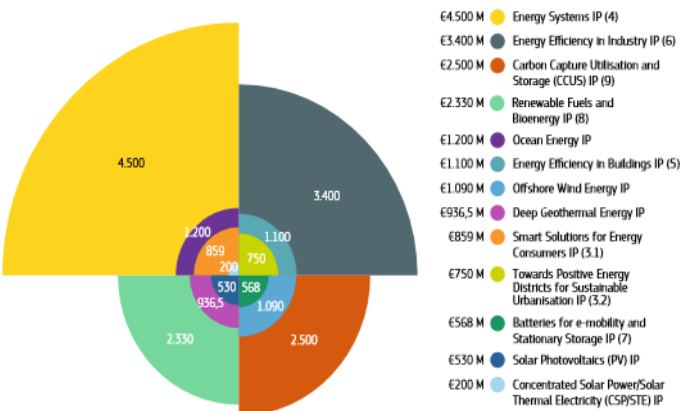


National R&I Expenditure SET Plan Investments

NATIONAL R&D EXPENDITURE PER SET PLAN ACTION (2012-2016) [EUR MILLION]



EXPECTED VOLUME OF INVESTMENTS IN R&I ACTIVITIES AS IDENTIFIED IN THE IMPLEMENTATION PLANS (EUR MILLION)



- In 2030 more than EUR 20 billion aggregated investments in R&I
- Part of wider effort to decarbonize EU energy system

SET Plan delivering results, SET Plan 2018 Edition

Action 8 - Renewable Fuels and Bioenergy

- ✓ Targets in Declaration of Intent – November 2016
- ✓ Implementation Plan with 12 Member States – 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

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Action 8: Renewable Fuels and Bioenergy for Sustainable Transport

Table 1: Total investment for R&I activities

		Billions €	Industry		MS Funding		EU	
Total Bioenergy and Renewable Fuels for Sustainable Transport		106,61	77,74	73%	22,23	21%	6,64	6%
Renewable Fuels for Sustainable Transport		84,81	62,34	74%	17,48	21%	4,99	6%
Advanced Biofuels		73,00	53,75	74%	15,00	21%	4,25	6%
#1	Development	1,00	0,25	25%	0,50	50%	0,25	25%
#2	Demonstration	2,00	1,00	50%	0,50	25%	0,50	25%
#3	Scale-Up	70,00	52,50	75%	14,00	20%	3,50	5%
Other renewable liquid and gaseous fuels		11,40	8,35	73%	2,36	21%	0,69	6%
#4	Development	0,20	0,05	25%	0,10	50%	0,05	25%
#5	Demonstration	0,40	0,20	50%	0,10	25%	0,10	25%
#6	Scale-Up	10,80	8,10	75%	2,16	20%	0,54	5%
#7 Renewable Hydrogen		0,41	0,24	59%	0,12	28%	0,05	13%
	TRL 2-6 (Development)	0,10	0,03	25%	0,05	50%	0,03	25%
	TRL 7-8 (Demonstration)	0,06	0,03	50%	0,02	25%	0,02	25%
	TRL 9 (Scale-Up)	0,25	0,19	75%	0,05	20%	0,01	5%
Bioenergy		11,30	8,03	71%	2,45	22%	0,83	7%
#8	Development	0,50	0,13	25%	0,25	50%	0,13	25%
#9	Demonstration	0,80	0,40	50%	0,20	25%	0,20	25%
#10	Scale-Up	10,00	7,50	75%	2,00	20%	0,50	5%
Intermediate Bioenergy Carriers		10,50	7,38	70%	2,30	22%	0,83	8%
#11	Development	0,50	0,13	25%	0,25	50%	0,13	25%
#12	Demonstration	1,00	0,50	50%	0,25	25%	0,25	25%
#13	Scale-Up	9,00	6,75	75%	1,80	20%	0,45	5%

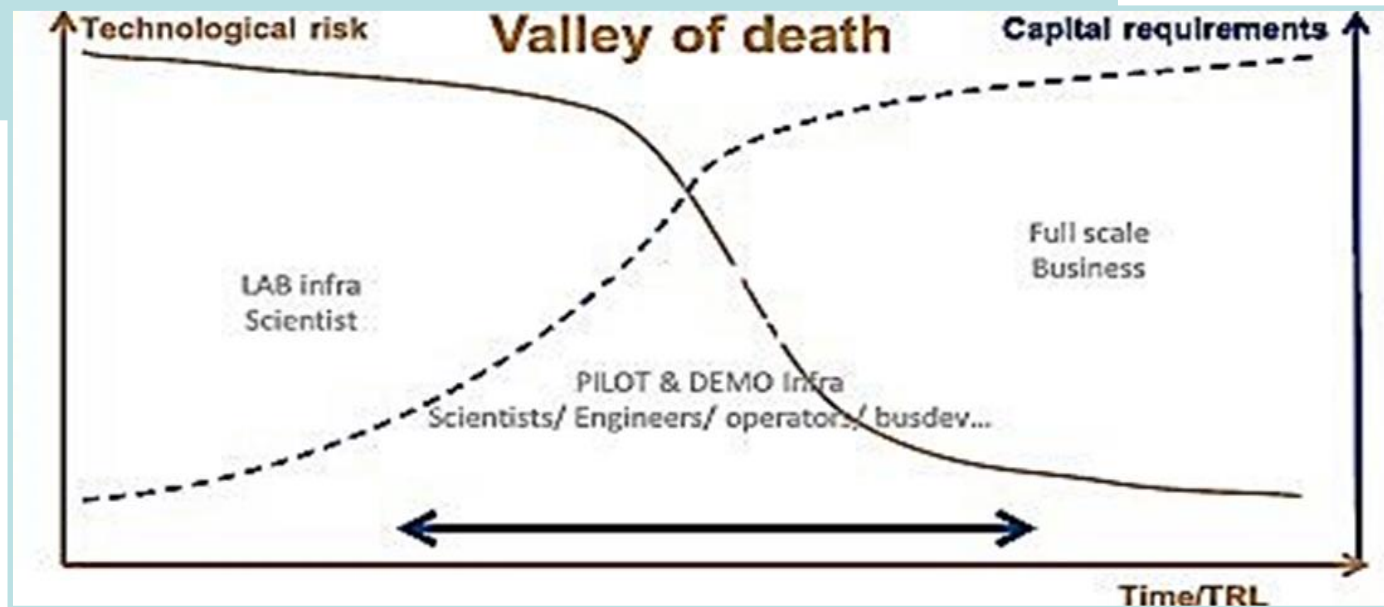
Market up-take challenges

Lack of investments due to financial risks => lack of new technologies coming into the market

Innovative technologies considered more risky, need higher upfront capital => banks more reluctant to finance them

Most mature technologies confronted with uncertainty on investment returns => pay-off costs much harder to calculate

Lack of awareness, capacity, cost and infrastructure



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Energy Financing in the Energy Union

- Investment Plan for Europe
- European Structural & Investment Funds
- Horizon 2020
- Horizon Europe
- Digital Europe Programme
- Just Transition Fund
- InvestEU for R&I
- Innovation Fund
- EU Finance for Innovators

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2020
European
Commission

The way forward

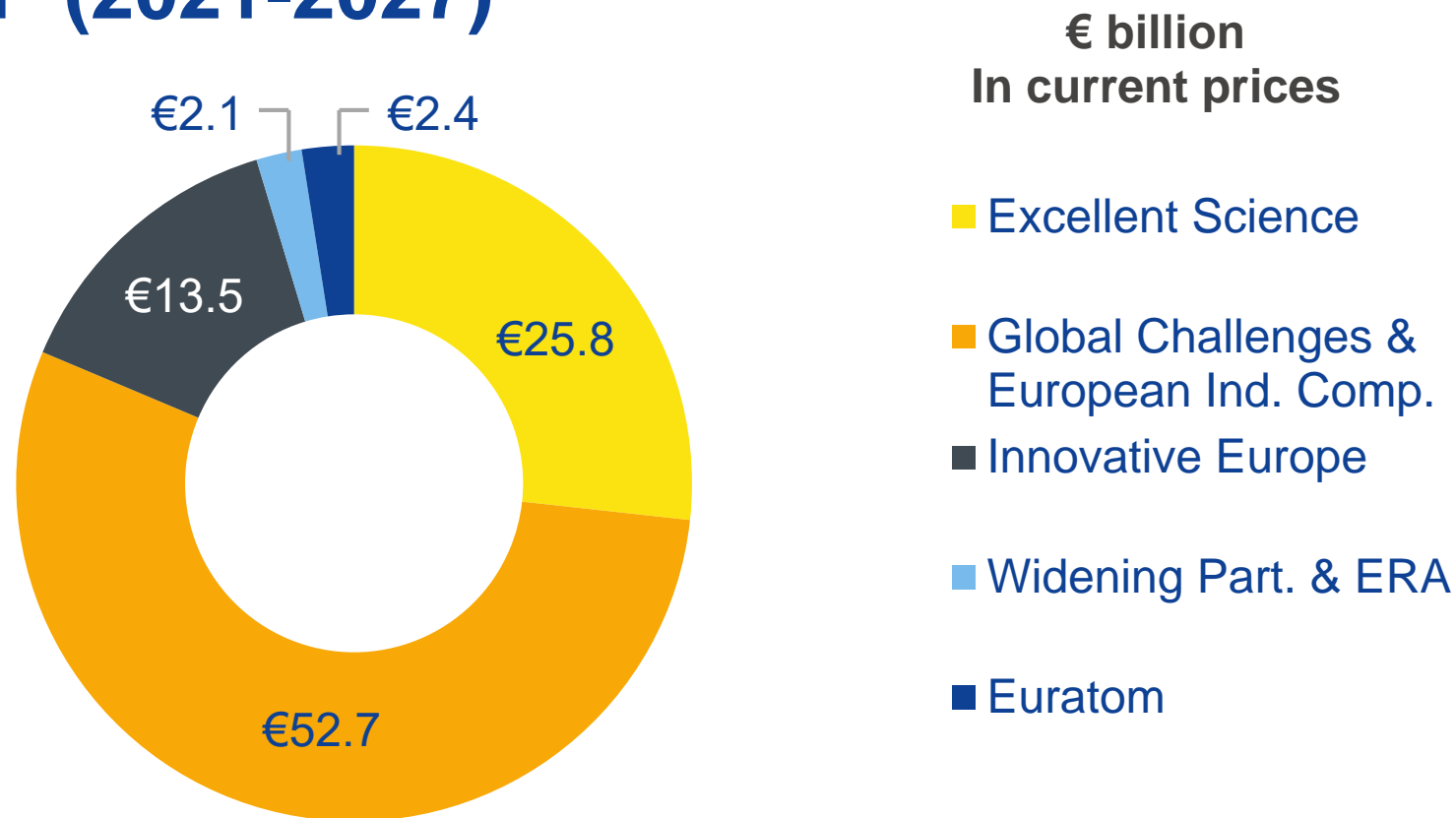
- A vast portfolio of technologies and value chains
- Support at all TRL & value chains including new
- Flexibility of installations
- Collaboration across EU and internationally
- Understanding early innovation potential
- Ensuring financing at later stages
- Regional approach and clustering of market players
- System integration
- Public acceptance
- Integrated approach

Horizon Europe The next EU R&I Investment Programme (2021-2027)

Preliminary structure



Commission proposal for budget: €100 billion* (2021-2027)

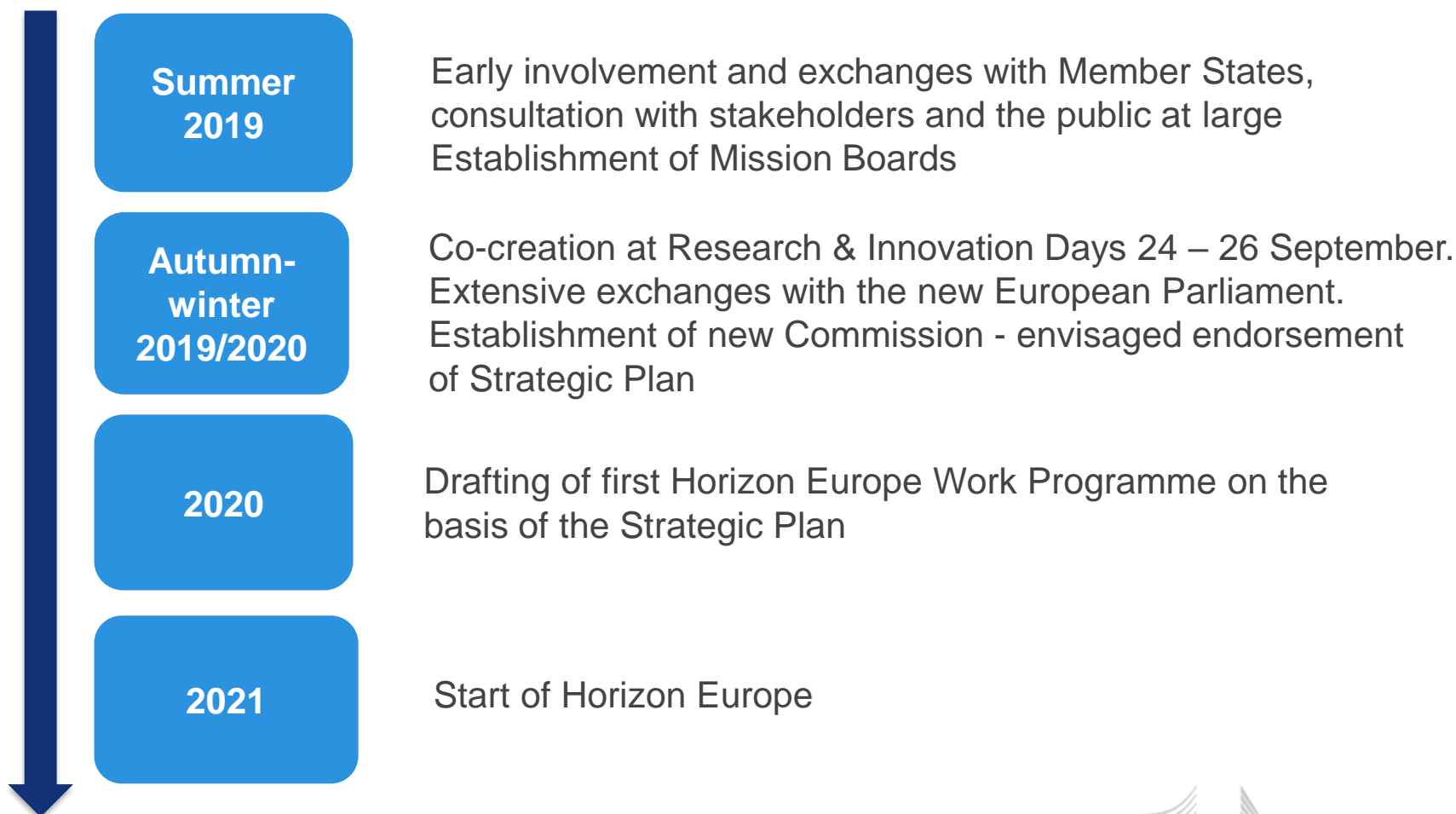


* This envelope includes EUR 3.5 billion allocated under the InvestEU Fund.

Clusters in 'Global Challenges and Industrial Competitiveness'

Clusters	Areas of intervention	
Health	<ul style="list-style-type: none"> • Health throughout the life course • Non-communicable and rare diseases • Tools, technologies and digital solutions for health and care, including personalised medicine 	<ul style="list-style-type: none"> • Environmental and social health determinants • Infectious diseases, including poverty-related and neglected disease • Health care systems
Culture, creativity and inclusive society	<ul style="list-style-type: none"> • Democracy and Governance • Social and economic transformations 	<ul style="list-style-type: none"> • Culture, cultural heritage and creativity
Civil security for society	<ul style="list-style-type: none"> • Disaster-resilient societies • Protection and Security 	<ul style="list-style-type: none"> • Cybersecurity
Digital, Industry and space	<ul style="list-style-type: none"> • Manufacturing technologies • Advanced materials • Next generation internet • Circular industries • Space, including Earth Observation • Emerging enabling technologies 	<ul style="list-style-type: none"> • Key digital technologies, including quantum technologies • Artificial Intelligence and robotics • Advanced computing and Big Data • Low-carbon and clean industry • Emerging enabling technologies
Climate, Energy and Mobility	<ul style="list-style-type: none"> • Climate science and solutions • Energy systems and grids • Communities and cities • Industrial competitiveness in transport • Smart mobility 	<ul style="list-style-type: none"> • Energy supply • Buildings and industrial facilities in energy transition • Clean, safe and accessible transport and mobility • Energy storage
Food, bioeconomy, natural resources, agriculture and environment	<ul style="list-style-type: none"> • Environmental observation • Agriculture, forestry and rural areas • Circular systems • Food systems 	<ul style="list-style-type: none"> • Biodiversity and natural resources • Seas, oceans and inland waters • Bio-based innovation systems in the EU Bioeconomy

Steps towards the first Horizon Europe work programme





Thank you for your attention!

CDMA 3/3 B-1049
Brussels/Belgium
Tel: +32 2 29 59846
maria.georgiadou@ec.europa.eu
<http://ec.europa.eu/research>