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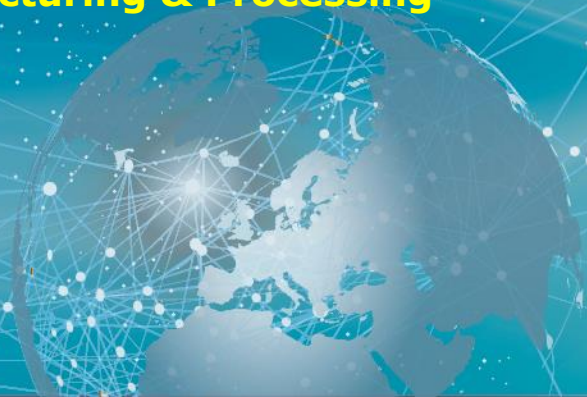
Horizon 2020 Work Programme for Research & Innovation 2018-2020

Infoday
Madrid 19 October 2017

**Upcoming challenges for Nanotechnologies,
Advanced Materials, Biotechnology and
Advanced Manufacturing & Processing**

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DG Research & Innovation

Research and
Innovation



EU Policy Context

R&I in the context of European policy priorities (Political Guidelines for the Juncker Commission, July 2014)

- To boost jobs, growth and investment
- To realise a connected digital single market
- To implement a resilient Energy Union with a forward looking climate change policy
- To make Europe a stronger global actor

Commissioner Moedas' priorities

- Open innovation, Open science, Open to the world

Strategic Context: Importance of EU Manufacturing

- **64%** of private R&D investment
- **2,1** million enterprises (9% of total)
- **32** million jobs (14% of the total + many indirect jobs via related services)
- Turnover : **EUR 7,110 trillion**
- Manufacturing added value : **EUR 2,130 trillion** (16% of European GDP)
- **Biggest purchaser and user of KETs** : huge potential for innovation

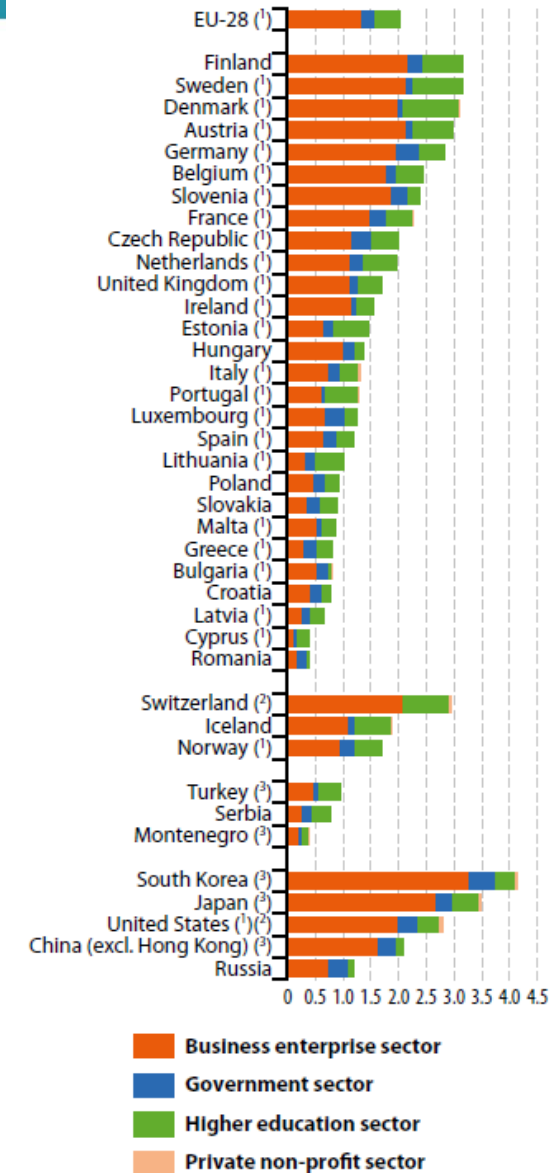
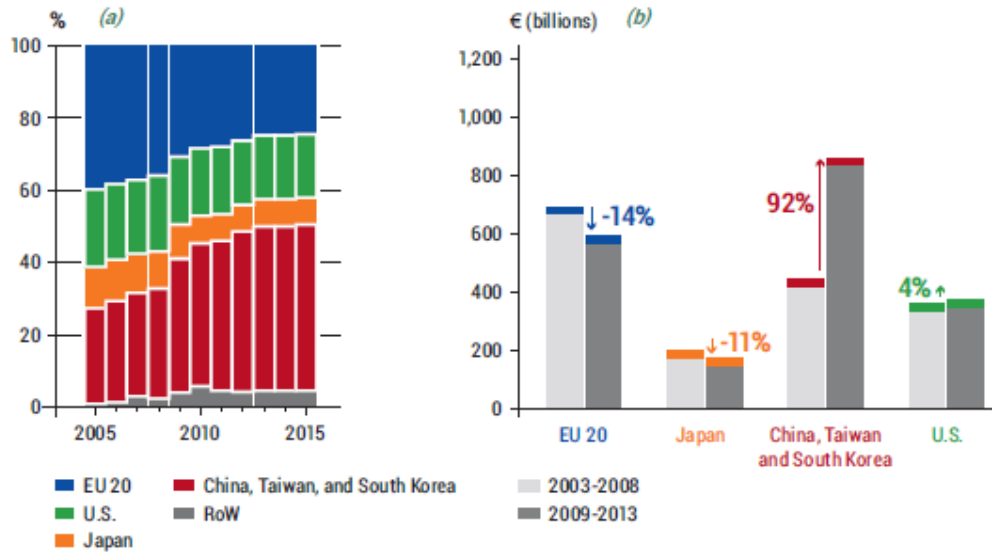
What are the challenges

- Fast growing competitors
- Investments outside EU
- EU still good in patenting, less good in turning R&D into innovation and business (e.g. KETs)
- Taking care of the SME landscape, value chains, « eco-systems »
- Difficulties in access to financing
- Keeping and developing skills and competences

→ **How to make industry invest and create jobs in Europe, renew and extend global leadership and generate returns for Europe.**

Investment in Manufacturing and R&I expenses

Figure 1.7. (a) Share of world's total manufacturing investment by regions and (b) Average change in total manufacturing investment by regions between the period 2003-2008 and 2009-2013.³²



Source: Eurostat, *Smarter, greener, more inclusive? Indicators to support the Europe 2020 Strategy, 2016 edition*

KETs HLG 2015

(1) Data are estimates and/or provisional.
(2) 2012 data instead of 2014.
(3) 2013 data instead of 2014.

What are Key Enabling Technologies

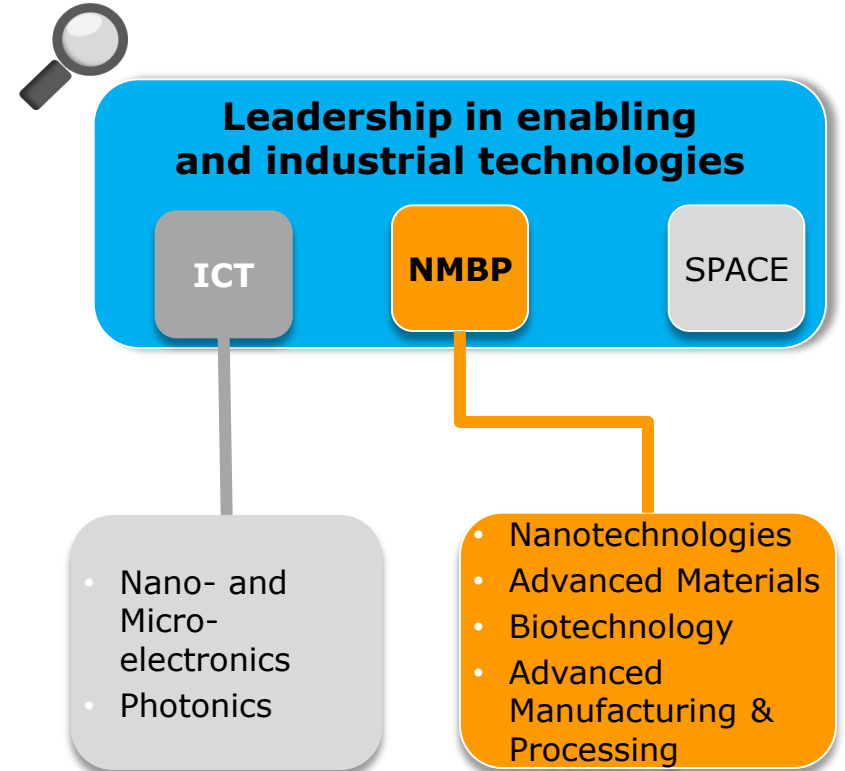
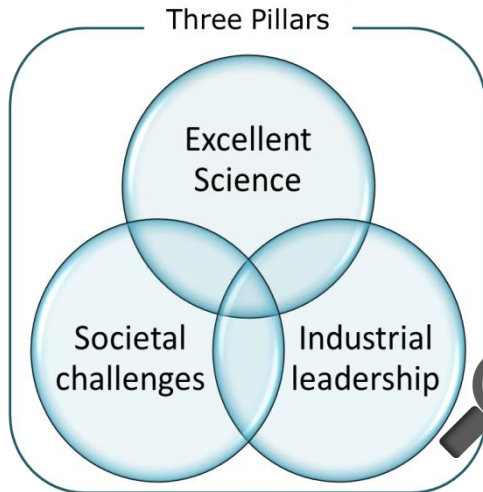
- Six strategic technologies
- Driving competitiveness and growth
- Contributing to solving societal challenges
- Knowledge- and Capital- intensive
- Cut across many sectors

- **Nanotechnologies**
- **Advanced Materials**
- **Biotechnology**
- **Advanced Manufacturing & Processing**
- Micro- and nano-electronics
- Photonics

European KET Strategy:

- Review by High Level Strategy Group (starting autumn 2017)
- KET High-level Group: final report 'KETs: Time to Act', June 2015
- EC Communications COM(2009)512 & (2012)341

NMBP in Horizon 2020



Indicative budget:
75 billion € *

Indicative Budget:
16.5 billion € *

Out of it for NMBP:
3.8 billion € *

* July 2015 – includes EIT, JRC, "Science with and for Society", "Spreading Excellence / Widening Participation", in addition to three priorities above

NMBP in Horizon 2020

R&D and innovation with a strong industrial dimension and in partnership with industry

- Activities primarily developed through relevant industrial roadmaps (ETPs, PPPs)
- Requirements for business cases and exploitation strategies for industrialisation

Strengthening industrial capacities including SMEs, including through synergies with other funds (private – public)

- Cross-cutting KETs, including pilot lines and demonstrators, addressing societal challenges

Outcome and impact orientation, developing key technology building blocks and bringing them closer to the market

- Technology Readiness Level (TRLs) from 3-4 to 6-7 with emphasis on expected impact

Total budget under Horizon 2020: 3.8 billion €

Contractual Public-Private Partnerships (cPPPs)

- **Industry** plays **leading role** in defining research priorities
- **Pre-defined budget** ensures continuity and commitment
- Focused on **enabling industrial technologies**
- Increased use of **SME-friendly** instruments and **demonstration**
- Roadmaps prepared with large stakeholder involvement and public consultation
- Concrete technological and sector related objectives – commitment from industry to reach them and to provide necessary R&D+I investments
- Using fully open H2020 calls
- Industry **commitment** for leverage and further investments

Contractual Public-Private Partnerships in Horizon 2020

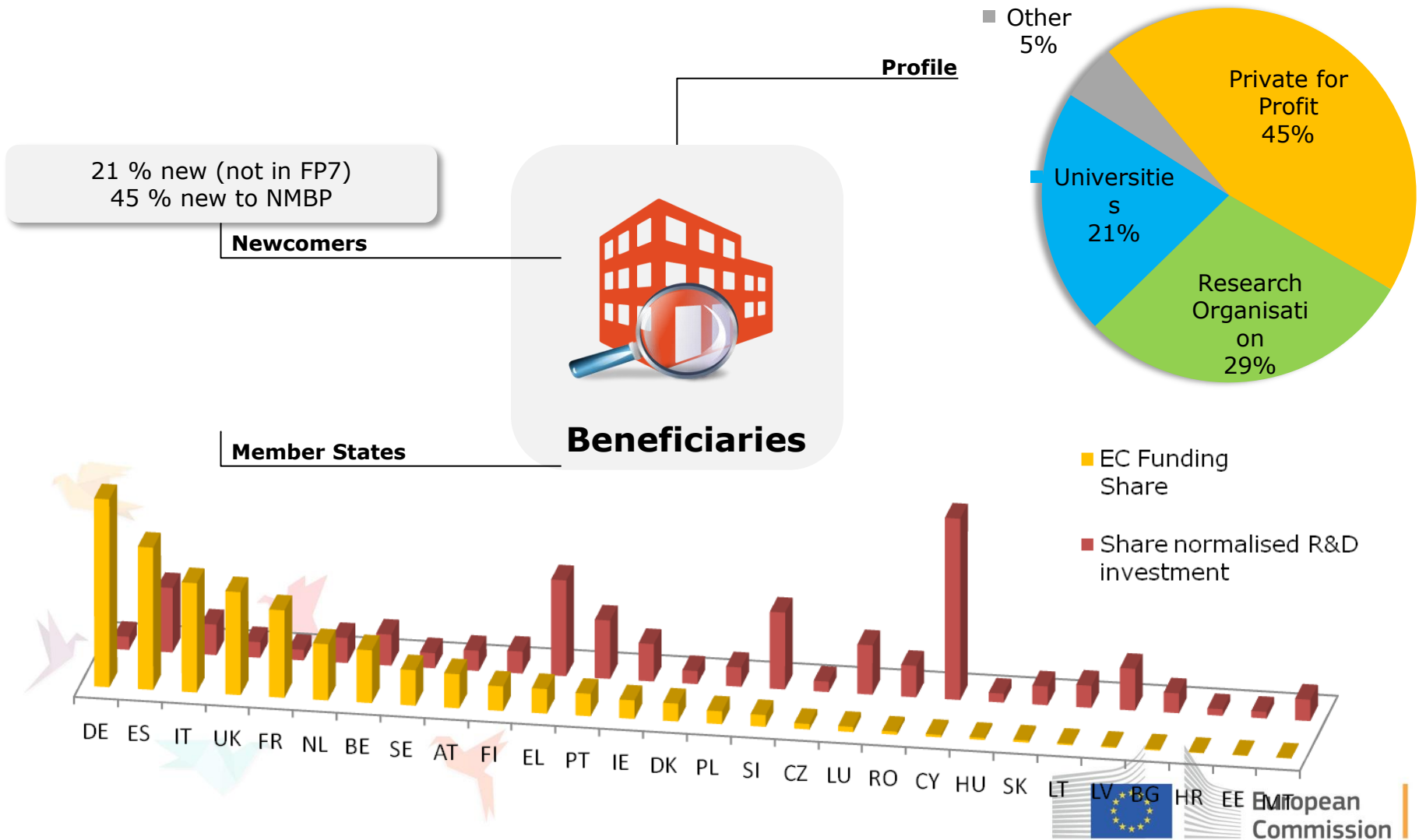
Institutionalised PPPs

- Innovative Medicines (IMI)
- Clean Sky
- Single European Sky ATM Research (SESAR)
- Fuel Cells and Hydrogen (FCH)
- Electronic Components and Systems (ECSEL - old ARTEMIS + ENIAC)
- **Bio-based Industries (BBI)**
- Shift2Rail

Contractual PPPs

- **Factory of the Future (FoF)**
- **Energy-efficient Buildings (EeB)**
- **Sustainable Process Industry (SPIRE)**
- **Green Vehicles (EGVI)**
- **Future internet (5G)**
- **Robotics**
- **Photonics**
- **High Performance Computing**
- **Big Data**
- **Cyber-Security**

NMBP Participation overview – collaborative R&I



Expected Impact

- **Technological ambitions**, including goals for environmental sustainability, cost reduction, human aspects etc. (see topic descriptions)
- **Take-up of results for industrialisation/commercialisation, including upscaling, investments, addressing different markets**

=> *business cases and exploitation strategies for industrialisation*

- Building **new test/experimentation/validation infrastructure and services** (for SMEs)
- Reach out to **newcomers** (e.g. SMEs) and **civil society**; dissemination goals

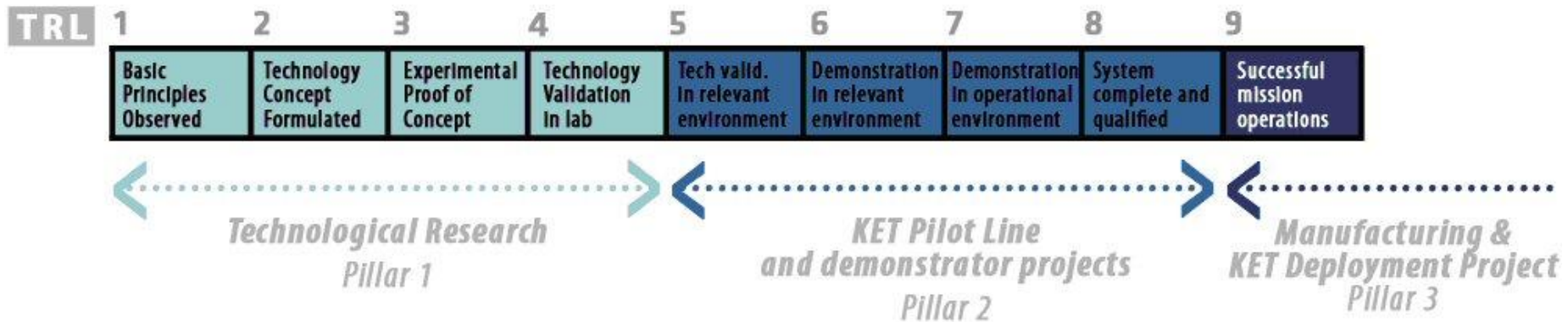
- *Proposal evaluation =>*

Excellence & Impact criteria equally important

Higher weighting for impact for Innovation Actions!

Technology Readiness Levels (TRLs)

- TRL Target: from 3-4 up to 7 with a centre of gravity on 5-6
- Highest TRLs for cases with a strong industrial commitment



- Beyond TRL 7: explore paths to commercial exploitation, to deploy technologies funded under Horizon 2020

Lessons learned - What is new?

Programme in good position to achieve impact:

- Strong industry participation and relevance
- SME newcomers
- Industry relevant demonstrators – TRLs up to 7
- Most projects intending to take results to markets (80%)
- Reflects developments such as the '4th Industrial Revolution'

What is new in 2018-20:

- Fewer topics per year, more budget per topic, to tackle oversubscription
- Baseline for impact to be defined in proposal
- Open Innovation Test Beds extend the concept of pilot lines
- Piloting 50% funding rate to increase industrial leverage
- More weight on '4th industrial revolution'

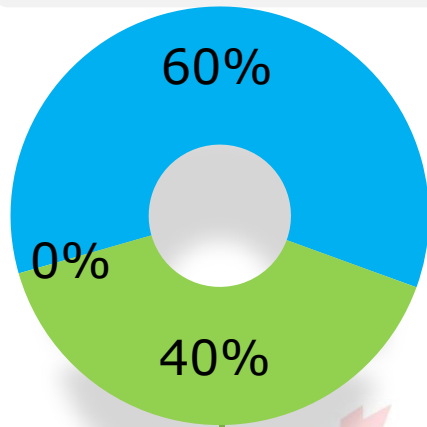
NMBP 2018-2020

(pre-published on our portal)

Priorities Calls Impacts

Bringing the digital to the physical world

Industry 4.0



Circular Economy (20%)

Climate, Energy (20%)

Climate, Energy and the Circular Economy

FOUNDATIONS for tomorrow's industry (~395M€)



Eco-system for design/testing/upscaling

TRANSFORMING European industry (~525M€)



Global industrial leadership for re-industrialisation

Industrial SUSTAINABILITY (~665M€)



Less energy input, more energy/ resource efficiency



Expected Impact

- Technological ambitions, including goals for environmental sustainability, cost reduction
- User involvement
- Take-up of results for industrialisation (business cases and exploitation strategies)
- Building an eco-system for test/validation infrastructure (for SMEs)
- Reach out to newcomers and civil society.

N.B. Proposal evaluation => Excellence & Impact criteria equally important; higher weighting for impact for Innovation Actions!

Digitising European industry – the importance of data

- Horizon 2020: **Open Data by default** with opt-out possibility – requirements for Data Management Plans
- Industrial/SME Data:
 - Aware of data and their value – balance between sharing & protection
 - Data at the heart of the "4th industrial revolution«
- Policy background: Digital Single Market
 - "Digitising European Industry" (Communication April 2016)
 - *Industrial platforms (e.g. "Connected smart factory")*
 - *Digital Innovation Hubs (for SMEs)*
 - *Skills*
 - *Standards*
 - European Cloud Initiative and European Science Cloud
 - Data Economy, Platform Economy, incl. data ownership & liability questions

Open Innovation Test Beds

EU Investment

€260m investment in Open Innovation Test Beds for Nanotechnology and Advanced Materials

What are they?

Physical facilities offering technology access and services to advance from validation in a laboratory (TRL 4) to prototypes in industrial environments (TRL 7)

How many test beds will be funded?

- 20 Test Beds for materials development and upscaling in 6 technology domains
- 4 Test Beds for materials characterisation
- 4 Test Beds for modelling
- Complementing the already established NanoSafety platform

Focus Area *'Building a low-carbon, climate resilient future'*

Covers the main actions in Work Programme 2018-2020 which can contribute to the goals of the **Paris Agreement**

- limit global temperature rise to well below 2°C, make efforts to limit this to 1.5°C;
- enhance adaptive capacity, strengthening resilience and reducing vulnerabilities;

Aims to develop ground-breaking solutions capable of achieving **carbon neutrality** and **climate resilience** of Europe and beyond in the second half of the century

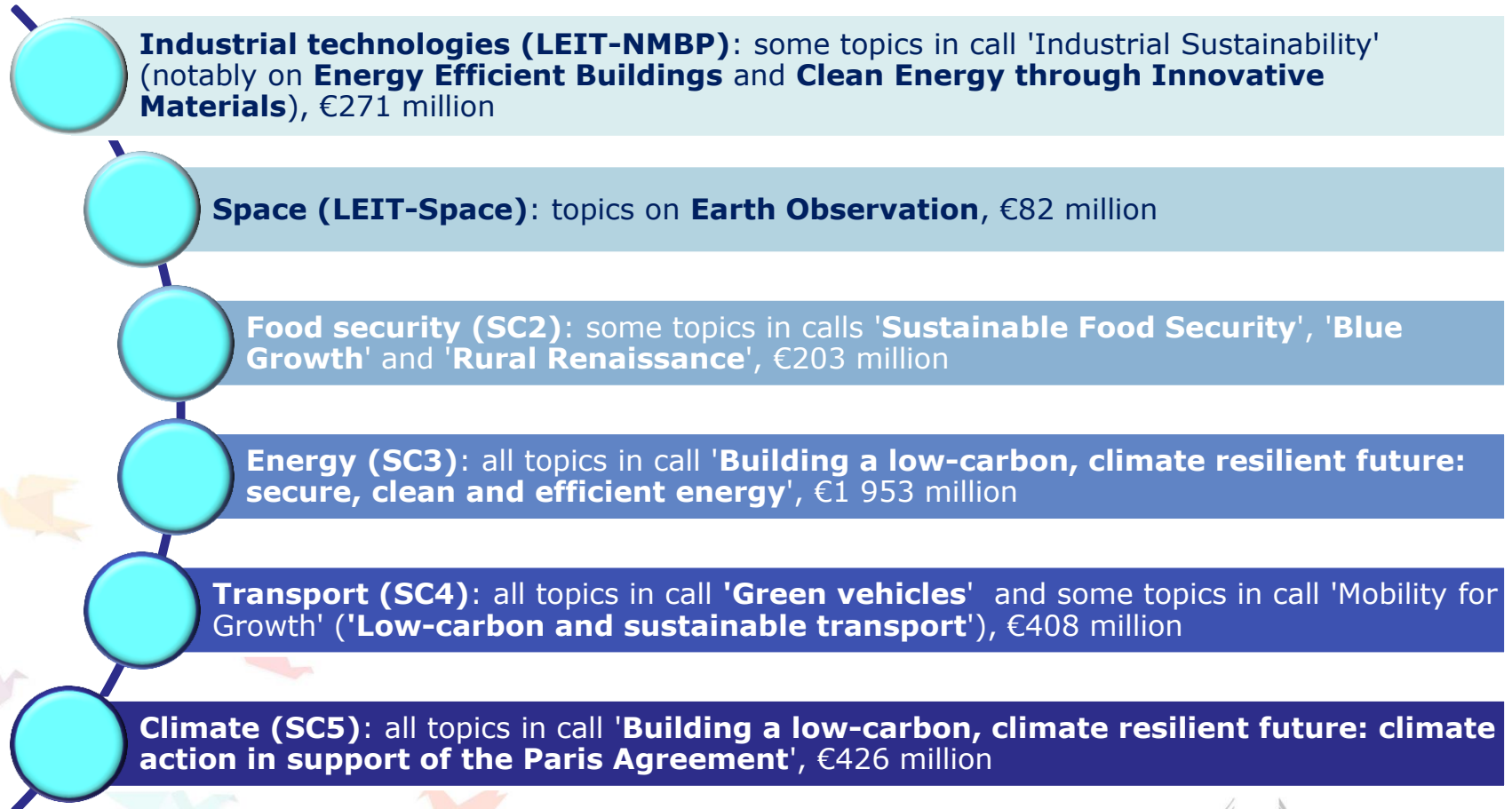
Integrating **multiple angles** of society, economy, technology, industrial value chains, the energy system, environment, health, land use and governance

Total indicative budget (2018-2020):
EUR 3 343 million



'Building a low-carbon, climate resilient future'

Focus Area



'Connecting economic and environmental gains – the Circular Economy' Focus Area

Covers the main actions in Work Programme 2018-2020 which will directly **support the circular economy policy**

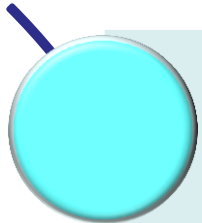
- integrating production, consumption, waste management and raw materials
- * Ensure that growth no longer requires increasing consumption of resources, energy, water and primary raw materials
- * Minimise waste, including from plastics
- * Enhance industrial competitiveness



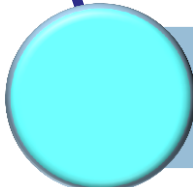
**Total indicative
budget
(2018-2020):**

EUR 940 million

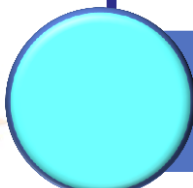
'Connecting economic and environmental gains – the Circular Economy' Focus Area



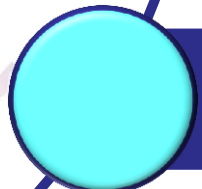
Industrial technologies (LEIT-NMBP): topics in call 'Industrial Sustainability' (notably **Sustainable Process Industry** and **Catalysing the Circular Economy**); and in industrial biotechnology: €370 million



Food security and Bioeconomy (SC2): topics in calls '**Sustainable Food Security**', '**Blue Growth**' and '**Rural Renaissance**', including **access to risk finance**: €253 million



Energy (SC3): Carbon dioxide reuse: €12 million



Climate, Environment and Raw Materials (SC5): topics in call '**Greening the economy in line with the SDGs**' – circular economy and raw materials: €306 million

NMBP Calls 2018-2019

[NMBP WP pre-published on the participant portal](#)

LEIT NMBP – 3 calls – 2018-19 budgets

- FOUNDATIONS FOR TOMORROW'S INDUSTRY – 269 M€
- TRANSFORMING EUROPEAN INDUSTRY – 340 M€
- INDUSTRIAL SUSTAINABILITY – 447 M€

Publication 27 October 2017

2018 Deadlines

- Two-stage topics: **23/01/18** and **28/06/18**
- Single-stage topics: **22/02/18**
- Lump sum funding pilot scheme topic: **DT-NMBP-20-2018: 08/03/18**
- EU-China flagship initiative on Biotechnology topic: **CE-BIOTEC-04-2018: 25/04/18**



FOUNDATIONS FOR TOMORROW'S INDUSTRY

Open Innovation Test beds (2018-2019)

Topic Title	Year	Type
DT-NMBP-01-2018: Open Innovation Test Beds for Lightweight nano-enabled multifunctional composite materials and components	2018	IA
DT-NMBP-02-2018 Open Innovation Test Beds for Safety Testing of Medical Technologies and Health	2018	IA
DT-NMBP-03-2019 Open Innovation Test Beds for nano-enabled surfaces and membranes	2019	IA

FOUNDATIONS FOR TOMORROW'S INDUSTRY

Materials Characterisation and Computational Modelling (2018-2019)

Topic Title	Year	Type
DT-NMBP-07-2018: Open Innovation Test Beds for Characterisation	2018	IA
DT-NMBP-09-2018: Accelerating the uptake of materials modelling software	2018	IA
DT-NMBP-08-2019: Real-time nano-characterisation technologies	2019	RIA
DT-NMBP-10-2019: Adopting Materials modelling in manufacturing processes	2019	RIA
DT-NMBP-12-2019: Sustainable Nano-Fabrication	2019	CSA



FOUNDATIONS FOR TOMORROW'S INDUSTRY

Governance, Science-Based Risk Assessment and Regulatory Aspects (2018-2019)

Topic Title	Year	Type
NMBP-13-2018: Risk Governance nanotechnology	2018	RIA
NMBP-14-2018: Nanoinformatics: from materials models to predictive (eco)toxicology	2018	RIA
NMBP-15-2019: Safe by design, from science to regulation: metrics and main sectors	2019	RIA

TRANSFORMING EUROPEAN INDUSTRY FACTORIES OF THE FUTURE (2018-2019)

Topic Title	Year	Type
DT-FOF-01-2018: Skills needed for new Manufacturing jobs	2018	CSA
DT-FOF-02-2018: Effective Industrial Human-Robot Collaboration	2018	RIA
DT-FOF-03-2018: Innovative manufacturing of opto-electrical parts	2018	RIA
DT-FOF-04-2018: Pilot lines for metal Additive Manufacturing	2018	IA (50%)
DT-FOF-05-2019: Open Innovation for collaborative production engineering	2019	IA
DT-FOF-06-2019: Refurbishment and re-manufacturing of large industrial equipment	2019	IA
DT-FOF-08-2019: Pilot lines for modular factories	2019	IA (50%)
DT-FOF-12-2019: Handling systems for flexible materials	2019	RIA
DT-NMBP-20-2018: A digital 'plug and produce' online equipment platform for manufacturing	2018	IA
DT-NMBP-18-2019: Materials, Manufacturing processes and devices for organic and large area electronics.	2019	IA
DT-NMBP-19-2019:Advanced materials for additive manufacturing	2019	IA
ICT Topics 2018	2018	
ICT Topics 2019	2019	

TRANSFORMING EUROPEAN INDUSTRY BIOTECHNOLOGY & MEDICAL (2018-2019)

Topic Title	Year	Type
BIOTECH-01-2018: Standardisation in Synthetic Biology	2018	CSA
BIOTECH-02-2019: Boosting the efficiency of photosynthesis	2019	RIA
BIOTECH-03-2018: Synthetic biology to expand diversity of nature's chemical production	2018	RIA
CE-BIOTECH-04-2018: New biotechnologies for environmental remediation	2018	RIA
CE-BIOTECH-05-2019: Microorganism communities for plastics biodegradation	2019	RIA
NMBP-22-2018: Osteoarticular tissues regeneration	2018	RIA



INDUSTRIAL SUSTAINABILITY

SUSTAINABLE PROCESS INDUSTRY (SPIRE) (2018-2019)

Topic Title	Year	Type
CE-SPIRE-02-2018: Processing of material feedstock using non-conventional energy sources	2018	IA
CE-SPIRE-03-2018: Energy and resource flexibility in highly energy intensive industries	2018	IA 50%
CE-SPIRE-04-2019: Efficient integrated downstream processes	2019	IA
CE-SPIRE-05-2019: Adaptation to variable feedstock through retrofiting	2019	IA 50%
CE-SPIRE-06-2019: Digital technologies for improved performance in cognitive production plants	2019	IA
CE-SPIRE-10-2018: Efficient recycling processes for plastic containing materials	2018	IA



INDUSTRIAL SUSTAINABILITY SUSTAINABLE PROCESS INDUSTRY (SPIRE) (2018-2019)

SC3 Energy and SC5 Climate actions are Contributions to SPIRE from other programmes

Topic Title	Year	Type
SC3 - Energy		
Conversion of captured CO2	2018	RIA
Solar Energy in Industrial Processes	2019	RIA
Business case for industrial waste heat/cold recovery	2018	IA
Business case for industrial waste heat/cold recovery	2019	CSA
SC5 – Climate action, environment, resource efficiency and raw materials		
Methods to remove hazardous substances and contaminants from secondary raw materials	2018	
Building a water-smart economy and society	2019	



INDUSTRIAL SUSTAINABILITY CATALYSING THE CIRCULAR ECONOMY (2018-2019)

Topic Title	Year	Type
CE-NMBPP-24-2018: Catalytic transformation of hydrocarbons	2018	RIA
CE-NMBPP-25-2019: Photocatalytic synthesis	2019	RIA
CE-NMBPP-26-2018: Smart plastic materials with intrinsic recycling properties by design	2018	RIA



INDUSTRIAL SUSTAINABILITY CLEAN ENERGY THROUGH INNOVATIVE MATERIALS & CULTURAL HERITAGE (2018-2019)

Topic Title	Year	Type
LC-NMBP-27-2019: Strengthening EU materials technologies for non-automotive battery storage	2019	RIA
LC-NMBP-29-2019: Materials for non-battery based energy storage	2019	RIA
LC-NMBP-30-2018: Materials for future highly performant electrified vehicle batteries	2018	RIA
LC-NMBP-32-2019: Smart materials, systems and structures for energy harvesting	2019	RIA
NMBP-33-2018: Innovative and affordable solutions for the preventive conservation of cultural heritage	2018	IA



INDUSTRIAL SUSTAINABILITY ENERGY-EFFICIENT BUILDINGS (EEB) (2018-2019)

Topic Title	Year	Type
LC-EEB-02-2018: Building Information modelling adapted to efficient renovation	2018	RIA
LC-EEB-06-2018-20: ICT enabled, sustainable & affordable residential building construction	2018-2020	IA 50%
LC-EEB-01-2019: Integration of energy smart materials in non-residential buildings	2019	IA
LC-EEB-03-2019: New developments in plus energy houses	2019	IA
LC-EEB-05-2019-20: Integrated storage systems for residential buildings	2019-2020	IA
Decarbonisation of the EU building stock	2018-2019-2020	
Next-generation of Energy Performance Assessment and Certification	2018-2019-2020	
Upgrading smartness of existing buildings through innovations for legacy equipment-	2019-2020	

Further information

Horizon 2020: http://ec.europa.eu/research/horizon2020/index_en.cfm

Key Enabling Technologies, R&I website :

http://ec.europa.eu/research/industrial_technologies/index_en.cfm

Participant Portal - Funding Opportunities and support services :

<http://ec.europa.eu/research/participants/portal/desktop/en/home.html>

National Contact Points in your country (NMP)

http://ec.europa.eu/research/participants/portal/desktop/en/support/national_contact_points.html#c,contact=country/sbg//1/1/0&+person.last_name/desc

National Contact Points website - webinars, presentations, guidance : <http://www.nmpteam.eu/>

Research Enquiry Service: <http://ec.europa.eu/research/index.cfm?pg=enquiries>

CORDIS database with EU funded research projects : http://cordis.europa.eu/projects/home_en.html

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