Horizon 2020
Work Programme
for Research & Innovation
2018-2020

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

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Industrial Technologies - Strategy
DG Research & 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

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

KETs HLG 2015
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

European KET Strategy:

• Review by High Level Strategy Group (starting autumn 2017)
• KET High-level Group: final report 'KETs: Time to Act', June 2015
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

Leadership in enabling and industrial technologies

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

- 21% new (not in FP7)
- 45% new to NMBP

**Newcomers**

**Beneficiaries**

- Member States
- EC Funding Share
- Share normalised R&D investment

**Profile**

- Private for Profit 45%
- Research Organisation 29%
- Universities 21%
- Other 5%
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** (preparation through 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
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
'Building a low-carbon, climate resilient future'
Focus Area

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

Aims to develop ground-breaking solutions capable of achieving carbon neutrality and climate resilience of Europe (and neighbouring countries) in the second half of the century

SDGs:

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

**Industrial technologies (LEIT-NMBP):** some topics in call 'Industrial Sustainability' (notably on Energy Efficient Buildings and Clean Energy through Innovative Materials), €271 million

**Space (LEIT-Space):** topics on Earth Observation, €82 million

**Food security (SC2):** some topics in calls 'Sustainable Food Security', 'Blue Growth' and 'Rural Renaissance', €203 million

**Energy (SC3):** all topics in call 'Building a low-carbon, climate resilient future: secure, clean and efficient energy', €1,953 million

**Transport (SC4):** all topics in call 'Green vehicles' and some topics in call 'Mobility for Growth' ('Low-carbon and sustainable transport'), €408 million

**Climate (SC5):** all topics in call 'Building a low-carbon, climate resilient future: climate action in support of the Paris Agreement', €426 million
'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

**SDGs:**

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

EUR 940 million
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
Lessons learned from Interim Evaluation – 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%)
- Contributions to sustainable development (70%) and climate action (35%)
- 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
- Open Innovation Test Beds extend the concept of pilot lines
- Piloting 50% funding rate to increase industrial leverage
- More weight on ‘4\textsuperscript{th} industrial revolution’
- Industrial sustainability call – key contribution to low-carbon and circular economy
NMBP Calls 2018-2019

NMBP WP pre-published on the participant portal

LEIT NMBP – 3 calls

• 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)**

<table>
<thead>
<tr>
<th>Topic Title</th>
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<tbody>
<tr>
<td>DT-NMBP-01-2018: Open Innovation Test Beds for Lightweight nano-enabled multifunctional composite materials and components</td>
<td>2018</td>
<td>IA</td>
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<tr>
<td>DT-NMBP-02-2018 Open Innovation Test Beds for Safety Testing of Medical Technologies and Health</td>
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<td>IA</td>
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<tr>
<td>DT-NMBP-03-2019 Open Innovation Test Beds for bio-based nano-materials and solutions</td>
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# FOUNDATIONS FOR TOMORROW’S INDUSTRY

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<td>DT-NMBP-07-2018: Open Innovation Test Beds for Characterisation</td>
<td>2018</td>
<td>IA</td>
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<td>DT-NMBP-09-2018: Accelerating the uptake of materials modelling software</td>
<td>2018</td>
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<tr>
<td>DT-NMBP-08-2019: Real-time nano-characterisation technologies</td>
<td>2019</td>
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<tr>
<td>DT-NMBP-12-2019: Sustainable Nano-Fabrication</td>
<td>2019</td>
<td>CSA</td>
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<tr>
<td>NMBP-13-2018: Risk Governance nanotechnology</td>
<td>2018</td>
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<tr>
<td>NMBP-14-2018: Nanoinformatics: from materials models to predictive (eco)toxicology</td>
<td>2018</td>
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<tr>
<td>NMBP-15-2019: Safe by design, from science to regulation: metrics and main sectors</td>
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# TRANSFORMING EUROPEAN INDUSTRY


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<td>DT-FOF-01-2018: Skills needed for new Manufacturing jobs</td>
<td>2018</td>
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<td>DT-FOF-02-2018: Effective Industrial Human-Robot Collaboration</td>
<td>2018</td>
<td>RIA</td>
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<td>DT-FOF-03-2018: Innovative manufacturing of opto-electrical parts</td>
<td>2018</td>
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<tr>
<td>DT-FOF-04-2018: Pilot lines for metal Additive Manufacturing</td>
<td>2018</td>
<td>IA (50%)</td>
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<td>DT-FOF-05-2019: Open Innovation for collaborative production engineering</td>
<td>2019</td>
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<tr>
<td>DT-FOF-06-2019: Refurbishment and re-manufacturing of large industrial equipment</td>
<td>2019</td>
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<td>DT-FOF-08-2019: Pilot lines for modular factories</td>
<td>2019</td>
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<td>DT-FOF-12-2019: Handling systems for flexible materials</td>
<td>2019</td>
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<td>DT-NMBP-20-2018: A digital 'plug and produce' online equipment platform for manufacturing</td>
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<td>ICT Topics 2018</td>
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<td>BIOTECH-01-2018: Standardisation in Synthetic Biology</td>
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<td>BIOTECH-02-2019: Boosting the efficiency of photosynthesis</td>
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<tr>
<td>BIOTECH-03-2018: Synthetic biology to expand diversity of nature's chemical production</td>
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<td>CE-BIOTECH-04-2018: New biotechnologies for environmental remediation</td>
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<td>NMBP-22-2018: Osteoarticular tissues regeneration</td>
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<tr>
<td>CE-SPIRE-02-2018: Processing of material feedstock using non-conventional energy sources</td>
<td>2018</td>
<td>IA</td>
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<td>CE-SPIRE-03-2018: Energy and resource flexibility in highly energy intensive industries</td>
<td>2018</td>
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<td>CE-SPIRE-04-2019: Efficient integrated downstream processes</td>
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<td>CE-SPIRE-05-2019: Adaptation to variable feedstock through retrofitting</td>
<td>2019</td>
<td>IA 50%</td>
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<tr>
<td>CE-SPIRE-10-2018: Efficient recycling processes for plastic containing materials</td>
<td>2018</td>
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### SC3 Energy and SC5 Climate actions are Contributions to SPIRE from other programmes

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<tr>
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<tr>
<td><strong>SC3 - Energy</strong></td>
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<td>Conversion of captured CO2</td>
<td>2018</td>
<td>RIA</td>
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<tr>
<td>Solar Energy in Industrial Processes</td>
<td>2019</td>
<td>RIA</td>
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<tr>
<td>Business case for industrial waste heat/cold recovery</td>
<td>2018</td>
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<td><strong>SC5 – Climate action, environment, resource efficiency and raw materials</strong></td>
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<tr>
<td>Methods to remove hazardous substances and contaminants from secondary raw materials</td>
<td>2018</td>
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<tr>
<td>Building a water-smart economy and society</td>
<td>2019</td>
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## INDUSTRIAL SUSTAINABILITY

**CATALYSING THE CIRCULAR ECONOMY (2018-2019)**

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<td>CE-NMBPP-24-2018: Catalytic transformation of hydrocarbons</td>
<td>2018</td>
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<tr>
<td>CE-NMBPP-25-2019: Photocatalytic synthesis</td>
<td>2019</td>
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<tr>
<td>CE-NMBPP-26-2018: Smart plastic materials with intrinsic recycling properties by design</td>
<td>2018</td>
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## INDUSTRIAL SUSTAINABILITY
### CLEAN ENERGY THROUGH INNOVATIVE MATERIALS & CULTURAL HERITAGE (2018-2019)

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<tr>
<td>LC-NMBP-29-2019: Materials for non-battery based energy storage</td>
<td>2019</td>
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<tr>
<td>LC-NMBP-30-2018: Materials for future highly performant electrified vehicle batteries</td>
<td>2018</td>
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<tr>
<td>LC-NMBP-32-2019: Smart materials, systems and structures for energy harvesting</td>
<td>2019</td>
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<tr>
<td>NMBP-33-2018: Innovative and affordable solutions for the preventive conservation of cultural heritage</td>
<td>2018</td>
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## INDUSTRIAL SUSTAINABILITY
### ENERGY-EFFICIENT BUILDINGS (EEB)  
#### (2018-2019)

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<td>LC-EEB-02-2018: Building Information modelling adapted to efficient renovation</td>
<td>2018</td>
<td>RIA</td>
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<tr>
<td>LC-EEB-06-2018-20: ICT enabled, sustainable &amp; affordable residential building construction</td>
<td>2018-2020</td>
<td>IA 50%</td>
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<tr>
<td>LC-EEB-01-2019: Integration of energy smart materials in non-residential buildings</td>
<td>2019</td>
<td>IA</td>
</tr>
<tr>
<td>LC-EEB-03-2019: New developments in plus energy houses</td>
<td>2019</td>
<td>IA</td>
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<tr>
<td>Decarbonisation of the EU building stock</td>
<td>2018-2019-2020</td>
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<tr>
<td>Upgrading smartness of existing buildings through innovations for legacy equipment-</td>
<td>2019-2020</td>
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Further information


**Key Enabling Technologies, R&I website:**

**Participant Portal** - Funding Opportunities and support services:

**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](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/](http://www.nmpteam.eu/)


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