

**FCT**

Fundação para a Ciência e a Tecnologia  
MINISTÉRIO DA CIÊNCIA, TECNOLOGIA E ENSINO SUPERIOR



## Nanotecnologia, Materiais Avançados e Processos de Produção

*Prioridades no médio prazo (2019-2020)*

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# ESTRUTURA DO H2020

## Excellent Science

~ 24 400 M€

- **European Research Council**  
Frontier Research by the best individual teams
- **Future and Emerging Technologies**  
Collaborative research to open new fields of innovation
- **Marie Skłodowska-Curie Actions**  
Opportunities for training and career development
- **Research Infrastructures**  
(including e-infrastructure)  
Ensuring access to world class facilities

*Bottom up*

## Industrial Leadership

~ 17 800 M€

- **Leadership in enabling and industrial technologies**  
ICT, NMBP (nanotechnologies, advanced materials, biotechnology, manufacturing), Space *Top down*
- **Access to Risk finance**  
Leveraging private finance and venture capital for research
- **Innovation in SMEs**  
Fostering all forms of innovation in all types of SMEs

## Societal Challenges

~ 29 700 M€

1. **Health**, demographic change and wellbeing
2. Food security, sustainable agriculture, marine and maritime research & the **bioeconomy**
3. Secure, clean and efficient **energy**
4. **Smart**, green and integrated transport
5. **Climate action**, resource efficiency and raw materials
6. Inclusive, innovative and reflective **societies**
7. Security **society**

*Top down*

European Institute of Innovation and Technology (EIT) (~2700 M€)

Spreading Excellence and Widening Participation (~1900 M€)

Science with and for Society (~1600 M€)

Joint Research Centre (JRC)



# WP (2018-2019) 2020?

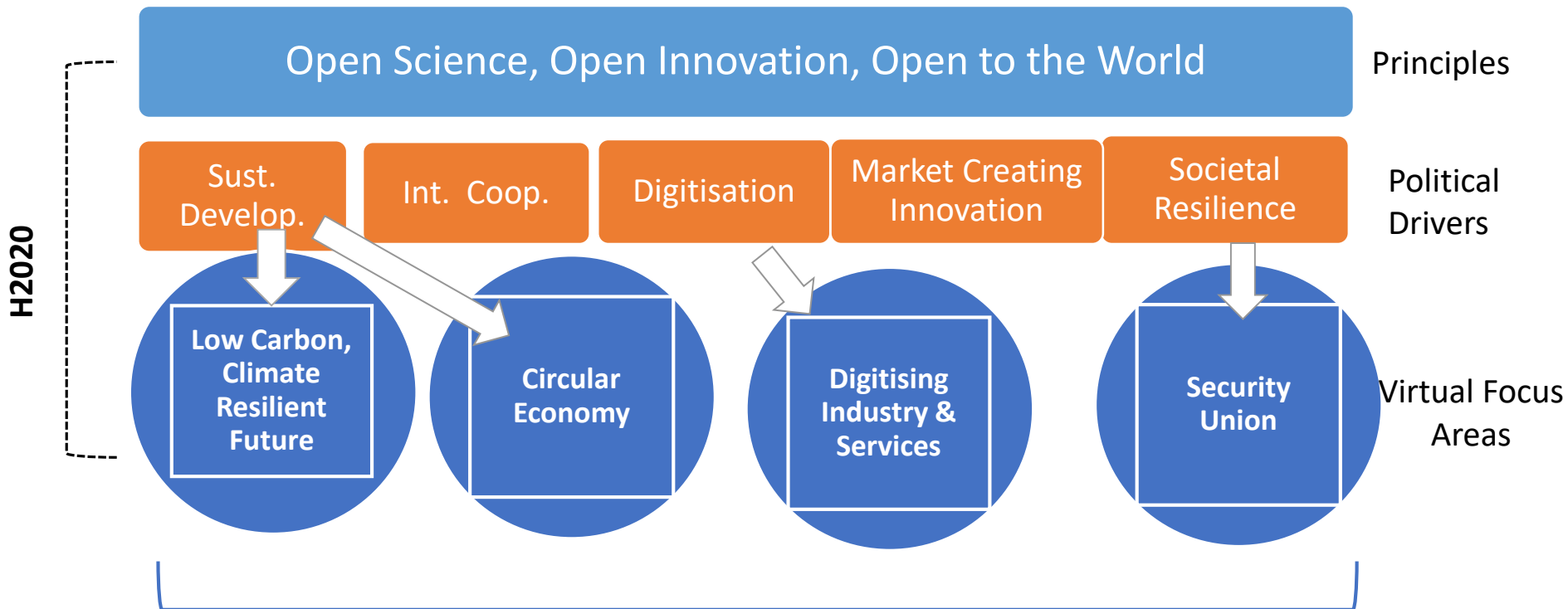


# Objectivos de Implementação (2018-2020)



- Maior impacto (foco nas prioridades, incluindo 4 áreas de enfoque mais abrangentes, tópicos menos prescritivos, “missões” ao nível dos concursos...);
- Documentos mais simples, menos tópicos;
- Abordar a sobre subscrição (adequar a oferta e a procura)
- Aprendizagem a partir da avaliação intermédia
- **Testar novas abordagens**

# FOCUS AREAS



## 4 FOCUS AREAS

# Não estão previstas alterações substanciais!

- ❑ **Clarificação do Anexo B** relativo à admissibilidade e outras condições;
- ❑ Ajustes a considerar para a ação preparatória do *EIC* (por exemplo, instrumento PME no capítulo *EIC*)
- ❑ **Referência a "missões"** ao nível dos concursos no critério de impacto



# OPORTUNIDADES DE FINANCIAMENTO

## NANOTEC, MATERIAIS AVANÇADOS & PRODUÇÃO

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# PROGRAMA DE TRABALHOS NMBP 2019-2020



## NMBP

*Nanotechnology, Advanced Materials, Biotechnology, Processes*

### FOUNDATIONS FOR TOMORROW'S INDUSTRY

Open innovation **test beds** 6

Materials **characterisation** and computational **modelling** 6

**Governance**, science-based **risk assessment** and **regulatory** aspects 5

### TRANSFORMING EUROPEAN INDUSTRY

Factories of the future (FoF) 20

**Biotechnology** 7

**Medical** technology innovations 2

### INDUSTRIAL SUSTAINABILITY

Sustainable process industry (SPIRE) 10

**Catalysing** the circular economy 3

**Clean energy** through innovative materials 6

**Cultural Heritage** 1

Energy-efficient buildings (EEB) 6



# *CALL FOUNDATIONS FOR TOMORROW'S INDUSTRY*



Gabinete de Promoção dos Programas Quadro ID&I



# FOUNDATIONS FOR TOMORROW'S INDUSTRY – OPEN INNOVATION TEST BEDS (OITB)



## Enquadramento do concurso

- OITBs permitirão o **desenvolvimento e aumento de escala** de materiais avançados e nanotecnologias, combinando avanços **digitais, químicos e físicos** para produtos e serviços inovadores;
- Técnicas avançadas de caracterização, modelação preditiva dos materiais a várias escalas, apoio a um quadro para garantir a segurança pública em nanotecnologia

Espera-se que o concurso crie **20** OITBs para o desenvolvimento e aumento de escala de materiais em 6 domínios tecnológicos, **4** OITBs para caracterização de materiais e **4** para modelação

Criar Ecosistema eficiente que permita aos inovadores ultrapassar as barreiras tecnológicas e regulatórias

## O contexto e objetivos

Prosseguir o desenvolvimento das linhas-piloto em **PÓLOS ABERTOS DE INOVAÇÃO** para Materiais Avançados e Nanotecnologias:



- Testes no design e/ou **avaliação de segurança** de novos produtos através do acesso aberto a tecnologias e serviços;
- Verificação em **ambiente real**;
- **Montra de tecnologias** com indústrias utilizadoras em experiências transfronteiriças;
- **Acesso das PMEs Europeias** às cadeias de valor de fornecimento;
- Identificação e avaliação de **barreiras** regulamentares, económicas e técnicas relevantes;
- **Envolvimento dos stakeholders** (incluindo fornecedores, utilizadores industriais e sociedade civil em geral da União Europeia e países Associados)

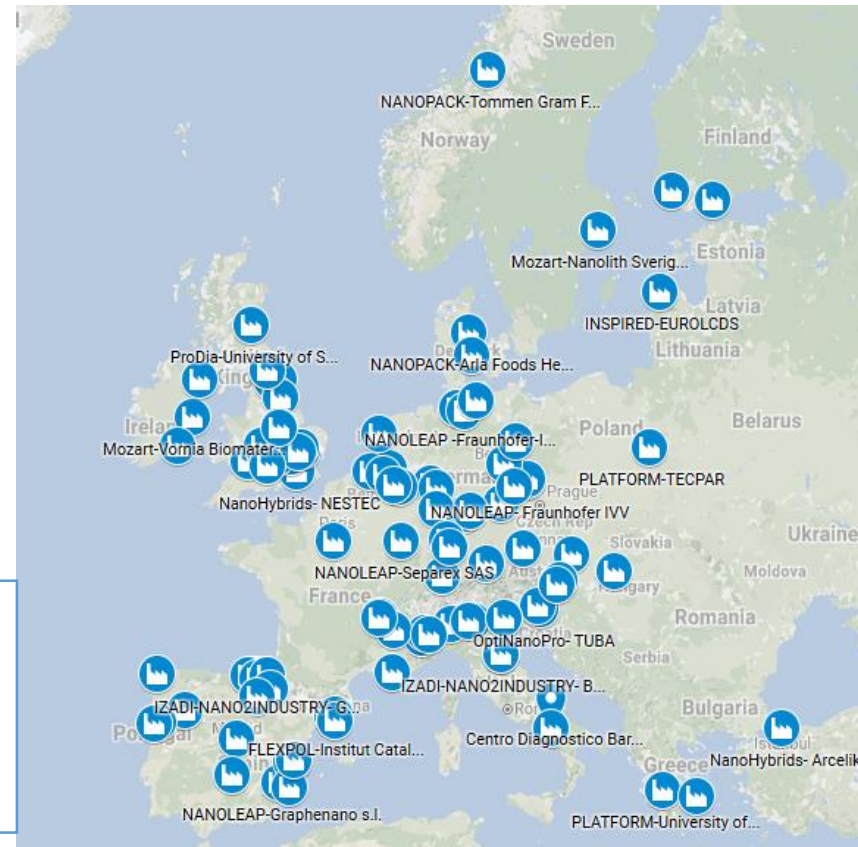
# Acelerar a inovação Física em 2 KETs

## Nanotecnologia

- 150 M€ de financiamento em 4 anos (2014-2015)
- 30 projetos nanotech e materiais avançados
- > 70 linhas piloto
- > 30 regiões envolvidas
- Nas áreas de:
  - NanoMateriais
  - NanoManufactring
  - Saúde/Cuidados de pessoas

Existem cerca de 80 Estados-Membros e regiões europeias que indicam a nanotecnologia e materiais avançados como uma prioridade das estratégias de especialização inteligente (RIS3).

## Materiais Avançados



# FOUNDATIONS FOR TOMORROW'S INDUSTRY – OPEN INNOVATION TEST BEDS (OITB)

**DOMÍNIOS  
TECNOLÓGICOS**  
para o aumento  
de escala de  
nanotecnologia  
e materiais

*Lightweight nano-enabled multifunctional materials and components*

*Safety testing of medical technologies for health*

*Nano-enabled surfaces and membranes*

*Bio-based nanomaterials and solutions*

*Functional materials for buildings envelopes*

*Nano-pharmaceuticals production*

**Criar novas instalações ou abrir as existentes para facilitar o acesso de todas entidades da EU.**

**COMPLEMENTAR AOS CENTROS DE INOVAÇÃO DIGITAL E AOS CENTROS REGIONAIS**



Gabinete de Promoção dos Programas Quadro ID&I



- Reduzir os custos das empresas no desenvolvimento de novos materiais e nanomateriais;
- Melhorar a **produtividade industrial**;
- **Acelerar a inovação** nestes domínios;
- Reduzir a **discrepância** na EU e Países Associados no **acesso a tecnologia**.

## IMPACTO ESPERADO



## INICIATIVAS

### **I4MS**

- *Support and stimulation of dynamic and organic growth of pan European ICT for*

### **ACTPHAST**

- *Access center for Photonics Innovation Solutions and Technology*

**DIGITAL  
INNOVATION HUBS**

**CNECT Competence  
Centres**

**European Regional  
Development Fund  
(ERDF) – Building  
Infrastructures**

**S3 (Smart  
Specialisation)  
thematic platforms**

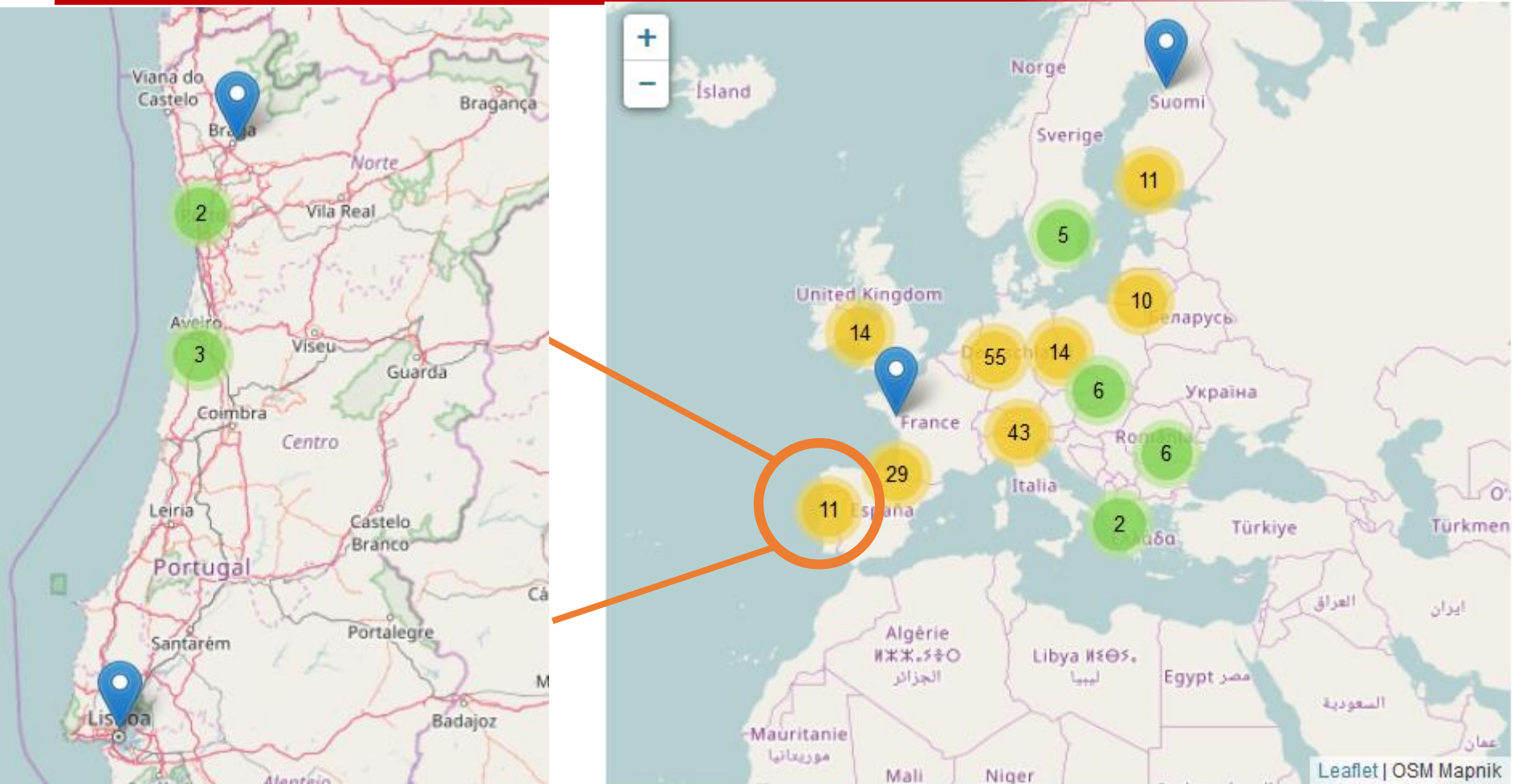
**RTD Materials  
Upscaling Hubs  
and Platforms**

### **GROW (INNOSUP-2017-3) ADMA SUPPORT CENTRE**

- *Technology services to accelerate the uptake of advanced manufacturing technologies*



# SMEs' Access to Key Enabling Technologies



**CrITÉrios para a incluso dos cento tecnolgicos no mapa:**

<https://ec.europa.eu/growth/tools-databases/kets-tools/kets-tc/map>



# FOUNDATIONS FOR TOMORROW'S INDUSTRY – MATERIALS CHARACTERISATION AND COMPUTATIONAL MODELLING

A caracterização e a modelação de materiais devem tornar-se **parte integrante de I&D industrial**, conduzindo ao *design* fiável de novos materiais e processos, à rápida escalabilidade e ao controlo de qualidade efetivo.

Digitising  
Industry &  
Services

Prioridades  
(2018-2020)

DT-NMBP-07-2018:  
Open Innovation Test  
Beds for  
Characterisation (IA)

DT-NMBP-08-2019:  
**Real-time nano-  
characterisation  
technologies (RIA)**

DT-NMBP-09-2018:  
Accelerating the uptake  
of materials modelling  
software (IA)

DT-NMBP-10-2019:  
**Adopting materials  
modelling to challenges  
in manufacturing  
processes (RIA)**

DT-NMBP-11-2020:  
Open Innovation Test  
Beds for Materials  
Modelling (IA)

DT-NMBP-12-2019:  
**Sustainable Nano-  
Fabrication (CSA)**

Todos os projetos devem contribuir para as iniciativas europeias relevantes: **EMCC** (European Materials Characterisation Council), the **EMMC** (European Materials Modelling Council), the **EPPN** (European Pilot Production Network) e outros clusters e redes.

# FOUNDATIONS FOR TOMORROW'S INDUSTRY – GOVERNANCE, SCIENCE-BASED RISK ASSESSMENT AND REGULATORY ASPECTS

A gestão dos riscos de todas as tecnologias emergentes é de importância fundamental para a sua aceitação social e consequente possível sucesso. O desafio é estabelecer uma forma adequada de **governança de risco** em nanotecnologia e garantir que as tecnologias para além do estado de arte sejam aceites pelos *stakeholders* (sociedade civil, indústria, reguladores).

Prioridades  
(2018-2020)

NMBP-13-2018: Risk Governance of nanotechnology (RIA)

NMBP-14-2018: Nanoinformatics: from materials models to predictive toxicology and ecotoxicology (RIA)

**NMBP-15-2019: Safe by design, from science to regulation: metrics and main sectors (RIA)**

**NMBP-16-2020: Safe by design, from science to regulation: behaviour of multi-component nanomaterials (RIA)**

**NMBP-17-2020: Regulatory science for medical technology products (RIA)**

# *CALL TRANSFORMING EUROPEAN INDUSTRY*



Gabinete de Promoção dos Programas Quadro ID&I



# TRANSFORMING EUROPEAN INDUSTRY – FACTORIES OF THE FUTURE (FOF)

- **Objetivo:** apoiar as empresas de transformação europeias, em particular as PMEs, a adaptarem-se à pressão da competitividade global através do desenvolvimento das KETs necessárias para apoiar a **EU Manufacturing** num conjunto alargado de setores.
- Vai apoiar a indústria europeia a satisfazer a crescente procura global por produtos mais ecológicos, mais **customizados** e de elevada qualidade através da necessária transição para uma indústria mais flexível, **digital** e **focada na procura** com menor geração de resíduos e consumo energético.



Manufuture



EFFRA



**FACTORIES OF THE FUTURE** *Multi-annual roadmap for the contractual PPP under Horizon 2020*

Prepared by  EFFRA

Priority Research



Pólo Engineering & Tooling



Produtech

# TRANSFORMING EUROPEAN INDUSTRY – FACTORIES OF THE FUTURE (FOF)

A indústria transformadora é um fator determinante no emprego e na criação de riqueza na Europa, contribuindo assim significativamente para a melhoria da qualidade de vida dos cidadãos. O desafio fundamental para a indústria europeia é passar de uma vantagem competitiva baseada em custos para uma vantagem competitiva de elevado valor acrescentado



Melhores empregos nas fábricas modernas

Excelência na Manufatura

Manufatura Flexível e customizada

*Towards open innovation*

Eco-factories

Prioridades (2018-2020)

DT-FOF-01-2018: Skills needed for new Manufacturing jobs (CSA)

DT-FOF-02-2018: Effective Industrial Human-Robot Collaboration (RIA)

DT-FOF-03-2018: Innovative manufacturing of opto-electrical parts (RIA)

DT-FOF-04-2018: Pilot lines for metal Additive Manufacturing (IA 50%)

DT-FOF-05-2019: Open Innovation for collaborative production engineering (IA)

DT-FOF-06-2019: Refurbishment and re-manufacturing of large industrial equipment (IA)

DT-FOF-07-2020: Reliable and accurate assembly of micro parts (RIA)

DT-FOF-08-2019: Pilot lines for modular factories (IA 50%)

DT-FOF-09-2020: Holistic energy-efficient factory management (IA)

DT-FOF-10-2020: Pilot lines for large-part high-precision manufacturing (IA 50%)

DT-FOF-11-2020: Quality control in smart manufacturing (IA)

DT-FOF-12-2019: Handling systems for flexible materials (RIA)

DT-NMBP-18-2019: Materials, manufacturing processes and devices for organic and large area electronics (IA)

DT-NMBP-19-2019: Advanced materials for additive manufacturing (IA)

DT-NMBP-20-2018: A digital 'plug and produce' online equipment platform for manufacturing (IA)

# TRANSFORMING EUROPEAN INDUSTRY - MEDICAL TECHNOLOGY INNOVATIONS



As alterações demográficas da UE exigem inovação para melhorar a **prestação de cuidados de saúde**, a **qualidade de vida** e o **envelhecimento ativo**, sendo também uma **oportunidade industrial e um mercado em crescimento**.

## Prioridades NMBP (18-20)

- Desenvolver design inovador;
- Desenvolvimento e fabricação de tecnologias médicas centradas no utilizador, incluindo implantes;
- Regeneração de tecidos e (nano)biomateriais inteligentes.

*NMBP-22-2020: Osteo-articular tissues regeneration (RIA)*

*NMBP-21-2020: Custom-made biological scaffolds for specific tissue regeneration and repair (RIA)*

*NMBP-23-2020: Next generation organ-on-chip (RIA)*

## Desafio para a indústria MEDTECH



Transposição inclusiva de soluções para **aplicações clínicas personalizadas**.

# CALL INDUSTRIAL SUSTAINABILITY



# INDUSTRIAL SUSTAINABILITY – SUSTAINABLE PROCESS INDUSTRY (SPIRE)



## SUSTAINABLE PROCESS INDUSTRY

Multi-annual roadmap  
for the contractual PPP  
under Horizon 2020

Prepared by **SPRE** Sustainable Process Industry through  
Resource and Energy Efficiency

Policy  
Research

Roadmap

**SPRE**  
Sustainable Process Industry through  
Resource and Energy Efficiency

- **Setores industriais:** cimento, materiais cerâmicos, produtos químicos, engenharia, minerais e minérios, metais não ferrosos, siderurgia e água
- **Objetivos 2018-2020**

Abordagens intersectoriais  
para melhorar a  
sustentabilidade industrial

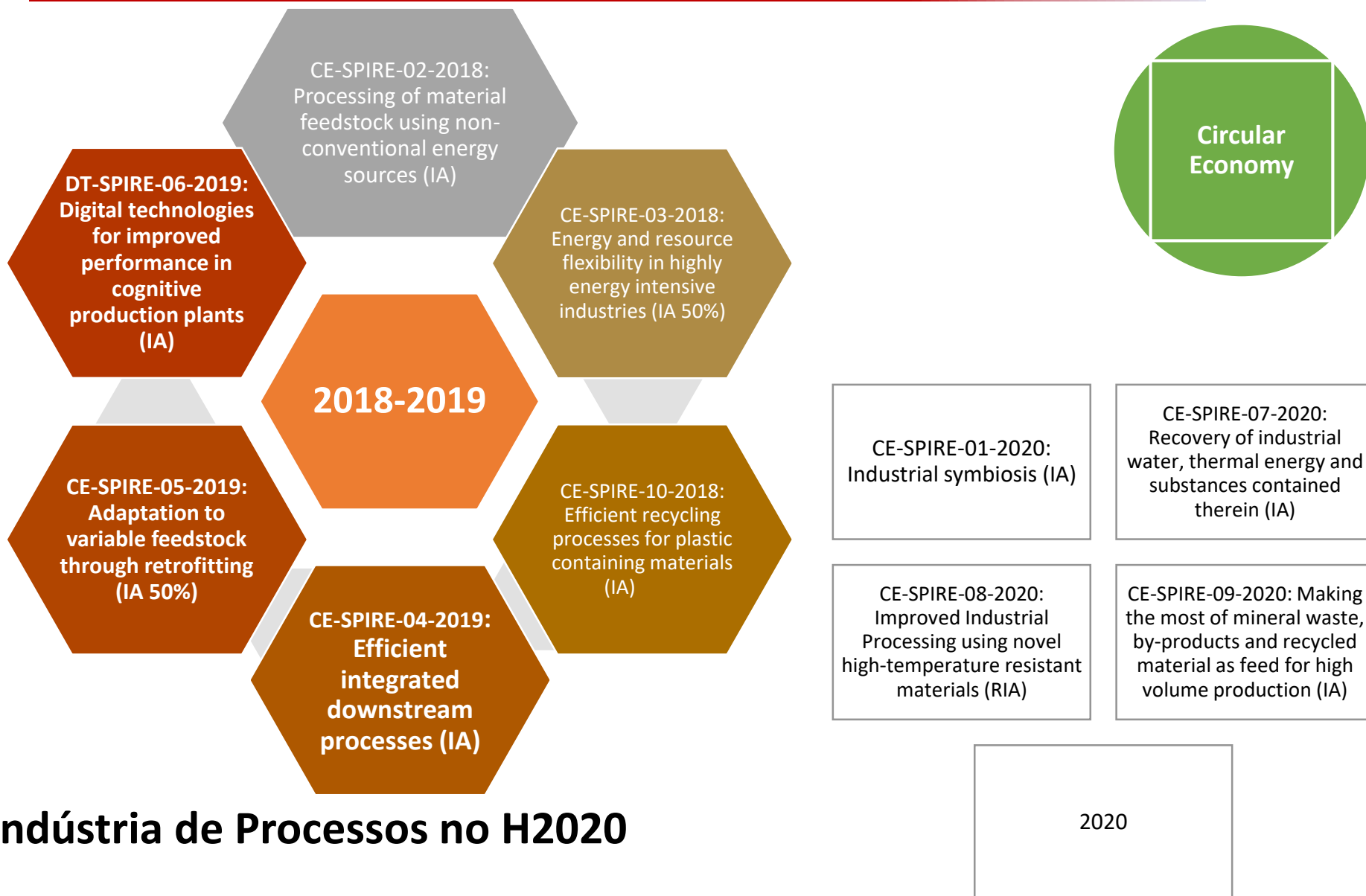
Tecnologias de  
processamento que  
apoiam a transição para as  
energias renováveis e  
matérias-primas na  
indústria

Melhorar a eficiência dos  
recursos na indústria através  
da utilização de fluxos de  
resíduos

Aplicações industriais de  
alta temperatura



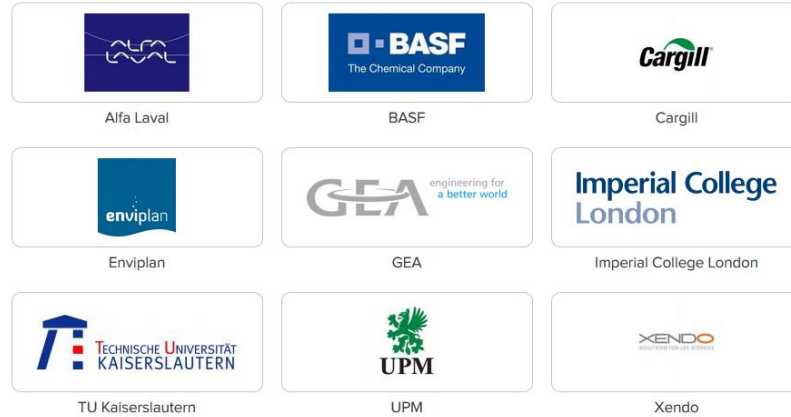
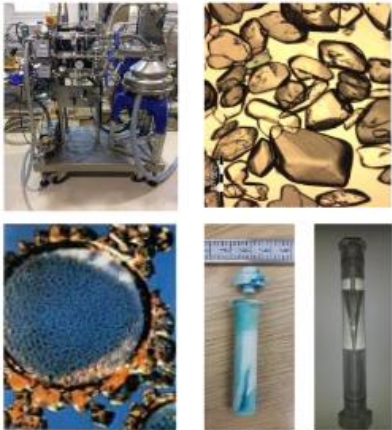
# INDUSTRIAL SUSTAINABILITY – SUSTAINABLE PROCESS INDUSTRY (SPIRE)



## Indústria de Processos no H2020



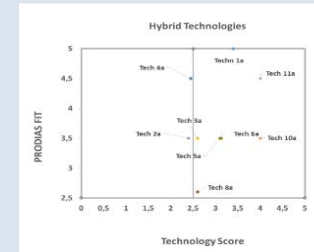
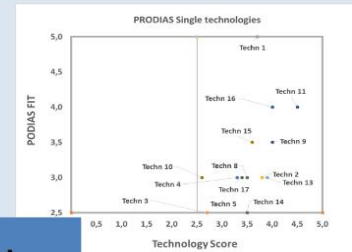
# PROcessing Diluted Aqueous Systems



## Technology Score Card Fit to PRODIAS Objectives

Current Development Phase & Credibility of Information Sources	Known & anticipated Issues/Challenges/Bottlenecks that need to be overcome	Expected Complexity & Comparability to established/known Technologies
Assessment Technology Today	Issues / Hardwires / Bottlenecks	Assessment Technology Future
Development Phase	e.g. scalability, conversion	Complexity
Credibility of Source	Yield, dilution, recovery, ...	Comparability
TRL	Value	TRL Score
1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

- Decreased **investment costs**
- Increased **raw material efficiency**
- Decreased **energy consumption** leading to e.g. less CO<sub>2</sub> emission

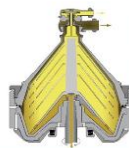


## Technology Evaluation

Today three Technologies nominated for **DEMONSTRATION** in pilot plants in industrially appropriate environments **TRL5-7**

### CENTRIFUGES WP3

- Energy efficient (50% reduction)
- Improved functionality
- Pilot plant separator 2017



### HIGH TITER FERMENTATION WP5

- Increase of final titer
- Increased productivity
- Improved raw material efficiency
- Implementation ongoing



### FREEZE CONCENTRATION WP4

- Technical feasibility proven
- Quick return on investment
- Savings in OPEX
- Starting construction of commercialized size module 2017





## Integrated Control and Sensing for Sustainable Operation of Flexible Intensified Processes

### Case study 1: Intensified synthesis of organic compounds



**ARKEMA**  
Arkema generates €7.6 billion, and holds leadership positions in performance materials, industrial specialties, and coating solutions.

**atlan-tec**  
atlan-tec Systems GmbH, Germany - a private company with the biggest amount of realized projects in the real industry at chemistry, refineries, food processing plants of data management, data analysis, process control, process optimization, neuronal networks / process models.

**BAM** Bundesanstalt für Materialforschung und -prüfung. BAM - Federal Institute for Materials Research and Testing, Germany, is a non-university research institute operating under the guideline "Safety in Technology and Chemistry".

**BASF**  
We create chemistry  
BASF SE, Germany - the largest chemical producer in the world with a portfolio ranging from chemicals, plastics, performance products, and crop protection products to oil and gas.

**BAYER**  
Bayer Technology Services GmbH, Germany - Bayer's global technological solution provider in the fields of process development, process and plant engineering, construction, and optimization.

**CLARIANT**  
Clariant Produkte (Deutschland) GmbH, Germany - a global supplier of specialty chemicals in the areas: Care Chemicals, Natural Resources, Catalysts & Energy and Plastics & Coatings.

**COATEX**  
COATEX ARKEMA  
Coatex SAS, France - a world leading designer and producer of water-based rheology additives. Coatex equips its expertise on multiple markets.

**inno**  
Inno TSD, France - one of Europe's leading innovation management consultancy firms, specialised in helping major private and public stakeholders design and implement R&D and innovation projects.

**invite**  
Invite GmbH, Germany - Not-for-profit research center for new production concepts for chemical industry, public-private partnership between TU Dortmund University and Bayer Technology Services.

**KROHNE**  
Krohne Messtechnik GmbH, Germany - is a world-leading manufacturer and supplier of solutions in industrial process instrumentation.

**P&G**  
Procter & Gamble Services Company NV, Belgium - an innovative multinational consumer goods company of leading brands for personal care products, baby care products, fabric and home care products and perfumes.

**SOLVAY**  
Solvay, a global chemical group assisting industries in implementing ever more responsible and value-creating solutions in many markets, from energy and the environment to automotive and electronics or electronics and electronics.

**TNO** innovation for life  
Nederlandse Organisatie voor toegepast natuurwetenschappelijk onderzoek TNO, Netherlands - TNO connects people and knowledge to create innovations that boost the competitive strength of industry and the well-being of society in a sustainable way.

**tu technische universität dortmund**  
TECHNISCHE UNIVERSITÄT DORTMUND, Germany - a leading German technically oriented research university with strengths in chemical engineering and in the operation of chemical processes.

**Università degli Studi di Cagliari**, Italy - A university established in 1606 with cutting edge research and multi-discipline education and with strengths in chemical engineering and data-analysis.

### Case study 2: Validation of PAT-based control for high-viscous polymer production



### Case study 3 : Continuous formulation of complex liquids





Sustainability assessment methods and tools to support decision-making in the process industries

**AENOR**

Asociación Española de Normalización y Certificación



BASF SE



Bayer Technology Services GmbH



CEMEX Research Group AG



Fundacion Tecnalia Research and Innovation

**NESTE**

Neste Corporation



Norsk Hydro ASA



SUEZ



VTT Technical Research Centre of Finland Ltd



Wuppertal Institut für Klima, Umwelt, Energie GmbH

## Outcome of the project

1. Identification of best practices for evaluating resource and energy efficiency
2. A strategy for implementing best practices across different sectors of the process industry
3. A roadmap for dissemination and R&D
4. Recommendations for future research and cross-sectorial assessment
5. Input for future standardization

A ambição é que a Europa se torne líder mundial no desenvolvimento de química sustentável, materiais inteligentes e reciclagem inteligente, através de uma combinação de tecnologias maduras e disruptivas

Prioridades  
(2018-2020)

CE-NMBP-24-2018:  
Catalytic  
transformation of  
hydrocarbons (RIA)

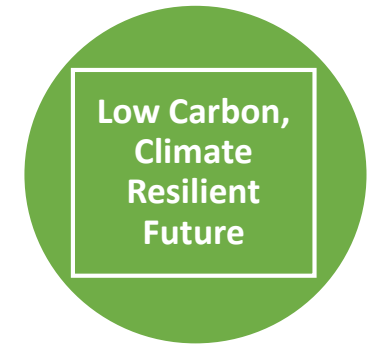
**CE-NMBP-25-2019:**  
**Photocatalytic  
synthesis (RIA)**

CE-NMBP-26-2018:  
Smart Plastic materials  
with intrinsic recycling  
properties by design  
(RIA)

Circular  
Economy

# INDUSTRIAL SUSTAINABILITY – CLEAN ENERGY THROUGH INNOVATIVE MATERIALS

Na sequência do acordo de Paris (**COP21**), bem como das metas UE 2020 e UE 2050, é necessário reduzir significativamente as emissões de CO2 e de gases com efeito de estufa num curto espaço de tempo.



Material para o armazenamento de energia

Material para a produção sustentável de energia

Prioridades (2018-2020)

**LC-NMBP-27-2019: Strengthening EU materials technologies for non-automotive battery storage (RIA)**

**LC-NMBP-28-2020: Advanced materials for innovative multilayers for durable photovoltaics (IA)**

**LC-NMBP-29-2019: Materials for non-battery based energy storage (RIA)**

**LC-NMBP-30-2018: Materials for future highly performant electrified vehicle batteries (RIA)**

**LC-NMBP-31-2020: Materials for off shore energy (IA)**

**LC-NMBP-32-2019: Smart materials, systems and structures for energy harvesting (RIA)**

# INDUSTRIAL SUSTAINABILITY – EDIFÍCIOS ENERGETICAMENTE EFICIENTES (EEB)

- **Objetivo:** promoção da criação de uma indústria de construção **altamente tecnológica** capaz de transformar a eficiência energética num **negócio sustentável**, promovendo a competitividade da UE no sector da construção.



**ENERGY-EFFICIENT BUILDINGS**

*Multi-annual roadmap for the contractual PPP under Horizon 2020*



[ECTP: European Construction Technology Platform](#)



[Energy Efficient Buildings European Initiative](#)



[Cluster Habitat](#)



[PTPC](#)

Consulte o Roadmap

# INDUSTRIAL SUSTAINABILITY – EDIFÍCIOS ENERGETICAMENTE EFICIENTES (EEB)

O sector da construção tem um impacto crucial no consumo de energia e nas emissões de carbono na União Europeia: os edifícios representam 40% do consumo total de energia e são responsáveis por 36% das emissões de gases com efeito de estufa na Europa.

**Desafio em 2018-2020** é desenvolver, demonstrar e validar tecnologias inovadoras para edifícios e “distritos” energeticamente eficientes, em conformidade com a Comunicação sobre a Aceleração da Inovação nas Energias Limpas.

Low Carbon,  
Climate  
Resilient  
Future

O valor acrescentado europeu resultará do impacto, da descarbonização do parque de edifícios da UE e do desenvolvimento de soluções de armazenamento de energia acessíveis e integradas

Prioridades  
(2018-2020)

**LC-EEB-01-2019: Integration of energy smart materials in non-residential buildings**  
(IA)

LC-EEB 02-2018: Building information modelling adapted to efficient renovation  
(RIA)

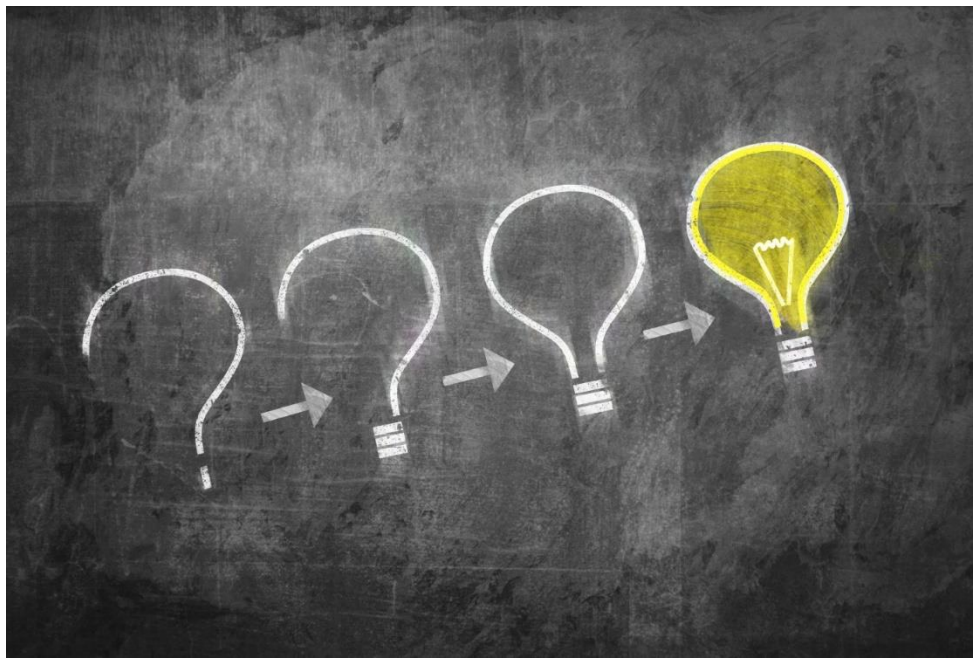
**LC-EEB-03-2019: New developments in plus energy houses**  
(IA)

LC-EEB-04-2020:  
Industrialisation of building envelope for the renovation market  
(IA)

**LC-EEB-05-2019-20: Integrated storage systems for residential buildings (IA)**

**LC-EEB-06-2018-20: ICT enabled, sustainable and affordable residential building construction, design to end of life**  
(IA 50%)





## Contact us!

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Apoio a PME  
Fast Track



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Questões legais e financeiras  
NMP+B  
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