

# EU Research & Innovation Framework Programme

## *The Chemical Industry's role in EU growth and competitiveness*

### THE NEXT EUROPEAN COMMISSION (EC) R&I FRAMEWORK PROGRAMME: HORIZON EUROPE

Cefic welcomes the EC Horizon Europe proposal's ambition to make Europe an unparalleled global innovation hub and recognition given to the innovative and enabling role of industry, by placing the pillar of the 'Global Challenges & Industrial Competitiveness' at the heart of the programme. In this role, industry provides productivity, progress, jobs and prosperity, and contributes to solving the global challenges.

#### **EU Research & Innovation Framework Programme Key Messages: The 3-I's**

*A future-oriented EU R&I Ecosystem requires a well-balanced combination and perfect orchestration of **Innovation, Industry and Impact**, under the guidance of excellence directed by the Innovation Principle.*

*Horizon Europe should: Generate science and ideas which can be turned into marketable innovations; promote partnership; propel funding; de-risk the innovation process; accelerate time to market; demonstrate commitment to the launch and acceptance of sustainable innovative solutions with the objective to invest in Europe to create jobs and develop and integrate critical value chains (e.g., e-mobility, digital health, battery alliance, light-weight materials, and construction).*

#### **Innovation**

The chemical industry has a strong and enabling position in multiple value chains and holds a pivotal position in research, development and the market introduction of innovative solutions. If research and knowledge generation are necessary precursors, then innovation is their transformation into new products, processes and/or business models, all aiming to advance technology for society's benefit. Research and Innovation is and will remain the basis for competitiveness, progress and welfare. Therefore, we must substantially strengthen our ability to transform knowledge into technological developments and its transfer into market-ready innovative goods and services, guided by innovation friendly regulation.

#### **Industry**

The chemical industry solidly supports the proposed three pillars of Horizon Europe "open science", "global challenges & industrial competitiveness" and "open innovation". Industry integration in Horizon Europe is essential to turn ideas into impact-driven and value-creating applications. Engagement of the whole Innovation Ecosystem coupled with Public Private Partnerships (PPPs), like SPIRE and BBI, address private sector participation. Understanding the channels to market, industry can bridge gaps and accelerate the generation of impact and results from R&I programmes, with the objectives to re-industrialise and develop global market leadership in selected value chains.

#### **Impact**

Europe's competitiveness and welfare rely on the economic and innovative strengths of enterprises. Research drives knowledge and a solid future. Innovation Partnerships bring together and bridge both the innovation chain and value chain. Knowledge transfer along these chains drives innovation to secure future-proof jobs and sustainable development (i.e., impact achieved in the economy, environment and society).

The Lamy High Level Group<sup>1</sup> noted: *"The EU's substantial knowledge assets, based on science and research, need to be faster and more intensively turned into innovations, in the form of new products, processes, services and business models, which generate value for economy and society. Industry plays a fundamental role in this transformation. Academia and industry are no rivals in this – they are allies. The vocation of the R&I programme must be to make their alliance productive. The participation of academia is natural, that of industry is to be encouraged".*

<sup>1</sup> Pascal Lamy HLG, 2017: *Lab-Fab-App: Investing in the European future we want*

Industry participation hinges on the triangle formed by Integration – Innovation – Impact. Key Enabling Technologies (KETs)<sup>2</sup> play a vital role in strengthening and modernising Europe’s industrial base and development of entirely new markets and value chains. Therefore, the full integration and deployment of KETs into Horizon Europe are critical to both the attraction of industry and the consequent impact creation.

Research and Innovation Missions, as defined by Mazzucato<sup>3</sup>, form an opportunity to balance *top-down programming* and *bottom-up creation* within Horizon Europe. Cefic recommends industry involvement in the definition of missions and aligning R&I Missions with the UN Sustainable Development Goals (SDGs). Our paper on R&I Missions<sup>4</sup> addresses the grand challenge of a low-carbon and circular economy.

*Going forward:* The Horizon Europe proposal should increase in size and be more concrete in some decisive areas. Therefore, during the course of the trilogues, the excellent suggestions made by the EU Commission should serve as the starting points to discuss 1) the content, number and operational functions of R&I Missions; 2) the focus and full integration of the KETs; and 3) the funding instruments, handling of partnerships; as well as the simplification of rules and regulations.

### **CEFIC’S POSITION & KEY-ASKS ON A SUCCESSFUL, VALUE GENERATING AND IMPACT DRIVEN HORIZON EUROPE:**

Gross domestic expenditure on R&D 2005 to 2015 (% relative to GDP)	EU-28	USA	Japan	China
	1.7 → 2.0 %	2.5 → 2.79 %	3.3 → 3.29 %	1.3 → 2.07 %
EU-28 sources of R&D Funding in 2015	Business Enterprise: 55%		Government: 33%	

Source: Eurostat February 2017 data

Europe is lagging behind in R&D investment. With close to 90% of the R&D funding coming from the business and government sectors there is an opportunity for these two sectors to work together in a symbiotic setting to close the gap. The next EU R&I Framework Programme should become the catalyst accelerating change: *Orchestrating an impact driven, value generating European innovation ecosystem.*

#### **1. A Competitive Innovation Ecosystem**

European innovation funding programmes will only be successful when all relevant stakeholders are engaged: universities, research technology organisations, industry (i.e., large industry, mid-caps, small and medium enterprises & start-ups) and civil society. Innovation ecosystems are solely impactful when each actor has a unique at the same time complementing role.

In the discovery and fundamental research areas, funding mostly originates from public investments and grants. Implementing innovations in the market is associated with funding from the private sector. In-between lies a critical phase often referred to as the *Valley of Death*. Lack of funding combined with an imbalance in risk management frequently causes promising inventions to die. Successfully crossing this valley requires the alignment of objectives and collaboration throughout the entire innovation ecosystem, with the aim to manufacture and introduce the innovations in European market. Involvement of industry in Horizon Europe is crucial to turn science into European jobs and growth.

Competitive Innovation Ecosystems, *Parameters to pull, solutions to be considered:*

- i. Public Private Partnerships: Committed to innovation in a specific area to address fundamental challenges. Public Private Partnerships (PPPs), like Sustainable Process Industry through Resource and Energy Efficiency (SPIRE) and Bio-Based Industries (BBI), create a *bottom-up* approach for project ideas and develop a solid portfolio of R&I projects with momentum to deliver impact. Preferably, PPPs should be cross-sectorial, with clear synergies between their mission and implementation of actions. They should have aligned common goals and the objective to replicate innovative solutions quickly throughout multiple sectors, rather than focusing on a single segment.

<sup>2</sup> see Jürgen Rüttgers High Level Group report, 2018: *Re-finding Industry; Defining Innovation*

<sup>3</sup> Mariana Mazzucato, 2018: *Missions, A problem-solving approach to fuel innovation-led growth*

<sup>4</sup> Cefic R&I Missions Paper, March 2018

Partnerships bring together and enable collaboration between all partners of the innovation ecosystem. PPPs should fund up to TRL<sup>5</sup> level 8 to turn science into marketable products & services for deployment in Europe and drive jobs & growth. As industry is often a driver in partnerships, Cefic believes that industry should be strongly involved in formulating the criteria and conditions for the implementation, monitoring, evaluation and phasing-out of European partnerships.

- ii. Common, Coherent and Innovation Friendly R&I policy across Europe: Homogeneous policy programmes with solid alignment and synergy between EU, member states and regions. Complementary funding instruments (e.g., grants, loans, tax breaks, etc.) should be available across the R&I management process to address risk management, create momentum and continuity in vital R&I programmes. The scope of the European Innovation Council should be broader than proposed and include advice on major innovation platforms, R&I policies, streamline and simplify the spectrum of innovation funding instruments with the objective of engaging all actors in the innovation ecosystem, including start-ups, small-medium enterprises, mid-caps and large companies, in the development of innovation programmes. Funding schemes should be designed to support a broad concept of innovation and different innovative companies. In particular, specific instruments dedicated to SMEs should be maintained, complementing the new measures foreseen in the Horizon Europe programme.
- iii. R&I Missions: The recommendations from Mazzucato provide, next to project calls and partnerships, a third, and *bottom-up*, avenue in accomplishing societal recognised R&I. Cefic recommends industry involvement in the definition of Research and Innovation Missions to bring results to market and improve competitiveness of Europe, and selecting R&I Missions that align with the Sustainable Development Goals (SDGs) defined by the United Nations. Cefic developed three R&I Missions<sup>6</sup> collectively addressing the grand challenges of a low-carbon and circular economy. ChemistryCAN<sup>7</sup> demonstrates how the European chemical industry facilitates the transition to a more sustainable society and make the UN SDGs a reality. R&I Missions should be technology neutral and include all actors. R&I Missions should cover the whole innovation process from research, through Key Enabling Technologies and application development stages, to market entry and wide-ranging availability. Emphasizing the benefits of innovations and their value to society, will help in gaining public acceptance and market success.
- iv. Innovation Programmes and Legislation Development: Close and direct interaction between major R&I programmes and regulatory development with the objective to identify barriers to innovation early, manage and eliminate these before market launching an innovation. Innovation Deals become a common approach in addressing (potential) disconnects.

## 2. A Balanced R&I Portfolio

Portfolio management aims to balance planning and steering of initiatives to provide the greatest overall impact. Considerations in managing balance across an R&I Portfolio include:

- i. Low and High TRL projects, that are fundamental long-term research ideas with output focus on new knowledge and breakthrough, combined with a seamless transfer and pick-up of knowledge and results by industry with focus on shorter-term innovation and demonstration. All coupled with and driven by the desire to *shorten time to market*.
- ii. Involvement of the whole Innovation Ecosystem. Participation of all relevant stakeholders - universities, research technology organisations, industry and civil society - while allowing some flexibility and 'permeability' of actors to work, and programmes to operate, across the three proposed pillars. Within the private sector involvement and support for start-ups, small-medium enterprises, mid-caps and large companies to achieve bridging partnerships along the value chain and assure success.

<sup>5</sup> Technology Readiness Level in Horizon 2020 range from 1 = Basic principles observed, to 9 = Proven in operational environment

<sup>6</sup> Cefic R&I Missions Paper, March 2018

<sup>7</sup> ChemistryCan: European chemical industry facilitates the transition to a more sustainable society. <https://chemistrycan.com>

- iii. Risk and Reward. Public financial funding accelerates turning research into products & services accepted and adopted by the marketplace. During the research & innovation phase, the chances of failure and hence the (financial) risks are high. Companies will assess these risks before considering scale-up to commercial production. For companies managing innovation investment portfolios, external funding for innovation projects from authorities, (i.e., acknowledgement of importance) will drive risk-reduction and accelerate market introduction of innovations.

### 3. A Competitive European Manufacturing Base: *Re-industrialising Europe*

*Made in Europe* requires a strong, coherent, integrated and competitive manufacturing base in Europe supported by an EU Industrial Policy. The chemical industry – as an enabler for many industry clusters and multiple value chains—holds a pivotal position in the research, development, scale-up and advancement of innovative materials, using sustainable production processes. Digital technologies play a vital role in innovation, value chain transformations and the creation of new value chains.

Priority innovation areas for the chemical industry include: Materials Application Development, Mobility & Transportation, Resource Efficiency, Utilisation of Alternative Feedstock (including biomass), Climate Change & Energy Efficiency, ICT & Process Digitisation<sup>8</sup>, Catalyst Development and Reactor & Process Development.

The chemical industry supports the recommendations of the Rüttgers group<sup>9</sup> to integrate the power of digital technologies into the Key Enabling Technologies (KETs). The backbone of innovations for the chemical industry are Manufacturing Process Technologies and Advanced Materials. Leveraging Digital Technologies into these will enhance the *innovation-power* and creation of disruptive business models and new customer experiences.

Europe's drive towards and transformation into a Digitised, Circular and Low Carbon Economy<sup>10</sup> calls for a *future oriented investment* mind-set, a perfect alignment of all actors and innovation programmes to create the necessary momentum and breakthrough in technologies and business models. The chemical industry is willing to take a leading role. With the (new) KETs balanced between the new digital technologies and the more traditional and physical technologies, and technologies forming the backbone in R&I programmes addressing all five Horizon Europe clusters (health, inclusive and secure society, digital and industry, climate, energy and mobility, food and natural resources).

- i. Breakthrough Process Technologies: Chemical industry production processes of the (near) future must be more intensive, efficient and sustainable from a resource and energy perspective. At the same time, these processes need to be more flexible, robust and tolerant to changes and variations due to, for instance, feedstock materials. Biobased chemicals will require new and efficient processes to be developed. Utilisation of alternative carbon sources (biomass, waste, gaseous industrial effluents including CO<sub>2</sub>) will require development and transformation of new production processes. Engagement in digital technologies will modernise these processes and create a leading position in terms of competitiveness, sustainability and safety for the European chemical industry.
- ii. Market Enabling Materials: Advanced material development targeting low carbon solutions include applications like mobility, energy performance in buildings and energy production & storage. Bridging the gap between lab and the market is the critical step in materials innovation. Key factors for success are Innovation Partnerships bringing together both the innovation chain and the value chain.

Europe's knowledge of and capabilities in Material Science are strong. This competitive advantage is best maintained by a combination of three actions: 1) A clear, focussed and uninterrupted materials R&I support programme with a focus on both application development, and discovery and design of new materials. 2) Enhanced engagement with the "Materials" focussed industries

<sup>8</sup> Includes Big Data and Artificial Intelligence initiatives

<sup>9</sup> Jürgen Rüttgers High Level Group report, 2018: *Re-finding Industry; Defining Innovation*

<sup>10</sup> An Economy based on low carbon energy sources that therefore has a minimal output of greenhouse gas carbon dioxide

like steel, glass, chemistry, transportation, non-fossil energy generation, non-ferro and more. 3) Integration of digital technologies like material (properties) modelling and the use of high-performance-computing to revolutionise the development of new advanced materials and structures.

*Made for Europe's future:* The European Commission needs to consider reinforcing the role of industry-driven European Technology Platforms (ETPs) such as SusChem, by making them accountable for the development of strategic innovation & research agendas (SIRAs) and significantly increasing their involvement in the strategic planning of their respective R&I areas.

#### 4. Sustainable Development & Impact: Industry's Role

Horizon Europe's driver should be **impact**. Outcomes should be tracked and reported along the three dimensions of Sustainable Development: Society, Environment and the Economy. Programmes funded by Horizon Europe should demonstrate impact across all three dimensions, rather than sub-optimised results along one or two dimensions. The replication and value generation potential to similar or related cases, between different sectors and value chains, should become a consideration for selection of innovation projects.

Guided by UN Sustainable Development Goals:

- Society with Horizon Europe expects, amongst others, a growth in terms of number of jobs and solutions to 'megatrends' like *health & aging, digitisation, resources & energy, globalisation and urbanisation*.
- Environment with Horizon Europe experiences sustainable generation, supply, storage and utilisation of energy; advances towards a circular economy; solutions to green house gas emissions and climate change.
- From the Economic point of view, Horizon Europe addresses EU competitiveness; European economic value-added; increasing GDPs; driving re-industrialisation; creating distinct technological differentiation from the rest of world; securing full independence of strategic value chains.

An important enabler of value generation and impact creation is a well-developed and stringently executed Intellectual Property (IP) strategy. The EU's drive to Open Innovation, Open Science and Open to the World should not imply open and free to everyone, but rather warrant sustainable IP strategies, especially when these strategies are in development. Protection of innovation through IP is an essential building block for Europe's ambition to grow and the chemical industry's competitiveness.

**Research and Innovation is a prerequisite for creation of impact. Industry understands the channels to market. Industry integration in Horizon Europe is essential to accelerate generation of impact and results.**

*Future European R&I Framework Programme:  
Excellence in Science;  
Excel in Impact driven and market focused  
Innovation.*

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#### About Cefic

Cefic, the European Chemical Industry Council, founded in 1972, is the voice of 29,000 large, medium and small chemical companies in Europe, which provide 1.2 million jobs and account for 17% of world chemicals production.