SUSCHEM
European Technology Platform
for Sustainable Chemistry

SusChem Stakeholders 2019

Vivi Filippousi - SusChem Manager/ NTPs Coordinator

Cefic Innovation manager

November 27, 2019

#SusChem2019

suschem.org

SusChem Stakeholders 2019: Launching the new SusChem SIRA

#SusChem2019

SusChem chairman – video message

Chairman of SusChem ETP
CEO of Covestro AG

New SusChem Strategic Innovation agenda (SIRA)

'The journey so far & the way forward'

2019 — 2030

-Expert nominations
-Working structure
[summer 2018]

Round 1 wide consultation
[November 2018]

Round 2 consultation
Input consolidation

SusChem SIRA WS:
-Peer review
-Prioritization/ filling gaps
[May 2019]

-SIRA WS - sorting input
- Formulation of SIRA content
-Experts involvement (targeted)
- Formulation of the final SIRA draft
[summer 2019]

SusChem Board & NTPs approval
[September-October 2019]

SusChem Stakeholders 2019
[27.11.2019]
New SusChem SIRA launch

- *> 100 experts (multi-stakeholders approach)*
- *SusChem Board*
- *SusChem NTPs*
- *European Commission*

(> 2020) New SusChem SIRA further implementation of strategy

SusChem priorities:
Technologies for a better Future of Europe

CIRCULAR ECONOMY AND RESOURCE EFFICIENCY

Transforming Europe into a more circular economy

- Materials design for durability and/or recyclability
- Safe-by-design for chemicals & materials (accounting for circularity)
- Advanced processes for alternative carbon feedstock valorisation (waste, biomass, CO/CO_2)
- Resource efficiency optimisation of processes
- Advanced materials and processes for sustainable water management
- Advanced materials and processes for the recovery and reuse of critical raw materials and/or their sustainable replacement
- Industrial symbiosis
- Alternative business models
- Digital technologies to increase value chain collaboration, informing the consumer and B2B on reuse and recyclability

LOW CARBON ECONOMY

Mitigating climate change, with Europe becoming carbon neutral

- Advanced materials for sustainable production of renewable electricity
- Advanced materials and technologies for renewable energy storage
- Advanced materials for energy efficiency in transport and buildings
- Electrification of chemical processes and use of renewable energy sources
- Increased energy efficiency of process technologies, enabled by digital technologies
- Energy efficient water treatment
- Industrial symbiosis via better valorisation of energy streams
- Alternative business models

ENVIRONMENTAL AND HUMAN HEALTH

Europe leading on environmental and human health protection

- Safe-by-design for materials and chemicals (functionality approach, methodologies, data)
- Improve safety of operations through process design, control and optimisation
- Zero-liquid discharge processes
- Zero-waste discharge processes
- Technologies for reducing GHGs emissions
- Technologies for reducing industrial emissions
- Sustainable sourcing of raw materials
- Increasing transparency of products within value chains through digital technologies
- Alternative food technologies
- Novel therapeutics and personalised medicine
- Sustainable agriculture, forestry and soil health related technologies
- Biocompatible materials for health applications

SUSTAINABILITY ASSESSMENT INNOVATION

EDUCATION AND SKILLS CAPACITY

ENABLING DIGITAL TECHNOLOGIES

New SusChem SIRA – overall document structure
'Innovation priorities for EU and Global challenges'

INTRODUCTION

SusChem strategic vision towards 2030

Global and EU challenges/priorities
(HEU and beyond)

(Ch2 – Ch4) Main body

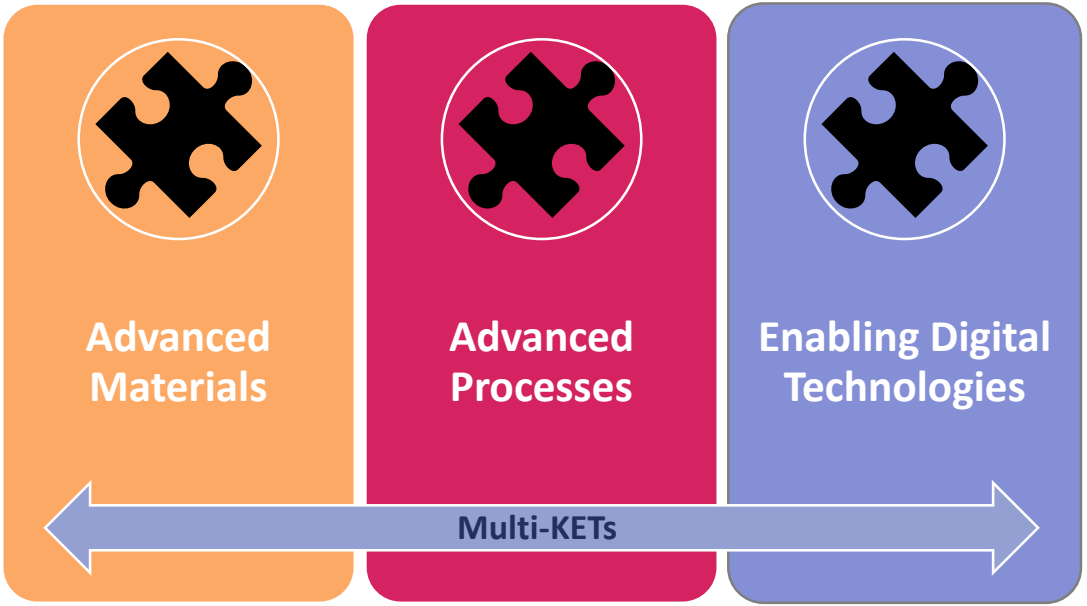
'Technology priorities & RD&I actions'

Advanced Materials,
Advanced Processes,
Enabling Digital Technologies

(Ch5) Horizontal topics – *Horizontal impact*

[sustainability assessment, safe-by-design, Edu/skills capacity]

New SusChem SIRA – Main body of the document - structure
'Innovation priorities for EU and Global challenges'



Impact and relevance to UN SDGs & HEU
HEU focus: PII clusters & IAs *

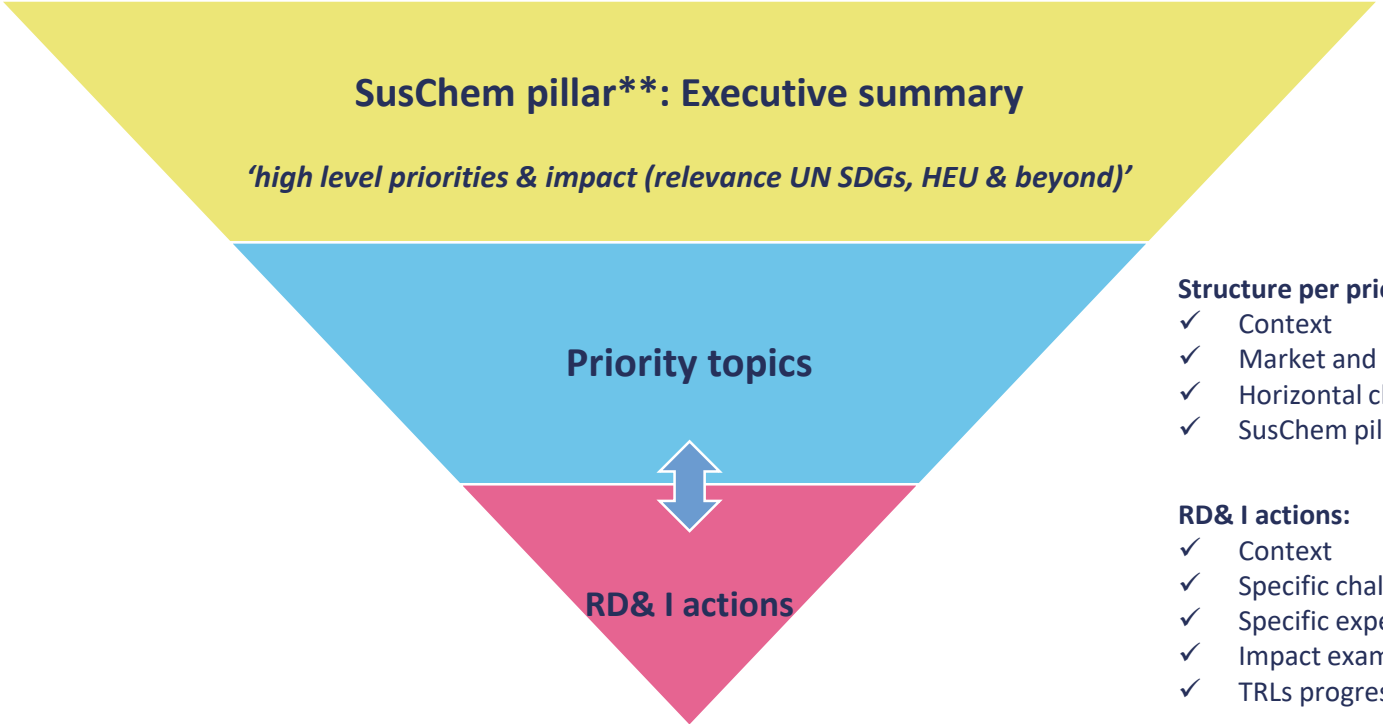
** thematic structure of PII*
** priorities across TRLs, relevance also to PI and PIII*

***Note**: HEU agreed text of the draft council decision – April 15, 2019*

New SusChem SIRA – SusChem pillar & priority topics structure

<u>*3-level structure</u>

****Advanced Materials, Advanced Processes, enabling Digital technologies**



Structure per priority topic:

- ✓ Context
- ✓ Market and overall expected impact (links w HEU {PII})
- ✓ Horizontal challenges
- ✓ SusChem pillars – multi-KETs

RD& I actions:

- ✓ Context
- ✓ Specific challenges
- ✓ Specific expected impact
- ✓ Impact examples
- ✓ TRLs progression - 2030 (application-driven)

New SusChem Strategic Innovation agenda (SIRA) – HEU structure under consideration

SusChem SIRA: addressing technology priorities [low – high TRLs]
SusChem KETs - HEU clusters, IAs, Global challenges (April 15, 2019 text)

Pillar 1
Excellent Science

- European Research Council
- Marie Skłodowska-Curie Actions
- Research Infrastructures

Pillar 2
Global Challenges and European Industrial Competitiveness

Clusters
1. Health
2. Culture, creativity and inclusive society
3. Civil Security for Society
4. Digital, Industry and Space
5. Climate, Energy and Mobility
6. Food, Bioeconomy Natural Resources, Agriculture and Environment

- Joint Research Centre

Pillar 3
Innovative Europe

- European Innovation Council
- European innovation ecosystems
- European Institute of Innovation and Technology

Widening participation and strengthening the European Research Area

- Widening Participation and Spreading Excellence
- Reforming and Enhancing the European R&I System

Table 4: Relevance of SusChem Priorities on Advanced Materials with Horizon Europe

Horizon Europe

Pillar 2: Global Challenges and European Industrial Competitiveness

Clusters and Intervention areas

SusChem priorities: ADVANCED MATERIALS

		Composites and cellular materials (lightweight, insulation properties)	3D-printable materials	Bio-based chemicals and materials	Additives	Biocompatible and smart materials	Materials for electronics	Membranes	Materials for energy storage	Coating materials and aerogels
CLUSTER 1: Health	1.1 Health throughout the life course		●			●		●		
	1.2 Environmental and social health determinants									
	1.3 Non-communicable and rare diseases									
	1.4 Infectious diseases, including poverty-related and neglected diseases									
	1.5 Tools, technologies, and digital solutions for health & care, including personalised medicine		●			●	●			
	1.6 Healthcare systems									
CLUSTER 4: Digital, Industry and Space	4.1 Manufacturing technologies	●	●	●	●	●	●	●	●	●
	4.2 Key Digital technologies						●			
	4.3 Emerging enabling technologies					●	●			
	4.4 Advanced Materials	●	●	●	●	●	●	●	●	●
	4.5 AI and Robotics									
	4.6 Next generation internet									
	4.7 Advanced Computing and Big Data						●		●	
	4.8 Circular Industries	●	●	●	●		●	●	●	●
	4.9 Low-carbon and Clean Industries							●		
	4.10 Space including Earth observation	●							●	
CLUSTER 5: Climate, Energy and Mobility	5.1 Climate Science and solutions									
	5.2 Energy supply	●		●			●	●	●	
	5.3 Energy grids									
	5.4 Buildings and Industrial facilities in energy transition	●	●	●				●	●	●
	5.5 Communities and cities	●	●	●	●		●	●	●	●
	5.6 Industrial competitiveness in transport	●		●			●		●	●
	5.7 Clean, safe and accessible transport and mobility								●	
	5.8 Smart mobility						●			
	5.9 Energy storage							●	●	
CLUSTER 6: Food, Bioeconomy, Natural Resources, Agriculture and the Environment	6.1 Environmental Observation									
	6.2 Biodiversity and natural resources									
	6.3 Agriculture, Forestry and rural areas			●				●		
	6.4 Seas, Oceans and inland waters			●						
	6.5 Food systems			●	●			●		●
	6.6 Bio-based innovation systems in the EU Bioeconomy		●	●	●	●				
	6.7 Circular systems	●	●	●	●		●	●	●	●

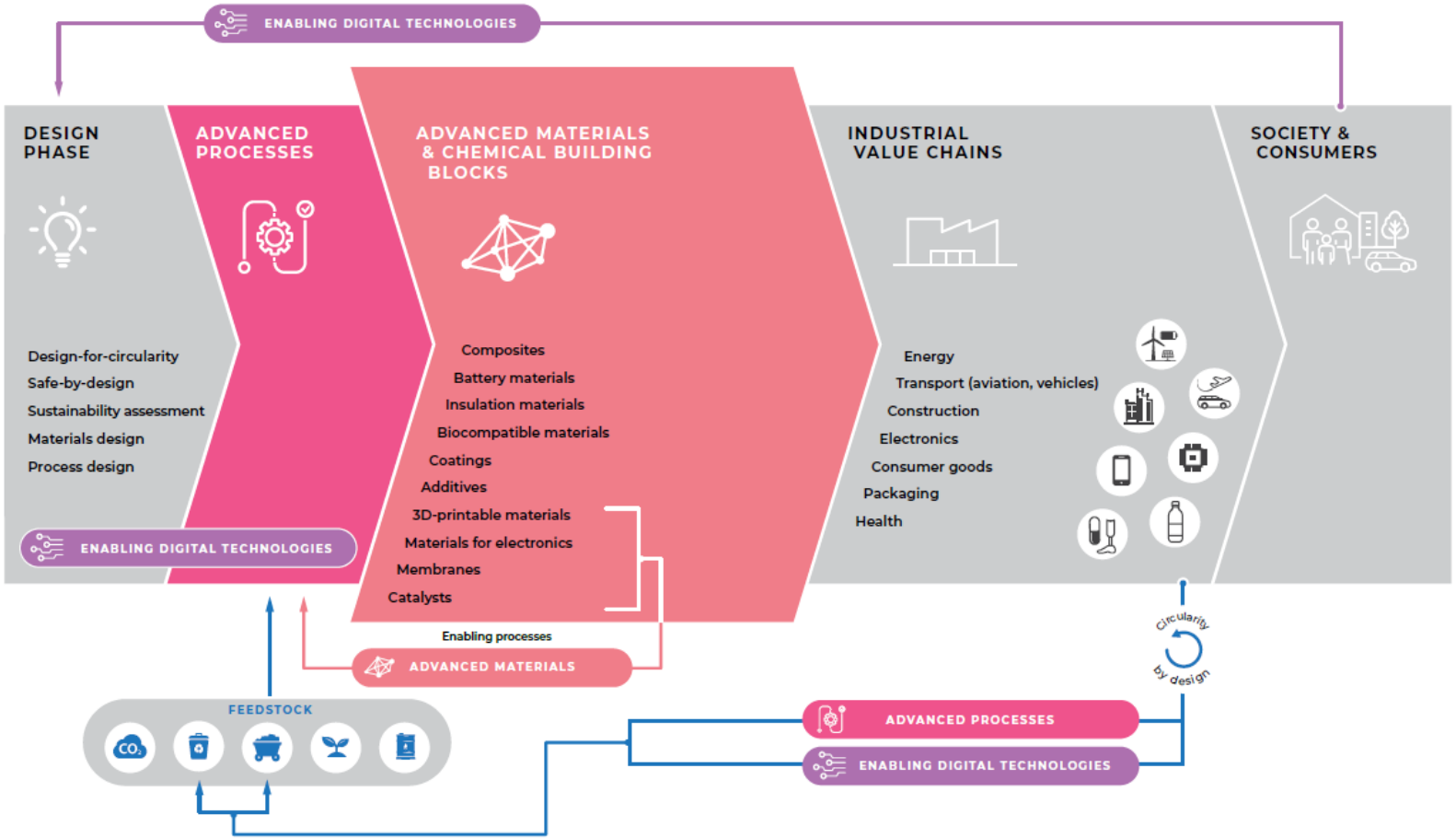
SusChem priorities
Relevance to **HEU**
P2-thematic approach

Example: Adv Mat. [Ch2]

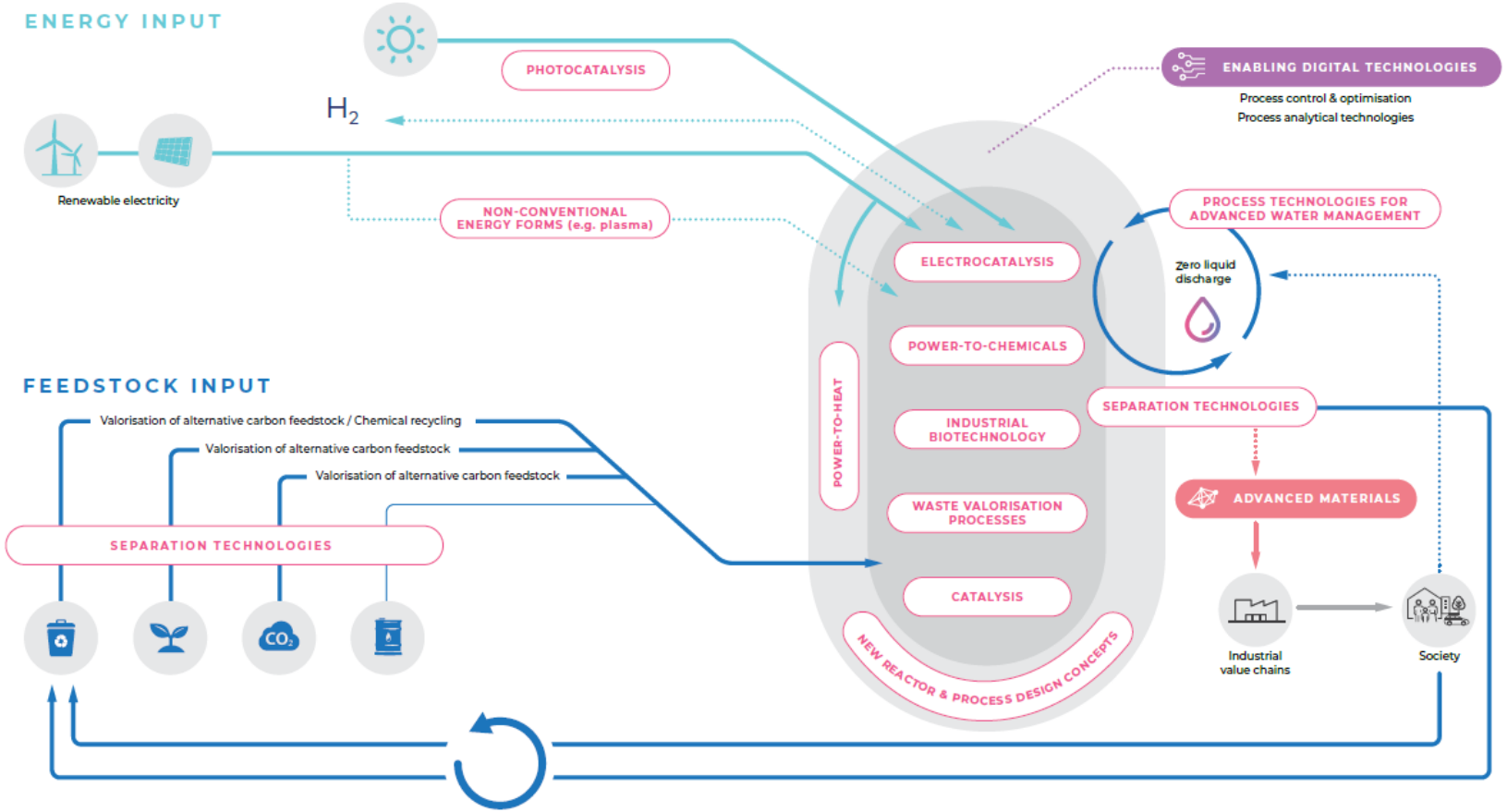
From overarching priorities to technology priorities and RD& I actions

Advanced materials, Advanced Processes, enabling Digital technologies

Advanced materials as solutions for other industrial value chains



Advanced Processes for energy transition & circular economy



Digitalisation Transforms the Chemical Industry Rapidly Across its Entire Value Chain

ADVANCED MATERIALS

ADVANCED PROCESSES

Management of feedstock supply

Big data-driven raw material analytics to optimize feedstock costs, flexibilisation in feedstock (including waste, biomass and CO_2)

R&D/ Laboratory 4.0

Machine-learning and artificial intelligence-driven research, advanced materials and formulation simulation, digital process development, digital twins, laboratory automation and high throughput screening

ADVANCED PROCESSES

Cognitive plants

PAT-based real-time model predictive control and process optimisation based on physical properties models enhanced by advanced data analytics/AI

Predictive maintenance

Advanced analytics-based predictive and risk-based asset maintenance

Management of processes

Scheduling of connected processes within plants and sites

ADVANCED MATERIALS

Supply chains in a circular economy

Increase transparency through tracking and tracing of products throughout life-cycles, e.g. by blockchain technology

New roads-to-market

Digitalisation of customer experiences, involving customers and/or consumers into the product development cycle, providing additional services, disruptive new business models

Supply chain integration

Production data sharing with suppliers/real-time supply tracking, digital tools enabling more efficient procurement processes

New forms for collaboration & co-creation

Platforms for exchanging R&D data, platforms to collaborate and for data exchange, co-creation within the sector and beyond

Process analytics (PAT)

Advanced sensing and process-analytical technology for tighter closed-loop process monitoring and control, at reasonable cost

ADVANCED PROCESSES

Risk management

Advanced analytics-based cybersecurity management

Industrial symbiosis

Model-based coordination and management of energy and material flows across industries and with municipalities/cities

Operator support

Advanced process interfaces, augmented reality, digital twins for training purposes

SUSCHEM ENABLING DIGITAL TECHNOLOGIES
DIGITAL INNOVATIONS FOR THE CHEMICAL INDUSTRY

SUSCHEM ENABLING DIGITAL TECHNOLOGIES
DIGITAL INNOVATIONS FOR THE CHEMICAL INDUSTRY

Acknowledgements

Special thanks

- > 100 experts/ SusChem stakeholders
- SusChem Board
- SusChem NTPs
- Core project team (Cefic)

Acknowledgements

Core project team:
Dr. Vivi Filippousi
Dr. Sophie Wilmet
Dr. Martin Winter
Dr. Nieves Gonzalez Ramon

Communications team:
Ms. Ellen Mulder and Ms. Marina Mendes.

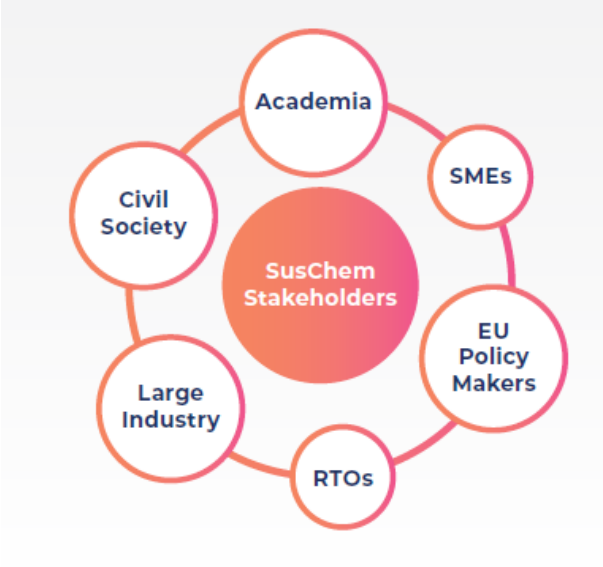
Special thanks go to all SusChem Board members and all representatives of the SusChem National Technology Platforms (NTPs) network for remaining consistently engaged in ensuring the strategic direction and vision of the new SIRA as well as for connecting the SusChem project team with their network of experts.

The production of the new SusChem SIRA would not have been possible without the direct contribution of over 100 experts across universities, Research and Technology organisations (RTOs) as well as SMEs and the large industry. These experts contributed through the initial consultation rounds, a workshop to define the final priorities and by formulating sections of the new SusChem SIRA. Moreover, we would like to thank PNO Consultants for their contribution in structuring and further developing the content of the new SIRA document.

So many experts and organisations have contributed at different levels that we cannot thank all of them specifically. Yet the quality of their input is reflected in this ambitious SIRA.

We sincerely hope that we will continue working with all stakeholders to take this agenda forward.

New SusChem SIRA: A call for action



- Full innovation ecosystem
- Other platforms and PPPs
- Cross-sectorial
- Across value chains collaborations

New SusChem SIRA: the ‘start’ and not the conclusion.

1. Global and societal challenges towards 2030 – innovation
2. Digital transformation of the industrial sectors
3. Horizon Europe: partnerships and platforms addressing challenges at national and EU levels
4. Circular economy and the energy transition: innovation challenges

SUSCHEM
European Technology Platform
for Sustainable Chemistry

Thank you

suschem.org