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ECON

Experiences of regional authorities with the Important Projects of Common European Interest (IPCEI) and suggestions for improvement

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List of abbreviations

AI	Artificial intelligence
AMR	Antimicrobial resistance
CEMR	Council of European Municipalities and Regions
CoR	Committee of the Regions
CS	Compound semiconductor
DNSH	Do no significant harm (principle)
DG COMP	Directorate-General for Competition
DG GROW	Directorate-General for Internal Market, Industry, Entrepreneurship, and SMEs
DG REGIO	Directorate-General for Regional and Urban Policy
DG RTD	Directorate-General for Research and Innovation
EIB	European Investment Bank
EIT	European Institute of Innovation and Technology
EU	European Union
EuBatIn	Second IPCEI on batteries
EUV	Extreme ultraviolet
FDI	Foreign direct investment
FG	Facilitation Group
GA	General Assembly
GBER	General Block Exemption Regulation
GHG	Greenhouse gas
HERA	Health Emergency Preparedness and Response Authority
IAPs	Indirect and associated partners
IoT	Internet of Things
IPCEI	Important Projects of Common European Interest
IPCEI-CIS	IPCEI on next generation cloud infrastructure
JEF-IPCEI	Joint European Forum for Important Projects of Common European Interest
KET	Key enabling technologies
KIC	Knowledge and innovation community
KPIs	Key performance indicators
LRAs	Local and regional authorities
PAB	Public authority board
ROs	Research organisations
RRF	Recovery and Resilience Facility
RTOs	Research and technology organisations
R&D	Research and development
R&I	Research and innovation
R&D&I	Research, development and innovation
SAM	State aid modernisation
SB	Supervisory board
SET	Strategic energy technology

SME	Small and medium-sized enterprise
TF	Technology fields
TFC	Technology field coordinator
TFEU	Treaty on the Functioning of the European Union
ToR	Terms of Reference

Executive summary

This study explores the awareness, involvement and future potential of local and regional authorities (LRAs) in Important Projects of Common European Interest (IPCEIs). IPCEIs represent a strategic EU instrument that enables Member States to jointly support large-scale cross-border projects in key industrial ecosystems. These projects aim to address market failures and strengthen European competitiveness, resilience, and innovation, particularly in areas where public and private investments are essential for scaling up high-risk, high-reward initiatives.

While IPCEIs are formally coordinated at national level, they often generate important territorial impacts and require multilevel cooperation for effective implementation. This study responds to growing calls for greater territorial cohesion and inclusiveness in EU industrial policy by assessing how LRAs have been engaged in IPCEI processes to date and identifying opportunities to enhance their role in future initiatives.

The analysis combines desk research, a stakeholder survey, and semi-structured interviews with national and regional authorities, project participants, and EU-level actors. It also draws on five case studies of existing and planned IPCEIs, covering microelectronics, batteries, hydrogen, health, and next-generation cloud infrastructure, to illustrate concrete experiences of LRA involvement and territorial dynamics.

The findings indicate that LRA involvement in IPCEIs has been limited and uneven. Most IPCEIs to date have followed a highly centralised governance model, with Member States playing the primary role in selecting projects, defining national priorities, and coordinating state aid applications. LRAs are rarely consulted during the early design phase, and there is no formal mechanism for their participation in the decision-making or governance of IPCEIs. Nevertheless, some regions have proactively supported IPCEI projects through complementary funding, infrastructure support, or coordination of local innovation ecosystems. Notable examples include Wallonia's financial support to companies in the Med4Cure IPCEI on health, and the collaboration between South Holland authorities and SMEs participating in the CIS IPCEI on cloud technologies.

The survey conducted for this study confirms relatively low levels of awareness and engagement among LRAs. Only a minority of respondents had prior knowledge of the IPCEI instrument, and even fewer had been involved in consultations or project implementation. However, there is significant interest among LRAs in playing a more active role in future IPCEIs, particularly in facilitating partnerships, providing local support services, and aligning regional strategies with EU priorities. Respondents also identified key barriers to

involvement, including insufficient communication, lack of transparency in national selection processes, and limited administrative capacity at local level.

The case studies shed further light on the governance challenges associated with the current IPCEI framework. These include long and complex procedures for state aid approval, fragmented coordination between Member States and between different levels of government, and legal uncertainty for participating entities. In particular, small and medium-sized enterprises (SMEs) often face difficulties navigating the administrative and funding requirements of IPCEIs without the support of regional or local intermediaries.

Despite these challenges, the study identifies a number of success factors that could inform future improvements. These include early engagement of LRAs in the identification of project needs and priorities, the use of regional development agencies to support local participation, and stronger alignment between IPCEIs and existing regional or smart specialisation strategies. Cross-border regional cooperation, in particular, is highlighted as a promising avenue for building transnational value chains and scaling innovation beyond national borders.

To promote a more inclusive and territorially balanced approach to IPCEIs, the study offers several forward-looking recommendations. These include:

- enhancing transparency and access to information for LRAs throughout the IPCEI lifecycle;
- creating structured channels for LRA involvement in national consultations and project governance;
- providing guidance and capacity-building to LRAs to navigate the technical and financial dimensions of IPCEIs;
- and fostering synergies between IPCEIs and other EU instruments that support regional innovation and industrial transitions.

Ultimately, stronger engagement of LRAs in IPCEIs could help ensure that these flagship projects deliver not only on strategic EU goals, but also on place-based development, resilience, and cohesion. Empowering regions to contribute to and benefit from IPCEIs will be essential for reinforcing the multilevel governance of EU industrial policy and supporting a more inclusive green and digital transition.

Introduction

Background

Important Projects of Common European Interest (IPCEIs) are key instruments for implementing the European Union (EU) Industrial Strategy[1]. They are typically organised as large-scale consortia focused on research and development (R&D), particularly for initial industrial applications within strategic value chains. Established under the Treaty on the Functioning of the European Union (TFEU), IPCEIs must meet certain criteria: (i) contribute to strategic EU objectives, (ii) involve at least four Member States, (iii) include private financing from beneficiaries, (iv) generate positive spillover effects across the EU while minimising competition distortions, and (v) demonstrate high ambition in research and innovation (R&I).

IPCEIs are financed through a mix of public and private investment, enabling Member States to provide direct financial support to companies and stimulate private sector investment in critical areas of common interest. Projects selected at the national level must undergo an assessment by the European Commission. A positive assessment enables Member States to issue national funding to companies participating in the IPCEI (using preferential conditions for state aid).

IPCEIs bring together a wide range of economic actors, including large and small companies, competent authorities from Member States, and relevant European Commission services. To date, the European Commission has approved 10 integrated IPCEIs across five value chains: batteries, cloud and edge computing, health, hydrogen, and microelectronics. These projects vary significantly in size, scope, and funding.

The new European Commission's marked political focus on greater technological sovereignty and strategic autonomy within the EU has contributed to increased interest in IPCEIs. Recent key policy documents such as the Draghi report[2] and the European Commission's Competitiveness Compass[3] emphasise the need for innovation and boosting the EU's competitive position on global markets. Megatrends such as the change in security paradigm and aggravating resource scarcity necessitate collaborative action by Member States and efficient use of public resources to meet the growing competition from outside the EU. In this context, IPCEIs may be seen as useful tools for creating complex new value chains that have the potential to ensure the EU's long-term competitiveness and

[1] European Commission, A New Industrial Strategy for Europe, COM(2020) 102 final.
[2] European Commission, Draghi, M., *The Draghi report on European competitiveness*, Publications Office of the European Union, Luxembourg, 2024.
[3] European Commission, An EU Compass to regain competitiveness and secure sustainable prosperity, Press release, 29 January 2025.

economic growth.

In early 2023, several Member States noted that the lack of transparency and consultation in the IPCEI process hindered their participation and input. In response, in late 2023, the European Commission established the Joint European Forum for IPCEI[4] (JEF-IPCEI), co-led by the Directorates-General for Internal Market, Industry, Entrepreneurship, and SMEs (DG GROW) and for Competition (DG COMP), with membership including EU Member States, Norway, Iceland, and Liechtenstein. The JEF-IPCEI aims to enhance information exchange, identify potential sectors for IPCEIs, and gauge Member States' interest. It is expected to increase the effectiveness of IPCEIs and identify relevant strategic technologies or infrastructures for potential future IPCEIs.

Local and regional authorities (LRAs) are not formally involved in the process of developing IPCEIs. However, they are crucial in providing adequate regulatory frameworks for a variety of stakeholders involved in IPCEIs, such as enterprises, civil society organisations and financial institutions. They can also provide valuable guidance on the most effective development of IPCEIs to maximise the benefits for their regions. The European Committee of the Regions (CoR) seeks insight into how LRAs can benefit from IPCEIs and contribute to their design and implementation, particularly given recent efforts to simplify and enhance this instrument.

This study examines LRAs' experiences with IPCEIs to date, notably barriers and opportunities. It analyses whether and how LRAs can better engage with IPCEIs, not necessarily as formal participants in governance, but, rather, as facilitators of local ecosystems and enablers of territorial benefits. Particular attention is given to the ongoing simplification of IPCEIs and how reforms might create space for more inclusive and balanced participation.

The study combines literature review, legal and policy document analysis, targeted stakeholder interviews, a survey of LRAs and their networks, and five in-depth case studies of approved IPCEIs.

Ultimately, this report aims to provide practical recommendations to support the CoR in its political work on IPCEIs. By identifying best practices, structural challenges and potential reforms, the study seeks to offer insights into how LRAs can be better positioned to benefit from and contribute to IPCEIs, while ensuring that the instrument remains fit for purpose in addressing Europe's strategic industrial challenges.

[4] European Commission, Joint European Forum for IPCEI, n.d.

Methodology

This study adopts a multi-method approach, combining qualitative and quantitative research techniques to capture a wide range of perspectives on the role of LRAs in IPCEIs. The methodology addresses six key research questions that guide the analysis:

1. What are the current experiences of LRAs in dealing with IPCEIs?
2. What are the lessons learned so far in implementing IPCEIs?
3. Which obstacles need to be addressed to make IPCEIs more effective in supporting a place-based industrial policy?
4. What role could a simplified IPCEI instrument play in addressing the industrial challenges identified in the Draghi report?
5. How could LRAs benefit better from IPCEIs?
6. What changes would have to be made in the legal and policy framework to achieve this?

The methodological framework consists of four main components:

- **Desk research**
  A comprehensive review of existing literature, policy documents, legal text, and official communications provided an overview of the IPCEI framework, its evolution and relationship with regional actors. This included analysing relevant European Commission communications, State aid guidelines, JEF-IPCEI outputs, and recent strategic reports such as the Draghi report. Academic studies, think tank analyses, and industry reports were also reviewed to contextualise the challenges and opportunities of IPCEIs, particularly from a regional perspective.

- **Survey of LRAs and other local entities**
  A targeted online survey was distributed to approximately 1,000 stakeholders, primarily from LRAs and their representative networks. Conducted between 7 and 28 February 2025, the survey assessed levels of awareness of IPCEIs, collected insights on past or ongoing participation, and gathered perspectives on potential future involvement. It included targeted questions on barriers, benefits and expectations, along with the types of support that LRAs would consider most helpful. A total of 37 respondents completed the survey, five of whom had direct experience of an IPCEI.

- **Structured interviews**
  Semi-structured interviews with key stakeholders, including DG COMP, DG GROW, national authorities, IPCEI project coordinators, regional governments, industry associations, and academic experts, provided insights into the practical challenges of implementing IPCEIs, best

practices in regional involvement, and opportunities for improvement. They also informed the development of the case studies by identifying relevant projects and experiences of LRA engagement.

- **Case studies**
  Five in-depth case studies on selected IPCEIs illustrate the diversity of regional involvement and highlighted the concrete lessons learned. The case studies focused on different thematic areas and Member States to capture a range of governance models, industrial contexts and regional dynamics. Each case study examined the role of LRAs (where applicable), their contributions to project development and implementation, the challenges they faced, and the broader territorial impacts of the projects. The selected case studies covered different sectors, waves of IPCEIs, and geographical areas to ensure a balanced representation of experiences:
    - First IPCEI on microelectronics (2018);
    - Second IPCEI on batteries (EuBatIn) (2021) ;
    - IPCEI on Next Generation cloud infrastructure (2023);
    - Third hydrogen IPCEI (Hy2Infra, 2024);
    - IPCEI Med4Cure (2024).

- **Strategic foresight**
  To complement the empirical research, a strategic foresight exercise identified future trends and challenges likely to affect IPCEIs and regional participation. It considered megatrends such as technological change, geopolitical shifts, resource constraints, and evolving EU policy priorities, with the aim of ensuring that the study's recommendations remain relevant and resilient in the face of long-term developments.

Together, these methodological components provide a robust foundation for the study's findings and recommendations, ensuring they are grounded in both practical experience and strategic reflection.

The report is structured as follows:

- **Chapter 1 State of play** explores the legal and policy contexts of IPCEIs, summarises approved IPCEIs, and maps them according to participation of Member States, numbers of companies and projects, financial scale and LRA involvement.
- **Chapter 2 Changes for successful future IPCEI** describes the lessons learned from the implementation of the IPCEIs, chiefly challenges, barriers and success factors. These are analysed generally and from the perspective of LRA involvement. This analysis includes a special focus on the early impacts of the JEF- IPCEI. The chapter concludes with a range of possible

options for improvement.

- **Chapter 3 Policy recommendations and conclusions** presents a set of recommendations for each of three types of stakeholders: the European Commission and the JEF-IPCEI, Member States, and the LRAs. The strategic foresight exercise concludes this chapter.
- Several annexes complement the study:
    - Annex I: Case study summaries;
    - Annex II: Bibliography;
    - Annex III: Presentation summarising the main outcomes and policy recommendations (separate Power Point file);
    - Annex IV: Social media shareables (separate pdf file).
    - Annex V: Summary of survey results.
    - Annex VI: List of interviews.

1. State of play

1.1 Overview of IPCEIs

IPCEIs are designed to support projects that deliver significant benefits to the EU by making 'a very important contribution to sustainable economic growth, jobs, competitiveness and resilience for industry and the economy in the Union and [by] strengthen[ing] its open strategic autonomy'[5]. Such projects must address 'important market or systemic failures' or 'societal challenges' that might not be implemented without public support. IPCEI funding aims to fill the financing gap, targeting initiatives that the private sector alone cannot fund. In practical terms, an IPCEI consists of a single project, or a group of interconnected projects, in areas such as infrastructure or research, development and innovation (R&D&I). These projects are undertaken by private sector entities and backed by at least four[6] EU Member States. R&D&I activities may involve either R&D or the initial industrial deployment of new technologies, products or processes. The focus on R&D&I and infrastructure is not mandated by the EU treaties but reflects the European Commission's decision to narrow the scope of eligible projects and minimise potential negative impacts. Although IPCEIs can, in theory, receive EU funding, this has rarely been the case in practice. Instead, these projects are proposed, managed and financed by participating national governments.

1.1.1 Legal context

Article 107(3)(b) of the TFEU provides that aid to promote the execution of an IPCEI may be considered compatible with the internal market[7].

The current IPCEI legal framework is outlined in the Commission's 2021 Communication[8]. Previously, the regulations governing public financing for IPCEIs were outlined in the 2006 Community Framework for State Aid for R&D&I)[9], in the 2008 Guidelines on State aid for environmental protection[10], and

[5] European Commission, State aid: Commission invites stakeholders to provide comments on revised State aid rules on Important Projects of Common European Interest, Press release, 23 February 2021.
[6] Fewer than four EU Member States may be involved if justified by the project's nature (European Commission, Communication from the Commission Criteria for the analysis of the compatibility with the internal market of State aid to promote the execution of important projects of common European interest 2021/C 528/02, OJ C 528, 30.12.2021).
[7] TFEU, Article 107 (ex Article 87 of the Treaty of Rome (TEC)).
[8] European Commission, Communication from the Commission Criteria for the analysis of the compatibility with the internal market of State aid to promote the execution of important projects of common European interest 2021/C 528/02, OJ C 528, 30.12.2021
[9] European Commission, Community Framework for State Aid for Research, Development and Innovation, OJ C 323, 30.12.2006, p. 1.
[10] European Commission, Community guidelines on State aid for environmental protection, OJ C 82, 1.4.2008, p. 1.

in the Commission's 2014 Communication on IPCEI[11].

The Community Guidelines on State Aid for Environmental Protection (2008/C 82/01) and **the R&D&I Framework,** respectively, outlined the criteria for determining the eligibility and compatibility of projects for State aid exemptions under EU rules. To be eligible:

(i) Projects must be clearly defined, specifying their objectives, participants, and implementation terms. Groups of projects may also be considered collectively as a single project;

(ii) Projects must demonstrate a significant contribution to the common European interest, with benefits extending beyond the Member States involved. Such contributions may include fostering innovation, advancing environmental strategies, creating new markets, improving competitiveness, or generating societal and economic spillovers. These benefits must be concrete, measurable, and exemplary, whether in environmental protection or innovation;

(iii) The aid must be necessary for the project's realisation and must act as an incentive, particularly for high-risk initiatives. This necessity is assessed based on factors such as the project's profitability, investment requirements, cash flow timelines, and risk levels;

(iv) Projects must be substantial in scale and scope, reflecting their importance and alignment with EU priorities[12].

For compatibility, aid granted to projects must support the development of a specific economic activity that would not occur without it (necessity), while avoiding undue distortions to trade and the common interest (appropriateness, proportionality and transparency)[13].

The 2014 IPCEI Communication introduced expanded eligibility and compatibility criteria.

- Eligibility: It expanded IPCEIs to cover all economic sectors and introduced 'integrated projects' in R&I, comprising multiple interconnected initiatives aligned with shared objectives[14]. It emphasised the need for cross-border benefits and alignment with EU strategies such as digital transformation and energy security;
- Compatibility: The transparency requirement is promoted through detailed reporting, largely available to the public, and ex-post evaluations to monitor

[11] European Commission, Communication on the Criteria for the Analysis of the Compatibility with the Internal Market of State Aid to Promote the Execution of Important Projects of Common European Interest, OJ C 188, 20.6.2014.
[12] European Commission, Community guidelines on State aid for environmental protection, OJ C 82, 1.4.2008.
[13] European Commission, Community Framework for State Aid for Research, Development and Innovation, OJ C 323, 30.12.2006.
[14] Eisl, A., EU industrial policy in the making: From ad hoc exercises to key instrument, Economy & Finance Policy Paper No. 286, December 2022.

the effectiveness and compliance of funded projects. A balancing test is also developed, requiring a thorough analysis of whether the positive effects of the aid outweigh potential distortions to competition and trade[15].

The 2014 IPCEI Communication is part of a broader process that started in 2012 with the Communication on State aid modernisation (SAM), aiming to create sustainable, smart and inclusive growth using more effective aid measures[16]. The SAM was revised in subsequent years, including a reform of the State aid procedures, exemptions of more aid measures from prior notification to the Commission, and additional transparency requirements.

The 2021 Communication builds on this framework with key updates to align with evolving EU priorities, while also reflecting lessons from the practical application of the previous rules. It reinforces the importance of addressing market and systemic failures through projects that deliver significant cross-border benefits and systemic impacts. The updated guidance explicitly prioritises projects that support sustainability, resilience, and the EU's digital and green transitions. A major change in the 2021 Communication is the increased emphasis on small and medium-sized enterprises (SMEs) and start-ups, recognising their pivotal role in the EU economy. It introduces simplified assessment processes for State aid to SMEs, particularly where aid amounts are unlikely to distort competition. The updated framework also introduces stricter requirements for openness and transparency, ensuring that all Member States are informed of emerging IPCEI projects and given genuine opportunities to participate. It includes a refined balancing test to ensure that aid is necessary, proportionate, and aligned with EU objectives, limiting potential distortions to competition. Projects must also adhere to the 'do no significant harm' (DNSH) principle under Regulation (EU) 2020/852, further embedding environmental and sustainability considerations into the framework[17].

However, the regional and local dimensions are not prominently addressed within the current legislative framework. While the 2021 Communication emphasises cross-border cooperation and alignment with EU-wide objectives, it provides limited explicit references to the role or involvement of regional and local actors. This could result in challenges when aligning IPCEI projects with specific regional development strategies or addressing locally specific needs, potentially

[15] European Commission, Communication on the Criteria for the Analysis of the Compatibility with the Internal Market of State Aid to Promote the Execution of Important Projects of Common European Interest, OJ C 188, 20.6.2014.
[16] European Commission, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on EU State Aid Modernisation (SAM), COM(2012) 209 final.
[17] European Commission, Communication from the Commission Criteria for the analysis of the compatibility with the internal market of State aid to promote the execution of important projects of common European interest 2021/C 528/02, OJ C 528, 30.12.2021.

affecting the implementation of these projects at sub-national level.

Finally, the 2021 IPCEI Communication complements other State aid rules such as **the General Block Exemption Regulation (GBER)** [18] and **the R&D&I Framework**[19], which allows innovative projects to be supported with generous conditions.

Box 1: Main new eligibility requirements introduced by the 2014 and 2021 Communications

This box summarises the widening of the eligibility criteria for projects of common European interest introduced by the 2014 and 2021 Communications.

2008 Community Guidelines on State Aid for Environmental Protection & R&D&I Framework

(i) **Project definition**: Projects must be clearly defined, specifying objectives, participants, and implementation terms. Groups of projects may also qualify as a single project;

(ii) **Contribution to European interest**: Projects must demonstrate measurable benefits beyond financing Member States, such as fostering innovation, advancing environmental strategies, or creating societal spillovers;

(iii) **Necessity and incentive**: Aid must be essential for realisation and act as an incentive, especially for high-risk initiatives;

(iv) **Scale and alignment**: Projects must be substantial in scope and aligned with EU priorities.

2014 IPCEI Communication

Wider requirements for existing criteria:

- **Contribution to European interest**: Explicit alignment with specific Union strategies (e.g. Europe 2020 Strategy, Energy Strategy, or flagship initiatives);
- **Cross-border participation**: Projects must usually involve more than one Member State, with benefits extending beyond financing countries.

New criteria:

(v) **Co-financing**: Beneficiaries must provide co-financing;

(vi) **Phasing out harmful subsidies**: Projects must align with principles to reduce environmentally harmful subsidies.

2021 IPCEI Communication

Wider requirements of existing criteria:

- **Contribution to European interest**: Strong emphasis on strategies such as the European Green Deal, Digital Strategy, and climate neutrality by 2050;
- **Cross-border participation**: Ordinarily involves at least four Member States unless justified by project nature. All Member States must have genuine opportunities to participate, including SMEs and start-ups;
- **Wider spillovers**: Benefits must include systemic effects across value chains or sectors.

New criteria:

(vii) **Increased transparency**: Notifying Member States must demonstrate that all Member States were informed of the possible emergence of a project;

[18] Commission Regulation (EU) No 651/2014 of 17 June 2014 declaring certain categories of aid compatible with the internal market in application of Articles 107 and 108 of the Treaty, OJ L 187 26.6.2014.

[19] European Commission, Framework for State aid for research and development and innovation, IO C 198, 27.6.2014.

(viii)	**DNSH principle**: Projects must comply with the DNSH principle under Regulation (EU) 2020/852.

1.1.2 Policy context

In the context of the climate crisis and changes in the international economic and geopolitical landscape, a broader and more active industrial policy is needed. Nevertheless, the EU industrial policy is bounded by the single market competition policy, which prevents the use of State aid that may create 'distortions of competition in the internal market that could result from the granting of selective advantages to certain companies'[20]. Accordingly, 'all direct aid granted by Member States (e.g. non-repayable subsidies, loans on favourable terms, tax and duty exemptions, and loan guarantees) as well as similar advantages are banned'[21].

IPCEIs are a key instrument to achieve common EU priorities without interfering with single market competition. Positioned at the intersection of **EU industrial policy** and **EU competition policy**, these projects underpin all policies and actions to achieve common European objectives, such as the European Green Deal, the Digital Strategy, and the Digital Decade, the New Industrial Strategy for Europe. IPCEI has thus become a key investment instrument, allowing Member States to finance early stages of industrial policy projects while aligning with European priorities.

The identification of IPCEIs and their alignment with ongoing industrial policy and strategy has developed through the **various waves of IPCEI**[22] (see section 1.3). During the first wave of IPCEIs, projects were identified in an ad hoc manner, largely based on the 2014 Communication. The second wave of IPCEIs, marking the consolidation phase, built on the experience and lessons of the first wave and was based on the 2021 Communication. It started and developed in parallel with the creation of the Recovery and Resilience Facility (RFF). European financing further expanded participation, enabling a broader range of Member States, particularly those from Central and Eastern Europe, to engage in IPCEIs[23]. The third wave of IPCEIs includes post-RRF projects and is guided by the JEF-IPCEI.

Established in October 2023, the JEF-IPCEI contributed to defining the sequence of steps of IPCEIs, involving various actors at each stage and requiring close coordination between Member States, the European Commission, and project participants. These phases guide the process from the initial identification of

[20] TFEU, Article 107 (ex Article 87 TEC), OJ C 115, 9 May 2008, pp. 91–92.
[21] Ibid.
[22] Eisl, A., EU industrial policy in the making. From ad hoc exercises to key instrument: how to make IPCEIs fit for the long run, Policy paper, Paris, Jacques Delors Institute, 16 December 2022.
[23] Ibid.

strategic needs to full implementation and monitoring of the projects.

Box 2: Phases of an IPCEI

The start and development process of IPCEIs involves different actors and activities. It comprises five phases:

- **Phase 1 Emergence of an IPCEI:** This phase extends from the identification of the object of a new project to the joint public announcement of at least four Member States considering initiating an IPCEI. Interested Member States should identify the market or systemic failures to be addressed, the objective(s) of common interest, the scope, and the innovative nature of the project or its importance from an infrastructure perspective.
- **Phase 2 Design of an IPCEI:** National authorities of interested Member States establish which of the Member States and projects will be part of the IPCEI design.
- **Phase 3 Pre-notification of an IPCEI:** The European Commission assesses the project documents submitted by participating Member States and may issue a Request for Information (RFI). At this stage, the national authorities, potential IPCEI direct participants and the European Commission services work closely together.
- **Phase 4 Notification of an IPCEI:** After the notification of all participating Member States is completed, the European Commission has two months to process the notified project. This phase ends with a formal European Commission Decision.
- **Phase 5 Publication and reporting on the implementation of an IPCEI and improving the process:** This starts when the European Commission has adopted the decision to approve State aid for the implementation of the IPCEI. National authorities grant and provide that aid, monitor the projects' implementation, and report to the Commission on the basis of the information gathered from the IPCEI participants.

Successful design and implementation of IPCEIs rely on the active contribution of multiple stakeholders. These include public authorities at national and EU level, as well as private entities of different sizes and capacities across the Member States. Box 3 summarises the key roles of the most relevant actors, highlighting how each contributes to the governance, financing, and execution of these large-scale projects.

Box 3: Key stakeholders and roles

IPCEIs typically involve many stakeholders, from the European Commission to Member States' national authorities, and from large corporations to SMEs[24].

Public entities

Member States' national authorities initiate the IPCEI process (see Box 2) and play a vital role throughout the entire life of the IPCEI. They act as intermediaries between the European Commission and the private companies interested in participating in the project.

Through the JEF-IPCEI, **DG COMP** and **DG GROW** ensure that the process is followed

[24] JEF-IPCEI, Recommendation of the Joint European Forum for Important Projects of Common European Interest on the roles of associated and indirect partners in an IPCEI ecosystem, adopted by the high-level meeting of the Joint European Forum for IPCEI on 27 November 2024.

and participants are kept up to date. From a wider perspective, the **European Commission** assesses the IPCEI documents in the pre-notification and notification phases (phase 3 and 4), and assesses the report submitted by the national authorities.

Private entities

Companies from the various Member States are called to participate in the IPCEI. The companies involved can be divided into three subgroups: direct participants, associated partners, and indirect partners (together: IAPs).

- **Direct participants:** Eligibility criteria for an individual project in an IPCEI are laid down in the IPCEI Communication. Direct participants are those companies involved in the governance of the IPCEI that have reporting obligations to their national authorities. They work closely with national authorities and the Commission in the pre-notification and notification phases. Direct participants receive funds from the IPCEI directly.
- **Associated partners:** The main goal is to give to companies and research organisations (ROs) the possibility to participate in the IPCEI. They are not subject to the pre-notification and notification processes, and their contributions play a complementary role in fulfilling IPCEI objectives. Associated partners cannot receive funds from the IPCEI, instead being funded through the GBER or an EU fund. They are selected at national level, contribute to an IPCEI with their own project, have a representation in the IPCEI governance, and can contribute to the setting up of an IPCEI. They have reporting obligations towards Member States and public authority boards (PABs).
- **Indirect partners:** ROs, academics, SMEs and large enterprises that are not participating in the IPCEI as direct participants or associated partners. They collaborate with a direct participant or an associated partner, thus do not have their own project. Indirect participants may have undergone a national selection procedure to determine their participation, they are not funded under the IPCEI Communication, and do not have a role in the governance of the IPCEI, nor are they required to report under the IPCEI Communication.

1.1.3 JEF-IPCEI

The JEF-IPCEI was launched in 2023 and is co-managed by DG COMP and DG GROW. It was established in response to Member States' longstanding concerns about transparency, coordination and efficiency within the IPCEI framework. It is composed of Member States' authorities and European Commission representatives. Other Commission services can be invited on a case-by-case basis, depending on the area of the IPCEI being discussed[25].

The JEF-IPCEI has four main functions:

- **Identifying new IPCEIs** by encouraging Member States to proactively propose strategic projects and facilitating discussions on future priorities such as artificial intelligence (AI) and biotech;

[25] European Commission, Joint European Forum for IPCEI (JEF-IPCEI), 2025.

- **Improving procedural efficiency**, notably through efforts to simplify the State aid notification process and reduce bottlenecks that have historically delayed project approval;
- **Enhancing implementation and evaluation** by promoting coordination to ensure that interdependent projects advance together and deliver the expected spillovers across participating Member States;
- **Facilitating dialogue and coordination between Member States and the European Commission**, involving national authorities and, where relevant, representatives from industry, academia, and other stakeholders to ensure early alignment on emerging IPCEI topics.

The JEF-IPCEI facilitates policy discussions on IPCEI between the Member States and the Commission's services across the five different phases of an IPCEI (see Box 2).

1.2 Existing IPCEIs

Since 2018, the European Commission has annually approved at least one integrated IPCEI, reflecting the growing strategic importance of these initiatives in addressing Europe's economic, technological, and environmental challenges. To date, 10 IPCEIs have been launched, focusing on research, development, industrial deployment, and infrastructure. The two infrastructure projects, Øresund and Fehmarn Belt cross-border transport links, aimed to improve EU connectivity but faced legal challenges over State aid compliance. Given their procedural complexities and limited relevance to the more recent, innovation-driven IPCEIs, these infrastructure projects are not considered further in this study[26].

The eight remaining projects seek to foster EU innovation and strengthen strategic value chains, particularly in critical sectors such as microelectronics, batteries, hydrogen, cloud infrastructure, and health. With over €37.2 billion in public funding and €66 billion in private investment committed to date, IPCEIs represent a level of financial engagement comparable to the EU Horizon programmes. The projects involve an increasing number of participants, including a significant proportion of SMEs. Since the launch of the first IPCEI on microelectronics in 2018, SME participation has grown from 7% to 64% (in the 2024 Med4Cure IPCEI[27]). This trend highlights the inclusivity and appeal of the IPCEI instrument for diverse stakeholders, fostering robust collaboration across Europe.

[26] European Parliamentary Research Service (EPRS), *Important projects of common European interest: Boosting EU strategic value chains*, 2020, https://www.europarl.europa.eu/RegData/etudes/BRIE/2020/659341/EPRS_BRI(2020)659341_EN.pdf

[27] European Commission, Commission approves up to €1 billion of State aid by six Member States for the first Important Project of Common European Interest in the health sector, Press release, 28 May 2024, https://ec.europa.eu/commission/presscorner/detail/en/ip_24_2852

This section provides an overview of the IPCEIs approved to date, highlighting their scope, objectives and contributions to the EU's broader strategic goals.

1.2.1 First wave

Microelectronics

- Launched in 2018, the first IPCEI on microelectronics unites 32 companies and ROs from five Member States. It aims to strengthen Europe's position in the global microelectronics sector by focusing on energy-efficient chips, power semiconductors, sensors, advanced optical equipment, and compound materials. This project has received €1.9 billion in public funding and €6.5 billion in private investment, fostering innovation and resilience in strategic technological fields.

Batteries

- Launched in 2019, the first IPCEI on batteries aims to create a competitive and sustainable battery value chain in Europe. It includes participants from seven Member States and covers the entire battery lifecycle, from mining and manufacturing to recycling. Supported by €3.2 billion in public funding and €5 billion in private investment, it advances lithium-ion battery technologies and promotes sustainability.
- Approved in 2021, EuBatIn, the second IPCEI on batteries, builds on these efforts, involving 42 companies from 12 Member States. This initiative focuses on advanced materials, battery systems, and recycling processes, receiving €2.9 billion in public funding and leveraging €9 billion in private investment. It supports clean mobility, the green transition, and industrial competitiveness.

1.2.2 Second wave

Microelectronics

- Launched in 2023, the second IPCEI on microelectronics involves 68 projects led by 56 companies across 14 Member States. This initiative supports R&D in areas such as 5G and 6G communication, autonomous driving, AI, and quantum computing. With €8.1 billion in State aid and €13.7 billion in private investment, it contributes to the EU's digital transformation and green transition goals.

Hydrogen

- Approved in 2022, the first hydrogen IPCEI (Hy2Tech) advances hydrogen technologies across the value chain, including production, storage, distribution, and mobility applications. It involves 41 projects from 15 Member States and receives €5.4 billion in public funding, with an additional €8.8 billion in private investment. The project supports

renewable hydrogen and fuel cell development, contributing to Europe's energy transition.

- Also approved in 2022, the second hydrogen IPCEI (Hy2Use) focuses on infrastructure and industrial applications in hard-to-decarbonise sectors such as steel and cement. With 35 projects in 14 Member States, it mobilises €5.2 billion in public funding and €7 billion in private investment, scaling-up and integrating hydrogen production in industrial processes.

Cloud infrastructure

- Launched in 2023, IPCEI-CIS, on next generation cloud infrastructure, supports Europe's digital transformation by advancing interoperable cloud-to-edge technologies. This initiative involves seven Member States, receives €1.2 billion in public funding, and leverages €1.4 billion in private investment. It promotes data privacy, cybersecurity, and energy efficiency, aligning with the EU's Digital Decade and European Data Strategy.

1.2.3 Third wave

Hydrogen

- Subsequent hydrogen projects such as the third hydrogen IPCEI, Hy2Infra, and the fourth hydrogen IPCEI, Hy2Move, address the development of hydrogen mobility and transport applications, creating robust ecosystems for clean energy technologies. Together, they attract €8.3 billion in public funding and €8.7 billion in private investment.

Health

- Approved in 2024, the IPCEI Med4Cure addresses unmet medical needs such as rare diseases and antimicrobial resistance (AMR). It involves six Member States and supports pharmaceutical innovation, sustainable production, and personalised therapies. With €1 billion in public funding and €5.9 billion in private investment, it contributes to the European Health Union and strengthens EU resilience to health crises.

Table 1: Approved IPCEIs, 2018-2024

IPCEI	Companies	Projects	State aid (€ billion)	Exp. private investment (€ billion)	Member States
First IPCEI on microelectronics (2018)	29	43	1,9	6,5	France, Germany, United Kingdom, Italy, Sweden, Finland

First IPCEI on batteries (2019)	17	23	3,2	5	France, Germany, Italy, Belgium, Poland, Slovakia, Finland, Sweden
Second IPCEI on batteries – EuBatIn (2021)	42	46	2,9	9	Germany, France, Italy, Sweden, Finland, Belgium, Spain, Croatia, Greece, Poland, Slovakia
First hydrogen IPCEI – Hy2Tech (2022)	35	41	5,4	8,8	France, Germany, Italy, Spain, Netherlands, Belgium, Portugal, Greece, Finland, Slovakia, Czechia, Estonia, Norway
Second hydrogen IPCEI – Hy2Use (2022)	29	35	5,2	7	France, Germany, Italy, Spain, Netherlands, Belgium, Sweden, Portugal, Greece, Finland, Czechia, Norway, Poland
Second IPCEI on microelectronics and communication technologies (2023)	56	68	8,1	13,7	France, Germany, Italy, Spain, Greece, Poland, Belgium, Finland, Slovakia, Czechia, Romania, Slovenia, Sweden, Ireland, Croatia, Luxembourg, Netherlands
IPCEI on next generation cloud infrastructure and services (2023)	19	19	1,2	1,4	France, Germany, Italy, Spain, Netherlands, Luxembourg
Third hydrogen IPCEI – Hy2Infra (2024)	32	33	6,9	5,4	France, Germany, Italy, Spain, Netherlands, Slovakia, Czechia, Slovenia, Croatia, Portugal, Bulgaria
Fourth hydrogen IPCEI – Hy2Move (2024)	11	13	1,4	3,3	France, Germany, Italy, Spain, Netherlands, Estonia, Portugal, Slovenia
IPCEI Med4Cure (2024)	13	14	1	5,9	France, Germany, Italy, Spain, Portugal, Belgium
Total	283	335	37,2	66	22 Member States, UK and Norway participated in at least one IPCEI

Source: European Commission, Approved integrated Important Projects of Common European Interest (IPCEI), 2025.

1.3 Mapping existing IPCEIs

The emergence and rapid proliferation of IPCEIs is increasingly visible across the EU. As the instrument has gained momentum, differences in participation patterns have emerged, both between Member States and across thematic areas. Understanding who participates, in which sectors, and at what scale is essential for assessing the current state of play and identifying opportunities to broaden engagement. This section maps current IPCEI activity and analyses participation at national and project levels, as well as the financial scale of these initiatives.

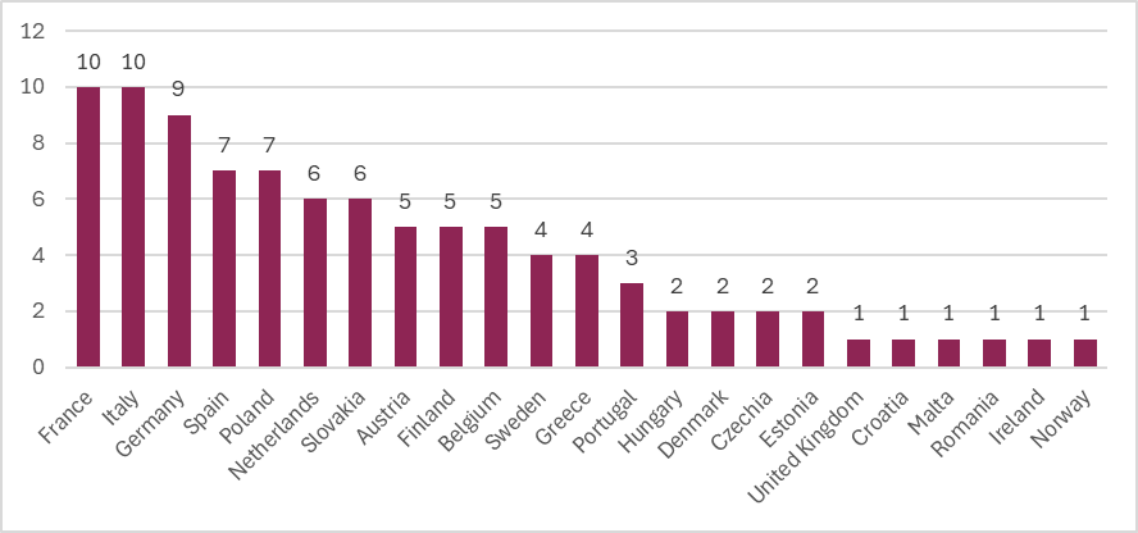
1.3.1 Country participation

Since the revitalisation of the IPCEI framework, 22 countries have participated in at least one project. However, participation is heavily concentrated in several Member States. France and Italy each participate in 10 IPCEIs, followed closely by Germany, with involvement in nine projects. A second group of increasingly active countries has emerged, including Spain and Poland, each participating in seven IPCEIs, as well as the Netherlands and Slovakia, at six each. These countries have a particularly strong presence in the most recent waves of IPCEIs, reflecting growing strategic interest and industrial capacity in key sectors such as hydrogen, batteries, and cloud infrastructure.

By contrast, several Member States remain only marginally involved, having participated in a single IPCEI – Ireland, Croatia, Malta and Romania, alongside Norway and the United Kingdom (UK) (prior to its withdrawal from the EU). Most entered the framework through hydrogen-related IPCEIs, which are the most geographically inclusive.

Finally, five Member States (Bulgaria, Cyprus, Latvia, Lithuania, Luxembourg) have yet to participate in any IPCEI.

Figure 1: Breakdown of participating coutries per IPCEI



Source: European Commission, Approved integrated Important Projects of Common European Interest (IPCEI), 2025.

The earliest IPCEIs (microelectronics and batteries) saw participation from a relatively concentrated group of Member States. For example, the first IPCEI on microelectronics (2018) included only five countries (Germany, France, Italy, Austria, UK). Similarly, the first IPCEI on batteries (2019) involved seven Member States, including Belgium, Greece, Croatia, Poland, Finland and Sweden.

However, participation expanded considerably in subsequent waves, with the second IPCEI on microelectronics (2023) growing to 14 Member States and EuBatIn (2021) to 12 Member States. More recent IPCEIs, particularly those in the hydrogen sector, show the broadest and most geographically diverse participation. The four hydrogen-related IPCEIs launched between 2022 and 2024 brought together a wide array of countries, including traditional industrial players and newer participants. Notably, Ireland, Malta, Romania and Norway joined hydrogen projects as first-time participants. In total, the hydrogen IPCEIs involve 15 countries, the most inclusive thematic area to date.

By contrast, participation in other thematic areas remains more selective. IPCEI-CIS (2023) includes seven Member States, mainly from larger economies with established digital sectors, such as Spain, Germany, France and Italy, alongside Hungary, the Netherlands, Poland, Portugal and Slovakia. The IPCEI Med4Cure (2024) was launched with only six participants (France, Germany, Italy, Hungary, the Netherlands, and Belgium) reflecting a more specialised industrial focus and perhaps more concentrated capacities within those Member States.

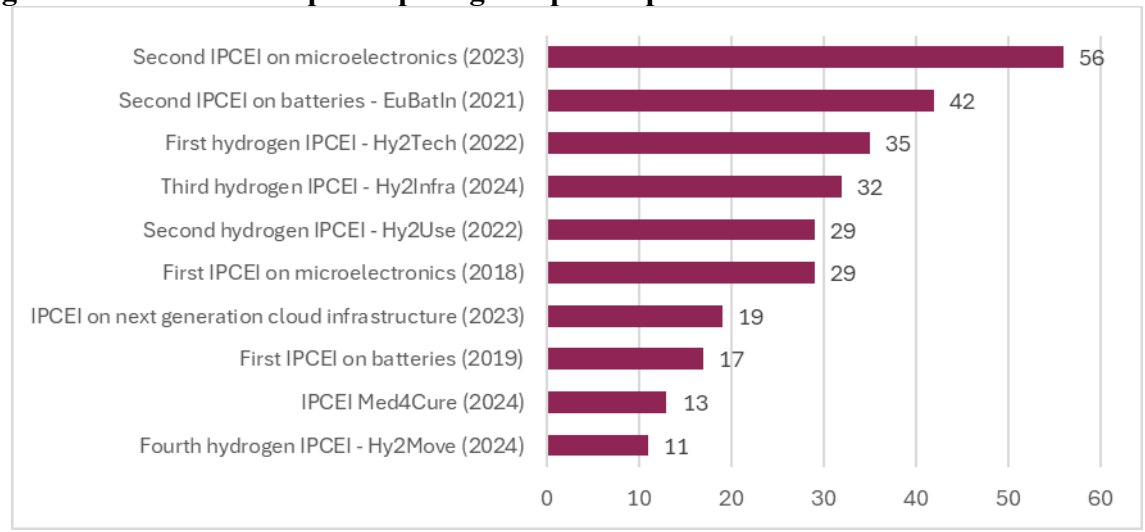
1.3.2 Participating companies and projects

The 10 IPCEIs launched between 2018 and 2024 have seen a total of 283 participating companies implementing 335 projects. Hydrogen-related IPCEIs involve 113 companies across four projects launched between 2022 and 2024. Microelectronics-related IPCEIs involve 85 companies across two projects. Battery-related IPCEIs involve 59 companies across two projects. IPCEI-CIS (2023) involves 19 companies, while IPCEI Med4Cure (2024) involves 13 companies.

The largest participation is in the second IPCEI on microelectronics (2023) with 56 companies, followed by EuBatIn (2021) with 42 companies, the first hydrogen IPCEI (2022) with 35 companies, and Hy2Infra (2024) with 32 companies. In contrast, smaller initiatives like the IPCEI Med4Cure (2024) and the fourth hydrogen IPCEI (2024) involve 13 and 11 companies, respectively. By theme, microelectronics IPCEIs involve 85 companies, hydrogen 113, batteries 59, cloud infrastructure 19, and health 13.

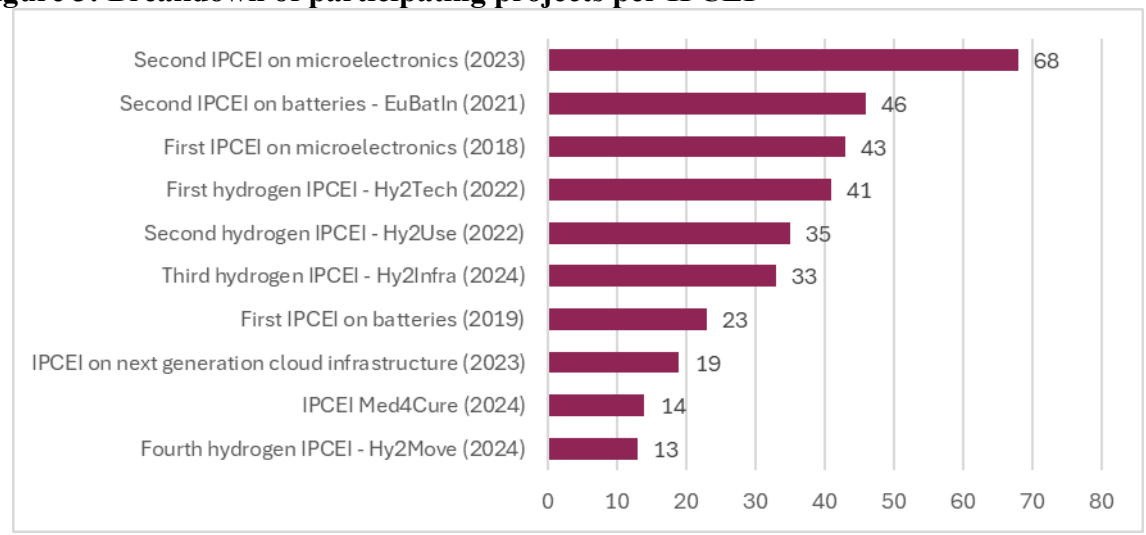
In total, IPCEIs have implemented 335 projects. The largest are the second IPCEI on microelectronics (2023) with 68 projects, EuBatIn (2021) with 46, and the first hydrogen IPCEI (2022) with 41. Across themes, microelectronics accounts for 111 projects, hydrogen for 122, batteries for 69, cloud infrastructure for 19, and health for 14.

Figure 2: Breakdown of participating companies per IPCEI



Source: European Commission, Approved integrated Important Projects of Common European Interest (IPCEI), 2025.

Figure 3: Breakdown of participating projects per IPCEI



Source: European Commission, Approved integrated Important Projects of Common European Interest (IPCEI), 2025.

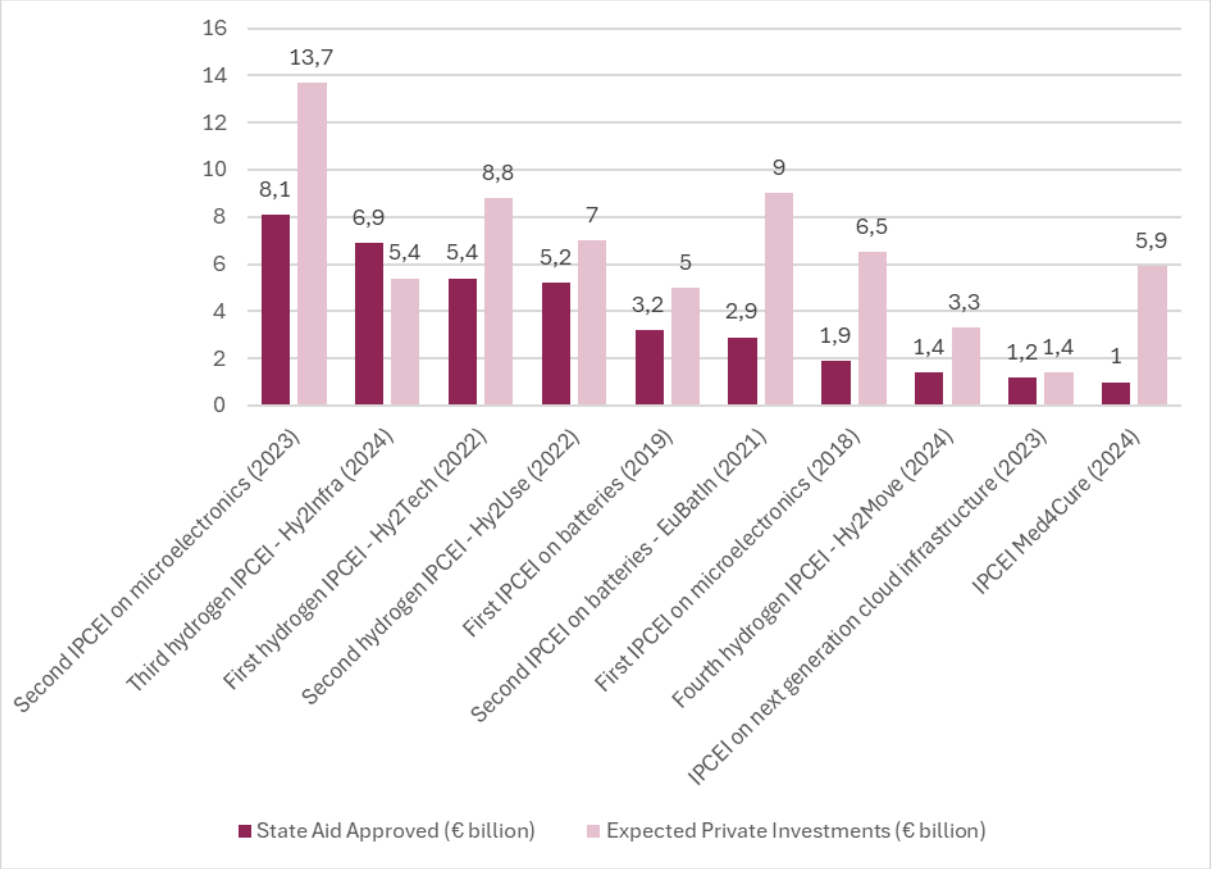
1.3.3 Financial scale

The financial scale of IPCEIs underscores their strategic importance. As of early 2024, IPCEIs have mobilised over €37.2 billion in State aid, alongside an estimated €66 billion in private investment. This significant leverage effect demonstrates the ability of IPCEIs to attract substantial public and private resources towards shared European industrial objectives.

The largest IPCEI by financial scale is the second IPCEI on microelectronics (2023), which has received €8.1 billion in State aid and is expected to generate €13.7 billion in private investment. This is followed by Hy2Infra (2024) with €6.9 billion in State aid and €5.4 billion in private investment, and the first hydrogen

IPCEI (2022) with €5.4 billion in State aid and €8.8 billion in private investment. These figures highlight not only the technological ambition of the IPCEIs but also their financial weight, as they channel considerable public support to crowd in substantial private capital, fostering investment in areas crucial to Europe's long-term competitiveness and strategic autonomy.

Figure 4: Breakdown of approved state aid and expected private investments by IPCEI



Source: European Commission, Approved integrated Important Projects of Common European Interest (IPCEI), 2025.

1.3.4 LRA involvement

The involvement of LRAs in IPCEIs remains somewhat limited. The stakeholder interviews highlighted that IPCEIs are primarily designed as top-down instruments, initiated and coordinated at European and national level, with no formal role foreseen for LRAs in their governance, financing or monitoring. The State aid framework underpinning IPCEIs focuses on national public funding and does not provide mechanisms for direct regional participation. As a result, LRAs are largely absent from formal decision-making processes and, in many cases, their awareness of IPCEIs remains low.

The survey findings support this observation. Of 37 respondents, approximately 54% had previously heard of IPCEIs, while around 46% had not. Among those

familiar with IPCEIs, the most common sources of information were EU institutions (41%), followed by national authorities (28%), the media (14%), and networks or associations (14%). Familiarity with the objectives and functioning of IPCEIs remained relatively low, with 25% rating their familiarity as very low, 10% as low, 20% as moderate, 25% as very familiar, and 15% as highly familiar.

When asked whether they were aware of any IPCEIs benefitting their region, around 62% of respondents said no. Among those who were aware of IPCEIs in their region, information most often came from national authorities (43%), followed by EU institutions (29%), private companies (21%), the media (21%), networks or associations (14%), and regional authorities (7%). Finally, when asked if they felt adequately informed about opportunities to join or contribute to IPCEIs through their Member State or the EU, 86% of respondents answered no.

Of the five respondents who reported experience with IPCEIs, two were LRAs (from Germany and Romania), alongside an innovation agency from Belgium, a chamber of commerce, and an industry organisation from Austria. The German LRA described its participation in national-level discussions as difficult, noting that the process was often focused on high-level political objectives rather than regional needs. Their practical involvement centred on providing financial contributions, covering around 30% of public funding for relevant projects. The Romanian LRA also confirmed participation but did not provide further details on its specific role. The Belgian innovation agency highlighted its involvement in intra-Belgian coordination, where regional and federal authorities align on thematic priorities and procedures for potential IPCEIs. Austrian stakeholders from the chamber of commerce and an industry organisation reported supporting innovation activities linked to IPCEIs but expressed concerns about the administrative complexity of the process, long delays, and the heavy burden placed on regional actors and smaller organisations. Overall, the forms of LRA involvement identified included **financial contributions**, **participation in national consultations,** and **support for regional coordination** and **innovation ecosystems**.

Finally, the five case studies confirm that LRA involvement is generally marginal, although the degree of engagement varies by Member State, sector, and specific regional contexts. While LRAs are not formally integrated into governance structures and are excluded from key procedural phases (e.g. pre-notification and project design), some regions have found ways to contribute indirectly, particularly through **co-funding**, **facilitating local networks**, and **supporting companies** participating in IPCEIs.

The analysis of the five case studies confirmed this overall trend of limited formal involvement, with some notable exceptions:

- **Microelectronics IPCEI (2018):** LRAs were not formally involved in the design or implementation phases. However, some regions contributed informally, such as Saxony (Germany), which provided political support and explored regional co-financing, and Sicily (Italy), which contributed funding through the national IPCEI fund to support a local project. In Austria, the Styrian Research Promotion Agency supported companies throughout the process;

- **EuBatIn (2021)**: LRA involvement was slightly more visible. Regions hosting General Assemblies, such as Lyon, facilitated local networking events. In Germany, Länder contributed around 30% of the funding to reflect local economic benefits, and LRAs supported regional clusters and informed companies of participation opportunities;

- **IPCEI-CIS (2023)**: LRA involvement was minimal. There was no consultation during the design or implementation phases, partly due to the R&D focus of the project, which involves fewer infrastructure investments that might require local coordination;

- **Hy2Infra (2024)**: LRAs have provided limited financial contributions and local support in countries with stronger regional structures, such as Germany and Belgium. In Italy, although all selected projects are located in Puglia, the region was only involved in permitting procedures, without formal consultation during project selection;

- **Med4Cure (2024)**: LRA involvement has been modest, with Wallonia (Belgium) participating through a local company, reflecting Belgium's decentralised governance. In the Netherlands, the South Holland region and the City of Leiden supported an SME through partnerships, workforce development, and infrastructure support. However, LRAs have otherwise not been formally engaged, and decision-making has remained concentrated at national level.

2. Changes for successful future IPCEIs

The literature review, interviews and survey results indicate a broad range of lessons from the implementation of the IPCEIs, including challenges, barriers and success stories, that can serve as guidelines for the further evolution of the IPCEIs. This study pays particular attention to the changes needed for greater involvement of LRAs in the IPCEIs and how the LRAs and their regions can better benefit from these projects.

The following sections provide an overview of the lessons in relation to overall implementation of the IPCEIs generally, then LRA involvement more specifically.

2.1 Lessons from IPCEI implementation

2.1.1 Challenges and barriers

Stakeholders in several Member States highlighted the **administrative burden of IPCEI procedures** as a pressing challenge. The application process is described as highly complex, requiring substantial documentation and detailed responses to the European Commission. This was confirmed in the case of the IPCEI on microelectronics, where stakeholders noted that companies, particularly SMEs, struggled to manage the volume of paperwork and compliance requirements. The procedural workload creates a heavy strain for both public authorities and companies and is widely seen as contributing to significant delays, which are especially problematic for industries operating in fast-paced global markets.

Long application periods and procedural uncertainty is equally crucial. Interviews conducted in the context of the IPCEI-CIS revealed that the approval process took over two years, which was considered excessive given the rapid technological developments in the digital sector. Similar concerns emerged in Hy2Infra, where delays in EU-level funding decisions reportedly pushed back the construction timeline for major hydrogen infrastructure projects, such as the large-scale electrolyser plant in Lower Saxony. This uncertainty has led to frustration among project promoters and, in some cases, resulted in the withdrawal of partners during the preparation phase, creating instability within consortia and complicating the coordination of cross-border projects.

Stakeholders underlined the **difficulty of adapting projects to evolving market conditions**. While IPCEIs are designed to foster innovation, the rigid frameworks and lengthy approval procedures leave little room for flexibility once projects are underway. As highlighted in the case of EuBatIn, the rapidly changing landscape

of battery technology requires agile responses, yet the current procedural model often forces companies to adhere to technological roadmaps defined years in advance. This limits their ability to incorporate emerging innovations and risks making parts of the projects obsolete before completion (see Box 4).

Box 4: Lessons from Northvolt's participation in EuBatIn

Northvolt, a Swedish company founded in 2016, has been one of the most emblematic participants in the EuBatIn IPCEI. It was hailed as a cornerstone of the EU's battery value chain and a key actor in its clean tech industrial ambitions. The company received institutional support from the European Investment Bank (EIB), the EU, and the German government, which helped to attract significant private investment, including from Volkswagen and Goldman Sachs[28].

Northvolt contributed to the EuBatIn workstream on battery cells, focusing on next-generation Li-ion and Li-metal batteries, and integrating innovations in both materials and production processes. However, by 2023, production at its Skellefteå plant was reportedly below 1% of its 16 GWh target capacity. Heavy reliance on imported Chinese machinery and expertise exposed structural weaknesses and raised questions about the sustainability and resilience of Europe's battery strategy.

The company's failure to secure new financing, missed production targets, and eventual bankruptcy filings in the United States (US) (November 2024) and Sweden (March 2025) sent shockwaves through the European cleantech sector[29]. Its German subsidiary has not yet filed for bankruptcy and its role in ongoing IPCEIs remains uncertain.

Northvolt's trajectory highlights a series of systemic risks that IPCEIs must address: the challenge of scaling manufacturing rapidly, dependence on non-EU supply chains, and the difficulty of competing with established global players. It also underscores the importance of robust due diligence, project adaptability, and resilient ecosystems in ensuring long-term success[30].

The **imbalance in funding capacities between Member States** represents another fundamental structural barrier. Stakeholders in smaller or less wealthy countries repeatedly pointed out that their financial limitations restrict the scale of their involvement in IPCEIs. The case study on IPCEI microelectronics confirms that countries like Austria would have struggled to support large-scale investments without the framework provided by the IPCEI, but the reliance on national budgets remains a disadvantage compared to the capacities of larger Member States such as Germany and France. The risk of deepening geographical inequalities was also noted in Hy2Infra, where German Länder were able to

[28] Meza, E., 'Germany greenlights over 150 million euros for Northvolt battery factory', *Clean Energy Wire,* 12 May 2022, https://www.cleanenergywire.org/news/germany-greenlights-over-150-million-euros-northvolt-battery-factory

[29] Northvolt, 'Northvolt files for bankruptcy in Sweden', Northvolt website, 12 March 2025, https://northvolt.com/articles/northvolt-files-for-bankruptcy-in-sweden/

[30] Tagliapietra, S. and Trasi, C., 'Northvolt's struggles: a cautionary tale for the EU Clean Industrial Deal', Bruegel website, 11 December 2024, https://www.bruegel.org/analysis/northvolts-struggles-cautionary-tale-eu-clean-industrial-deal

provide additional financial contributions, while regions in more centralised countries had limited means to participate.

Limited SME participation presents an additional challenge. The case of IPCEI microelectronics showed that the initial phases of the project were dominated by large industrial players, with SMEs joining after targeted efforts by national authorities and research centres. In the IPCEI-CIS, despite the project's strong emphasis on digitalisation, SMEs found it difficult to participate due to insufficient administrative capacity and lack of specialised staff to handle the complex application and reporting procedures. The interviews highlighted that, without stronger support structures, SMEs will continue to be marginalised in future IPCEIs, despite their potential to contribute significant innovation.

Finally, the **lack of coordination across funding instruments and levels of governance** remains a key obstacle. Hy2Infra, in particular, illustrated the practical difficulties of combining multiple funding sources, such as State aid, the RRF, and Cohesion Funds. Interviewees reported that aligning these instruments' timelines, rules, and administrative procedures required careful planning and created additional complexity. As noted in both Hy2Infra and IPCEI-CIS, there is a high degree of variation between Member States in the degree to which LRAs are involved in funding strategies. While some Länder in Germany actively supported IPCEI projects with additional resources, more centralised Member States such as Italy and France provided fewer opportunities for regions to contribute, reinforcing existing asymmetries.

Table 2: Key barriers to effective IPCEI implementation

Barriers	Specific obstacles
1. Administrative and procedural complexity	• Heavy administrative burden of IPCEI application and reporting processes • Lengthy application periods, sometimes exceeding two years • Complex and rigid procedures with multiple review loops • Lack of flexibility to adapt projects to evolving market needs • High workload and resource demands for authorities and companies • Slow disbursement of funds, creating financial strain for participants • Lack of clear communication and shifting timelines during the process • Complexity in aligning national procedures and timelines across Member States • Difficulty in combining and coordinating multiple funding sources (e.g. State aid, RRF, Cohesion Funds) • Delays in EU-level funding decisions impacting project timelines
2. Financial and resource	• Imbalance in national funding capacities between larger and smaller Member States

constraints	• Limited financial resources for smaller countries, reducing their ability to participate • Disparities in regional funding contributions due to differences in governance systems • Insufficient financial capacity of SMEs to participate in large-scale projects • Financial risks for companies, particularly SMEs, due to long gaps before receiving support
3. Strategic and structural limitations	• Limited SME participation due to lack of administrative capacity and specialised staff • Initial dominance of large industrial players, with SMEs joining only later or minimally • Limited mechanisms to support spillover effects and broader ecosystem engagement • Difficulty in ensuring geographical balance in participation across Member States • Structural asymmetries in LRA involvement depending on national governance models
4. Information and coordination gaps	• Low awareness of IPCEIs among new actors, particularly at regional and local level • Insufficient dissemination of opportunities to regional and local authorities • Poor coordination between regional, national, and EU levels • Lack of proactive communication and early information-sharing with potential participants • Fragmented information on existing and future IPCEI opportunities • Challenges in ensuring that information reaches smaller municipalities and less central regions
5. Time sensitivity and global competition	• Inability to match the speed of global competitors, such as China and US • Slow procedures hindering projects in fast-moving sectors like microelectronics and batteries • Risk of obsolescence of planned innovations due to lengthy approval and implementation times • Projects starting with cutting-edge technology becoming outdated by the time they are operational

2.1.2 Success factors

Despite these challenges, stakeholders identified several factors contributing to the successful implementation of IPCEIs, particularly in relation to the involvement of LRAs, and offering insights into how the instrument can operate more effectively.

One of the most consistent findings is the value of **strong support from national authorities**. Across the case studies, national ministries played a crucial role in

guiding companies through complex procedures and ensuring compliance with State aid requirements. In Austria, the success of the microelectronics IPCEI was partly attributed to the proactive involvement of national authorities, which provided technical assistance and helped to mobilise funding that would otherwise have been difficult to secure.

The **strategic alignment of IPCEIs with EU industrial policy priorities** has been a critical driver of success. Projects such as EuBatIn and Hy2Infra were designed to reinforce key EU objectives, including the European Green Deal, the EU Hydrogen Strategy, and the Digital Compass. This alignment helped to build political momentum at both national and EU level and ensured that IPCEIs were integrated into broader policy frameworks. In the case of EuBatIn, for example, the strong link with EU sustainability goals not only attracted funding but enhanced the project's appeal to regional stakeholders seeking to promote green industrial development.

Effective cluster participation and regional innovation ecosystems is another key factor. The microelectronics IPCEI demonstrated how strong regional clusters, such as Silicon Saxony in Germany and the Crolles-Grenoble cluster in France, facilitated knowledge-sharing, networking, and the dissemination of project results. These clusters provided fertile ground for spillover effects, enabling indirect participants and regional SMEs to benefit from the technological advancements and collaborations fostered by the IPCEI.

Stakeholders highlighted the importance of **dedicated management structures** to oversee the coordination of complex IPCEI consortia. The experience of the IPCEI-CIS showed that managing highly integrated projects across multiple Member States requires a mix of technical, legal and administrative expertise. Dedicated teams ensured continuity, built trust among participants, and streamlined internal communication, helping to mitigate some of the administrative challenges identified in earlier IPCEIs.

A further success factor is the **modular and collaborative approach** to innovation within IPCEIs. For example, in the case of EuBatIn, participants worked across multiple workstreams, allowing flexibility and adaptability as the project progressed. This model supported risk-sharing between partners and ensured that knowledge was distributed widely across the value chain, fostering collaboration between large companies, SMEs and research institutions.

Finally, the **ability of IPCEIs to attract significant private investment and generate long-term regional benefits** has been repeatedly confirmed. The EuBatIn case study highlighted the development of the first French gigafactory for Li-ion batteries, which is expected to create thousands of jobs and strengthen

regional specialisation in battery technologies. Similarly, the microelectronics IPCEI catalysed major industrial investments, such as Bosch's billion-euro facility in Dresden, which contributed to revitalising the local economy and enhancing Europe's global competitiveness in strategic sectors.

These examples show that while IPCEIs face important procedural and structural challenges, they also have a proven capacity to drive large-scale industrial transformation and regional development when supported by effective governance, strategic alignment with EU priorities, and robust regional ecosystems.

Table 3: Key success factors supporting effective IPCEI implementation

Success factors	Specific success factors
1. Strategic regional and national coordination	• Strong support from national authorities helping participants to navigate complex procedures • Effective coordination between Member States and the European Commission through platforms like the JEF-IPCEI • Early involvement of DG COMP in project design to reduce procedural delays • Joint action by national ministries and regional actors to mobilise participation and secure project approval • Active participation of Member States with smaller economies through collaborative frameworks to avoid dominance by larger countries • Alignment of regional and national strategies to promote participation in key sectors such as hydrogen and microelectronics
2. Regional ecosystem development	• Creation and strengthening of regional innovation clusters (e.g. Silicon Alps in Austria, Silicon Saxony in Germany) to support IPCEI participation • Spillover effects fostering new businesses, collaborations, and local specialisations beyond the initial projects • Attraction of foreign direct investment (FDI) through IPCEI participation (e.g. battery gigafactories in France, Bosch factory in Dresden) • Increased regional attractiveness by anchoring leading research centres and high-tech facilities through IPCEI participation • Enhanced local value chains through targeted IPCEI investment, generating skilled employment and growth in specialised sectors • Integration of LRAs as facilitators of local ecosystem readiness by aligning skills, infrastructure, and industry needs
3. Information-sharing and knowledge dissemination	• Use of IPCEIs to disseminate knowledge via clusters, research centres and European networks • Active promotion of project results through open-source platforms, technical publications, and conferences • Cross-border spillovers, with regions sharing technological advances and best practices beyond their own territory • Training and capacity-building initiatives linked to IPCEIs (e.g.

	European Battery Academy), improving regional skills and workforce readiness • Dissemination of research outcomes to non-participating actors through cluster networks and academic collaborations
4. Flexible and inclusive participation models	• Mechanisms allowing SMEs to participate through simplified roles (e.g. IAPs) • Modular design of IPCEIs (e.g. IPCEI-CIS), enabling diverse participants to engage at different levels and manage risk collectively • Flexibility in participation through complementary funding instruments, such as the GBER • Proactive inclusion of research centres, SMEs and start-ups alongside large industrial players, fostering balanced ecosystems • Participation of new actors in follow-up projects (e.g. transition from the first to the second IPCEI microelectronics), expanding the diversity of stakeholders
5. Acceleration of European strategic objectives	• IPCEIs as drivers of major European policy goals (European Green Deal, Digital Decade, REPowerEU, European Chips Act) • Fast-tracked progress in key sectors such as microelectronics, batteries, hydrogen, and cloud services through coordinated European projects • Strengthening of technological sovereignty and resilience in strategic value chains • Long-term operability of infrastructures such as the cloud-edge continuum, with sustained governance and community support beyond the end of funding periods

2.2 Insights into LRA involvement in IPCEIs

2.2.1 Challenges and barriers

The involvement of LRAs in IPCEIs remains limited and uneven. Stakeholder interviews identified several key barriers to effective LRA participation in both the preparation and implementation of IPCEIs.

One of the main obstacles highlighted by interviewees is the **imbalance between LRAs**, with participation tending to favour wealthier regions or those already embedded within established industrial value chains. In Germany, for example, stakeholders noted that only a select number of Länder are actively involved, typically those with existing clusters in sectors like batteries. This selective participation limits the opportunities for less-developed regions to engage, reinforcing disparities.

Stakeholders emphasised that **IPCEIs lack a clear local dimension**, as projects must demonstrate European relevance. Interviewees reported that projects with strong local or regional impacts, but limited cross-border value, were rejected for

failing to meet the necessary European scope. This requirement has excluded otherwise high-quality proposals and narrowed opportunities for LRA involvement.

Many stakeholders stressed that **IPCEIs are primarily designed as top-down instruments**, initiated at European and national level, with little consideration for regional authorities. The State aid framework underpinning IPCEIs does not provide a formal role for LRAs, limiting their participation in decision-making and governance structures. Interviewees highlighted that **no formal coordination mechanisms** connect local, regional, national and EU levels during the IPCEI process. While some LRAs maintain informal relationships with companies involved in IPCEIs, they lack any official channel through which to influence or engage with the process directly.

Interviewees pointed to the **misalignment between EU and regional priorities** as a barrier. While the EU focuses on strategic objectives such as technological sovereignty, regional authorities often prioritise employment, education and local economic development. In some cases, regional authorities expressed concerns about large-scale investments they cannot adequately support due to infrastructure constraints, such as insufficient land availability or housing capacity. There are also instances where regional permitting processes have caused delays or even cancellations of approved IPCEI projects, as reported by stakeholders in Italy, where local authorisations failed to align with project timelines.

Lastly, competition in fast-moving sectors such as microelectronics presents a challenge for regions with **less agile administrative processes**. The microelectronics IPCEI highlighted the difficulties LRAs face in supporting companies under tight market pressures, due to insufficient administrative capacity and limited technical expertise in highly innovative sectors. In Italy, delays in administrative authorisations from an LRA led to the withdrawal of a company from the IPCEI-CIS due to excessive bureaucracy. These examples show how limited capacity and administrative bottlenecks at local level can actively hinder participation.

The survey findings confirm these barriers. For the 37 respondents, the most significant challenges to launching or participating in IPCEIs were **complex procedures** (considerable or very much: 54%), **lack of resources,** such as funding and investment capital (considerable or very much: 43%), **limited capacity,** including insufficient technical expertise and administrative support (considerable or very much: 43%), and **lack of coordination between levels of government** (considerable or very much: 41%). **Lack of awareness** was also reported as a challenge, although to a slightly lesser extent (considerable or very much: 41%). For the respondents who had been involved in an IPCEI, common

challenges included **administrative or procedural burdens** (64%), and to a lesser extent, lack of clarity on roles and responsibilities (36%), limited communication or coordination with other stakeholders (36%), and insufficient resources or funding (29%).

Several survey respondents also pointed to the difficulty of ensuring sufficient **internal coordination within Member States**, particularly in federal systems, where aligning across different levels of government can be highly complex, especially budget planning and resource allocation.

Uncertainty about the outcomes of IPCEI participation was flagged as a significant issue. Stakeholders noted that mobilisation efforts, such as calls for interest and engagement with companies, often require considerable investment of time and resources without a guaranteed result, creating a high-risk environment for regional actors.

Table 4: Main barriers to LRA involvement in IPCEIs

Barriers	Specific obstacles
1. Uneven participation and territorial disparities	• Imbalance between LRAs, with participation favouring wealthier regions or those embedded in established industrial value chains • Limited opportunities for less-developed regions, reinforcing existing disparities
2. Lack of formal role and coordination mechanisms	• IPCEIs designed as top-down instruments with no formal role for LRAs • Absence of coordination mechanisms linking local, regional, national, and EU levels • Informal relationships with companies, but no official channels for LRA influence
3. Misalignment of priorities	• Diverging objectives between EU-level strategic goals and regional priorities such as local employment and infrastructure needs • Infrastructure constraints (e.g. land and housing shortages) limiting LRA support for large projects • Local permitting delays impacting IPCEI project implementation
4. Limited administrative capacity and technical expertise	• Insufficient resources and know-how at LRA level to support complex and innovative IPCEI projects • Bottlenecks in local authorisation procedures causing delays and project withdrawals • Difficulties supporting companies in high-speed sectors like microelectronics
5. Complexity and resource constraints	• Complex procedures and heavy administrative burden • Limited financial resources and technical expertise at regional level • High mobilisation costs and uncertain outcomes for LRAs • Challenges in aligning internal government coordination, especially in federal systems
6. Lack of awareness and	• Low awareness of IPCEIs among LRAs, particularly in smaller municipalities

information gaps	• Insufficient dissemination of IPCEI opportunities to regional actors

2.2.2 Success factors

Stakeholders identified several examples of good practices and success factors that can support greater LRA involvement in IPCEIs.

One key factor noted by interviewees is the **involvement of LRAs in networking and launch events**. For instance, during the general assemblies of the IPCEIs on batteries, LRAs were invited to participate, facilitating direct engagement with local industry clusters. In France and Germany, in the case of EuBatIn, local governments contributed to networking sessions alongside industry actors, fostering connections between regional ecosystems and IPCEI participants.

Another successful practice is the **co-funding of IPCEIs by LRAs**. In Germany, stakeholders highlighted well-established frameworks through which Länder contribute up to 30% of the funding for projects that generate significant local benefits, such as job creation. This approach remains uncommon beyond Germany, and while Italy's legislation allows for LRA financial contributions, it has not been applied in practice. Nevertheless, the German experience demonstrates that co-funding can be an effective way to involve LRAs more directly in IPCEI implementation and ensure that their interests are represented.

Interviewees pointed to the importance of **regional cluster development before IPCEI participation**. In Austria, regional authorities have proactively supported the creation of innovation clusters in areas such as microelectronics, green tech, and pharmaceuticals, often using European Regional Development Fund (ERDF) funding. These clusters, such as Silicon Alps, provide structured platforms for regional actors to coordinate, share knowledge, and collaborate, both nationally and across borders. According to stakeholders, such clusters play a crucial role in preparing regional industries to participate effectively in IPCEIs and facilitate lasting international partnerships.

Several stakeholders emphasised the value of **disseminating information on IPCEIs at regional level**. In Austria, for example, authorities in Styria actively informed local companies about IPCEI opportunities and supported coordination between regional industries and national authorities.

Interviewees noted the importance of **proactive regional lobbying to influence national IPCEI strategies**. In Austria, the decision to participate in the microelectronics IPCEI was partly driven by pressure from industry associations and regional authorities, who advocated at national level to ensure Austria's

inclusion through the regional agency. Without this bottom-up mobilisation, it is unclear whether national authorities would have joined the project.

Another positive outcome highlighted by stakeholders is the ability of IPCEIs to **attract FDI**. In Austria, for example, participation in the microelectronics IPCEI was a decisive factor in securing major investments that might otherwise have gone to Asia. Stakeholders noted that the presence of the IPCEI helped to secure R&D activities in Austria, even though production elements were located abroad.

These qualitative insights are supported by the survey findings. Of the respondents who had participated in IPCEIs, the most frequently cited benefit was the **contribution to strategic EU objectives** (45%), followed by **knowledge-sharing and capacity-building** (30%) and **enhanced regional or cross-border collaboration** (20%). Fewer respondents pointed to **access to funding or resources** and **strengthening competitiveness** (both 5%) as key benefits.

Focusing specifically on those with direct experience in IPCEIs, the same priorities emerged, with half of respondents identifying **contribution to strategic EU objectives** as a key benefit, followed by **knowledge-sharing and capacity-building,** and **enhanced regional or cross-border collaboration**. Fewer respondents highlighted direct financial benefits or increased competitiveness, suggesting that the added value for regional actors lies more in strategic alignment, partnerships, and knowledge exchange than immediate economic gains.

Table 5: Main success factors for LRA involvement in IPCEIs

Success factors	Specific success factors
1. Active participation in networking and events	• LRA involvement in IPCEI networking and launch events to connect with industry clusters • Participation in sessions with industry actors to strengthen local ecosystems
2. Co-funding and financial involvement	• LRA financial contributions to IPCEIs (e.g. Germany) • Providing regional funding to projects with local benefits, such as job creation
3. Regional cluster development	• Proactive support for innovation clusters in strategic sectors • Using clusters to build readiness for IPCEI participation and foster international partnerships
4. Information dissemination and communication	• Regional authorities actively informing local companies about IPCEI opportunities • Supporting coordination between regional industries and national authorities
5. Regional advocacy and lobbying	• Bottom-up mobilisation by LRAs and industry associations to influence national IPCEI participation • Advocating for regional interests in national IPCEI strategies
6. Attracting FDI	• IPCEI participation contributing to securing significant

	investments in regions • Strengthening local R&D activities and economic development through IPCEI visibility
7. Strategic contribution and knowledge-sharing	• Advancing strategic EU objectives at regional level • Facilitating knowledge-sharing, capacity-building, and cross-border collaboration through LRA engagement

2.3 Effects and early impacts of the JEF-IPCEI

Interviewees broadly agreed that the JEF-IPCEI has filled an important gap by creating a formal space where Member States can engage directly with each other and the European Commission. Prior to the its creation, Member States were not always properly informed about new IPCEI initiatives or emerging strategic priorities, sometimes leading to delays in participation or missed opportunities (e.g. Austria's late involvement in the 2019 microelectronics IPCEI).

According to stakeholders, one of the key improvements introduced through the JEF-IPCEI is DG COMP's earlier involvement in the design phase of IPCEIs. Interviewees noted that in previous IPCEIs, DG COMP's participation often came only at the formal notification stage, contributing to delays and procedural uncertainties. Under the new approach promoted by the JEF-IPCEI, DG COMP engages from the outset, helping to align State aid compliance with project development and ensuring smoother progression through the approval process. Stakeholders involved in the preparation of the upcoming AI and edge node IPCEI confirmed that this early coordination is already being applied and is expected to avoid some previous procedural difficulties.

Nevertheless, the overall impact of the JEF-IPCEI remains modest so far. Stakeholders acknowledged that while it has improved communication and knowledge-sharing between Member States, the structural complexity of IPCEIs continues to pose significant challenges. Lengthy procedures persist, with projects such as the Med4Cure IPCEI taking around two years to secure authorisation, and additional time required before aid is disbursed. The JEF-IPCEI's ambition to streamline these processes is widely welcomed, but reducing the overall duration from proposal to funding remains difficult, with full cycles still often taking up to four years.

From a regional perspective, the effects of the JEF-IPCEI have been limited. Several interviewees highlighted that it is primarily a platform for Member States and does not directly involve LRAs. While LRAs may occasionally participate in peripheral activities such as networking events linked to IPCEI conferences, they

are not formally represented within the Forum's governance structures. Information shared through the JEF-IPCEI does not automatically cascade to regional levels, leaving LRAs dependent on their respective national authorities to inform them of opportunities and developments. This reinforces the wider finding that LRAs remain largely excluded from the strategic and procedural aspects of IPCEIs, despite some projects' tangible impacts at regional level.

Stakeholders suggested that the future success of the JEF-IPCEI will depend on its ability to accelerate and coordinate the early stages of IPCEI development. Improved alignment between Member States at the design phase, clearer communication of strategic priorities, and enhanced transparency will be essential to avoid fragmented approaches and ensure timely project implementation. While significant reforms to the State aid framework remain uncertain, the JEF-IPCEI is expected to continue to play a key role in refining processes and promoting best practices.

There is scope to strengthen the link between the JEF-IPCEI and regional actors. Although the involvement of LRAs in the formal governance of IPCEIs may not be necessary, ensuring that regions are better informed and prepared to support local stakeholders could maximise the territorial benefits of IPCEIs without adding further complexity. Finding this balance between procedural efficiency, broad participation, and regional impact will be crucial for the future evolution of the IPCEI instrument.

Survey findings confirmed the limited visibility of the JEF-IPCEI among stakeholders. Of 37 respondents, only around 19% were aware of the existence of the JEF-IPCEI. Of those who were familiar with the Forum, the main sources of information were national authorities (four respondents) and EU institutions (three respondents).

These results highlight that the JEF-IPCEI has a relatively low profile outside of national government circles, with limited awareness among other relevant actors, including LRAs, innovation agencies and business organisations.

2.4 Options for improvement

Building on the challenges and success factors, a number of proposals emerge to strengthen the effectiveness of IPCEIs and reinforce the role of LRAs. These recommendations are directed at EU and national level policymakers and LRAs, focusing on reducing complexity, expanding participation, improving coordination, and ensuring long-term impact.

2.4.1 For policymakers at EU and national level

1. **Streamline procedures and reduce complexity**

Reducing the administrative burden of IPCEIs remains a key priority. Lengthy procedures, extensive documentation requirements and slow approvals limit the relevance of innovative projects, particularly in fast-evolving sectors such as microelectronics, hydrogen and batteries. Stakeholders and survey respondents consistently highlighted the need for simplified application processes, clearer guidelines and faster authorisation. Indeed, 59% of survey respondents indicated that simplified procedures would help them to overcome barriers to participation, while 57% pointed to the need for clearer information and guidance. These improvements would particularly benefit smaller entities, which often lack the administrative capacity to manage such complex processes. Ensuring earlier and more structured involvement of the European Commission, especially DG COMP, in the design phase of projects has already proven helpful and should become standard practice to prevent bottlenecks and reduce delays.

2. **Ensure more balanced financing**

A recurring challenge is the imbalance in financial capacities across Member States, which can exclude those with limited budgets from fully participating in IPCEIs. Several interviewees stressed the importance of introducing EU-level co-financing to complement national contributions. Considering that IPCEIs address challenges of strategic European interest, EU funding should play a more prominent role in supporting participation, particularly for countries with constrained public finances. This was echoed in the survey, where respondents called for additional financial resources and specialised technical support to overcome current barriers. Existing EU instruments such as Horizon Europe – with its focus on research, innovation systems, and relevant thematic clusters – could be used to co-finance future IPCEIs. Likewise, the ERDF, which aims to strengthen economic, social and territorial cohesion, and the Cohesion Fund, which supports investments in Member States with a gross national income (GNI) per capita below 90% of the EU average, could serve as additional sources to facilitate broader and more balanced participation.

3. **Facilitate the inclusion of SMEs and smaller actors**

Stakeholders agreed that specific measures are needed to better integrate SMEs into IPCEIs. For some smaller companies, participation as associated partners through simpler mechanisms like the GBER may be more appropriate than full involvement. SMEs require rapid, accessible support, and policymakers should consider tailored financial tools to help them to cover participation costs. In the survey, the need for capacity-building initiatives, including training programmes and knowledge-sharing opportunities, was identified by 54% of respondents as an essential measure to support involvement. Equally, guidance on acceptable

spillover activities and clearer expectations of SME roles in IPCEIs would encourage broader participation.

4. **Strengthen coordination and communication**

Improved coordination between Member States, the European Commission, and regional actors is essential. In the survey, many local entities reported that they are not adequately informed about IPCEIs, with only 14% feeling sufficiently informed. Respondents specifically called for better communication from national and EU authorities, with regular updates, dedicated contact points, and clearer, more transparent channels of information. Several also stressed the need for early, proactive notification oft planned IPCEIs and clearer explanations of eligibility criteria and application procedures. This reflects wider calls for greater alignment between DG COMP, the Directorate-General for Regional and Urban Policy (DG REGIO) and DG GROW to ensure industrial, competition, and regional policies are better integrated.

5. **Sustain IPCEI impacts over time**

Beyond the initial implementation of projects, ensuring that IPCEIs deliver lasting benefits is essential. Interviewees highlighted the need to maintain infrastructures, networks, and ecosystems developed through IPCEIs, such as the cloud-edge continuum in IPCEI-CIS. This requires sustained investment, long-term strategies and active community engagement. LRAs could play a central role in supporting the continuity and relevance of these infrastructures, ensuring that the knowledge, partnerships and capabilities developed continue to benefit local economies and the wider EU. Sustaining these impacts also demands clear responsibilities for maintenance and governance beyond the life of the initial IPCEI funding cycle.

2.4.2 For LRAs

1. **Act as facilitators and ecosystem builders**

LRAs have an important role in supporting regional ecosystems that can host and sustain large-scale projects. By engaging early, LRAs can help to assess local industrial strengths, align skills and education programmes, and support the broader value chains needed for IPCEIs to succeed. Survey responses emphasised the value of strengthening coordination between national and regional levels, with respondents suggesting closer collaboration to ensure that projects reflect local capacities and ambitions. LRAs can also facilitate complementary investments, ensuring that IPCEI activities are embedded in resilient, well-prepared regional economies.

2. **Support information dissemination and company mobilisation**

LRAs are well positioned to raise awareness of IPCEIs among local businesses and research actors. Survey feedback highlighted a strong demand for better

information flows, with calls for training, webinars, and clearer, proactive communication on upcoming opportunities. LRAs could take on a leading role in organising local information sessions, promoting IPCEIs through regional networks and ensuring that companies (particularly SMEs) understand the processes and requirements for participation. This would also help to address the uneven distribution of IPCEI knowledge, which respondents from smaller municipalities noted often fail to reach beyond national capitals and larger urban centres.

3. **Provide targeted administrative support**

Supporting local companies through the demanding administrative aspects of IPCEI participation can significantly lower barriers. LRAs could assist with the preparation of applications, facilitate compliance with reporting obligations, and provide technical guidance throughout the project lifecycle. In several Member States, where regulations allow, LRAs could also provide complementary funding to projects, helping to close gaps and ensure that local priorities are reflected in national IPCEI strategies. Survey respondents expressed a need for additional staffing and technical expertise to better manage complex projects, suggesting that dedicated teams within LRAs could be an effective solution.

4. **Encourage bottom-up initiatives and alignment with regional strategies**

Proactive regional leadership can help to identify strategic sectors for IPCEI development. LRAs should work closely with local industry, research institutions and national ministries to propose ideas for future IPCEIs that build on existing regional strengths, such as smart specialisations in hydrogen, photonics, or circular economy. The survey feedback stressed the importance of linking IPCEIs to regional strategies and ensuring that LRAs are formally consulted during the development of national positions on IPCEI participation. This would allow regions to advocate for their priorities and ensure that their industries and communities benefit from European projects.

5. **Reduce regulatory and permitting barriers**

Permitting and regulatory delays at regional and local level can pose major risks to IPCEI implementation. LRAs should prioritise aligning local procedures with project timelines, ensuring that authorisations are granted swiftly and predictably. This requires internal coordination within regional administrations and regular communication with project stakeholders. Several survey responses highlighted streamlining administrative procedures, providing clear contact points, and ensuring that small municipalities are adequately informed and supported as critical steps to enable effective participation.

In conclusion, while the complexity of IPCEIs poses ongoing challenges,

improvements at both national and regional/local level can make the instrument more accessible, effective, and impactful. By strengthening cooperation, simplifying processes and ensuring that regional ecosystems are prepared to host major projects, policymakers and LRAs can help to ensure that the benefits of IPCEIs are shared across the EU and contribute to lasting industrial resilience.

3. Policy recommendations and conclusions

3.1 Recommendations for future IPCEIs

Drawing on the findings of this study, the following recommendations offer possible avenues that the European Commission, the JEF-IPCEI, Member States, and LRAs could explore to strengthen future IPCEIs. These suggestions support a more balanced, inclusive and efficient framework, particularly by improving the involvement of LRAs and ensuring that IPCEIs generate lasting territorial benefits, while recognising the need to safeguard procedural efficiency.

3.1.1 Recommendations for the European Commission and the JEF-IPCEI

The European Commission and the JEF-IPCEI could explore the possibility of **simplifying procedures and reducing the administrative burden** of IPCEIs by streamlining application and reporting requirements and ensuring clearer, more accessible guidance. Continuing the practice of early involvement of DG COMP could help to reduce delays and procedural uncertainties.

They could reflect on opportunities to **establish complementary EU-level funding mechanisms** that help to rebalance disparities between Member States, allowing countries with more limited public resources to participate fully and ensuring broader territorial coverage of IPCEIs. EU co-financing could be made available through a range of existing funding programmes, such as Horizon Europe, the ERDF and the Cohesion Fund. EU funding could also be used, such as a dedicated IPCEI financing stream in the EIB, for example, as a part of the Invest-EU programme. Horizon Europe, with its focus on R&I systems, infrastructure, and its dedicated clusters on Health, Digital, Industry, Climate, Energy, and European innovation ecosystems, is particularly well suited to support the co-financing of IPCEIs. The Commission could encourage Member States unable or unwilling to fund their companies' participation in IPCEIs to promote their applications to Horizon Europe calls. The Directorate-General for Research and Innovation (DG RTD), which is responsible for designing Horizon Europe calls for proposals, could ensure better alignment between those calls and the priorities of future IPCEIs. Programming documents could provide a clear reference to the IPCEI framework, possibly with dedicated funding stream within the follow-up Horizon programme.

By contrast, the Commission would have more limited scope to influence Member States' uptake of ERDF and Cohesion Fund resources for IPCEIs, where a more active role by Member States and LRAs could help to promote their use.

Further consideration could be given to **encouraging greater participation of SMEs through flexible models**, such as the use of IAP roles, and supporting these actors with targeted capacity-building measures and technical assistance.

The Commission and the JEF-IPCEI might also reflect on how to **improve communication and coordination with regional and local stakeholders**, for example by ensuring regular updates on upcoming IPCEIs, clearer information on participation processes, and more structured communication channels that reach beyond national authorities.

Finally, they could explore approaches to **supporting the long-term sustainability of IPCEI outcomes**, including governance and maintenance of the infrastructures, networks and partnerships developed through the projects, with regional actors involved in supporting continuity beyond the funding period.

3.1.2 Recommendations for Member States

Member States could consider how to **facilitate stronger inclusion of LRAs in IPCEIs**, such as providing targeted support, encouraging EU and regional co-financing where possible, and maintaining open communication channels to ensure that regional stakeholders are informed and able to contribute.

They could reflect on establishing **national coordination mechanisms that integrate regional and local perspectives**, particularly during the early identification of strategic sectors for new IPCEIs, helping to align national strategies with territorial strengths.

Member States might also explore the possibility of **supporting complementary regional funding arrangements**, following examples from countries such as Germany, where LRAs have contributed to IPCEIs, reflecting their local benefits.

Member States facing financial constraints in participating in IPCEIs could **prioritise the allocation of ERDF and Cohesion Fund resources for this purpose**. The ERDF, which aims to strengthen economic, social and territorial cohesion by addressing regional imbalances, is well suited to bridge national funding gaps that limit participation in IPCEIs. Similarly, the Cohesion Fund, which supports investments in transport, environment, energy efficiency, and renewable energy in Member States with a GNI per capita below 90% of the EU average, could also serve as a valuable source of support. Programming and tendering documents could include an indication that these funds can be used to support participation of companies in IPCEIs. Contributions of Cohesion Policy funding to IPCEIs could be seen in some regions as a priority, which could be reflected in the relevant strategic and funding disbursement frameworks at both

national and regional level.

3.1.3 Recommendations for LRAs

Several stakeholders noted the need for greater formal involvement of LRAs in the governance of IPCEIs. However, there were also concerns that expanding the role of LRAs could add further complexity to an already demanding process and contribute to delays, particularly in fast-moving technological sectors, where timely implementation is crucial to remain competitive at global level.

Rather than pursuing a formalised role in IPCEI governance, **LRAs could consider** contributing indirectly. For example, their involvement might focus on **creating favourable conditions for regional stakeholders to participate effectively**, rather than becoming direct actors in the governance process.

Examples from existing IPCEIs suggest how LRAs can provide valuable indirect support. In Austria, regional authorities helped to raise national awareness of the microelectronics IPCEI following requests from local industry, which contributed to Austria's participation. In other cases, LRAs **supported the development of regional innovation clusters, facilitated networking opportunities, and ensured the dissemination of information to local businesses and research institutions**. In Germany, some Länder have co-financed IPCEI projects, recognising the economic benefits these initiatives can generate for local communities.

These experiences indicate that **any future enhancement of LRA involvement will need to be carefully balanced to avoid increasing procedural burdens or slowing implementation.** Rather than seeking formal governance roles, LRAs could focus on strengthening the local conditions that enable successful participation in IPCEIs.

Findings from the survey confirm LRAs' interest in participating in future IPCEIs, with certain important considerations. Of the 37 respondents, 26 expressed a clear interest in future participation, while 11 stated that their involvement would depend on specific circumstances. These included factors such as the thematic relevance of the IPCEI (with some regions highlighting interest in batteries, cloud and edge computing, health, hydrogen, and microelectronics), the potential benefits for the local territory, the region's financial capacity, and the overall cost-to-benefit ratio. Some respondents noted structural limitations, explaining that regional authorities in certain Member States face legal and financial constraints that limit their ability to engage in IPCEIs, particularly direct funding. Others emphasised that involvement would require an alignment with regional priorities and the availability of dedicated resources.

LRAs could explore ways to support the development of regional ecosystems that are well positioned to engage with IPCEIs. This might involve fostering strong industrial clusters, ensuring that education and training systems are aligned with the needs of strategic sectors, and identifying regional strengths that correspond to European priorities.

They might also **consider raising awareness of IPCEIs within their territories by providing clear, accessible information to local companies, ROs and SMEs**. This could be achieved through dedicated information sessions, guidance on participation criteria, and communication strategies designed to reach stakeholders beyond major urban centres.

In addition, LRAs could reflect on how to assist regional and local actors with the administrative aspects of IPCEI participation. Providing support in areas such as preparing applications, managing reporting obligations, and navigating regulatory requirements could help to reduce barriers for local companies, particularly SMEs.

LRAs may also contribute to **identifying strategic sectors within their regions that could benefit from future IPCEIs.** By working collaboratively with local industries, research centres and national authorities, LRAs could help to shape national IPCEI strategies in a way that reflects regional strengths and ambitions.

Finally, LRAs could explore how to **streamline local administrative procedures**, particularly permitting and authorisations, to avoid delays that might impact the timely implementation of IPCEI projects. Coordinating these processes with national timelines could help to ensure smoother project delivery.

In conclusion, while the complexity of IPCEIs presents ongoing challenges, there is scope for LRAs to contribute meaningfully through supportive, complementary actions that do not add procedural burdens. By focusing on strengthening regional ecosystems, improving information flows, and providing targeted support, LRAs could help to maximise the territorial benefits of IPCEIs and promote more balanced participation across the EU.

3.2 Strategic foresight

The current policy framework and forward-looking trends put an increasing emphasis on innovation and boosting the EU's competitive position on global markets. The Draghi report on the future of European competitiveness[31] outlines

[31] European Commission, Draghi, M., *The Draghi report on European competitiveness*, Publications Office of the European Union, Luxembourg, 2024.

the main factors supporting the EU's pursuit of inclusive economic growth that serve as pillars of prosperity:

- Sustainable competitiveness;
- Economic security;
- Open strategic autonomy;
- Fair competition.

The findings of the Draghi report contribute to the new Clean Industrial Deal for competitive industries and quality jobs. The Competitiveness Compass[32] presented by the Commission in January 2025 builds on the Draghi report and provides a strategic roadmap to boost EU economic growth. Three core areas of action highlighted by the Competitiveness Compass are:

- **Closing the innovation gap**: Promotion of industrial leadership in high growth sectors based on new technologies such as advanced materials, quantum, biotech, robotics and space technologies; diffusion of technologies across companies (with special focus on SMEs; industrial adoption of AI in key sectors);
- **A joint roadmap for decarbonisation and competitiveness:** The upcoming Clean Industrial Deal will aim to secure the EU as an attractive location for manufacturing, including for energy intensive industries, and promoting clean tech and new circular business models;
- **Reducing excessive dependencies and increasing security**: The Compass promotes a new range of Clean Trade and Investment Partnerships to help to secure supply of raw materials, clean energy, sustainable transport fuels, and clean technologies.

The IPCEIs designed to contribute to sustainable economic growth, jobs, competitiveness and resilience for industry and the economy are very well placed within these trends, and their role can be expected to become more prominent over time.

Several megatrends[33] are likely impact the future development of IPCEIs. Table 6 presents these trends, together with a short explanation of how each may impact the IPCEIs, as well as the LRAs and their regions.

Table 6: Megatrends and their likely impacts on IPCEIs

Megatrend	Likely impact on IPCEIs	Likely impact on LRAs
Accelerating technological	Some of the current IPCEIs (microelectronics, cloud infrastructure) address the	LRAs will need to adapt to the technological changes, they can also actively support and initiate projects

[32] European Commission, An EU Compass to regain competitiveness and secure sustainable prosperity, Press release, 29 January 2025.

[33] Megatrends are major global trends and key drivers of change. The selection of the megatrends analysed in this section is based on a larger list of key megatrends presented on the European Commission portal, Competence Centre on Foresight.

change and hyperconnectivity Growing use of technology and increase of digital connectivity	needs related to this trend. More projects in this area will likely be needed in the future	in this area. LRAs and their subordinate institutions can be helpful in testing new solutions developed by the IPCEIs (e.g. pilot projects focusing on digital connectivity)
Aggravating resource scarcity Earth's limited resources can no longer meet growing demand	Decreasing material consumption, increased efficiency of material use and circularity are issues tackled by current IPCEIs that will likely remain in focus	LRAs will need to support the move to a more circular economy through adequate regulatory frameworks and promotion of resource efficiency. They can support the deployment of IPCEI results through green public procurement
Changing security paradigm Political power positions are changing. Technologies such as AI, autonomous weapons systems, biotechnologies, hypersonic glide vehicles and quantum technologies are crucial elements of modern security systems	Given the growing need for the EU to increase security cooperation, IPCEIs could provide good platforms for joint development of new technologies to strengthen security systems and Member States' capacity for quick reaction and defense	LRAs must be ready to shift their priorities to recognise the growing role of the defense sector. This trend may aggravate environmental and resource pressures. At the same time, the defense sector may contribute to the creation of new jobs and economic growth. Balancing these negative and positive pressures may pose a challenge for LRAs
Climate change and environmental degradation Urgent environmental and climate action is necessary to slow these processes and avoid excessive greenhouse gas (GHG) emissions	Hydrogen IPCEIs addresses this megatrend. Given that climate change and environmental degradation are global problems that need international cooperation, more IPCEIs are likely to emerge to tackle these issues	LRAs are well aware of the challenges related to climate change and environmental degradation[34]. Some of the most effective actions, for example those involving nature-based solutions, are taken at local and regional level, thus LRA involvement in IPCEIs addressing this megatrend may be indispensable for their success. Green public procurement is one possible support tool

[34] See, for example, European Committee of the Regions: Commission for the Environment, Climate Change and Energy, Milieu Consulting SRL, Paltriguera, L., Vona, L., Vroom, I. et al., *The contribution of EU cities and regions to the Kunming-Montreal Global Biodiversity Framework*, European Committee of the Regions, 2024; European Committee of the Regions: Commission for the Environment, Climate Change and Energy, Milieu Consulting SPRL, McNeill, A., Tugran, T. and McGuinn, J., *Boosting the capacity of LRAs to implement the Green Deal – A toolbox for the climate pact*, European Committee of the Regions, 2020; European Committee of the Regions: Commission for the Environment, Climate Change and Energy, Milieu Consulting SRL, Gancheva, M., O'Brien, S., Tugran, T. et al., *Adapting to climate change – Challenges and opportunities for the EU local and regional authorities*, European Committee of the Regions, 2020.

Expanding influence of East and South By 2050, Asia will be the centre of the global economy, providing more than 50% of global economic output, largely driven by China and India	IPCEIs' role is to strengthen the EU's position on the global market by developing cutting-edge technologies and increasing intra-EU cooperation	LRAs can actively support and initiate projects in R&D&I. LRAs and their subordinate institutions can be helpful in testing new solutions developed by the IPCEIs (e.g. pilot projects focusing on digital connectivity)
Growing consumption This trend reflects the expansion of the middle class and the increase in business models targeting people at the bottom of the income pyramid	By supporting new technologies that enhance more efficient resource use and dematerialisation, IPCEIs can alleviate the negative impacts of growing consumption on the environment	LRAs can support sustainable production and consumption through adequate regulatory frameworks and promotion of well-being based on local networks and values
Shifting health challenges Science and better living standards have reduced infectious diseases, but unhealthy lifestyles and pollution create health burdens	IPCEIs can contribute to a better understanding of factors impacting human health, which are increasingly multidimensional and connected to lifestyles and the environment, as well as genetics and the microbiome	LRAs play a crucial role in making sure that the health sector provides adequate, state-of-the-art services for citizens. The COVID-19 pandemic was a testing ground, with a range of lessons that can be utilised in future crises. IPCEIs can provide solutions to help LRAs to cope with similar situations in the future

Annex I: Case studies

First IPCEI on microelectronics (2018)

1. Introduction

The IPCEI on microelectronics was the first IPCEI approved by the European Commission. It was launched in December 2018, after spending two years examining the projects and the overall structure of the IPCEI. It originally included France, Germany, Italy and the UK, with Austria joining in March 2021. It currently features 32 undertakings, including companies and ROs/research and technology organisations (RTOs) from these four Member States and the UK. The IPCEI allows public and private actors to support transnational cooperation projects in the microelectronics sector to enhance and expand European competencies and the EU role internationally in the sector.

This IPCEI represents a crucial area of work for the EU to strengthen and support digital transformation. The 2030 Digital Compass strategy[35] states that 'microprocessors are at the start of most of the key, strategic value chains such as connected cars, phones, Internet of Things, high performance computers, edge computers and Artificial Intelligence.' The IPCEI aims to address important EU gaps, notably in state-of-the-art fabrication technologies and chip design, that expose Europe to a number of vulnerabilities.

2. Background

In 2016, Germany and the UK were the first countries to pre-notify the Commission of the need to set up an IPCEI on microelectronics. They expressed their interest in developing transitional integrated projects and drafted an overall descriptive text (Chapeau document) to illustrate the scope and activities of the project.

The Commission then requested additional information. In September 2017, the German authorities presented an overview of the companies willing to take part to the IPCEI on microelectronics and the State aid budget it intended to allocate. In December 2017, the Commission organised high-level meetings and working group meetings at technical level to enhance coordination between Member States, align them to set up the IPCEI, and deliver all necessary information for the pre-notification stage. Several high-level meetings and technical meetings took place in 2018 and, by the end of that year, Germany and the UK had developed draft documents describing companies' activities in the IPCEI on microelectronics.

In July 2018, the Italian and French authorities submitted their documents for companies to participate. The Commission assessed the request, and, in December

[35] Including the 2030 Digital Compass: the European way for the Digital Decade, A competition policy fit for new challenges, European Chips Act.

2018, approved the first IPCEI on microelectronics, with the participation of Germany, the UK, France and Italy. In December 2020, Austria notified the Commission of its intention to join the project, which it subsequently did in 2021, after a year of negotiations.
In total, the Commission approved €1.9 billion in State aid for the IPCEI on microelectronics, aiming to unlock an additional €6.5 billion in private investment.
As reported by the Facilitation Group (FG) coordinator, the associated IPCEI projects concluded in 2024. The second IPCEI on microelectronics was approved by the Commission on 8 June 2023.

IPCEI objectives

The IPCEI on microelectronics aims to contribute to the key enabling technologies (KET)[36] and microelectronics strategies. The request from Member States to establish the IPCEI was rooted in the KET strategy and responds to the need to strengthen EU actors in this field, especially in the global market.
The IPCEI on microelectronics aims to support industries developing high-edge innovative products that are becoming crucial in a digitalised society, such as electronic components and systems advancing disruptive technologies across various sectors (e.g. automotive and mobility, energy, healthcare). By developing innovative microelectronics technology and components for automotive, Internet of Things (IoT) and other key applications, the IPCEI on microelectronics strengthens the full technological and economic potential of the KET to transfer to downstream industries for new or improved applications, as well as R&D in these sectors.

Project participants and their partners concentrated their work on five technology fields (TF), that are complementary and interlinked and require a combination of different processes and technologies. The TF are:

- TF 'Energy efficient chips' involves eight partners collaborating to enhance the energy efficiency of fundamental microelectronic components (chips);
- TF 'Power semiconductors' involves 11 partners working together to develop power semiconductor devices and integrated smart power solutions along the relevant value chain, with enhanced energy efficiency and reliability;

[36] KET are defined as 'knowledge intensive and associated with high R&D intensity, rapid innovation cycles, high capital expenditure and highly skilled employment. They enable process, goods and service innovation throughout the economy and are of systemic relevance. They are multidisciplinary, cutting across many technology areas with a trend towards convergence and integration. KETs can assist technology leaders in other fields to capitalise on their research efforts' (Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, 'A European strategy for Key Enabling Technologies – A bridge to growth and jobs', SEC(2009) 1257, COM(2012) 341 final).

- TF 'Smart sensors' empowers the European sensor industry to develop and supply sensor components to the European market, strengthening cooperation and R&D within the sector;
- TF 'Advanced optical equipment' focuses on enhancing R&D&I in Europe's semiconductor equipment industry, with a particular focus on extreme ultraviolet (EUV) technology, currently being developed for integration into semiconductor factories to enable future high-end chip manufacturing in the next decade;
- TF 'Compound materials' aims to establish an integrated, pan-European compound semiconductor (CS) ecosystem to support the TF above and other key technological areas across the supply chain, and to engage downstream organisations to build a strong user community that drives the adoption of CS technologies.

Large companies, SMEs, ROs and academic laboratories are involved in the IPCEI on microelectronics, as well as end users, fostering collaboration and partnership between players from the private and public sectors. R&D&I activities can also involve academic and industrial partners that are not part of this IPCEI and do not belong to any Member State joining the IPCEI, as these activities can be implemented within the framework of other EU initiatives, such as the Eureka PENTA cluster or the Chips JU.

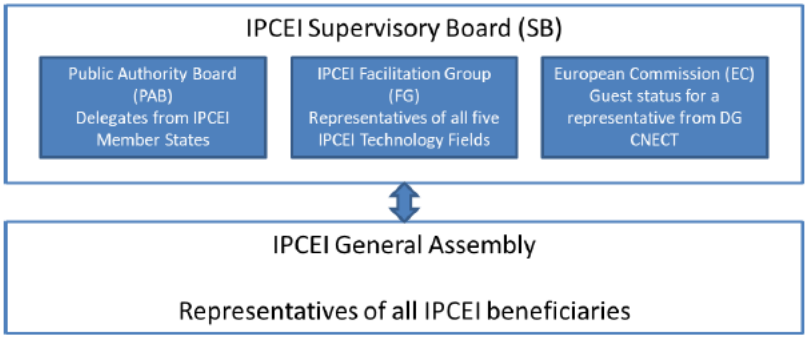
Representatives of the Styrian Research Promotion Agency and the former coordinator of the IPCEI FG reported that the IPCEI projects are aligned and intertwined with other projects developed within the industrial alliance framework or the clusters initiative. These collaborations can ensure efficient dissemination of IPCEI results through the whole microelectronics ecosystem.

Governance of the IPCEI on microelectronics

The governance structure of the IPCEI is set up by the Member States in coordination with the Commission (DG GROW, Dg COMP).

It mainly incorporates Member States' representatives at ministerial level, as well as companies' (including SMES') representatives.

Figure 5: Governance structure of IPCEI on microelectronics



The supervisory board (SB) includes:

- Public authority board (PAB), with representatives of the Member States participating in the IPCEI on microelectronics;
- Representative of the Commission;
- FG.

In the first meeting of the SB, the participants set up the key performance indicators (KPIs) to monitor the performance of the IPCEI.

While PAB members and the Commission guest are appointed by the Member States and the Commission, respectively, members of the FG are elected by the representatives of the IPCEI's General Assembly (GA). The GA is an internal meeting exclusively for IPCEI on microelectronics participants, organised alongside the annual public IPCEI on microelectronics conference. It also plays a role in supporting dissemination and communication activities.

The IPCEI on microelectronics FG is responsible for governance and comprises:

- A chair and deputy for the overall IPCEI project;
- Five TF coordinators (TFCs) and their substitutes;
- Additional company representatives to assure a balanced contribution of large and SME companies. At least two members of the FG must be representatives of SMEs.

The FG steers the overall progress of the TF internally, by disseminating and promoting the activities of the companies working in the IPCEI ecosystem, and externally, by sharing the results with private and public stakeholders via annual execution reports, websites, publications and conferences in Europe. The FG is responsible for organising and fostering collaboration and communication within the undertakings joining the IPCEI, as well as with third parties that could benefit from the results but are not partners in the project.

The TFCs are responsible for organising and improving coordination, as well as facilitating the exchange of experiences and best practices within the TF. They report their progress during the GA. They also organise technical meetings multiple times a year. Each year, the TFCs compile a summary report detailing progress and results, highlighting technological advancements and spillover activities to which TF members have committed. These yearly reports complement the individual reports delivered by each partner to their national funding authorities.

Selection of participating partners in IPCEI on microelectronics

The Member States are responsible for the selection procedure for companies participating in the IPCEI:

- Germany published a call for projects on microelectronics in August 2016, with 16 companies (including five SMEs) subsequently selected;
- France launched an open call for projects between December 2016 and February 2017. Seven companies and one RO replied and submitted project outlines;
- Four companies from the UK participated in the IPCEI;

- One company and one RO from Italy joined the IPCEI;
- Three companies in Austria took part in the IPCEI.

The Member States indicated that total project costs will be over €7.8 billion, with €5.3 billion for the first industrial deployment and €2.5 billion for R&D. The IPCEI should have been concluded in 2024, but some activities to close projects are ongoing.

3. Impacts, EU relevance and key lessons

This section explores the impact of the IPCEI on microelectronics at local and regional level, its alignment with other EU initiatives, and key lessons.

3.1. Regional and local impact

The projects under the IPCEI on microelectronics have a European scope and outlook, and aim to reinforce EU competitiveness internationally.

At national level, the interviews confirmed that the IPCEI on microelectronics enhanced political willingness to invest and dedicate budget to these types of projects. In Austria, for example, such investment would not have been possible without the IPCEI on microelectronics. The IPCEI on microelectronics is considered a pivotal instrument to increase investment and retain important industrial players in Europe, thereby creating growth.

The interviews[37] confirmed that there is no assessment of the impact at territorial level, making it difficult to assess. However, some examples of positive impact are evident, mostly in business creation and new job opportunities. For example, Bosch decided to build a new factory in Dresden, capital of Saxony (Germany), the first in Europe for 20 years. This €1 billion investment was one of the company's largest, creating jobs for 500 new employees in European R&D and production. It has attracted players active in microelectronics and downstream industries. Interviews with the representative of the Austrian Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology and the IPCEI FG confirmed that without such investment and State aid, Bosch would have invested outside the EU.

Participation in the IPCEI ecosystem increases networking opportunities at local and regional level, encouraging local companies and ROs to join other policy initiatives, such as the Industrial Alliance and Cluster initiatives, according to the representatives of the Austrian ministry, and the Styrian Research Promotion Agency.

According to a representatives of the Bruno Kessler Foundation, a key public-private research actor for the Province of Trento in Italy, participation in the IPCEI enhanced the research centre's role in the European scenario as an open facility, with its laboratories active in R&D&I, applied research and FDI

[37] One representative of the Austrian Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology, the FG coordinator, the responsible of the IPCEI in the Bruno Kessler research centre, and one representative of the Styrian Research Promotion Agency.

activities. It also allowed local companies with consolidated relationships with the research centre to build and consolidate their working relationships with other Italian and EU companies. This facilitated new opportunities, such as the possibility to join the second IPCEI on microelectronics and communication technologies and participate in two pilot lines envisaged in the Chips Act.
These activities ensure that the research centre takes a long-term perspective on its strategies and financial plans, aiming to become a better-known interlocutor at European level, with positive spillovers for the local sector and economy. As one of the most advanced microelectronics laboratories nationally, it now attracts more companies, other research centres and new skilled workers to collaborate. Italian companies have an interlocutor to develop high innovation and high-edge solutions and are not forced to use other EU companies or leave the national territory. This increases regional attractiveness by creating a pole of innovation within the microelectronics sector and consolidating the research centre's position, as well as region's socioeconomic ecosystem.

3.2. Contribution to EU priorities

The IPCEI aligns its goals and supports many of the EU strategies on industrial policies:

- A European strategy for Key Enabling Technologies (KET) — A bridge to growth and jobs is the backbone of the relevant policy strategies. The IPCEI on microelectronics aims to contribute to the KET and microelectronics strategies. Microelectronics is identified by the Commission as one of the six KETs, crucial for the future development of European industry to stimulate growth and create jobs;
- Europe 2020[38] reinforces the need for the EU to invest in high edge technology and build long-term responses to the EU innovation gap. It focuses on smart growth, namely developing an economy based on knowledge and innovation and improving the conditions for private R&D;
- Communication on a Strategic Energy Technology (SET) Plan, first launched in 2007, then revised in 2023, calls for 'bringing together energy and information and communication technology researchers and companies to support the development of innovative solutions and, over time, encourage the integration of these services into smart homes with other digitally delivered services, such as environmental control, electro mobility and e-health via the Internet of Things'[39]. The IPCEI on microelectronics provides essential technologies supporting this integration through power

[38] Communication from the Commission, A strategy for smart, sustainable and inclusive growth, COM(2010) 2020 final.
[39] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the revision of the Strategic Energy Technology (SET) Plan, COM(2023) 634 final.

electronic components, low power components for local data processing, and sensors;

- Strategy on Low-Emission Mobility[40] acknowledges that EU citizens can use a wide range of options for passenger cars and buses, while rail solutions are straightforward through electrification. It also emphasises that 'to achieve mass acceptance and deployment of electric vehicles, charging and maintenance infrastructure must become widely available across Europe', which directly impacts the adoption of electric vehicles. Electrification is essential for all alternative fuels in future low-emission vehicles, whether for powertrain control within the vehicle or for electric refuelling infrastructure. The IPCEI on microelectronics delivers a broad range of components, from power electronics to sensors and computing capacity, to enable downstream innovation in engineering alternative fuel and electric vehicles;
- Horizon 2020 and Horizon Europe have been used to strengthen R&D. Horizon 2020 was the EU's eighth R&I funding programme, with a budget of €75.6 billion for 2014-2020. The core mission of the programme was to drive and support economic growth and create jobs through R&I. Horizon calls include R&D&I activities in microelectronics, especially within the framework of the R&I action to establish new knowledge and/or explore a new or improved technology, product, process, service or solution;
- 2030 Digital Compass: the European way for the Digital Decade translates the ambition to invest in the areas supporting digitalisation for the public and private sectors. The Compass envisages multi-country projects, large-scale projects that no single Member State could develop on its own[41]. It highlights that 'Europe will only achieve digital leadership by building it on a sustainable digital infrastructure regarding connectivity, microelectronics and the ability to process vast data as they act as enablers for other technological developments and support our industry's competitive edge. Significant investments need to be made in all of these areas that require coordination to achieve European scale'[42];
- The Chips Act[43] entered into force in September 2023 and represents another pivotal strategy to bolster Europe's competitiveness and resilience

[40] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, A European Strategy for Low-Emission Mobility, COM(2016)501.

[41] For example, data infrastructure, low-power processors, 5G communication, high-performance computing, secure quantum communication, public administration, blockchain, digital innovation hubs, digital skills and cybersecurity.

[42] Communication from the Commission to the European Parliament, the European Economic and Social Committee and the Committee of the Regions, 2030 Digital Compass: the European way for the Digital Decade, COM(2021) 118 final.

[43] Regulation (EU) 2023/1781 of the European Parliament and of the Council of 13 September 2023 establishing a framework of measures for strengthening Europe's semiconductor ecosystem and amending Regulation (EU) 2021/694 (Chips Act).

in semiconductor technologies and applications and achieve both the digital and green transitions. It represents the long-term response of the EU to semiconductor shortages and aims to strengthen Europe's technological leadership. It mobilises more than €43 billion of public and private investment and sets out measures to prepare, anticipate and respond to any future supply chain disruptions, together with Member States and other international partners.

3.3. Key lessons

The interviews noted that this IPCEI went very well, with almost all projects now closed. The project partners respected all commitments. From an innovation perspective, the technology and type of sensors developed found interest in the market. The Italian experience suggested that the R&D&I activities went far beyond expectations: as the market needed advanced applications, it required the insertion of new types of machinery and processes in laboratories, advancing R&D&I and first industrial deployment (FID) activities.

The Member States emphasised that a significant portion of the knowledge generated and shared by IPCEI partners will be made accessible to the broader semiconductor industry through technical conferences and publications. For instance, scientific personnel from ROs and enterprises will present the latest R&D findings at conferences and publish their results in peer-reviewed journals. Procedures and methodologies for robust sensor design, as well as guidelines for qualifying high-performance consumer components for automotive and industrial applications, will be available for system companies across Europe. Key information and findings will be shared with the public at dedicated IPCEI on microelectronics events and various well-established international conferences. IPCEI partners will actively contribute to relevant industry events regularly. This may generate additional positive spillovers for other companies, as well as end users in clusters in other regions across the EU. The IPCEI on microelectronics has already generated a positive impact outside the regions where its participants are located, with Member States noting that clusters contribute to the dissemination of knowledge and know-how. Many partners in the European clusters are involved directly or indirectly in the IPCEI on microelectronics and will promote the knowledge developed in the projects. Member States also noted that the project has had significant spillover effects in downstream markets, with partners now entering into supply and cooperation agreements with third parties, often outside the notifying Member States. The IPCEI on microelectronics has already brought together 16 European partners directly and 370 partners indirectly, as members of a major European cluster:

- Five direct partners and 350 indirect IPCEI partners are members of the Crolles-Grenoble (Minalogic, France) cluster;
- Nine direct partners and 320 indirect IPCEI partners are members of the Dresden (Silicon Saxony, Germany) cluster;

- At least two indirect IPCEI partners are members of the Leuven-Eindhoven (Belgium and the Netherlands) cluster;
- Additional direct and indirect partners recruited as part of the IPCEI on microelectronics to strengthen the first ever CS cluster in South Wales (UK) in the TF of compound materials;
- Additional direct and indirect partners recruited as part of the IPCEI on microelectronics to strengthen the European microelectronics clusters, focusing on ecosystems mainly in Italy, in the TF of energy efficient chips, power semiconductors and sensors.

As reported by the representative of the Styrian Research Promotion Agency, this IPCEI contributes to improving microelectronics in the EU and helps to increase industrial competitiveness, especially vis-à-vis the world leaders, China and the US. As competition from these two economies is fierce, a very active and strong European-based innovation and industrial policy is needed and the IPCEI can be seen as part of this policy. In Styria, for example, participation in the IPCEI allowed the region to increase productivity in the cluster, as well as competitiveness of the companies.

Finally, as reported by the Bruno Kessler research centre, one of the main differences between the first and second IPCEI on microelectronics was the type of undertakings participating. The first comprised mostly large companies, with Member States encouraged to support SMEs to join the second, with research centres, for example, working to broaden the range of companies and get SMEs to join.

4. LRA involvement

The section explores the extent to which LRAs are involved in the IPCEI, from the design process through to implementation.

4.1 Role of LRAs

According to official IPCEI documents and interviews with Austrian, German and Italian representatives, LRAs did not have a role in either developing or implementing the projects. They were not consulted in the pre-notification phase or during the initiation of project activities. Rather, the main actors were Member States' representatives from ministries, companies involved in the IPCEI projects, and industry associations. LRAs do not play an active role in the governance of the IPCEI on microelectronics, nor within the JEF-IPCEI.

The Saxony Länder is an interesting example, where they did not play a role in the IPCEI on microelectronics, but the ministry and the president of the region met informally during the negotiation phase. The president of the region welcomed the project and support Germany decision to join the initiative. The region was also willing to invest additional money to support projects included in the initiative.

Representatives of the Italian Ministry of Enterprise and Made in Italy illustrated how LRAs could play a role in the project, even if that role was somewhat limited. The Italian government, in establishing the rules for the IPCEI Fund[44], envisages the possibility for LRAs to contribute by providing additional financial resources to support regional companies (as their only opportunity to participate). This option was used by the Sicily region, which contributed to the fund to support the STMicroelectronics in the Etna valley area.
Finally, the interviewee from the Styrian Research Promotion Agency highlighted its key role, as a regional public body, in establishing a dialogue between companies and the national government, and in supporting companies from design through to implementation of the project.

4.2 Challenges

A key enabling factor for the success of the first IPCEI is the amount of funding to finance the projects. Participating countries invested significant budgets to support the activities of the integrated project. These financial resources are decided, managed and disbursed at central level, with LRAs having no say in deciding the modalities or amounts. Nor is there any financial contribution at local and regional level generally. As smaller Member States have fewer possibilities (i.e. funding) to participate in the IPCEIs, companies operating in a region with a strong specialisation in microelectronics in a smaller Member State may receive less funding comparing to those in located in a region in a bigger Member State.
Participating and implementing projects is perceived as excessively burdensome and time-consuming, especially by companies. SMEs lack the administrative structure to navigate the administrative requests. Despite efforts to simplify the process for SMEs to join the second IPCEI on microelectronics, they still face administrative challenges. As the requirements (financial plan preparation, control requests) remained significant, many SMEs gave up. In addition, the IPCEI does not cover the costs fully, creating a significant barrier for SMEs without facilitated access to credit support from financial institutions. However, LRAs, according to the Styrian Research Promotion Agency, can support companies to deal with administrative activities and overcome potential bureaucratic issues.
The microelectronics sector is characterised by rapid innovation, market dynamics, and strong competition, making rapid response to market needs a crucial factor. Quick support to companies is important, but LRAs may not have the capacity to fully know the initiative and the market. However, they have structured contacts at national level to ensure rapid support and ease the process. A dedicated department in LRAs supporting companies, especially SMEs, to deal with administrative requests and disseminate opportunities across the region can

[44] Ministry of Enterprise and Made in Italy, Decreto interministeriale 21 aprile 2021 - Fondo IPCEI, Criteri generali per l'intervento e il funzionamento del Fondo, 2021.

raise awareness, coordinate different stakeholders, and establish a dialogue with national authorities and other regional agencies across the EU.

4.3 Best practice and innovation

The interview with the Styrian Research Promotion Agency showed that LRAs can support undertakings in the regional industrial ecosystem, as facilitators and information disseminators.

Firstly, the Agency is responsible for supporting and enhancing economic and the innovation environment in Styria, focusing on special fields of interest for the region, such as mobility, green tech, human technology, biotech, and pharmaceuticals, and developing long-term strategies with the private sector. Microelectronics is one of the key sectors/clusters that the Agency intends to support. Among the potential funding resources, the IPCEI appeared as a fundamental opportunity.

The interviewee noted that the request to get involved in the IPCEI came from some of the most relevant regional companies active in the microelectronics sector, making it a bottom-up process from the private sector. The Agency played a key role in identifying potential industrial partners for the IPCEI, informing them of its logic and structure, aligning the interests of the industrial players in the region within the IPCEI framework, and supporting communication between national and regional level and with the local microelectronics industry.

The Agency raised national awareness to encourage the relevant ministries to join the IPCEI, coordinating requests from the companies to the national authorities. During project implementation, the Agency was a contact point for the problems and challenges companies faced. Overall, it acted as bridge between industrial interests and the national authorities.

The Agency is part of some research networks and participates in the Silicon Alps, a cluster organisation for microelectronics, which is part of a broader European network (Silicon Europe Alliance). It could therefore communicate with similar agencies in other EU regions, facilitating companies' networking beyond the region.

In Italy, the LRAs did not play a role in the IPCEI. Their only option was to provide financial support. However, in the Autonomous Province of Trento, the Bruno Kessler Foundation research centre provided indirect support. It discussed with the Province of Trento (one of the shareholders) making the IPCEI part of the Province's R&D strategy. The Province did not itself provide financial or administrative support to the RO, but approved its financial decision to invest part of its budget in the IPCEI. It acted as guarantor that the RO could manage the IPCEI, creating confidence that there would then be coverage by the ministry. This mechanism also applies for the second IPCEI on microelectronics, in which the Bruno Kessler Foundation participates. The Province saw this relaunch of the microelectronics sector as very positive, as it is one of the themes in microelectronics and technologies in which Europe is not only investing, but will

need in-house skills, industries, and research centres capable of providing activities.

5. Recommendations

In view of the implementation, problems and solutions described, some suggestions emerge for both the EU and regional level.

5.1. For policy makers at EU and national level

The desk research and interviews show that the IPCEI is a transitional, multi-country, integrated project. Its aims are to support R&D&I and facilitate product placement on the international market, reinforcing the EU players as competitors for their Chinese and US peers.

An international and highly innovative market, it is crucial for EU actors to have a clear European plan/strategy to guide the European microelectronics industry in an increasingly global context.

The interviews highlighted the need to **reduce the administrative complexity of the IPCEI** for large companies and SMEs. Certification of expenditure and control and audit measures slow the process and pose obstacles for companies needing flexible procedures to quickly react to market demand.

It took two years to set up and finally approve the IPCEI, jeopardising companies' needs and hindering their opportunities to conduct R&D&I activities and operate on the global market. The process should be more streamlined and standardised, so that actors at local, national and EU level can comply with administrative tasks quickly and easily.

Interviews with representatives at ministerial level highlighted a willingness to **increase the financial allocation for the IPCEI**, as well as an openness to using other EU budget-supported funds for the IPCEI (e.g. Cohesion Fund).

5.2. For LRAs

The involvement of the LRAs in the IPCEI can be re-thought in terms of involvement in the IPCEI design and implementation, and in financial terms.

LRAs can be more active in IPCEIs and better prepared to support companies entering the EU market, including by fostering transnational collaboration.

Firstly, they should be aware of the opportunities such projects can create for the large companies and SMEs in their territory. They should request frequent exchanges with the relevant ministry, including formative sessions on the state of play of the IPCEI and any new opportunities for large companies and SMEs.

Ministry/ies can exploit LRAs' knowledge of the socioeconomic needs of the region and ask for qualitative and quantitative information on the IPCEI area of interest in respect of development of the sector, employees in the area, success factors or barriers to further development, companies to potentially join projects, and related initiatives where companies are already involved to look for synergies and complementarities.

LRAs can play a role in **disseminating and communicating** such information to companies active in that area of work to investigate their interest and support them to contact the ministry to find out more.
LRAs can also **support companies to deal with administrative requests** during and after the accession phase to the IPCEI. Overall, they can facilitate the process, as satellite actors at territorial level.
Internally, **LRAs can create a dedicated department** to support companies to deal with administrative requests for the IPCEI and inform companies on R&D&I opportunities generally.
LRAs are very different from one another, as are EU regions and territories' capacities on R&D&I and propensity to such activities and areas of work. Accordingly, the regions industrial profiles could be assessed to identify those LRAs of high interest and propensity to invest in the IPCEI, i.e. where there are undertakings interested in such projects.
A dedicated department could deal with IPCEI in a specific region, perhaps operating as a satellite for others, and a contact point with the ministry.

Second IPCEI on batteries (EuBatIn, 2021)

1. Introduction

The IPCEI European Battery Innovation (EuBatIn) was approved in 2021. It is the second IPCEI on the batteries sector. EuBatIn benefitted from the lessons of the earlier IPCEI and improved several aspects.

Similar to the first IPCEI on batteries, EuBatIn encompasses the entire battery value chain, from raw material extraction and the design and production of battery cells and packs to recycling and disposal within a circular economy, with a strong emphasis on sustainability. The goal is to steer technological advancements, including new cell chemistries, innovative production processes, and other breakthroughs in the battery sector, building on the progress made by the first battery IPCEI.

The Battery IPCEIs can be understood as 'an organisational platform through which actors in different regional and national economies compete and co-operate for a greater share of value creation, transformation, and capture through geographically dispersed economic activity'[45]. Participants in the IPCEI include all actors embedded in the whole value chain, through a high degree of networking between companies and the two IPCEIs.

2. Background

Lessons learned from the first IPCEI on batteries

The first IPCEI was approved in 2019 and involved 17 companies from seven Member States (Belgium, Germany, France, Germany, Italy, Poland, Finland, Sweden). The European Commission approved €3.2 billion in support from these countries.

Following the Commission's positive assessment of the project results, a second IPCEI on batteries was proposed in 2021. EuBatIn builds on the following considerations and reflections by the Commission and participating public and private actors in the first IPCEI on batteries:

- Coordination and political willingness to invest in this sector played a crucial role in supporting Member States to propose the second IPCEI on batteries. Multi-level coordination between the Commission, Member States and industrial stakeholders resulted in the creation of the European Battery Alliance, facilitating and strengthening coordination and political debate on the need to advance investment;
- The Commission developed and proposed a clear overall strategy for batteries (Commission Action Plan), identifying the IPCEI as one tool among many others;

[45] Gräf, H., 'A Regulatory-Developmental Turn Within EU Industrial Policy? The Case of the Battery IPCEIs', *Geoeconomic Turn in International Trade, Investment, and Technology*, Vol. 12, 2024, p2.

- Coordination activities by France in the first IPCEI were crucial to steer the work, especially during the pre-notification and notification phase. Member States' inputs meant that the whole package was submitted together, including individual project files, at the start of the pre-notification phase. This accelerated the process;
- Member States and the Commission took stock of the issues in the first IPCEI and proposed facilitating exchanges and requests.

The Member States and the Commission encouraged more undertakings to take part in the project, especially SMEs, and focused on advancing innovation.
From an administrative point of view, the first IPCEI demonstrated that public and private undertakings needed more support, as well as standardisation of procedures and information. The main recommendations were to develop templates for the project portfolio and the funding gap questionnaire. More detailed guidance on the funding gap was developed for R&D&I and FID projects. Close cooperation with DG RTD clarified the eligibility of the costs of the projects. Lastly, the Commission and the Member States revised the proportionality of aid that was further ensured by general claw-back mechanisms for larger beneficiaries.
That experience and the lessons from the first IPCEI supported the work of the Member States to propose and design EuBatIn.

Genesis of EuBatIn

In November and December 2019, Belgium, Spain, Germany, France, Croatia, Italy, Austria, Poland, Slovakia, Finland and Sweden, followed by Greece in March 2020, pre-notified their plans to participate in the EuBatIn.
The Commission requested and received complementary information from all participating Member States and companies between December 2019 and December 2020. Between February and September 2020, the Commission also organised high-level meetings at senior administrative level to enhance coordination between the Member States and ensure progress.
By December 2020, all 12 Member States had notified their participation in EuBatIn, using the common Chapeau document and including their planned aid measures.
By participating in EuBatIn, the Member States agreed to ensure the environmental and social sustainability of battery production for automotive and non-automotive applications to comply with the EU's climate and sustainability goals, and contribute to setting up a sustainable EU battery production ecosystem.
Aid approval was granted by the Commission in early 2021, in the amount of €2.9 billion in State aid, supplemented by €9 billion in private investment.

EuBatIn objectives

The key objectives of the EuBatIn are to:

- Research and develop innovative, sustainable battery materials, cells, and systems for automotive and other critical applications across various sectors, unlocking the full technological potential of Europe's battery value chain;
- Significantly reduce the carbon footprint of battery cell production technologies while ensuring efficient battery recycling and second-life applications, maintaining a circular material flow with high environmental and social standards;
- Establish a cost-efficient battery value chain in Europe through standardisation, process innovation, and optimisation, leveraging factory digitisation to support the widespread adoption of e-mobility across the continent;
- Promote job creation and economic growth by developing and strengthening a highly skilled workforce, helping to mitigate the social impact of the clean energy transition;
- Coordinate battery-related activities across Europe, fostering an integrated EU battery ecosystem that aligns with the goals of the European Battery Alliance and supports EuBatIn's mission to meet the EU's strategic objectives.

Project participants and their partners concentrate their work in four workstreams:

- Raw and advanced materials: Focuses on developing sustainable and innovative processes for extracting, refining and purifying ores to obtain high-purity raw materials. For advanced materials, the goal is to enhance existing materials and create new ones for next-generation battery cells;
- Battery cells: Develops innovative battery cells and modules that meet the safety and performance standards of the automotive industry and other applications, such as stationary energy storage and power tools;
- Battery systems: Develops advanced battery systems, including battery management software, algorithms, and innovative testing methods;
- Recycling and sustainability: Creates safe and innovative solutions for collecting, dismantling, reusing, converting, and refining recyclable battery materials, promoting a circular economy.

EuBatIn is an integrated project, as the activities developed in the four workstreams are complementary and mutually connected. EuBatIn is expected to drive R&D&I investments of up to approximately €5.1 billion by participating companies, based on estimates provided by the Member States. It will implement 67 FID activities, with companies piloting their R&D&I results through 37 newly established pilot lines. It will also foster over 200 new collaborations between participating companies and indirect partners, contributing to a total of more than 500 partnerships that would not otherwise have materialised.

Linkages between the first IPCEI on batteries and EuBatIn

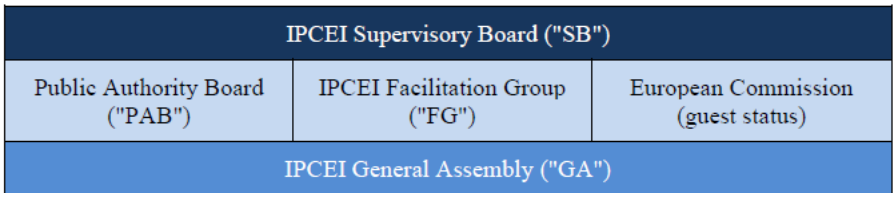
The two IPCEIs on batteries address complementary workstreams, target the same value chain, and have the same high-level common objectives strictly linked to the EU initiatives in climate protection, decarbonised mobility, sustainability and industrial policy. However, some differences can be detected:

- Due to its larger size, EuBatIn has a broader reach, both geographically and in its technical scope. By including an additional five Member States, it fosters spillovers, concrete direct participation and collaboration in other EU regions;
- Participating Member States also explore various cell chemistries and adopt alternative, cutting-edge production processes to diversify battery production for different applications;
- EuBatIn places a strong emphasis on achieving technological excellence for equipment manufacturers, an aspect not addressed by the first IPCEI;
- EuBatIn intends to support several small-scale projects to enable penetration of highly innovative cell technology into niche applications (not the main focus of the first IPCEI) with high potential for growth. This includes applications in water or airborne transport, medical devices, industrial applications and logistics, and marine applications, among others;
- EuBatIn is oriented towards all kinds of beyond state-of-the-art Li-ion battery technologies, including technologies exploring chemistries with fewer environmental or social concerns;
- EuBatIn targets all kinds of next-generation battery technologies, carrying out research into new and alternative materials. Compared to the first IPCEI, it encompasses a higher number of efficient recycling solutions and addresses the development of systems that foster the circular economy;
- Unlike the first IPCEI, EuBatIn includes infrastructural works, e.g. for testing or disassembly;
- The broad application domains of EuBatIn also cover the industrial/consumer sectors and stationary energy storage.

Governance

The EuBatIn governance model is based on an SB and a GA.

Figure 6: EuBatIn governance structure



The SB consists of:

- The PAB, with representatives appointed by participating Member States participating, each with one vote;
- The FG, composed of the chair, the deputy, workstream coordinators, and any additional company representatives or advisors assuming related duties. Currently there are eight representatives in the FG. The composition of the FG can evolve over time to reflect the conclusion of participation by companies based on their respective individual portfolios. It is responsible for coordinating the workstreams, overseeing annual reporting, managing communication, and organising events. It drives the overall progress of the workstreams, acting as a permanent interface between private and public stakeholders to showcase EuBatIn's role and impact;
- Commission representatives (DG GROW, DG COMP), as observers and advisers, without voting rights, appointed by the Commission.

The SB supervises and assures the implementation of EuBatIn by monitoring the progress of the participating companies, as well as EuBatIn as a whole. The focus of the implementation is on the technological advances and dissemination activities to which the participating companies have committed. The SB is responsible for annual reporting to the Commission on the basis of the information provided by the FG. The SB generally meets twice a year. KPIs have been set up to monitor implementation.

The **GA** occurs once a year[46], gathering all participating companies and the representatives of the Member States, with the Commission as an observer. It is responsible for electing the members of the FG and making decisions on any changes to its composition. More specifically, it elects the chair and deputy of EuBatIn, as well as the workstream coordinators, all of whom serve as members of the SB. Additionally, it designates a participating company within the FG as the key contact for implementing spillover commitments. The GA acknowledges any exit decisions from EuBatIn. From its second meeting, it is held in conjunction with the annual public EuBatIn conference.

While the first IPECI was coordinated by France, EuBatIn is coordinated by the German Federal Ministry for Economic Affairs and Energy (BMWi), with the support of VDI/VDE-IT[47]. The latter is in charge of several tasks, including idea development, preliminary identification of participants, preparation of funding

[46] The last GA was in Lyon (France) in October 2024, with more than 75 participants from DG GROW, DG COMP, Member States, and companies.

[47] An organisation set up by two of the largest European professional associations for engineers (VDI, Association of German Engineers, and VDE, Association for Electrical, Electronic and Information Technologies). Its primary objective is to promote R&D by developing instruments and initiatives for accelerating technological development and industrialisation. VDI/VDE-IT is closely involved in the design and is responsible for the implementation and management of R&D and innovation support programmes launched by national and regional governments. At European level, VDI/VDE-IT is the office of the European Technology Platform on Smart Systems Integration (EPoSS). VDI/VDE-IT has been active in European R&D projects related to electric mobility, connected and automated driving, as well as mobility.

approvals, providing supplementary research, and facilitating networking between IPCEI participants and with external networks and actors.
The German government would like to expand EuBatIn to include Portugal and non-EU countries such as Switzerland and Norway[48]. For this purpose, the Commission introduced the option of associated membership in November 2023 to facilitate the participation of non-EU actors in networking events and the workstreams, but without receiving State aid through the IPCEI.
At national level, the projects are selected by the ministry responsible for the IPCEI. The 12 Member States selected 42 undertakings to join EuBatIn[49] through open calls of interest. In some cases (e.g. Finland), the continuous open call was accompanied by specific campaigns and workshops, such as a national state-of–the-art battery ecosystem organised by the Finnish governmental organisation, Business Finland. In Italy, an information event and workshop were between July and September 2019 to inform all interested parties of the IPCEI process. Slovakia established a working group to support the development of industrial battery production, including representatives of the government, the automotive sector, the business and scientific community, and the EIB. The undertakings and the ministry signed a funding agreement outlining the administrative requirements and obligations for each individual project, according to the rules set up by the funding authority. The PAB is responsible for monitoring the completeness of the listings and announcements of spillover activities.

3. Impacts, EU relevance and key lessons

This section explores the impact of EuBatIn at local and regional level to date, as well as its alignment with other EU initiatives and the main lessons learned.

3.1. Regional and local impact

By fostering technological development, creation of knowledge and infrastructure and high-skilled jobs, EuBatIn can have significant impacts at local and regional level through improved capacity for networking, creation of new business and job opportunities, and enhanced support to local environmental sustainability strategies:

- Enhanced territorial and inter-regional networking: Bringing together 42 participating companies and 150 indirect partners from 12 Member States, EuBatIn enhances the capacity of the participating territories and local economic actors to network within and between participating EU regions. By developing, strengthening and networking the battery value chain within European regions by exploiting battery related mining sources in the

[48] Four Norwegian battery projects have been awarded funding under EUBatIn (according to the IPCEI website). The projects, led by Vianode, Morrow Batteries, Cenate, and Beyonder, have collectively received €85 million in grants from Innovation Norway to collaborate with other European companies.
[49] Two in Belgium, one in Greece, two in Spain, 11 in Germany, two in France, one in Croatia, 12 in Italy, six in Austria, one in Poland, four in Slovakia, and one in Sweden.

EU and/or by securing sources under the highest ethical and social standards, EuBatIn contributes to effective and efficient production and local specialisation models;

- Improving business creation opportunities: By increasing collaborative and networking activities, attracting significant private financial resources, and directing investment into specific specialised areas, EubatIn can facilitate the creation of new businesses (see Box 1). It also enables existing and new companies to develop new product applications and designs, as well as to attract and acquire specialised skills and know-how that can be used in collaborations within and outside their regions. EuBatIn ensures further dissemination and spread to large companies, SMEs and ROs, with other actors in downstream sectors in the local clusters;
- Stronger focus on sustainable local specialisation: By covering the entire value chain with sustainable battery cells, modules and systems, and through the implementation of sustainable materials sourcing approaches, EuBatIn significantly improves the carbon footprint of battery cell production and ensures battery recycling. The circular material flow may contribute to new and more efficient Industry 4.0 at local level, and to Research and Innovation Strategy for Smart Specialisation (RIS3) strategies. EuBatIn may also help to define future local specialisation trajectories within the sector by helping to develop next-generation battery cells, modules and systems within the EU regions and contributing to the proliferation of battery-based grid connected energy storage, accommodating higher shares of renewable energy in the electricity grids and directly addressing challenges for stationary energy storage applications.

Unlike its predecessor, EuBatIn enables the creation of three facilities on electrified transport that will benefit European industrial and academic stakeholders.

Box 5: First French gigafactory of battery impacting on regional economies

An early EuBatIn result was the establishment of the first French gigafactory of battery by the Automotive Cell Company (ACC) in 2023. The joint venture between Stellantis, Saft and Mercedes is developing advanced cells and modules for advanced Li-ion batteries, and the construction of three gigafactories in France, Germany and Italy. ACC chose to locate its R&D activities in Bruges, near Bordeaux, while its pilot plant (designed to test the production process prior to scale-up) is located in Nersac (Charente), close to a historic Saft plant.

The French gigafactory is located in Billy-Berclau Douvrin (Pas-de-Calais), on a site owned by Stellantis (Française de Mécanique), historically dedicated to combustion engine production. The Billy-Berclau Douvrin gigafactory has supplied Stellantis and Mercedes from 2024. It will reach an annual capacity of 40 GWh by 2030, the equivalent of around 500,000 electric vehicles. The plant will employ 2,000 people by 2030 and will be France's first gigafactory for Li-ion batteries for electric vehicles.

The Commission has authorised France to grant ACC €846 million in State aid to support R&D activities at Bruges and Nersac and the ramp-up of the gigafactory at Billy-Berclau Douvrin. In total, this project represents almost €3 billion of investment in France, including €2.5 billion for the gigafactory.
This project demonstrates a truly trans-European scope, spanning multiple EU regions across Belgium, Germany, France and Italy.

3.2 Contribution to EU priorities

EuBatIn reflects some of the main industrial policy strategies of the EU:

- 2030 Climate Target Plan[50]: Envisages a set of required actions across all sectors of the economy and the launch of revisions of the key legislative instruments to achieve gas emissions reduction targets of at least 55% by 2030 (compared to 1990). It paves the way for further electrification of the economy, associated with the deployment of renewable sources of electricity, including e-mobility;
- European Green Deal: Aims to transform the EU into a climate-neutral society, i.e. no net GHG emissions by 2050, and where economic growth is decoupled from resource use;
- A new Circular Economy Action Plan for a cleaner and more competitive Europe[51] (Circular Economy Action Plan): Mentions investing in sustainable batteries and vehicles as the backbone of future mobility. Attention is devoted to swift progress on enhancing the sustainability of the emerging battery value chain for electro-mobility and boosting the circular potential of all batteries. Following this Plan, and as part of the European Green Deal, the Commission adopted Regulation (EU) 2023/1542 on batteries and waste batteries[52], which facilitates uptake of the technologies and solutions developed under IPCEIs, through the single market;
- Sustainable and Smart Mobility Strategy – putting European transport on track for the future[53]: Presented by the Commission between 2020 and 2021, it aims to transform the transport ecosystem. It supports investment in creating sustainable, smart and resilient transport, including battery-electric vehicles, to support decarbonisation and meet sustainability challenges;

[50] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Stepping up Europe's 2030 climate ambition Investing in a climate-neutral future for the benefit of our people, COM(2020) 562 final.
[51] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, A new Circular Economy Action Plan: For a cleaner and more competitive Europe, COM(2020) 98 final.
[52] Regulation (EU) 2023/1542 on batteries and waste batteries regulates sustainability, safety, labelling, marking and information to allow placing on the market or putting into service of batteries within the EU. It also lays down minimum requirements for extended producer responsibility, collection and treatment of waste batteries, and reporting.
[53] Communication from the Commission to the European Parliament, the Council, the Economic and Social Committee and the Committee for the Regions, Sustainable and Smart Mobility Strategy – putting European transport on track for the future, COM(2020) 789 final.

- Integrated SET Plan: Launched in 2007 and revised in 2023, this is the central pillar of the EU's energy and climate policy. It mentions investments in the batteries sector as pivotal in reaching the goals envisioned in Priority 4 - Diversify and strengthen energy options for sustainable transport. Actions focus on enhancing EU competitiveness in the global battery sector for e-mobility and stationary storage (Action 7) and renewable fuels and bioenergy (Action 8), with the implementation Working Groups (IWGs) on batteries and renewable fuels and bioenergy. It aims to strengthen the European battery manufacturing value chain, including domestic sourcing of raw materials and advanced materials, as well as reusability and recyclability, to achieve self-sufficiency by 2030. Together with Batteries Europe, it seeks to support the monitoring of the battery value chain. It also aims to address innovative storage technologies beyond electrochemical batteries;
- Clean Industrial Deal: A joint roadmap for competitiveness and decarbonisation'[54]: This strategy was published by the Commission on 26 February 2025. It includes the creation of the IPCEI Design Support Hub to fast-track new IPCEI projects. The Commission will also collaborate with the EIB to create a one-stop shop offering guidance on grant applications and financial structuring. It intends to commit €6 billion from the Innovation Fund in 2025, including for clean tech, battery manufacturing, the Hydrogen Bank and industrial decarbonisation.

EuBatiIn is embedded in the European Battery Alliance initiative, launched by the Commission in 2017 to structure the dialogue between European stakeholders and policymakers in the field.
Another relevant initiative is the European Batteries Academy, run by InnoEnergy, a knowledge and innovation community (KIC) of the European Institute of Innovation and Technology (EIT). The Academy was launched in 2022 to train, reskill and upskill approximately 800,000 workers by 2025 to address the skills shortages in the rapidly growing European battery value chain. It was created under the framework of the European Battery Alliance[55].
EuBatiIn is also embedded in the European Batteries R&I Community[56], a network including other three initiatives collaborating in the battery sector, namely the Batteries European Partnership Association (BEPA), Batteries Europe and Battery 2030+. Their mission is to strengthen R&D&I on batteries in the EU. Activities include co-organisation of activities, events, official statements and

[54] Communication from the Commission to the European Parliament, the Council, the Economic and Social Committee and the Committee for the Regions, The Clean Industrial Deal: A joint roadmap for competitiveness and decarbonisation, COM(2025) 85 final.
[55] European Battery Alliance, Website, n.d., https://www.eba250.com/about-eba250/
[56] Batteries European Partnership Association (BEPA), Website, n.d., https://bepassociation.eu/the-european-batteries-ri-community/

joint publications. This fosters dissemination and contamination of research results.
Finally, EuBatIn aligns with the latest initiative promoted by the Commission in December 2024[57] when it launched two new calls for proposals. With a budget of €3.4 billion, it seeks to accelerate the deployment of innovative decarbonisation technologies in Europe, including electric vehicle batteries. The calls for proposals are financed by the Innovation Fund[58].

3.3 Key lessons

The EuBatIn GA promotes merging the two IPCEIs on batteries to consolidate existing strengths. The goal is to foster even closer professional exchange and jointly advocate for the interests of the IPCEI community. The Commission supports this closer alignment and has called on stakeholders to propose constructive suggestions for a potential adjustment of IPCEI structures.
The IPCEI enables dissemination of R&D&I activities to both participating and not-participating undertakings. Participation in conferences and events (as speakers, contributors, or attendees) facilitates the exchange of knowledge and skills. These events typically attract key stakeholders from the battery value chain, including businesses, ROs , and universities, providing a platform to share the latest advancements. Collaborations with a diverse range of indirect partners, together with strong communication and engagement with clusters, professional trade associations and other intermediary bodies, can further enhance dissemination efforts.
The results of EuBatIn will be disseminated through the clusters of which they are members, notably:

- The Batteries Europe Platform, a European open coordination platform for research, innovation and battery applications;
- European Battery Alliance;
- EIT Raw Materials, the largest consortium in the raw materials sector worldwide.

Dissemination extends beyond key application domains such as mobility, industrial and consumer applications, and stationary energy storage, without compromising EuBatIn's objectives. This dissemination will allow these entities to benefit from the R&D&I and FID activities carried out within EuBatIn across different workstreams, enabling them to apply the results in various sectors, both upstream and downstream. As a result, they will be able to enhance their technological expertise, advance their own research, improve equipment,

[57] European Commission, 'Commission earmarks €4.6 billion to boost net-zero technologies, electric vehicle battery cell manufacturing and renewable hydrogen under the Innovation Fund', Press release, 3 December 2024, https://ec.europa.eu/commission/presscorner/detail/en/ip_24_6184
[58] The Innovation Fund is the EU's climate policy fund dedicated to the energy and industrial sectors. Its goal is to introduce market-ready solutions for decarbonising European industry, supporting its transition to climate neutrality while enhancing competitiveness.

materials and processes, develop new products, and establish new collaborations, ultimately contributing to EuBatIn's overarching goals.
With respect to the specific spillover effects of FID activities, activities across the four workstreams can generate significant spillover effects in downstream markets and in the regions where EuBatIn's undertakings and partners are located. These benefits will extend not only to the participating companies (e.g. increased innovation and enhanced production models) but beyond, for instance by fostering the creation of newmodels, impacting on the local value chain and job market. EuBatIn enables companies to develop new product applications and designs, as well as to attract and acquire specialised skills and know-how, which can be leveraged in collaborations within and outside their regions.
EuBatIn facilitates access to next-generation batteries and new technologies developed during the FID phase, benefitting participating companies, other large enterprises, and SMEs and research centres looking to advance their knowledge and applications across the entire lifecycle of high-performance batteries. These stakeholders may gain an early advantage in leveraging cutting-edge innovations, improving local specialisation in innovative and sustainable development trajectories.
A 2021 study[59] by the German Federal Ministry for Economic Affairs and Energy assessed the relationships between actors and the resulting network structures in batteries, particularly the added value of transnational collaborative activities in under Horizon Europe. It acknowledged that projects carried out under Horizon generally involve a larger number of participants, enabling greater diversity in participant profiles and territories of origin. Given the presence of various downstream markets for batteries, EU investment in R&I plays a key role in ensuring that knowledge and solutions are effectively shared across different economic sectors, enhancing productivity and capacity to innovate in local clusters. The study also reported that the IPCEIs on batteries will scale up European cell production, bring significant innovations to the market, and establish a robust network of key players across the entire value chain.

4. LRA involvement

The section explores the extent to which LRAs are involved in EuBatIn, from design to implementation.

4.1. Role of LRAs

The representatives of VDI/VDE Innovation noted that the role of LRAs is very limited.

[59] Federal Ministry for Economic Affairs and Energy, Battery cell manufacturing ecosystem in Europe Network structures as a basis for knowledge transfer and value creation partnerships, 2021, https://www.ipcei-batteries.eu/fileadmin/Files/accompanying-research/media/download/Battery_cell_manufacturing_ecosystem_Europe.pdf

However, there is some room to involve them more. When organising the GA, the coordinator generally invites the region hosting the meeting. This event provides networking opportunities beyond the GA itself. Interviewees reported that they organised social events with the local actors that (could) play a role in the battery community. When the GA was organised in Lyon, the coordinators asked the local government to organise a network meeting with local industry.
The interviews revealed varied involvement of LRAs between countries, depending on the institutional set up of the individual Member State. In Germany, the Länder play a role in defining the national industrial strategy for industrial policy. In addition, investment projects (including under the IPCEI) receiving funding are also supported by regional funding, with about 30% covered by the Länder. This approach reflects the fact that the project has local benefits (e.g. job creation), thus the Länder are involved in funding the project.
The VDI/VDE Innovation representatives mentioned that they generally collaborate with the regional officers in charge of cluster policy. Bavaria, for example, promoted funding measures on industrial policies and informed Bavarian companies about the possibility of participating in the clusters and/or the IPCEI.
Apart from funding, the administrative process of EuBatIn is managed exclusively at national level by the relevant ministry or a funding agency (e.g. VDI/VDE Innovation in Germany). In the case of Germany, the Länder generally follow the agency's recommendations. Companies are in contact with local governments and often require support from the regional office to deal with administrative requests.

4.2. Challenges

Many companies reported that the application process to join EuBatIn took a long time and they had to wait for confirmation from the Member State before accessing the funds. The administrative requirements are burdensome, with a lot of forms and detailed questions from the European Commission. In Germany, VDI/VDE Innovation advises companies on how to fill in the forms and respond to the questions, but the process remains long and complicated, leading to many withdrawals by companies during the pre-selection process.
Another challenge is the notification process. Member States must individually notify every single project to the Commission, with a detailed assessment on the Commission side. This process is lengthy, with an associated administrative burden for companies, especially SMEs.
EuBatIn is an R&I programme, with funding and investments targeting big, innovative projects. While the IPCEI should support these types of projects, it sometimes conflicts with the flexibility that such projects require, especially for long-term R&D&I activities. For example, companies must detail the technological roadmap at the beginning of the project. This plan is then assessed in detail and is the basis for the approval of the project. If projects are subject to

modifications and changes to the roadmap, based on research, or to adapt to business developments or changing market and customer requirements, it is not easy to adapt the project towards different technologies.

4.3. Best practice and innovation

The interviews suggested that LRAs do not play a key role in the design and implementation of EuBatIn. However, VDI/VDE Innovation's experience indicates that LRAs can act as facilitators, hosting events and meetings to support stakeholder networking, and involving key local industrial players.

LRAs have provided funding to local undertakings joining EuBatIn, as the benefits of the IPCEI can impact local and regional economies (e.g. Germany). However, their role as funding bodies strictly depends on the division of powers between central governments and sub-national levels, which varies considerably across the Member States.

5. Recommendations

This section provides conclusions and recommendations for both the Commission and LRAs to improve their participation in the integrated project.

5.1 For policy makers at EU and national level

The requirements set by the Commission and the Member States to join EuBatIn entail detailed information and impose significant administrative effort. National authorities should consider whether an IPCEI is the best solution and tool for the projects in question, particularly whether this programme is suitable for SMEs or a simpler programme would be better, with undertakings instead becoming IAPs in the IPCEI.

5.2 For LRAs

It can be helpful to involve LRAs as facilitators from the design phase of the IPCEI. They can investigate whether there is sufficient interest or willingness from companies, and preliminarily assess the market.

Dissemination and communication by LRAs can support the regional industrial ecosystem to start building up a new value chain or a new sector. Involving LRAs can also make the IPCEI more attractive to undertakings.

LRAs should be aware of other type of initiatives, similar to the IPCEI, to provide inputs to the regional ecosystem in respect of all possible EU single market opportunities.

Another long-term factor to consider is **enhancing education programmes focused on this sector**. The EBA can be a template to inspire similar, even smaller, initiatives at local level.

IPCEI on next generation cloud infrastructure (IPCEI-CIS) (2023)

1. Introduction

This case study covers a specific sector, namely cloud and edge computing. The IPCEI-CIS is the first IPCEI approved in the sector and is, somewhat unusually, almost all software-based.

IPCEI-CIS was approved on 5 December 2023. Nineteen companies from seven Member States (Germany, Spain, France, Italy, Hungary, the Netherlands, Poland) are participating in this project.

IPCEI-CIS concerns the development of the first interoperable and openly accessible European data processing ecosystem, the multi-provider cloud to edge continuum. It aims to develop data processing capabilities, software and data-sharing tools that enable federated, energy-efficient and trustworthy cloud and edge distributed data processing technologies and related services. The innovation provided by IPCEI-CIS offers new possibilities for European private and public sectors to advance the digital and green transitions in the EU.

2. Background

In October 2020, the 27 Member States of the EU signed a Joint Declaration for a European cloud federation initiative to shape the next generation of secure, energy efficient and interoperable cloud supply for Europe. This initiative showed their willingness to cooperate and invest in cloud computing technologies, deploy innovative technologies and solutions, create synergies, and enhance national and cross-border projects.

The IPCEI-CIS resulted from that process. In December 2020, Germany, Spain, France and Italy invited all Member States to participate in the design phase of the IPCEI, essentially establishing the first multi-provider cloud edge continuum in Europe. Belgium, Czechia, Latvia, Luxembourg, Hungary, the Netherlands, Poland and Slovenia expressed their interest in joining, with some issuing national calls to preselect potential projects for the IPCEI in 2021.

Between April and May 2022, Germany, Spain, France, Italy, Hungary, the Netherlands and Poland pre-notified the Commission of their plans to participate in an IPCEI-CIS on the basis of the Chapeau document, explaining how the individual projects would contribute to achieving the IPCEI's goals. Between October and November 2023, the Member States individually notified the common Chapeau document, together with a project portfolio of their individual aid measures. In December 2023, the IPCEI-CIS was approved by the Commission. The project timeline lasts approximately six years, from 2020 to 2026.

IPCEI-CIS represents the EU's long-term response in respect of investment in the development (including industrial research) and FID of the next generation of cloud-edge capabilities to foster new types of data and platform solutions.

Considering the global market and geopolitics, the EU needs to become a global leader in federated data processing (cloud and edge) capabilities.
IPCEI-CIS focuses on designing and deploying the first highly energy-efficient, secure, and distributed multi-provider cloud-edge continuum. It aims to deliver the next generation of innovative, secure, and environmentally friendly data processing capabilities that the EU and its end users require for sustainable technological leadership. This initiative is built on interoperable, advanced, and open cloud-edge infrastructure and services and is intended to equip the EU with advanced and federated cloud and edge capabilities based on interconnection services and interoperable platforms.
IPCEI-CIS provides the basis for the 8ra Initiative, which represents EU financial and socioeconomic efforts to create a decentralised and federated digital infrastructure that enhances innovation, sovereignty, resilience and sustainability. More specifically, it aims to establish a multi-provider cloud-edge continuum, a pioneering cloud ecosystem, designed to revolutionise data processing. The first ever cloud-edge continuum combines real-time capability, scalability, interoperability and low latency, offering the ideal starting conditions for AI, the industrial metaverse or autonomous systems. IPCEI-CIS builds on existing initiatives at EU and national level, such as the GAIA-X open-source architectural framework.
The key building blocks of IPCEI-CIS are:

- Infrastructure: Setting up an appropriate and supported next generation infrastructure to manage the technological complexity of the meshed continuum;
- Interconnection: Development and set up of physical and logical linking of networks, including integrated smart network services for the cloud-edge continuum, to enable the entire network to combine cloud-edge computing processes and data transfer throughout the EU;
- Foundation services: Representing the basis for real-time data services with ultra-low latency and the load balancing for optimised utilisation. This will enable sorting, interpreting and prioritising of storage and processing capabilities of large amounts of data in advance as close as possible to the place of origin and/or consumption of those data;
- Platforms and smart processing services: Providing integrated services such as application lifecycle management to build, deploy and maintain apps all over the cloud-edge continuum; platform services; data management to ease data ingestion, transformation and analysis in a multi-provider, federated environment in accordance with EU regulation; data platform; and innovative data processing;
- Initial roll-out of next generation use cases: As part of an FID with European-wide scale, showcasing data processing in different sectors to verify functionality, high scalability, interoperability, portability, interconnectivity and compatibility.

IPCEI-CIS goals

The key objectives of IPCEI-CIS are to:

- Create a common architecture with technological components for an open cloud-edge stack that is highly scalable and interoperable;
- Create a set of services to automate at the highest possible scale the federation/orchestration at cloud-edge level;
- Enable Security Operation Centre (SOC) and Computer Emergency Response Team (CERT) to serve customers' needs and security accidents from edge to cloud across national borders;
- Create automated management for distributed hardware;
- Ensure high level of energy efficiency and security across all technology building blocks;
- Create platform and smart processing services to support different applications;
- Overcome users' vendor lock-in and foster data portability.

IPCEI-CIS workstreams

IPCEI-CIS is structured into four workstreams, each representing a key layer of technologies and capabilities essential for completing the multi-provider cloud edge continuum. Within each workstream, the participating entities will engage in both R&D&I and FID activities.

- Workstream 1 – Cloud Edge Continuum Infrastructure works on infrastructure resources readiness to take part in the deployment and operation of the cloud edge continuum. Such infrastructure is both tangible (hardware) and intangible (software). It aims to provide software developing all necessary infrastructure-related capabilities to build the base layers of the edge cloud stack, such as resource availability and management, energy monitoring, security, performance metrics and network connectivity determination;
- Workstream 2 – Cloud Edge Capabilities aims to develop a common reference architecture that will serve as a blueprint for how to set up and operate a cloud and edge system. The final goal is to design and provide an innovative and holistic reference architecture that will enable the implementation and operation of the multi-provider cloud edge continuum;
- Workstream 3 – Advanced Smart Data Processing Tools and Services aims to develop a set of advanced cloud and edge services that can be deployed seamlessly across networks of providers. Activities include the design of services that are reusable in various application contexts as building blocks for cross-domain service integration. The overall goal is to define and build ready to use, fully configurable and modular processing services to create, operate, and maintain applications and services in all IPCEI-CIS application domains;

- Workstream 4 – Advanced Applications aims to develop solutions for complex, real-world, sector-specific challenges to demonstrate the maturity of the multi-provider cloud edge continuum solutions developed in the three previous workstreams. It showcases how specific use cases in sectors such as energy, health, and manufacturing can benefit from integration into the continuum, while also proving that these results can be applied to other industries. Its main objective is to identify and address R&D&I challenges related to the integration and operation of complex applications within the multi-provider cloud edge continuum, as well as the transferability of sector-specific solutions to other domains.

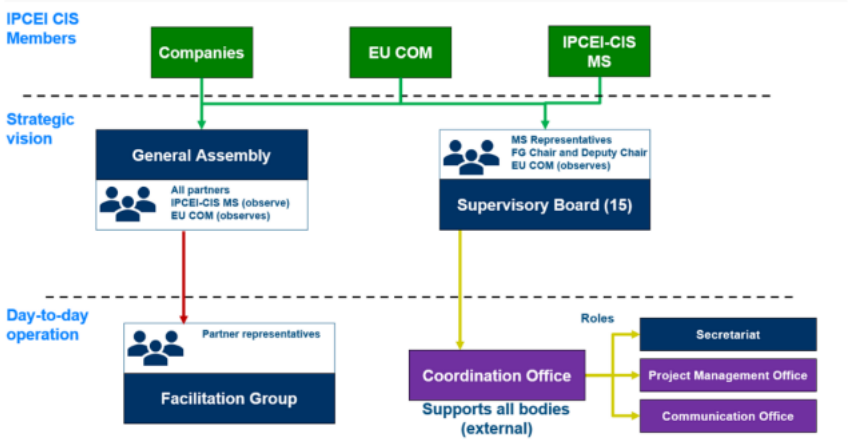
Governance

IPCEI-CIS includes 19 participating companies, including SMEs and start-ups, as well as research centres and universities, from seven Member States, with 90 indirect partners, all working to create the first interoperable and accessible European data processing ecosystem.

The indirect partners were selected at national level according to the Member States' specific selection criteria. As part of the design of IPCEI-CIS, these indirect partners have effective cross-border collaboration with at least one direct participant or one other indirect partner. They are members of the GA and have voting rights. Indirect partners may receive funding, which has not been notified in this context to the Commission, and such funding is neither examined nor approved in the context of this decision. Additional Member States that have submitted indirect partners to IPCEI-CIS are Belgium, Croatia, Latvia, Luxembourg and Slovenia.

The IPCEI-CIS is coordinated by Germany and France and Germany.

Figure 7: IPCEI-CIS governance structure



With about 100 participants, IPCEI-CIS GA comprises:

- All partners to the IPCEI (direct participants and indirect partners);
- Representatives of all Member States, acting as observers and without voting rights;

- The Commission, as an observer and without voting rights.

The GA is the platform to exchange and debate implementation challenges and solutions. The GA is organised at least once a year. The first meeting elected the chair and vice-chair of the FG, as well as the chair and deputy coordinators of each workstream, who will be members of the SB. In the GA, Member States can propose new projects, assessed later by the FG.

The SB presents its strategy for IPCEI-CIS, as well as an overview of the progress of the integrated project. In addition to the Member States, with one vote each, it includes:

- FG, which consists of members elected from the GA, representing GA partner members. The FG is represented at SB meetings by its chair and vice chair and has two votes. It consists of 10 representatives of all IPCEI-CIS partners: the chair and vice chair, elected by the GA and eight coordinators, elected within the four workstreams (two coordinators each). The FG acts as the permanent communication channel between the IPCEI-CIS partners and governing bodies. It is responsible for monitoring the results of the individual projects, including dissemination and spillovers, sustainability and security impacts. It also reports to the GA and SB;
- The head of the Coordination Office, as a permanent observer without voting rights. The Coordination Office is a permanent office that acts as the overall coordination, project management and communication office on behalf of the SB on a day-to-day basis. It handles operations, management, reporting, internal and external communication activities. The Coordination Office is made up of representatives of the German Federal Ministry for Economic Affairs and Climate Action and the French Ministry for Economy, Finance and Recovery.

The SB meets twice a year. Its role is to supervise, monitor and ensure implementation of IPCEI-CIS in all of the Member States. It reports to the Commission on the basis of information provided by the FG and the Coordination Office. It is responsible for resolving disputes between the IPCEI participants.

The Commission has one representative in the SB and is a permanent observer without voting rights. Its role is to enhance coordination between Member States in the project through technical meetings during the period preceding the pre-notifications. The Directorate-General for Communication Network (DG CONNECT) is the main DG involved in the IPCEI-CIS.

At national level, the projects are governed by funding agreements concluded with the relevant funding authority within each Member State, generally at ministerial level. The Member States are responsible for monitoring implementation and closure of the project, e.g. deliverables, sustainability, compliance with the DNSH principle, as well as the committed spillover activities and knowledge dissemination.

Each participating Member State hosts a national call for project proposals or a call for expression of interest. The companies that receive the notification to take

part in the IPCEI-CIS are fully compliant with all Commission conditions. Where funding is not possible under the IPCEI framework, the Member States can suggest that the companies, research centres and universities ask for other national or European funds.
An important element is the involvement of SMEs in IPCEI-CIS. The interviews and the official documents on the IPCEI website stated that the Member States should support and facilitate the participation of SMEs. Compared to the other IPCEIs, SMEs represent the minority of the companies participating in this project, thus the IPCEI-CIS places more focus on supporting and encouraging them to participate in the integrated projects, including through consortia with other companies.

IPCEI-CIS funding
The seven Member States committed up to €1,2 billion in public funding, which is expected to unlock an additional €1,4 billion in private investment. The projects included in the IPCEI-CIS are also financed through the national recovery and resilience plans (NRRPs), as they contribute to the digital transition and green transitions. Germany, Spain, Italy and Poland all noted their intention to use funds from the RRF.
According to the IPCEI-CIS website, the total funding available is up to €3.5 billion for all projects around the EU.

3. Impacts, EU relevance and key lessons
This section examines the preliminary impact of the IPCEI at regional and local level, its alignment with other EU initiatives, and the key lessons learned.

3.1 Regional and local impact
IPCEI-CIS was approved in late 2023, making it difficult to assess its impact and effect at this early stage. The Commission decision on the IPCEI-CIS reported several expected project results, which may also have a positive impact at regional and local level:

- It is expected to contribute to sustainable and inclusive growth by supporting the twin transition (green and digital) and reinforcing the EU's data-related capabilities;
- According to Member States' estimations, direct participants (SMEs, large companies, research centres, universities) are expected to create 1,000 direct and indirect jobs for highly qualified professionals (e.g. data scientists, software engineers, cloud architects, cybersecurity engineers, AI specialists);
- It should stimulate collaborative interactions among direct participants across different Member States, with the aim of developing the expected technologies rapidly by using the different technology elements required

by the different collaborators. Projects in different fields will work together, reinforcing integration, including across Member States;
- It should operate as the first building block, enabling the creation of an interoperable European cloud edge continuum, thus contributing to lowering entry barriers for new service providers, in line with the objectives of the Data Act. By enabling implementation of the 8ra Initiative, it contributes to enlarging the capabilities of Europe's digital landscape.

This IPCEI also has significant positive spillover effects for non-participating actors. Dissemination and contamination activities will reach actors working in related fields. IPCEI-CIS participants will:

- Beyond their usual open-source software practices and business models, grant permissive, non-restrictive open-source software licences to any interested party and actively engage with and contribute to the development of open-source communities;
- Provide interested parties with access to at least 20% of the capacity of the edge nodes and laboratories employed in their projects;
- Expand the technologies developed to additional economy sectors;
- Engage in targeted training, standalone technical materials, conferences, publications, partnerships with universities and ROs;
- Licence intellectual property rights with fair, reasonable, and non-discriminatory terms.

Actors involved in the IPCEI-CIS can grant direct participants access to the infrastructure elements or laboratories supported as part of the R&D&I and/or FID phases of the projects to develop, test or upscale the software concerned. The direct participants have in turn committed, as a spillover effect, to grant access to at least 20% of the annual capacity of these infrastructure elements for free to any interested third party. Some direct participants have also committed to providing a digital, live demonstration of their project results and allowing other users to experiment on those results, effectively guaranteeing an equivalent result.
Interested users can thus obtain knowledge and advance their own research remotely. This will foster further R&D by other market players and in other Member States.
The FID phase of the projects, during which use cases are performed, can expand the tests to additional sectors of the economy to produce standalone technical material and business case studies, or to organise training, with important positive spillovers for local economies in business creation and new job opportunities. Undertakings from those additional sectors will be able to acquire know-how, apply the developed technologies and adapt the use cases into solutions for other sectors, providing for further integration.
As the majority of the projects are R&D&I activities in the software area, most of the solutions built are free, open-source software. This will mean no limitation on

who or where the results of this IPCEI will be used. Every company and public institution in every Member State can use the results, provided they adhere to the principles of the open source.
A German representative of the FG noted that the IPCEI solutions and achievements are expected to go far beyond 2026, with impacts at regional and local level likely in the longer term. In practice, however, LRAs play no role in either the design or implementation of this IPCEI.

3.2 Contribution to EU priorities

IPCEI-CIS is in line with the EU's main policies and strategies on digitalisation and digital transformation of public and private sectors, data protection, and green transition:

- 2030 Digital Compass: the European way for a digital decade (published in 2021)[60]: Translates EU digital ambitions for 2030 into concrete targets by strengthening the uptake of cloud services and deploying edge infrastructures and capabilities, while also ensuring innovative and high-quality technical results. The strategy envisages the development of an EU cloud market by providing the opportunity to more and smaller players (including SMEs) to enter, thereby reducing the Union's strategic dependencies in the information and communications technology (ICT) sector. Of the four cardinal points of the strategy, digitalisation of public services can have the greatest impact on LRAs. It aims to ensure full online provision of key public services available for European citizens and businesses, full access to medical records (e-records), and 80% of citizens using a digital ID solution[61];
- New Industrial Strategy for Europe[62] (published in 2020 and updated in May 2021): Focuses on empowering SMEs to reduce administrative burden, increase resilience, combat late payments, and support solvency. The Commission has proposed the introduction of new instruments to strengthen EU industrial policy, including harmonising standards for key business services, strengthening the digitalisation of market surveillance, and other targeted measures for SMEs;

[60] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, 2030 Digital Compass: the European way for the Digital Decade, COM(2021) 118 final.
[61] The other three goals (pillars) include: a digitally skilled population and highly skilled digital professionals, translating to 20 million employed ICT specialists (women and men) in the EU; build secure and performant sustainable digital infrastructure, such as the first EU computer with quantum acceleration, the deployment of 10,000 climate-neutral highly secure edge nodes, and the production of cutting-edge and sustainable semiconductors in Europe, including processors at least 20% of world production in value; the digital transformation of businesses, translating to reaching 75% of EU enterprises taking up cloud computing services, Big Data and AI, and more than 90% of EU SMEs reaching at least a basic level of digital intensity.
[62] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Updating the 2020 New Industrial Strategy: Building a stronger Single Market for Europe's recovery, COM(2021) 350 final.

- European strategy for data[63] (approved in 2020): This is the first step in the EU vision to set up and reinforce a single market for data, as well as tackling problems identified through policy measures and funding. Interventions include investments to strengthen Europe's capabilities and infrastructure for hosting, processing and using data, interoperability (of which this IPCEI is a part);
- Data Act[64] (entered into force in January 2024): This represents a key pillar of the European data strategy and contributes to the Digital Decade's objective of advancing digital transformation. As consumers and businesses generate data by using products and services, the Act aims to make more data available for use via new rules on who can use and access data and for which purposes across all economic sectors.
- Green Deal Industrial Plan for Net Zero Age[65]: This calls for European standards to promote the rollout of clean and digital technologies and provide Union industries with an important competitive advantage, including at global level. It aims to accelerate the transition to climate neutrality by creating a more supportive environment for scaling-up the EU's manufacturing capacity for the net-zero technologies and products required to meet Europe's ambitious climate targets. The main pillars of the plan include efforts to simplify regulatory frameworks (net-zero industry Act, Critical Raw Materials Act, Reform of electricity market design) and enhance digital skills;
- Next Generation EU: This is a crucial tool to support advancement in digitalisation, as its RRF instrument requires Member States to dedicate at least 20% of the NRRP total allocation to measures contributing to the digital transition or to addressing resulting challenges. Some Member States have decided to fund some IPCEI-CIS projects through the RRF.

3.3 Key lessons

As IPCEI-CIS was launched quite recently, the interviews and information collected through desk research necessarily reflect its early stage. Nevertheless, interviews with the representatives of the German Federal Ministry for Economic Affairs and Climate Action and the officials of the Italian Ministry of Enterprises and Made in Italy provide some useful reflections on IPCEI-CIS and inputs for future IPCEIs:

[63] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, A European strategy for data, COM(2020) 66 final.
[64] Regulation (EU) 2023/2854 of the European Parliament and of the Council of 13 December 2023 on harmonised rules on fair access to and use of data and amending Regulation (EU) 2017/2394 and Directive (EU) 2020/1828 (Data Act).
[65] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, A Green Deal Industrial Plan for the Net-Zero Age, COM(2023) 62 final.

- Private actors with connections to research centres and specific academics can play a highly relevant role, as suggested by the experience in Germany. Research centres that are part of IPCEI-CIS can create linkages between the public and private sector, enabling further spillover effects and facilitating other actors to join the project. Given the relevance and urgency of new digital solutions, there is considerable interest in using them at a larger scale;
- The Member States participating in IPCEI-CIS provide the full budget to the undertakings involved in the integrated projects. The differences between Member States, including varying policy priorities and financial support available mean that smaller Member States find it harder to participate. This risks always having the same Member States joining IPCEIs;
- Speed of decision-making at national and EU level are crucial to attracting undertakings to these EU initiatives. Companies need rapid and simplified instruments to access finance to implement R&D&I and FID activities, thereby retaining and increasing their competitiveness. Approval of the IPCEI-CIS took more than two years, during time companies' global competitors were launching their products on the market;
- IPCEI-CIS is perceived by stakeholders as a valid instrument of industrial policy to make the EU more competitive in the digital markets. It builds on the concept of integration and spreading experiences and ideas. Participation of SMEs is crucial to integration, but they often lack the administrative capacity to join or implement the project. SMEs reported lacking this know-how inhouse;
- Setting up a dedicated team to follow the IPCEI-CIS is perceived as challenging, requiring administrative and legal experts, State aid, and ICT.

4 LRA involvement

The section explores the extent to which LRAs are involved in IPCEI-CIS, from design to implementation.

4.1 Role of LRAs

LRAs have a limited role in the IPCEI-CIS. They were not consulted or informed during the design phase, nor do they play a role in implementing the R&D&I and FID activities.

As an integrated multi-country software-based project, it does not envisage building large-scale factories, but, rather, research fabs.

Nevertheless, the projects developed within the IPCEI-CIS ecosystem can be highly relevant for LRAs as potential future users of the results.

To date, the main IPCEI-CIS actors are not considering involving LRAs, even at an informal level, for instance to inform them of project implementation or potential benefits.

The interviews showed that the IPCEI-CIS is not easily approachable for companies. Accordingly, the ministry responsible should clearly present the project and inform companies how to participate, as they are the main target groups. This includes SMEs, which find the initiative even more difficult to access. According to the interviews with the Italian and German ministries, LRAs can support dissemination and communication activities at regional and local level, even pre-identifying potential companies interested in joining the IPCEI.

4.2 Challenges

The LRAs' limited role in IPCEI-CIS may reflect several issues described during the interviews:

- The central governments in the IPCEI-CIS (and other IPCEIs) generally cover all costs, leaving little room for LRAs to add resources and participate financially in supporting the projects. In some cases, national legislation foresees the possibility for LRAs to contribute financially to the IPCEIs. For instance, the Italian government's rules for the IPCEIs Fund foresee that 'regions, autonomous provinces and other public administrations may contribute financially to the Italian share of support for the implementation of each IPCEI' in the Decree of April 2021[66]. However, this option has been used just once by the Sicily region for the first IPCEI on microelectronics. No Member State has highlighted the involvement of LRAs in IPCEI-CIS;
- Managing an IPCEI, especially for a very high-edge innovative sector such as the digital market, needs specific skills and expertise that LRAs may not have;
- In very innovative sectors, such as cloud and edge computing, subject to rapid technological changes, strong competition, and dynamic users' needs, rapid financial and administrative support to undertakings, especially smaller companies. LRAs may not have this capacity. The interview with Italy's Ministry of Enterprise and Made in Italy reported a case where LRA delays in permits hampered the participation of a company in IPCEI-CIS and it eventually withdrew altogether.

4.3 Best practice and innovation

Due to the very limited involvement of LRAs in IPCEI-CIS, no particular practices or innovative solutions emerged at regional or local level. The interviews highlighted that regions and local bodies have a greater knowledge of territorial realities, thus it is important to involve LRAs at least in the design phase. This would better identify and involve undertakings, especially SMEs, and construct and reinforce an effective dialogue with national authorities, bridging

[66] Ministry of Enterprise and Made in Italy, Decreto interministeriale 21 aprile 2021 - Fondo IPCEI, Criteri generali per l'intervento e il funzionamento del Fondo, 2021.

the ministerial (central) and local levels by disseminating information about the scope, working mechanism and long-term effects of the IPCEI.
LRAs can also play a role as facilitators for companies, for instance to rapidly obtain specific administrative authorisations and limit the potential for the administrative burden to impede smooth implementation of the projects.

5 Recommendations

This section presents conclusions and recommendations for the Commission and LRAs to improve their participation in the integrated project.

5.1 For policy makers at EU and national level

In 2020-2021, the Commission carried out a fitness check to provide a comprehensive policy assessment of the modernisation of State aid[67], including the IPCEIs[68]. That evaluation highlighted that the IPCEI communication has facilitated the emergence of IPCEIs and provided Member States with a tool to address market failures in the financing of large projects of strategic importance for the EU. However, it highlighted the need to improve the framework conditions to enable and facilitate SMEs to access and participate in IPCEIs.
Based on the results of the evaluation and the requests of Member States, one of the revisions included in the Commission Communication on IPCEIs (2021), impacting IPCEI-CIS, was to **promote the participation of SMEs** in these projects and to maximise the benefits of their participation. This includes specific measures to facilitate assessment of the compatibility of aid to SMEs, such as allowing smaller companies to make a smaller than usual financial contribution to projects. The revised Communication also encourages cooperation between larger companies and SMEs within IPCEIs. The IPCEI-CIS thus continues to promote the involvement of SMEs and start-ups: the integrated project currently involves 35 SMEs and 20 start-ups. Nevertheless, more efforts are needed, especially at local level, to involve SMEs in the IPCEI-CIS.
Smaller companies need **rapid and simplified instruments to access finance** to implement R&D&I and FID activities that will enable them to retain and increase their competitiveness in the cloud and edge computing market. One solution could be to **have a share of EU co-financing** specifically supporting SMEs to join the initiative.
The evaluation also highlighted the need for more guidance to Member States on the types of spillover activities the Commission accepts. In addition, the Commission's role as a facilitator between Member States should be 'bolder' to ensure the openness of projects. Member States expressed concerns about the

[67] Commission Staff Working Document, Fitness Check of the 2012 State aid modernisation package, railways guidelines and short-term export credit insurance, Part 2/4 and Part ¾, SWD(2020) 257 final.
[68] The integrated projects considered were those already approved, namely the first IPCEI on microelectronics (December 2018), the first and second IPCEIs on batteries (December 2019 and January 2021, respectively), as well as the decision approving an infrastructure IPCEI, the Fehmarn Belt fixed rail-road link (March 2020).

minimum number of countries required to set up an IPCEI. Although the Commission stated that such projects should 'normally involve more than one Member State', this requirement alone might not be sufficient to ensure geographically balanced participation. Member States instead suggested that the Commission introduce a specific requirement to ensure geographical representativeness of Member States and promote equitable development.
The interviews underlined the need to build on the work of the IPCEI-CIS and further increase smaller countries' access and participation.

5.2 For LRAs

The LRAs could **inform companies and territories about the existence of a specific IPCEI**, especially when it concerns some companies that are important for the regional economy, by facilitating dialogue with the ministry or assisting them (especially SMEs) with the application process.

This implies that LRAs should be properly informed and equipped with the necessary knowledge about IPCEIs, including their functioning, scope, eligibility criteria, and administrative requirements. This capacity-building role could be supported through LRA budgets and the involvement of specialised consultancies or facilitated by organisations such as the Council of European Municipalities and Regions (CEMR), Eurocities, the Assembly of European Regions, and others. Alternatively, training could also be provided directly by Member States, either using internal resources or external expertise financed through national budgets or EU funding (e.g. EIB).

Finally, LRAs could support enterprises, particularly SMEs, by taking care of administrative requests for them and providing flexible mechanisms to encourage their participation in the IPCEI. In those Member States where legislation allows, LRAs should consider contributing financially to IPCEIs, following an ex-ante market assessment to evaluate costs and benefits and identify potential local stakeholders.

Third hydrogen IPCEI (Hy2Infra, 2024)

1. Introduction

Hy2Infra is one of the latest IPCEIs on the hydrogen value chain, approved by the European Commission on 15 February 2024[69], almost two years after the first pre-notification by the Member States. Hy2Infra was jointly prepared and notified by seven Member States: Germany, France, Italy, the Netherlands, Poland. Portugal and Slovakia.
Hy2Infra involves 32 undertakings, including five SMEs, from the participating Member States. It allows public and private entities to establish the first regional infrastructure clusters and prepare the ground for future interconnections across Europe, implementing the EU Hydrogen Strategy[70].

Hy2Infra is the third IPCEI in hydrogen and complements two previously approved IPCEIs in the hydrogen value chain: the IPCEI on hydrogen technology (Hy2Tech) and the IPCEI on hydrogen industry (Hy2Use). Together with the fourth IPCEI on hydrogen mobility (Hy2Move), they represent the key investments in the sector, together with the RRF for clean energy[71]. both channels are used to fund Hy2Infra. More specifically, some projects will be funded by the RRF, including those from France, Poland and Portugal, and some from Germany.

2. Background

Hy2Infra exists in a wider context of efforts by Member States and other European countries to advance the hydrogen value chain. On December 2020, 23 Member States and Norway agreed to pursue low-carbon and renewable hydrogen objectives through plans to support the development of an (incentivised) sector of excellence in Europe[72]. Their manifesto recognises the need for cross-border collaboration and large-scale joint investment in sectors such as the safe and sustainable low-carbon production of hydrogen, manufacturing of equipment, storage, transmission and distribution of hydrogen, and application of hydrogen technologies to industry.

Several Member States issued national calls to pre-select potential projects and, during 2021, started the preparations and development of a common programme for IPCEI on hydrogen. Due to the broad range of technologies and considerable

[69] European Commission, Statement by Executive Vice-President Vestager on the Important Project of Common European Interest, Hy2Infra, Press release, 15 February 2024.
[70] European Commission, EU hydrogen strategy.
[71] European Commission, Recovery and Resilience Facility for clean energy, n.d.
[72] EU20.20de, Manifesto for the development of a European 'hydrogen technologies and systems' value chain, 2020.

stakeholder interest, the participating Member States opted to design multiple IPCEIs on hydrogen, each with a distinct focus.
The pre-notifications for Hy2Infra started in April 2022 and ended in April 2023. During that period, Germany, France, Italy, Hungary, the Netherlands, Poland, Portugal, Slovakia and Sweden pre-notified their plans to participate. Between December 2022 and November 2023, the European Commission requested and received complimentary information, while also organising technical meetings with the Member States. The Commission adopted the decision not to raise objections on Hy2Infra on 15 February 2024.
Overall, the Commission approved €6.9 billion in State aid for Hy2Infra, with an additional €5.4 billion in private investments expected to be unlocked.

Context of IPCEIs on hydrogen
Hy2Tech, Hy2Use, Hy2Infra, and Hy2Move, while having complementary objectives, address different aspects of the hydrogen value chain. They share a common goal of supporting the EU's climate and energy strategies but remain distinct in scope and focus.
Hy2Tech primarily supports R&D&I and FID activities in four key areas: hydrogen generation technologies, fuel cell technologies, storage, transportation, and distribution technologies, and hydrogen applications for selected end users, particularly in the mobility sector. It emphasises technological advancements, such as improving electrolyser efficiency, rather than infrastructure deployment.
Hy2Use builds on Hy2Tech by targeting industrial applications of hydrogen, promoting hydrogen generation in several Member States, and supporting transport infrastructure in one Member State. It complements Hy2Tech by addressing areas not covered by the latter, including R&D&I projects for hydrogen use in industrial sectors.

In contrast to Hy2Tech and Hy2Use, Hy2Infra does not involve R&D&I or FID activities, but focuses exclusively on infrastructure development. Its projects extend beyond the scope of Hy2Use and include large-scale storage capacities, port infrastructure for embedded hydrogen, and the deployment or repurposing of pipeline networks connecting to electrolysers and storage facilities. Hy2Infra is intended as a foundational step towards a broader European hydrogen network, supporting the large-scale transport and storage of hydrogen. Together, these three IPCEI initiatives contribute to the advancement of hydrogen technologies and infrastructure across different stages of the value chain, aligning with the EU’s long-term climate and energy ambitions.

The latest IPCEI on hydrogen, Hy2Move, exclusively focuses on addressing the specific challenges and objectives of hydrogen applications in mobility and transport. Hy2Move extends the development of hydrogen technology to novel mobility and transport applications, such as hydrogen-powered light mobility for

aviation, rail, heavy-duty transport, and marine vessels, as well as hydrogen generation technologies tailored to these uses. Hy2Move complements the hydrogen infrastructure projects under Hy2Use and Hy2Infra, recognising that both R&D&I/FID initiatives and infrastructure development are essential for establishing a fully integrated hydrogen value chain.

Hy2Infra objectives

Hy2Infra aims to start the development of an integrated infrastructure for the supply of hydrogen across several Member States. The final goal is the establishment of regional clusters and interconnections across the EU.

Participating undertakings pursue sub-objectives such as the creation of a reliable supply chain for renewable and low-carbon hydrogen, establishment of a functional, open and non-discriminatory network between the direct participants, and knowledge generation through direct experiences, contributing to a standardised framework across the Member States.

The work is divided into four workstreams:

- Workstream 1 Electrolysers: Installation of hydrogen production capacity. It will be implemented through the installation of large-scale electrolyser capacity of 3.2 GW, which will produce 0.3 megaton (Mt) of renewable hydrogen per year. The installation is expected to be complete by Q2 2028;
- Workstream 2 Pipelines: Installation of hydrogen transmission and distribution via pipelines. This will be achieved through the building of 1,063 km of new pipeline and the repurposing of 1,607 km of pipeline for the transport of hydrogen. The work is expected to be completed by Q4 2029;
- Workstream 3 Storage: Installation of large-scale hydrogen-storage facilities to scale-up capacity to 9,120 tonnes of hydrogen. The work is expected to be completed by Q4 2028;
- Workstream 4 liquid organic hydrogen carriers (LOHC) handling terminals: Develop port infrastructure and LOHC-related infrastructure to handle 6 kt of renewable hydrogen per year. The work is expected to be completed by Q4 2028.

Ultimately, Member States aim to achieve the goals of the EU Hydrogen Strategy while reaching the decarbonisation targets.

Implementation of the projects funded through Hy2Infra will address market failures in the hydrogen sector:

- Coordination issues arise because the profitability of hydrogen projects is interdependent, leading to underinvestment. Hy2Infra is a coordinated approach that will integrate investments in electrolysis, transport, storage,

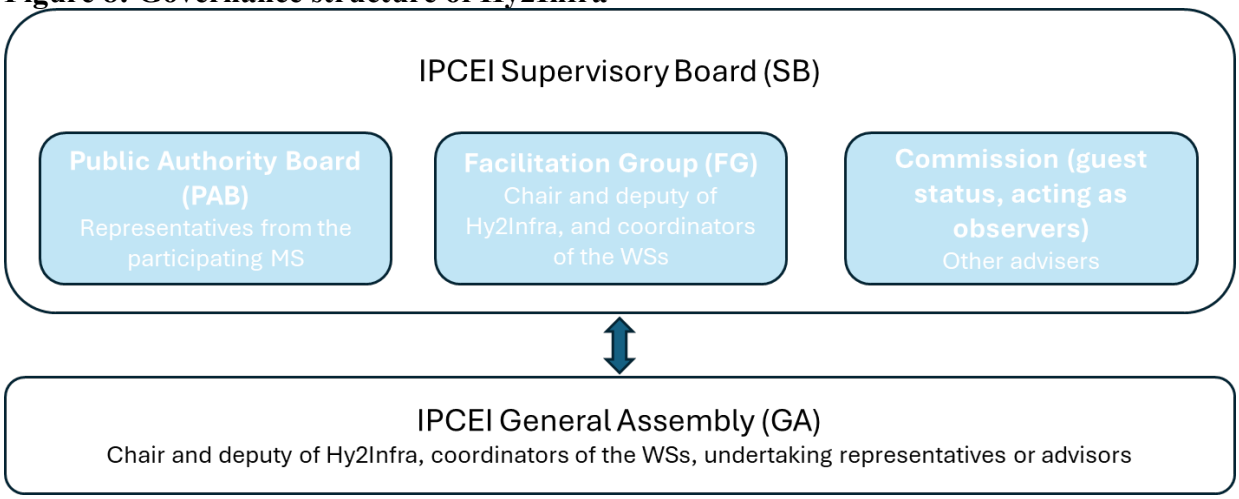
and international hydrogen trade, ensuring a structured and efficient rollout of hydrogen infrastructure;

- Negative externalities in the hydrogen sector stem from the environmental costs of fossil-based hydrogen, which are not fully reflected in market prices, leading to continued reliance on polluting energy sources. Hy2Infra aims to mitigate these externalities by scaling-up electrolyser production, developing hydrogen transport networks, and establishing large-scale storage to ensure a stable supply for end users;
- Positive externalities, where societal benefits exceed private returns, also contribute to underinvestment in hydrogen infrastructure. State aid under Hy2Infra is designed to address this imbalance, reducing the financial burden on first movers and facilitating a socially optimal level of investment in hydrogen infrastructure across Europe.

Governance of Hy2Infra

The governance structure of Hy2Infra comprises representatives of the participating Member States, representatives of the Commission, which act as observers, advisers, the chair and the deputy of Hy2Infra, workstream coordinators, and additional representatives from participating companies.

Figure 8: Governance structure of Hy2Infra



The SB is composed of:

- PAB, which includes representatives of the seven Member States participating in the IPCEI, each with one vote;
- FG, which includes the chair and deputy of Hy2Infra and the workstream coordinators;
- Three representatives from the Commission, with guest status and acting as observers, and other advisers, such as additional company representatives or advisors without voting rights.

The purpose of the SB is to oversee the implementation and monitoring of Hy2Infra, ensuring compliance with the annual reporting requirements to the

Commission. The oversight is based on the information provided by the FG and concerns the technical advancements of the projects and spillover activities undertaken by the direct participants. The SB reports to the GA on the progress of Hy2Infra once per year and informs it of any modifications of the Hy2Infra.

The SB meets regularly twice per year, with optional extraordinary sessions in case of significant developments, such as changes in the participating undertakings. During the first meeting, the SB establishes the KPIs to assess the effectiveness of Hy2Infra, which will then be monitored throughout the IPCEI. The GA meets once per year, gathering together all direct participants, representatives of the Member States, and three representatives of the Commission. During the first meeting of the GA, the voting participants elect the members of the FG. The GA also designates a participating undertaking that is a member of the FG, as a key contact for the implementation of the spillover commitments[73]. The FG oversees workstream coordination, annual reporting, and communication within Hy2Infra and with third entities that are not participating undertakings but that could potentially benefit from the results of Hy2Infra. The composition of the FG can vary, reflecting changes in the structure of the participating undertakings.

Selection of participating partners

The selection procedure for direct participants is the responsibility of the Member States. Overall, 33 projects were selected from 32 direct participants across the seven participating Member States:

- Germany: 24 projects and 23 direct participants, one of which is an SME. Ten projects relate to workstream 1, 10 to workstream 2, three to workstream 3, and one to workstream 4;
- France: One project from one direct participant, an SME; workstream 1;
- Italy: Three projects and three direct participants, including one SME. Two projects relate to workstream 1 and one relates to workstream 2;
- The Netherlands: One project from one participant, relating to workstream 4;
- Poland: One project from one direct participant, relating to workstream 1;
- Portugal: Two projects from two direct participants, both SMEs. Both projects relate to workstream 1;
- Slovakia: One project from one direct participant, relating to workstream 2.

Overall, the participating Member States indicate that the total eligible costs for Hy2Infra are €11.51 billion.

3. Impacts, EU relevance and key lessons

[73] Due to the novelty of the IPCEI Hy2Infra, no decision on the FG has been made publicly available.

This section explores the expected impact of Hy2Infra at local and regional level, as well as its alignment with other EU initiatives.

3.1 Regional and local impact

The Hy2Infra projects are essential from a Europe-wide perspective. They are essential for the advancement of various policy plans, such as the EU Hydrogen Strategy, the European Green Deal and REPowerEU, and are central to boosting the uptake of hydrogen and decarbonisation of various industrial process. Hy2Infra is crucial for a wider set of projects involving and relying on hydrogen, including the projects under Hy2Tech, Hy2Use, and Hy2Move.

The importance of Hy2Infra may vary by individual Member State. Unlike the other IPCEIs, Hy2Infra is an infrastructure project and is thus linked to the willingness of each participating Member State to boost its national infrastructure revolving around hydrogen. The interviews confirmed that Hy2Infra is mostly a German IPCEI. The cross-border dimension is also relevant, as the projects related to Hy2Infra are expected to create hubs across the participating Member States.

Impacts at local and regional level are difficult to assess, as the projects are in the early stages and publicly available data are limited. Interviews with Commission representatives noted that the first reporting from the various projects is expected by June 2025. However, the expected impact is largely the creation of business and new job opportunities in relevant areas. For example, the energy supplier EWE Hydrogen plans to build one of the largest hydrogen production plants in Europe in Lower-Saxony as part of Hy2Infra.

3.2 Contribution to EU priorities

Hy2Infra's goals are aligned with many EU-wide strategies related to industrial policies:

- EU Hydrogen Strategy: Defines a comprehensive framework supporting the uptake of renewable and low-carbon hydrogen with the aim to decarbonise Europe. The goal is to produce 10 million tonnes of renewable hydrogen and import 10 million tonnes by 2030. By 2050, the Hydrogen Strategy aims to have hydrogen covering 10% of European energy needs. It is founded in the 'Fit for 55 package', which includes binding targets for the uptake of renewable hydrogen in industry and transport[74];
- REPowerEU (launched in May 2022): Aims to save energy, diversify energy supplies and produce clean energy. It sets the policy context for the increase in the production of renewable and low-carbon hydrogen. More

[74] European Commission, EU Hydrogen Strategy, n.d.

specifically, it supports the development of three major hydrogen import corridors via the Mediterranean, the North Sea and with Ukraine;

- Green Deal Industrial Plan: Aims to enhance the competitiveness of the European net-zero industry while accelerating climate neutrality. It targets the strengthening of infrastructure, including hydrogen, as well as the streamlining and simplification of the IPCEI process[75];
- Commission's Recovery Plan: Highlights the willingness of the Commission to boost investment in clean technologies and value chains. This is supported through Horizon Europe funding[76]. It lays the basis of the new Clean Hydrogen Strategy and Alliance;
- Trans-European Energy Networks (TEN-E) framework: Acts as the basis on which Hy2Infra is developed. It addresses the fragmented interconnection between Member States, the isolation of certain Member States from gas and electricity networks, and the provision of a secure and diversified energy supply in the context of the EU interoperability of national energy infrastructure. It explicitly includes the development of hydrogen infrastructure[77].

3.3 Key lessons

This IPCEI is newly implemented, making it too early to draw any firm conclusions. However, some early lessons relate to the identification of projects and the notification phase. Interviews with Commission representatives highlighted that the time between conception and implementation was shorter than the first IPCEIs. Various factors shortened the timeframe. Firstly, improved IPCEI organisation, notably the JEF-IPCEI and better guidance on the information to be provided. Secondly, Hy2Infra has a lower number of projects than previous IPCEIs, due to the intrinsic nature of the infrastructure and its intersection with existing pipelines and industrial needs.

The length of the process is still perceived as a problem. Delays in the provision of funding from the EU is still perceived as an obstacle: for example, a web article notes that the electrolyser being built by EWE Hydrogen in Lower-Saxony was delayed by the Commission's funding decision[78].
Better coordination of funding is also essential for the implementation of IPCEIs, as highlighted in the interviews. While different funding sources are possible, such as State aid and Cohesion Funds, coordination of these sources can create

[75] Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions, A Green Deal Industrial Plan for the Net-Zero Age, COM(2023) 62 final.
[76] Communication from the Commission to the European Parliament, the European Council the Council, the European Economic and Social Committee and the Committee of the Regions, Europe's moment: Repair and Prepare for the Next Generation, COM(2020) 456 final.
[77] European Commission, Trans-European Networks for Energy, n.d.
[78] Ostfiresen Zeitung, Die EU verlangsamt den Wasserstoff-Ausbau in Emden erheblich.

practical challenges linked to the complexity of aligning timelines and requirements. Hy2Infra aggregates several projects that are funded through other sources, such as the RRF. The accumulation of multiple funding sources requires careful planning to ensure the feasibility of the projects and compliance with the regulatory framework, and regional support can play a key role in funding strategies. However, disparities between Member States in resources and funding mechanisms prevent the establishment of common practices across LRAs.

Disparity in the involvement of LRAs has been central to Hy2Infra. For example, in Germany the various Länder have a degree of freedom to fund projects. This seems to allow German LRAs to play a role in funding and promoting the projects under Hy2Infra. Other Member States, such as France and Italy, have a centralised organisation, preventing LRAs from having a similar degree of freedom.

4. LRA involvement

The section explores the extent to which LRAs are involved in Hy2Infra, from design to implementation

4.1 Role of LRAs

According to the IPCEI official documents and interviews with Italian representatives and an academic researcher, LRAs have not played a role in the development or implementation of the projects. They were not consulted in the pre-notification phase, nor during the initiation of the projects' activities. The main actors involved are Member States' representatives (ministries), companies involved in the IPCEI projects, and industry associations. LRAs do not play an active role in the governance of the IPCEI nor in the JEF-IPCEI. It has been confirmed that the Commission does not expect LRA involvement, as it interacts only with participating Member States.

However, LRAs are not prevented from interacting with national authorities in the participating Member States and the direct participants of IPCEIs. LRAs can participate in funding projects, depending on the nature of the project and the alignment of project and regional objectives. The involvement of LRAs depends on the internal organisation of the participating Member States. German and Belgian LRAs, for example, are more active than their French or Italian counterparts.

The interview with the academic researcher highlighted that the funding of an IPCEI is shared between the national and the local authority, with the local authorities involved in the funding process but not in the formal process. The presence of 24 German projects reinforces the idea that German LRAs have a higher degree of engagement in IPCEIs. The interview with the Italian authority reinforced this notion. Although all projects selected by the Italian ministry are

concentrated in the region of Puglia, there has been no dialogue between the national authority and the region, but only between the region and the direct participants in relation to regulatory and permitting aspects. This concentration is because the region is in a pivotal position for infrastructure and the construction of electrolysers is aligned with the decarbonisation of the regional industrial sector.

4.2 Challenges

Funding of IPCEI projects is primarily from Member State budgets, resulting in a degree of variation between Member States, depending on the size of the country and the availability of funds. LRAs can be involved in funding projects, depending on the characteristics of the national authority. The Italian projects in Hy2Infra have been funded through a fund managed by the Italian Ministry of Enterprise and Made in Italy. While Italian LRAs can contribute their own funds, this possibility has rarely been used.

IPCEI funding does not prevent the accumulation of other sources of funding. This allows a single project to benefit from two different sources of funding, increasing the likelihood that the project will be completed. However, the accumulation of funding can hinder the development of the project by introducing additional requirements and increasing the administrative burden.

The time required for the project to receive funding is a common challenge across the various IPCEIs. Although the time from the notification of projects to the publication of the Commission decision has decreased significantly, from four years to around two years, it is still perceived as a lengthy procedure. Hy2Infra involves the deployment of large amounts of financial resources due to the nature of the projects involved. Delays in the provision of funding or a growing administrative burden linked to the use of different sources may hinder the innovative aspects of the projects.

4.3 Best practice and innovation

Hy2Infra is newly implemented, which, together with limited engagement from the contacted entities, prevented the identification of best practices and innovations at this early stage.

The interviews highlighted that LRAs should actively engage with the entities active in the IPCEI to play a role. Direct involvement would allow LRAs to attract and retain certain types of projects, ensuring that the objectives of the IPCEI are aligned with regional priorities. A partial example of this is the alignment of the Region Puglia decarbonisation priorities with the objectives of Hy2Infra.

LRAs can also act as a sounding board to raise awareness and interest among local undertakings. The Wallonia region in Belgium, for example, promoted the engagement of companies in its territory by advertising the call for projects online.

Similarly, the Ministry of Enterprise and Made in Italy noted that the Italian manufacturing association, Confindustria, mapped the interest of Italian businesses in IPCEIs across different sectors. Although Confindustria is not an LRA, it highlights how coordination between the local and the national levels can increase the capillarity of IPCEIs.

5. Recommendations

This section presents some recommendations for policy makers and LRAs, This section presents some recommendations for policy makers and LRAs, drawing on the information gathered, problems and solutions.

5.1 For policy makers at EU and national level

The desk research and interviews highlighted the complexity of IPCEIs, the involvement of various stakeholders at different levels, and the need to improve and streamline the process itself. IPCEIs have specific objectives that differ from one project to another, while the overarching objective is to reinforce the strength and competitiveness of EU players compared to their Chinese and US counterparts.

Given the inherently innovative nature of the sectors in which IPCEIs are implemented, a well-defined strategy is essential to safeguard the competitiveness of EU actors in an increasingly globalised market. Advancements in hydrogen technology play a crucial role in achieving key policy objectives related to the EU's decarbonisation efforts and energy independence.

The interviews highlighted the need to **reduce the complexity and length of the IPCEI process**. The strictness of the European approach contrasts with the subsidy policies in place in the US[79] and China. The JEF-IPCEI is currently working towards streamlining the process and enhancing its transparency.

An academic researcher highlighted the **unequal representation in IPCEIs funding**. There is a significant overrepresentation of Germany (and, to a lesser extent, France), prompting formal complaints from Sweden and other Member States about fair access to funding.

Potential improvements should include Commission **guidance for Member States on including regional authorities**, establishing best practices for regional involvement in industrial policy planning, and encouraging better communication between national governments and regional authorities on IPCEI opportunities.

5.2 For LRAs

LRAs' involvement in IPCEIs should be adapted in terms of the IPCEI process and in financial terms.

LRAs should proactively engage with counterparts (especially enterprises), acting as an aggregator of information and facilitating interactions between national authorities and prospective direct participants. This would allow an

[79] For example, the Inflation Reduction Act.

improved diffusion of information, enhancing the capillarity of the information on IPCEI opportunities.

LRAs could play an extended role in **facilitating compliance with regulatory and permitting requirements**. This would reduce the administrative barriers independent of the IPCEI process.

LRAs could **engage more with national and EU authorities, assuming a more active role in the IPCEI process**. This could be accomplished through increased transparency and early notification of upcoming IPCEI, structured consultation with regional representatives during IPCEI topic selection, and a clarified governance role of LRAs within JEF-IPCEI discussions. This coordination would allow an initial selection at LRA level, allowing for a more targeted presentation of the IPCEI topic to specific entities.

LRAs could **exploit their knowledge of the socioeconomic needs of the area** to better understand the synergies and complementary factors that could boost the spillover effects of an IPCEI.

IPCEI Med4Cure (2024)

1. Introduction

The IPCEI Med4Cure was approved by the European Commission in May 2024. It builds on the ambitions of the 2022 Health Manifesto, which was signed by 16 Member States to strengthen cooperation in the health sector. As the first health-related IPCEI, Med4Cure aims to enhance Europe's strategic autonomy in the pharmaceutical industry by supporting research, innovation, and FID of new healthcare products and processes. It focuses on the entire pharmaceutical value chain, including advanced drug discovery, innovative therapies for rare diseases, AMR, and emerging health threats, as well as the development of sustainable, resilient manufacturing processes. Med4Cure is designed to address existing market failures by supporting high-risk, high-reward health innovations that would otherwise struggle to reach the market.

2. Background

Six Member States (Belgium, Spain, France, Italy, Hungary, Slovakia) lead the initiative, providing up to €1 billion in public funding and leveraging an estimated €5.9 billion in private investment. Fourteen highly innovative projects form the backbone of Med4Cure, implemented by 13 companies, including nine SMEs. By 2036, Med4Cure is expected to create approximately 6,000 direct and indirect jobs and support Europe’s efforts to repatriate pharmaceutical production while promoting environmentally friendly and economically viable alternatives.

IPCEI objectives

Med4Cure was launched to strengthen Europe’s strategic autonomy in the pharmaceutical sector, supporting the objectives of the European Health Union and addressing the growing need for innovative solutions to public health challenges. It responds to the strategic goal of reducing the EU’s dependence on external suppliers for critical medicines and production technologies, while fostering a resilient, sustainable, and competitive pharmaceutical industry within Europe.

Med4Cure focuses on supporting high-risk, high-reward innovation across the entire pharmaceutical value chain. Its objectives centre on the development of advanced therapies and innovative production processes to tackle unmet medical needs, such as rare diseases, AMR, and emerging health threats. A key priority is the creation of greener and more resource-efficient pharmaceutical manufacturing methods, contributing to the green and digital transitions.

Med4Cure brings together large companies, SMEs, ROs and healthcare providers to collaborate on 14 highly innovative projects. These projects are organised across four complementary and interlinked workstreams, each covering a critical part of the pharmaceutical value chain:

- **Workstream A – Collecting, gathering and studying bio-resources**: Improving the collection and use of biological materials, including cells, tissues, and other samples, to support drug discovery and development;
- **Workstream B – Tools for better understanding disease biology and increasing medical translatability**: Developing advanced tools, such as bioinformatics platforms and predictive models, to enhance the understanding of diseases and the development of targeted treatments;
- **Workstream C – Processing innovations through enhanced drug discovery, preclinical, and clinical procedures**: Supporting the creation of novel methods and technologies to accelerate the transition from early-stage research to clinical application;
- **Workstream D – Innovative production processes and tools towards sustainability and resilience across the health value chain**: Developing sustainable and scalable manufacturing solutions to ensure secure, local production of essential medicines.

By integrating the expertise of actors across different segments of the pharmaceutical industry, Med4Cure aims to deliver cutting-edge health innovations and support the long-term competitiveness of the European pharmaceutical ecosystem.
Interviewees noted that Med4Cure builds on and complements other EU initiatives, such as the Health Emergency Preparedness and Response Authority (HERA), the EU Pharmaceutical Strategy, and relevant Horizon Europe projects. These linkages help to ensure that the knowledge generated within Med4Cure is effectively shared across Europe's health innovation ecosystem, while facilitating synergies with other efforts to strengthen Europe's preparedness, industrial resilience, and leadership in health technologies.

Governance of Med4Cure

The insights presented here are partial and reflect the early stage of Med4Cure's implementation. Given the recent approval of the project, the very few steps completed, and the limited publicly available information, this analysis is primarily based on insights gathered from three stakeholder interviews and a small number of press articles. As such, the assessment remains indicative and should be revisited as the initiative progresses and more comprehensive data become available.

Med4Cure's governance structure includes a GA, an SB, a Coordination Office, and an FG. The European Commission participates as an observer, providing technical expertise and logistical support. France leads the coordination of the initiative, which is closely linked with the preparation of Tech4Cure, a parallel IPCEI focusing on medical devices. While Med4Cure benefits from

NextGenerationEU funds, disbursement procedures vary across participating Member States and are still being formalised.
A representative from DG GROW highlighted that although Med4Cure has successfully established its governance arrangements, implementation is still at an early stage due to the ongoing finalisation of national procedures. While there is significant collaboration across Member States and companies, engagement with LRAs remains limited, with Wallonia one of very few examples of regional involvement.

Selection of participating partners
Med4Cure is characterised by strong SME participation, at over 60% of the companies involved. Collaboration between SMEs and large enterprises is facilitated through matchmaking processes, contributing to the project's strategic objective of fostering cross-sectoral cooperation.
An SME from Hungary, a direct participant in Med4Cure, noted that the initiative offers a unique opportunity to advance complex, long-term therapies from pre-clinical to clinical approval stages. These include innovative approaches such as xenotransplantation and advanced stem cell therapies. However, financing remains a major challenge, particularly for SMEs with limited resources and long development timelines. The interviewee emphasised that regional support could play a crucial role in bridging funding gaps, particularly in the transition from R&D to industrial deployment (FID) but noted that such involvement is minimal as yet.
An associated partner from the Netherlands, active in contract development and manufacturing for cell and gene therapies, echoed the importance of collaboration. Despite the Netherlands opting for GBER support rather than full IPCEI participation, the company values its inclusion in the project as a way of staying connected to developments and supporting manufacturing innovation. The interviewee highlighted the positive role of regional actors such as the South Holland authorities in supporting workforce development and infrastructure but acknowledged the high administrative burden of participation and the lengthy application process.

3. Impacts, EU relevance and key lessons
This section explores the impact of Med4Cure at local and regional level, as well as its alignment with other EU initiatives and the main lessons learned.

3.1. Regional and local impact
Med4Cure brings together a diverse set of actors across Europe to address strategic dependencies in the pharmaceutical sector. While a full assessment of its territorial impact is premature, early indications point to significant regional benefits in several participating countries. In Hungary, one SME involved in the project is working to advance innovative therapies from pre-clinical to clinical

stages, with the potential to create high-quality employment and strengthen the regional economy through high-tech industrial activities. However, regional authorities have not played a significant role so far, and no regional funds have been mobilised to support these efforts.
In the Netherlands, an SME participating as an associated partner is collaborating closely with local stakeholders, including the regional government of South Holland, to strengthen the local biotech ecosystem. The region supports talent development and infrastructure aimed at boosting capacities in cell and gene therapy manufacturing, helping to anchor high-value pharmaceutical activities locally. These efforts contribute to establishing the region as a centre of excellence in advanced therapies.
The most notable example of local and regional engagement in Med4Cure is in Wallonia (Belgium), where two companies are participating, including a spin-out[80] focused on the development of personalised mRNA cancer vaccines. This company is set to receive up to €30 million in direct funding from the Walloon government to support its activities within Med4Cure, including the construction of a production facility in the region. This investment not only strengthens local industrial capacity but also supports job creation, technological innovation, and the development of cutting-edge treatments, reinforcing Wallonia's position as a key player in the health innovation sector.

3.2. Contribution to EU priorities

Med4Cure contributes to several key EU policies and strategies to strengthen the resilience, competitiveness and sustainability of the European health sector. Although early in its implementation, the project is designed to address strategic challenges identified in EU industrial, health, and digital policies, supporting long-term objectives for innovation, sustainability, and open strategic autonomy.

- European Health Unio: Aims to reinforce EU preparedness and response capacity for cross-border health threats. Med4Cure supports innovation in the production of critical medicines, including advanced therapies for rare diseases, AMR, and other unmet medical needs, while strengthening Europe's pharmaceutical value chain;
- EU Industrial Strategy: Seeks to secure Europe’s strategic autonomy in key sectors. Med4Cure directly supports this objective by reducing dependency on non-EU countries for the supply of active pharmaceutical ingredients and other essential health technologies, fostering localised, resilient, and sustainable pharmaceutical production within the EU;
- European Green Deal: Emphasises the need to transition to more sustainable industrial processes. Med4Cure develops greener manufacturing technologies for pharmaceuticals, aiming to reduce resource

[80] A *spin-out* is a newly formed company that emerges from a larger organisation, such as a university or research centre, to commercialise innovations or research results. In this case, the company is a spin-out from the University of Liège. Source: OncoRNA Therapeutics, OncoRNA

consumption and environmental impacts in line with the principles of the circular economy and sustainable production;

- Digital Decade – Europe's Digital Compass for 2030: Sets the ambition for Europe to lead in digital infrastructure and technologies. Med4Cure supports this goal through the integration of advanced digital tools in drug discovery, disease modelling, and production processes, promoting data-driven innovation across the pharmaceutical sector;
- Horizon Europe: Promotes high-risk, high-reward innovation in strategic sectors. Although funded through national resources under the IPCEI framework, Med4Cure complements Horizon Europe's objectives by fostering cutting-edge research, technological development, and first industrial deployment in health-related technologies.

3.3. Key lessons

As Med4Cure is still in the early stages of implementation, with most national procedures ongoing and projects yet to fully start, concrete lessons are somewhat limited. However, insights from interviews and preliminary experiences yielded several initial reflections on the setup and early execution phases of the project.

Firstly, the high level of SME participation is a distinguishing feature of Med4Cure, accounting for over 60% of participants. This demonstrates the potential of IPCEIs to foster innovation beyond large industrial players and support the scaling-up of smaller actors, particularly in high-risk fields such as advanced therapies, AMR, and rare diseases. Nevertheless, the process remains particularly demanding for SMEs, which often face challenges in navigating complex administrative procedures and coping with delayed funding disbursements.

From a governance perspective, the coordination mechanisms, including dedicated workstreams and structured matchmaking activities, were well received. These tools facilitate cross-border collaboration between companies that have not previously worked together, creating new opportunities for innovation across the pharmaceutical value chain. However, interviewees noted that the overall timeline to launch the IPCEI – more than four years from concept to implementation – is excessive and risks undermining the competitiveness of European actors in this fast-moving sector.

Early evidence suggests that stronger involvement of LRAs could improve project delivery by supporting SMEs through complementary funding, administrative facilitation, and strategic alignment with local ecosystems. The case of Wallonia illustrates the positive role that regions can play, providing up to €30 million in direct support to a participating company developing mRNA-based personalised cancer vaccines, along with plans for local infrastructure investments. This

example suggests that regional engagement can enhance territorial impact and create synergies between IPCEIs and local industrial policy.

Finally, the interviewees underlined the importance of harmonising national procedures, as differences in funding rules, timelines, and support measures introduce fragmentation and slow project execution. Streamlining these processes, while reinforcing multilevel governance that actively involves regional actors, is key to improving future IPCEIs.

Although it is too early to assess broader spillover effects, Med4Cure has the potential to generate long-term benefits for participating companies, wider industrial clusters and regional innovation ecosystems. As the project progresses, further monitoring will be essential to capture its contribution to strengthening Europe's strategic autonomy in health, fostering sustainable production methods, and positioning European regions as global leaders in pharmaceutical innovation.

4. LRA involvement

There is limited information on LRA involvement in Med4Cure, as the project is at an early stage and public documentation is lacking. Accordingly, insights are drawn from a small number of interviews and limited press coverage.

4.1 Role of LRAs

A notable feature of Med4Cure is the direct involvement of LRAs alongside Member States at the negotiation table, a novelty in the governance of an IPCEI. Wallonia is a concrete example of this regional engagement. The call for expressions of interest was published on the Walloon authority's website, and Wallonia has been participating in the coordination process together with Member States. While the research team was unable to interview a representative from the region, publicly available information indicates that the Walloon government has committed to partial co-funding. More specifically, up to €30 million in regional funding will support the SME OncoRNA to develop personalised mRNA cancer vaccines, including plans for a local production facility.

An interview with a representative of a Dutch SME participating as an associated partner highlighted the role of the South Holland regional government. Although it does not directly fund the project, South Holland actively supports the local biotech ecosystem through infrastructure development and workforce training. These efforts create favourable conditions for Med4Cure participants.

4.3 Challenges

SMEs involved in Med4Cure described a 'two-speed' dynamic, where larger companies with more resources have been able to move forward, while smaller actors continue to face administrative bottlenecks and are still waiting for funding to be disbursed. For SMEs with limited cash flow and smaller teams, these delays

are difficult to manage and put their participation at risk. One SME representative emphasised that, in practice, this has forced smaller companies to either slow their work or advance at their own financial risk while waiting for national procedures to conclude.

Interviewees noted that stronger regional engagement could ease some of these pressures by providing complementary support, helping to navigate administrative requirements, and facilitating smoother implementation. In regions where LRAs have been more actively involved, such as South Holland, there are signs that this type of support can create a more favourable environment for SMEs, whether through co-funding, infrastructure, or skills development.

4.3 Best practice and innovation

As the implementation of Med4Cure is still at an early stage, concrete best practices are still emerging. However, initial insights from interviews and available information point to some innovative approaches and practices that may serve as useful examples, particularly the involvement of regional actors and the integration of SMEs into complex, large-scale industrial initiatives.

Wallonia represents the most notable case of regional engagement in Med4Cure. Unlike other regions, the Walloon government has provided substantial financial support to a participating SME through direct funding of up to €30 million over 10 years. This funding supports the development of personalised mRNA cancer vaccines and the establishment of local production facilities, contributing to both the scientific objectives of Med4Cure and regional economic development.

In the Netherlands, although the national government opted for support under the GBER rather than full IPCEI State aid, the South Holland region has played a supportive role in Med4Cure through its ongoing collaboration with an associated SME partner. The region, alongside local institutions such as the Leiden University Medical Centre and the regional investment agency, contributes to developing the local biotech ecosystem. These efforts include supporting specialised infrastructure, facilitating workforce development, and promoting international visibility, all of which create an environment conducive to the growth of advanced therapies and manufacturing solutions.

These examples underline the potential of LRAs to act as facilitators, not only through direct financial contributions but through strategic support, fostering local clusters, and enabling cross-border cooperation.

Early indications from Med4Cure show the value of establishing strong governance structures to coordinate a diverse range of actors, from large multinationals to highly specialised SMEs. The use of dedicated workstreams and matchmaking processes is considered an effective way to align interests, share expertise, and foster new collaborations across borders and value chains.

These emerging practices suggest that strengthening the proactive role of LRAs, supporting SME participation, and facilitating knowledge exchange within transnational networks could be key factors in maximising the innovation potential and territorial impact of future IPCEIs in the health sector.

5. Recommendations

Based on the initial insights from interviews and available information, some preliminary recommendations can be identified to support the successful implementation of Med4Cure and inform future initiatives, particularly in relation to the involvement of LRAs and SMEs.

5.1. For policy makers at EU and national level

The early experience of Med4Cure suggests the need to explore options to streamline procedures, reduce administrative complexity, and harmonise implementation across participating Member States. Fragmentation of national processes and funding mechanisms creates challenges for participants, particularly SMEs, and risks slowing progress.

The Commission, together with Member States, could consider fostering greater coordination between national and regional levels, ensuring that regional strengths and capacities are more systematically integrated into the design and implementation of IPCEIs. Encouraging LRA involvement from the earliest stages could help to identify synergies with regional development strategies and unlock additional sources of funding, including Cohesion Policy instruments.

Med4Cure highlights the importance of supporting SMEs throughout the process, from initial application to project implementation. Developing targeted guidance, administrative support, and dedicated financing tools could help to ensure that SMEs can participate and contribute fully to achieving IPCEI objectives.

5.2. For LRAs

LRAs could consider strengthening their role in IPCEIs by:

- Engaging proactively during the early phases of project design to ensure that regional priorities and capacities are reflected in IPCEI objectives;
- Facilitating connections between local SMEs, research centres, and larger industrial players to encourage participation in complex, cross-border projects such as IPCEIs;
- Providing administrative assistance to help SMEs to manage the high procedural demands of IPCEIs and reduce barriers to participation;
- Identifying financial instruments at regional level to offer complementary support, particularly to innovative SMEs developing high-risk technologies;
- Strengthening regional clusters and contributing to transnational networks to foster knowledge exchange, attract investment, and enhance cooperation with other regions involved in similar initiatives.

The examples of Wallonia and South Holland illustrate how regional authorities can contribute not only through direct financial support but also by creating favourable conditions for innovation, investment, and collaboration. By building on these practices, other regions can enhance their strategic positioning within future IPCEIs and maximise the local benefits of European industrial policy.

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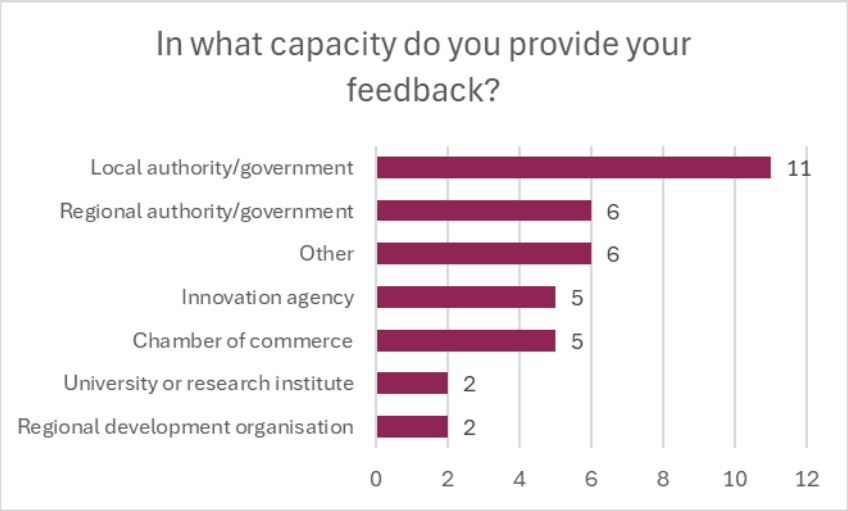
Annex III: Survey results

The survey was conducted using EU Survey and ran from 7 to 28 February 2025. It targeted approximately 1,000 stakeholders, primarily LRAs and their representative networks, which could provide informed feedback on awareness, involvement, and challenges related to IPCEIs. Respondents included representatives of LRAs, innovation agencies, chambers of commerce, universities, and regional development organisations.

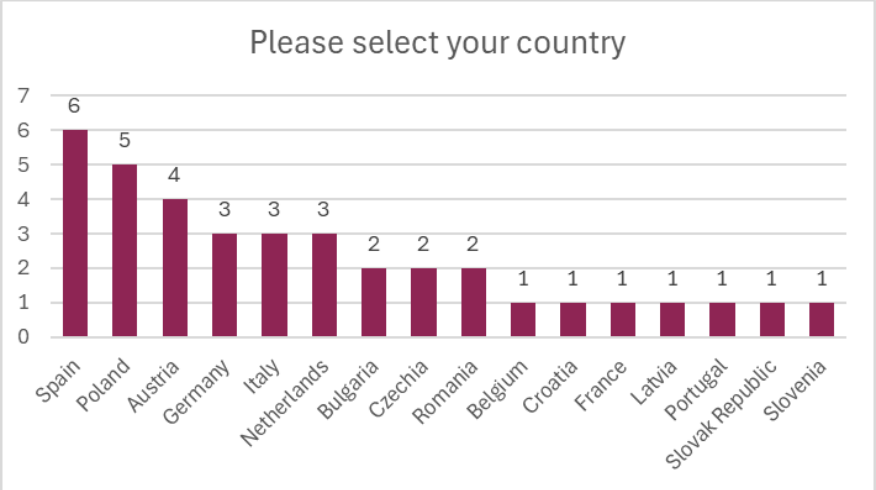
The survey received 37 responses from a wide range of stakeholders, five of which reported direct experience with an IPCEI (see Figure 9).

Figure 9 : In what capacity do you provide your feedback? (n=37)



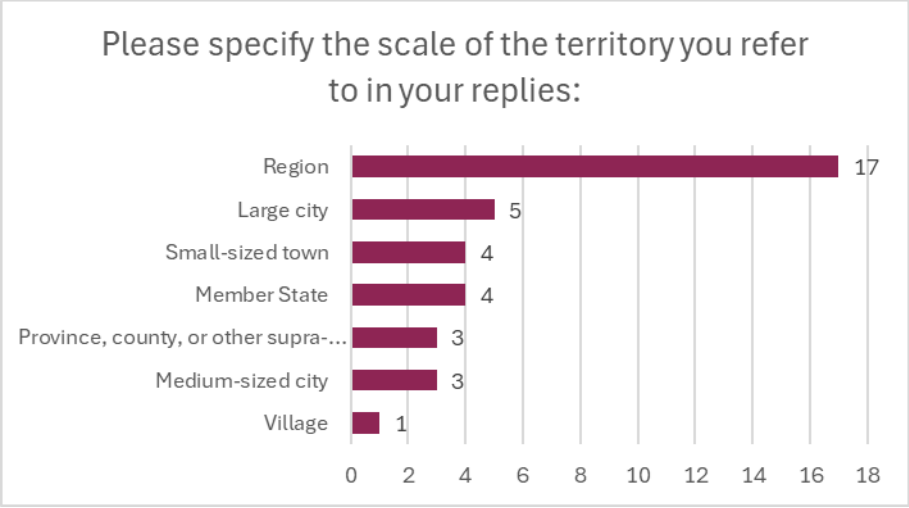
Responses were received from a wide range of Member States, with the highest representation from Spain (six), followed by Poland (five) and Austria (four). Germany, Italy and the Netherlands each had three responses, while Bulgaria, Czechia and Romania had two apiece. Several countries (Belgium, France, Croatia, Latvia, Portugal, Slovakia, Slovenia) were represented by a single respondent. This distribution points to a relatively broad, although uneven, geographical spread, with some Member States less represented in the sample (see Figure 10).

Figure 10: Please select your country (n=37)



The majority (17) of respondents referred to the regional level in their replies, followed by large cities (five), small-sized towns (four), and Member State level authorities (four), suggesting a strong representation from both subnational and national perspectives. A smaller number of responses came from provinces or counties (three), medium-sized cities (three), and just one from a village, indicating that rural and smaller-scale territories were less represented (see Figure 11).

Figure 11: Please specify the scale of the territory you refer to in your replies (n=37)



Awareness and familiarity with IPCEIs

A significant share of respondents was unfamiliar with IPCEIs. Over 40% had not heard of the instrument before the survey (see Figure 12). Those who were aware had typically learned about IPCEIs through EU institutions or national authorities (see Figure 13).

Figure 12 : Have you heard before of Important Projects of Common European Interest (IPCEIs)? (n=36)

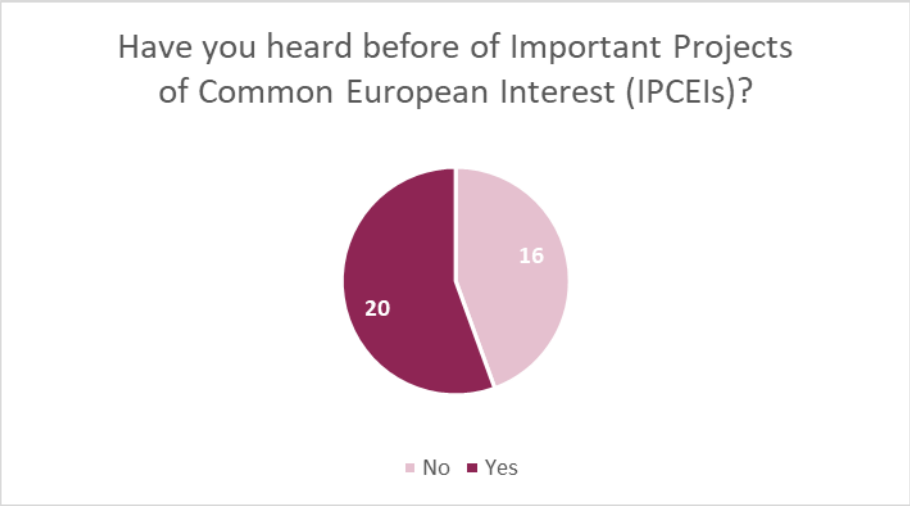
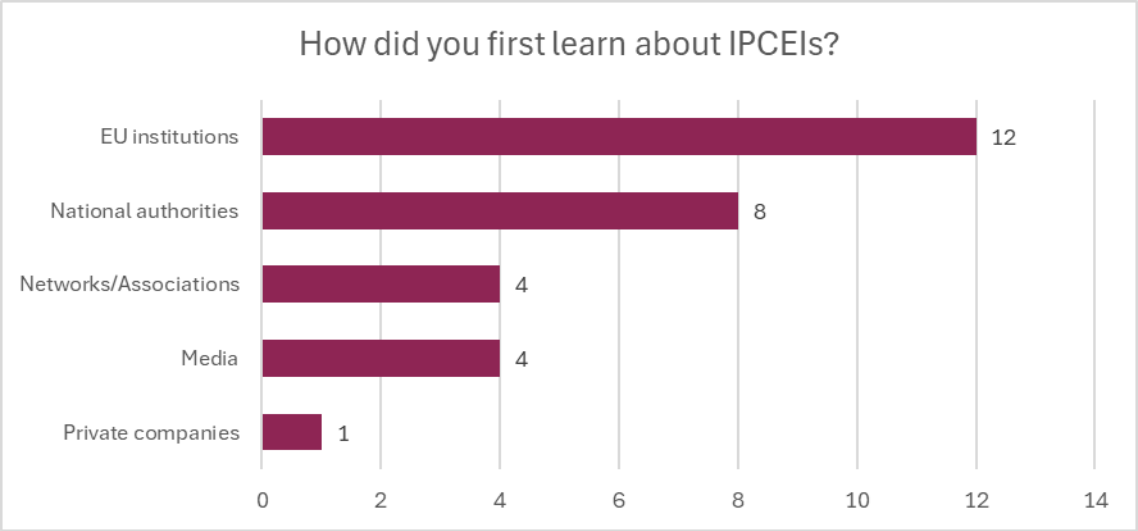


Figure 13: How did you first learn about IPCEIs? (n=29)

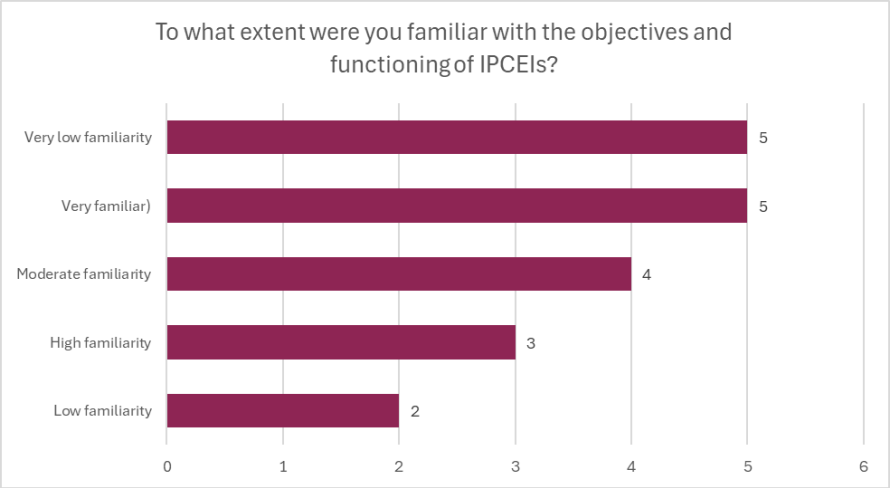


Notes: Only those who responded 'yes'.

When asked whether they were aware of IPCEIs benefiting their region, the majority replied 'no', reinforcing the idea that regional visibility and communication remain limited (see Figure 14).

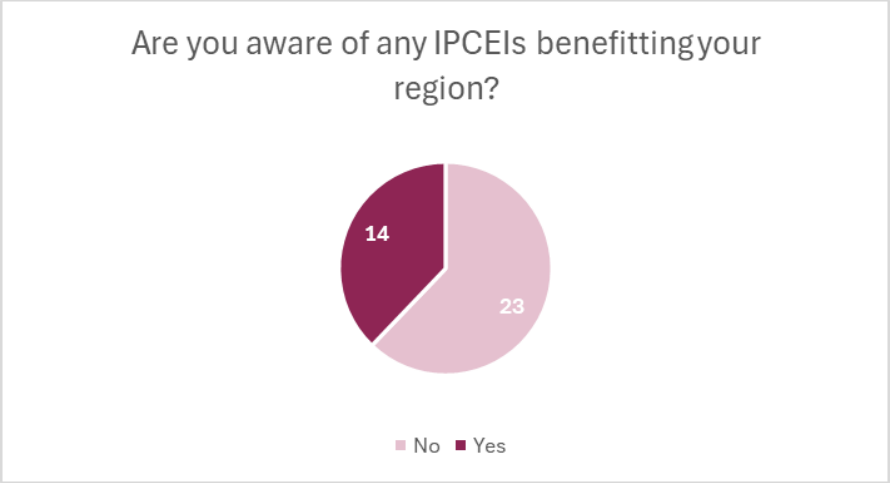
Only a minority reported a high or very high familiarity with the objectives and functioning of IPCEIs, while most cited moderate or low familiarity levels (see Figure 15).

Figure 14: To what extent were you familiar with the objectives and functioning of IPCEIs? (n=19)



Notes: Only those who had heard of IPCEIs

Figure 15: Are you aware of any IPCEIs benefitting your region? (n=37)



Respondents who were aware of an IPCEI in their region had primarily learned about it through national or EU authorities, private companies, and media sources (see Figure 16).

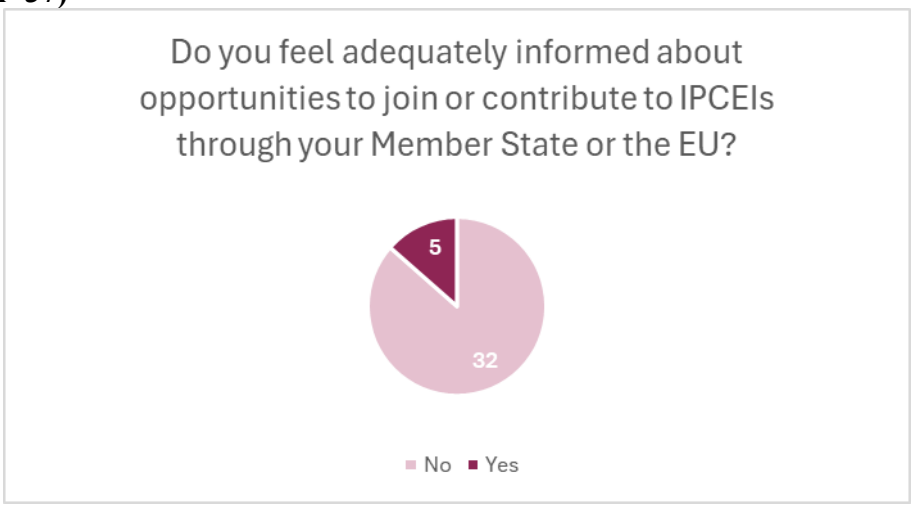
Figure 16 : How did you first learn about it? (n=14)

Notes: Only those who responded 'yes' to previous question.

Level of information and familiarity

Most respondents do not feel adequately informed about opportunities to join or contribute to IPCEIs, either through their Member State or the EU (see Figure 17). This reflects a clear information gap that may hinder participation.

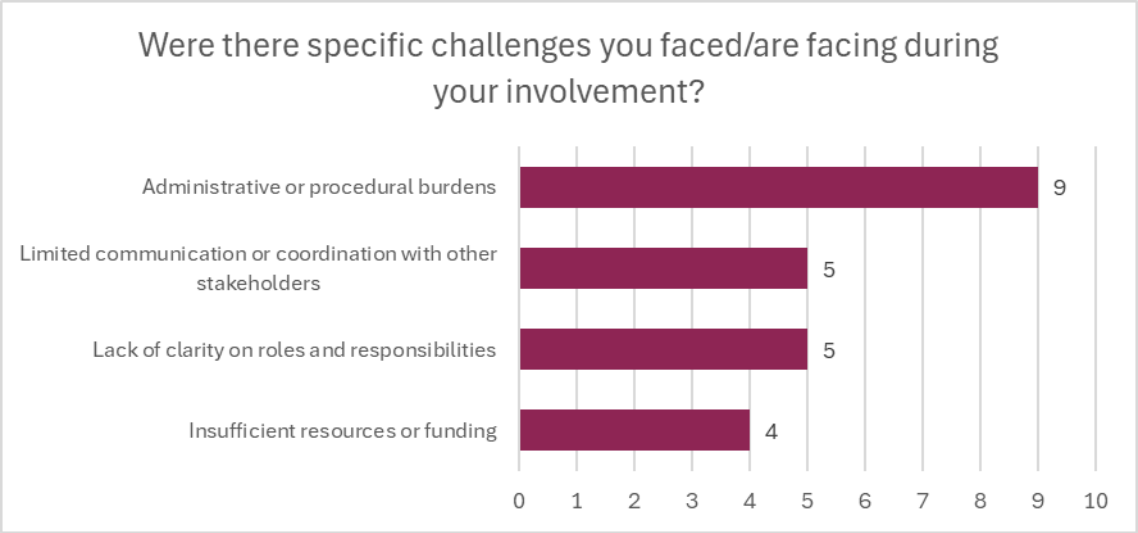
Figure 17 : Do you feel adequately informed about opportunities to join or contribute to IPCEIs? (n=37)



Challenges and barriers

Of the 23 respondents who had participated in an IPCEI or related consultation, administrative and procedural burdens were the most commonly reported challenge, followed by limited coordination and lack of clarity on roles (see Figure 18).

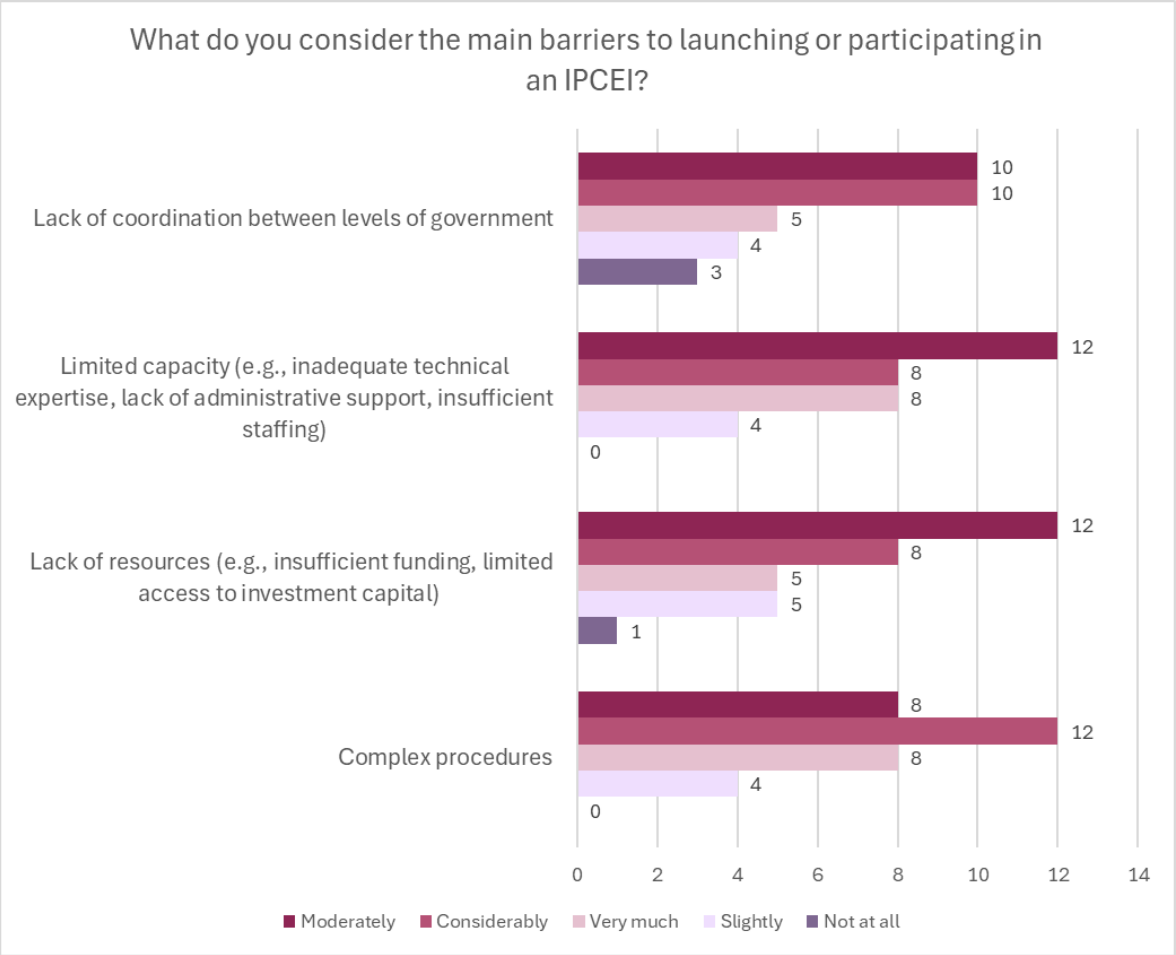
Figure 18: Were there specific challenges you faced/are facing during your involvement? (n=23)



Notes: Only those who reported involvement.

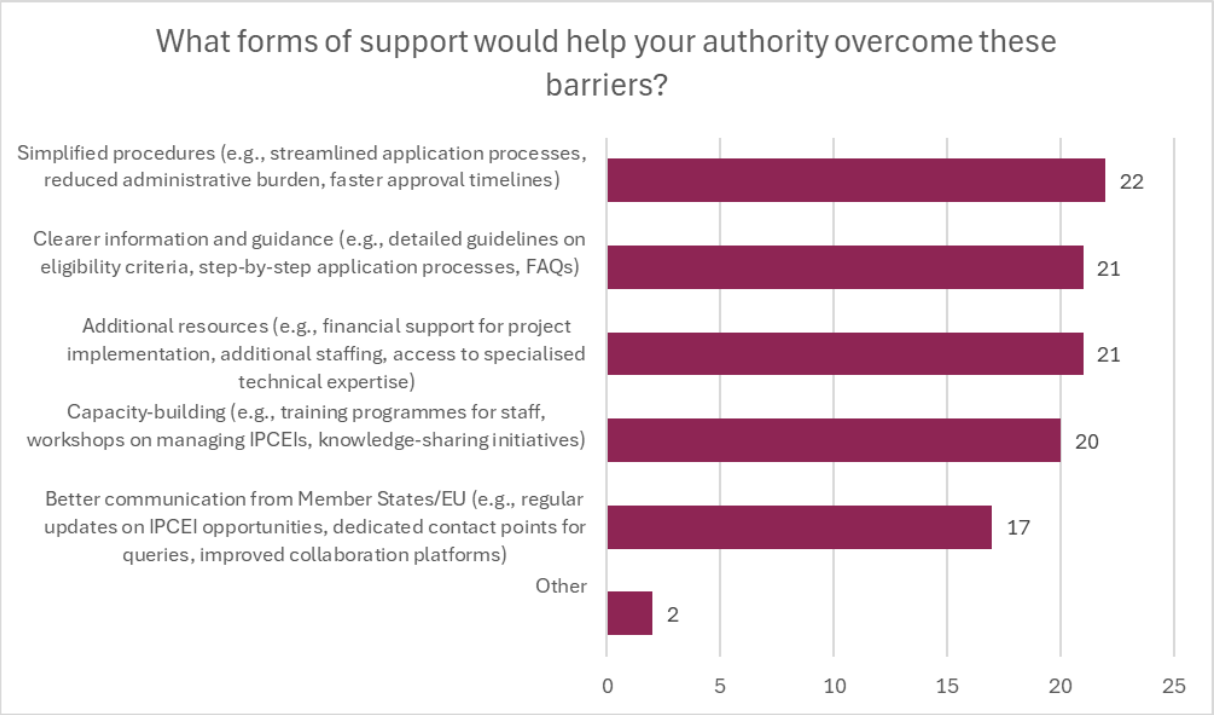
Looking more broadly at barriers to launching or participating in IPCEIs, the most significant issues were complex procedures, lack of resources, and limited capacity. Coordination across governance levels also emerged as a recurring issue (see Figure 19).

Figure 19 : What do you consider the main barriers to launching or participating in an IPCEI? (n=37)



The support measures considered most helpful in overcoming these barriers included simplified procedures, clearer information and guidance, and additional resources such as funding and staffing. Capacity-building and improved communication from Member States or the EU were also important enablers (see Figure 20).

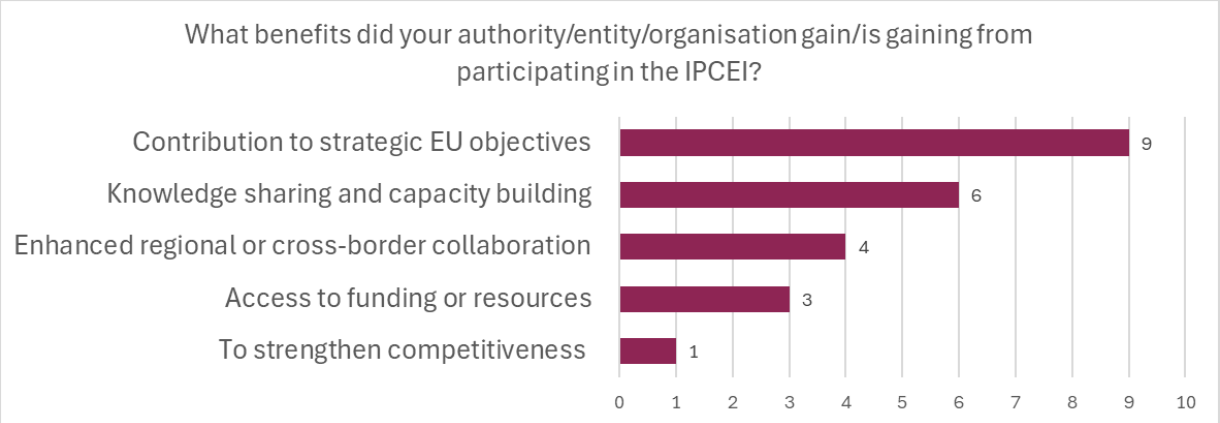
Figure 20 : What forms of support would help your authority overcome these barriers? (n=37)



Benefits and thematic relevance

Of the 23 respondents involved in IPCEIs, key reported benefits included contributing to EU strategic objectives, knowledge-sharing, and enhanced regional or cross-border collaboration (see Figure 21).

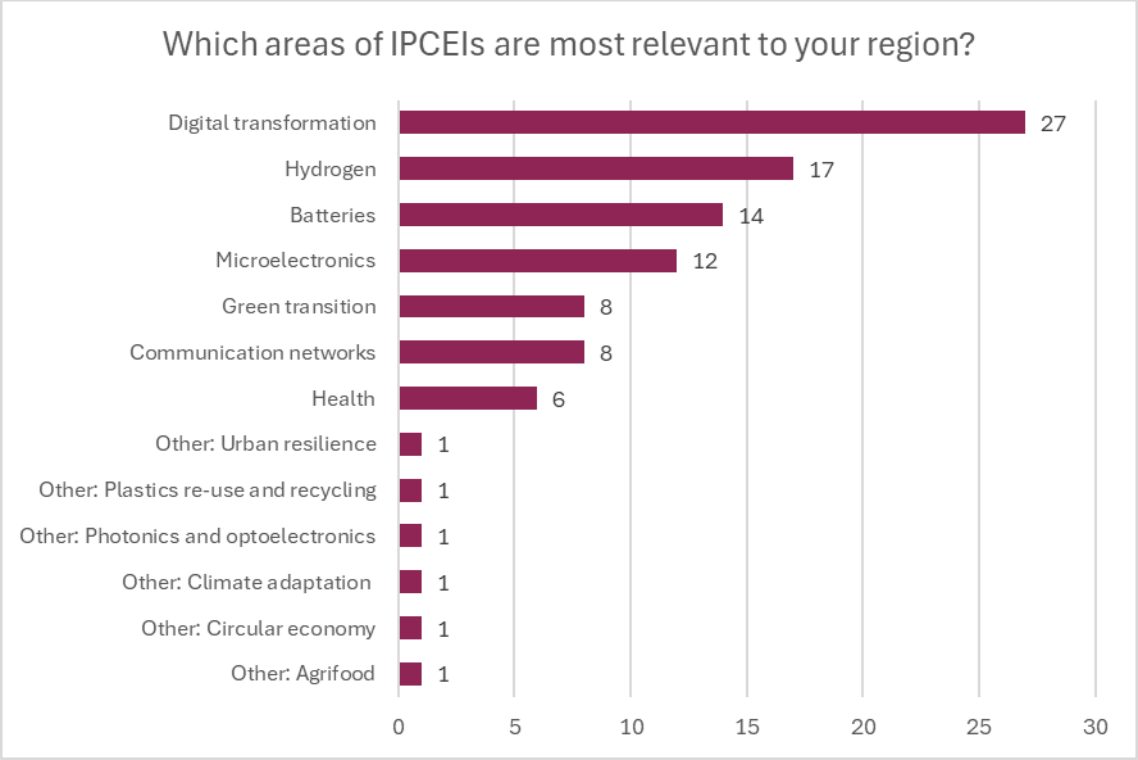
Figure 21 : What benefits did your authority/entity/organisation gain from participating in the IPCEI? (n=23)



Notes: Only those involved in IPCEIs.

When asked which IPCEI areas were most relevant to their region, respondents highlighted digital transformation, hydrogen, batteries, and microelectronics as top priorities. Communication networks, health, urban resilience and the circular economy were also mentioned (see Figure 22).

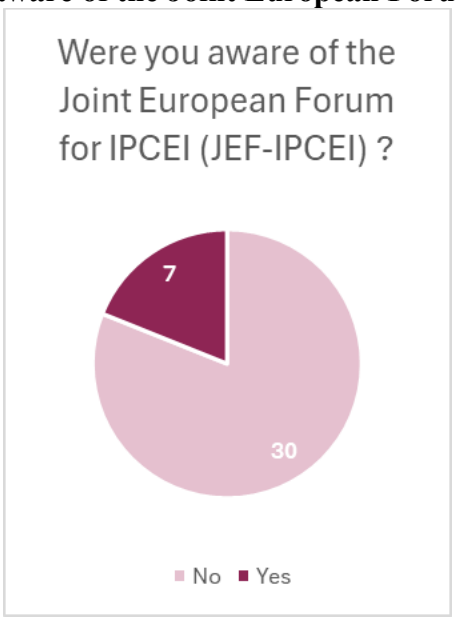
Figure 22: Which areas of IPCEIs are most relevant to your region? (n=37)



Awareness of JEF-IPCEI

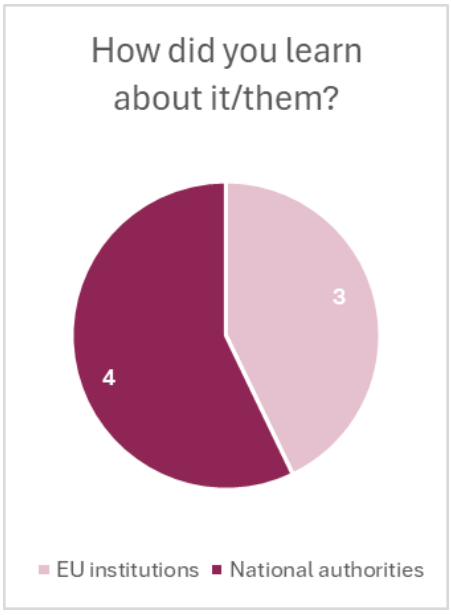
Finally, respondents were asked about the JEF-IPCEI. Most had not heard of the Forum (see Figure 23), and of those who had, awareness primarily came from national or EU institutions (see
Figure 24). This suggests a need to strengthen outreach and communication about the JEF-IPCEI as a potential support mechanism.

Figure 23 (left): Were you aware of the Joint European Forum for IPCEI (JEF-IPCEI)?



(n=37)

Figure 24 (right) : How did you learn about it/them? (n=7)



Notes: Only those who responded 'yes' to the previous question.

Annex IV: List of interviews

Representing country/level	Type of entity	Name of the entity	Interview date (2025)
DE	National authority	Federal Ministry for Economic Affairs and Climate Action, Division IVA3	12 February
EU	University	Bard College Berlin	13 February
IT	National authority	Ministero delle imprese e del made in Italy - Divisione V	14 February
EU	European Commission	DG GROW C3; DG COMP H23	17 February
DE	Company (Direct participant)	Bosch	17 February
AT	Regional development agency	Styrian Research Promotion Agency	18 February
DE	Consulting firm that advises governments; national authority	VDI/VDE Innovation + Technik GmbH; Department of Mobility, Energy and Future Technologies	20 February
AT	National authority	Austrian Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology	20 February
IT	Research Center (Direct participant)	Fondazione Bruno Kessler	21 February
EU	European Commission	DG GROW I3	21 February
IT	National authority	Ministero delle imprese e del made in Italy - Divisione V	25 February
EU	European Commission	DG GROW F3	25 February
HU	Company (Direct participant)	Bio Talentum	28 February
NL	Company (Associated partners)	NecstGen	4 March
PT	Regional development agency	ADRAL – Alentejo Regional Development Agency	Written replies on 25 March

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