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IMPORTANT PROJECTS OF COMMON EUROPEAN INTEREST, A EUROPEAN INDUSTRIAL POLICY TOOL

For several years, France and its European partners have made strong commitments to decarbonise and strengthen strategic autonomy. Achieving these objectives means implementing a vertical industrial policy at the European Union level, based on both the definition of common objectives and strategic choices in favour of sectors, companies or technologies. This requires finding a balance between industrial and competition policy, and thus a strict framework for state aid.

The Important Projects of Common European Interest (IPCEI), implemented from the end of 2018, make it possible to meet this dual requirement of strengthening the industrial policy of the European Union (EU) and preserving competition in the single market. IPCEIs involve the definition of common EU-wide technological and industrial objectives, which translate into projects, led by companies selected by Member States. Public funding for selected companies does not come from an EU funding programme, but is provided by Member States from their national budgets. In order to restrict the risks of distortion of competition related to the public funding granted to the projects, these are authorised by the European Commission only if the company demonstrates the existence of market failures, the economic impossibility of carrying out the project in the absence of aid and, in terms of competition, the existence of positive effects greater than the negative effects. In addition, in order to further reduce the risk of distortion, companies commit to strong counterparts, particularly in terms of dissemination of knowledge.

France is currently engaged in seven IPCEIs that support its industrial policy in the fields of batteries, electronics, hydrogen and cloud, the 7th of which was authorised by the European Commission on 5 December 2023, "Next-Generation Cloud Infrastructure and Services". By this decision alone, it validates 19 projects supported by seven Member States, including those of two French companies.

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I. An industrial policy at European level requires a specific framework for intervention

Industrial policy is deployed using instruments that can be either 'horizontal' or 'vertical': while the former target all companies – for example through support for innovation – the latter target sectors, industries or technologies. **The construction of a vertical industrial policy at a European level had already started in the early stages of European integration**. For example, the European Coal and Steel Community (ECSC) was set up in 1951 to create a single market for steel and coal and support their production in the signatory countries. The legal basis for IPCEIs was established from the outset of the EU Treaties (Article 107(3)(b) of the Treaty on the Functioning of the EU).

Several factors have led, over the recent period, to increase the need for a vertical industrial policy at European level and to the Commission's approval of a first IPCEI at the end of 2018. The Covid crisis revealed the scale and cost of the European economy's dependency on international trade on certain products, sometimes critical, necessitating a vertical European industrial policy targeted at certain value chains. This shift towards more strategic autonomy is notably embodied in the Versailles declaration of 10 and 11 March 2022[1]. Furthermore, the ambitious decarbonisation targets that the European Commission and the Member States have set themselves also require, in addition to existing cross-cutting tools (ETS carbon quota markets, regulations, etc.), to specifically accompany the transformation of certain industrial sectors. The first IPCEI, which concerns the microelectronics sector, was authorised at the end of 2018.

[1] One of the objectives of the Versailles agenda is to work on solutions to reduce strategic dependencies in terms of energy, raw materials, semiconductors, health products, digital and food..

The European Commission had already adopted in 2014 a first Communication on criteria for the analysis of the compatibility with the internal market of State aid to promote the implementation of IPCEIs. Following the implementation of the first IPCEIs, it was updated on 30 December 2021[2] under a strong influence of the French and German authorities, aimed at facilitating the use of the instrument. According to this legal framework, an IPCEI is a State aid instrument subject to authorisation by the European Commission to promote innovation and the implementation of industrial projects in strategic and future fields through massive investments involving at least four Member States. The new framework sets out the arrangements for Member States' interventions and the overall IPCEI procedure in order to ensure respect for free competition and the single market.

To date, **the IPCEIs have enabled the Member States to define together, in a coordinated manner, four priority themes validated at EU level: microelectronics, battery, hydrogen and cloud** (see Table 1)[3]. These themes are fully in line with the objectives of supporting (i) the decarbonisation of the European economy through the development of non-fossil energies and electrification, and (ii) strengthening the productive capacity of European economies on strategic products, in particular in the field of microelectronics:

- The IPCEIs on microelectronics and connectivity aim to foster research and develop innovative chip technologies and components that are particularly useful for a wide range of downstream applications;

- The IPCEIs on batteries cover the entire value chain of batteries[4] that play a crucial role in electrifying lifestyles;

- The IPCEIs on hydrogen (Hy2Tech and Hy2Use) aim to cover a large part of the hydrogen technology value chain, including the production or storage, transport and distribution of hydrogen and supports the construction of hydrogen-related infrastructure, including large electrolysers;

- The IPCEIs on the cloud focuses on the development of Europe's first interoperable, free-to-access data processing ecosystem, the multi-vendor cloud-periphery continuum.

As shown in Table 1, **the IPCEI framework allows companies to benefit from large amounts of aid that generally exceed those accessible under other legal frameworks**. Thanks to the scale of the financial resources mobilised, the IPCEIs make it possible to carry out major industrial projects throughout the national territory. Of the 60 existing hydrogen, battery, microelectronics and connectivity sites in France, more than half are funded through an IPCEI. Most of these projects are financed through the "France 2030" plan, which has a budget of EUR 54 billion and is a major tool of French vertical industrial policy. It meets the objective of supporting strategic sectors, from basic research to innovation and to industrialisation[6].

[2] European Commission, 2014/C 188/02 updated on 30 December 2021 (2021/C 528/10).

[3] Table 1 lists the IPCEIs authorised by the European Commission at the end of December 2023. Therefore, IPCEIs on Health, Hy2Infra and Hy2Move, which are still under investigation by the European Commission, do not appear in this table..

[4] Extraction of raw materials, design and manufacture of cells and battery packs, recycling and disposal of waste in the context of a circular economy. .

[5] Microelectronics and Connectivity. This IPCEI covers R&D projects covering microelectronics and communication technologies along the value chain, from materials and tools to chip design and manufacturing processes.

[6] See Thema of the DGE n°5 "France 2030: une réponse économique aux enjeux de demain", 5 November 2022.

Table 1: IPCEIs authorised in December 2023

PIIEC	Date of authorisation	End of project	Member States	Companies	EU public funding (EUR)	FR public funding (EUR)	Private investment (EUR)
Micro-électronics	18/12/2018	2022	5	29	1,75 Bd	0,3 Bd	6 Bds
Batteries	09/12/2019	2031	7	17	3,2 Bds	1 Bd	5 Bds
EuBatIn	26/01/2021	2028	12	42	2,9 Bds	0,1 Bd	9 Bds
Hy2Tech	15/07/2022	2036	15	41	5,4 Bds	1,6 bd	14,2 bds
Hy2Use	21/09/2022	2036	13	35	5,2 Bds	0,3 Bd	7 Bds
ME/CT[5]	08/06/2023	2032	14	56	8,1 Bds	1 Bd	13,7 Bds
Cloud	05/12/2023	2031	7	19	1,2 Md	40 M	1,4 M

Reading note: public funding is the sum of the maximum amounts of aid authorised by the Commission to the Member States participating in a given IPCEI, while private investment corresponds to the sum of the private co-financing of companies for individual projects authorised under an IPCEI.

Source: DGE.

II. The establishment of an IPCEI is conditional on the existence of market failures and the support provided in this framework is strictly regulated

A - To limit distortions of competition, an IPCEI is only allowed if market failures are identified.

As with any vertical industrial policy intervention instrument, the implementation of IPCEIs is only relevant in the event of identified market failures. These shortcomings (externalities, information asymmetries and coordination problems – see Box 1) indeed lead to an economically inefficient situation in the absence of public intervention. For example, several market failures have contributed to weakening the emergence of European value chains and ultimately to limiting the development of a supply of batteries produced in Europe.

- **Moreover, in order for a company's project to benefit from an aid instrument, the negative effects of the aid on competition and trade must be offset by greater positive effects. T**he project leaders must carry out this demonstration and benefit from the support and technical and economic expertise of the administration of the Member State upon which they depend. The European Commission examines in detail whether the payment of aid is likely to lead to situations in which the negative effects of Member States' aid on competition and trade within the single market outweigh the positive effects. To this end, the Commission will examine the market situation at global and EU levels, before and after the completion of the project, including the current and anticipated market shares of the company carrying the project and that of its main competitors. Five potential competition risks are assessed:

- the creation or strengthening of market power likely to have a negative impact on the consumer;

- the risk of abuse of a future dominant position and the introduction of technological locks;

- maintaining an inefficient market structure with, for example, persistent barriers to entry;

- the risk of overcapacity creation;

- the existence of a location effect if it is demonstrated, for example, that the choice of location is actually the result of relocation and results in the closure of other sites within the EU.

B - The amount of aid granted under an IPCEI is strictly regulated

The public funding provided under the IPCEIs is established in such a way as to trigger a change in the company's strategic position. This makes it possible to finance exclusively projects which would not take place without the payment of the aid and to limit

Box 1: market failures justifying the existence of an IPCEI

The Commission lists, in a non-exhaustive manner, four main types of market failures:

a) **Negative externalities.** Negative externalities can occur when a company does not bear the total cost of the damage it imposes on society, which leads, for example, to the use of more polluting technologies. In that context, the objective of State aid would be to promote "cleaner" technologies. .

b) **Positive externalities**. EIn the presence of positive externalities, companies provide benefits that they do not fully internalise. This can be the case when a company's innovation efforts benefit other companies because new knowledge is disseminated, through social and business interactions, in the form of regional development, or because of employee mobility.

c) **Coordination problems**. Coordination problems can arise when multiple actors need to invest simultaneously to increase production and commercialise new technology. This is often the case for technologies that require new infrastructure. The strategic interaction between the different actors may then require state intervention to coordinate actions and align incentives, in order to accelerate investments.

d) **Asymmetric information**. There are information asymmetries where different actors do not benefit from the same level of information. When companies are better informed than investors about the real prospects of their projects, companies may find it difficult to convince investors of the prospects of their projects and ultimately not have access to capital.

the deadweight losses[7]. The company must justify that, in the absence of aid, its project would not be profitable, resulting in a negative Net Present Value[8] (NPV) and that it would therefore not be implemented. The financial assistance provided under the IPCEI shall be calibrated in such a way as to bring this NPV to balance: the aid is thus an incentive without exceeding the amount strictly necessary for the implementation of the project[9]. To the extent that the authorised aid is defined according to the business plan and calculated on the basis of the NPV of the project, the IPCEIs allow companies to benefit from high amounts of aid and which cannot generally be achieved on the basis of other legal frameworks. For example, a large company carrying out applied research may apply for aid from a Member State on the basis of the framework for State aid for research, development and innovation[10]. The aid which the Member State might be able to propose on this basis cannot, however, exceed a rate of 60% of the total project costs considered eligible under this framework (and 80% if it were a small or medium company). Conversely, under an IPCEI, the aid which the Member State is in a position to propose may cover the full eligible costs of the project, irrespective of the size of the company, provided that such an amount is necessary to bring the NPV to balance. The aid proposed under an IPCEI will thus be higher than in a conventional R&D project.

Moreover, a 'claw-back' clause allows the State to recover part of the aid paid when the profitability of the project exceeds what was anticipated. Indeed, there is an irreducible share of uncertainty regarding the costs and revenues included in the business plans proposed by companies and, consequently, regarding the actual level of cash flows generated by their projects. Due to these uncertainties, a 'claw-back clause allows the State to recover part of the aid paid if the profitability of the project proves to be greater than expected in order to ensure the proportionality of the aid scheme.

C - IPCEIs are implemented through a well-defined procedure that leads companies to commit to strong counterparts, particularly in terms of knowledge dissemination

The establishment of an IPCEI implies consistency of individual projects selected by the participating Member States and is based on a legal procedure strictly regulated by the European Commission, from its emergence to authorisation. This includes several stages and starts with an EU political communication on joint priorities (see below Graph 1).

As part of this procedure, companies undertake, in return for the aid received, to carry out so-called spillover dissemination activities with a cross-border dimension. These are:

- activities for the dissemination of research results not protected by an intellectual property right or title: participation in conferences, publications, funding of theses;

- activities for the dissemination of research results protected by an intellectual property right or title: policy of licensing intellectual property rights on fair, reasonable and non-discriminatory terms (so-called FRAND), subject to compliance with the rules intended to avoid unintended cartels and merger effects between competitors;

[7] There is a deadweight loss when economic actors receive aid, without altering their economic decisions..

[8] The Net Present Value is a financial indicator that can be used to appreciate the profitability of an investment. It is calculated as the sum of discounted future cash flows. This discount is done using the weighted average cost of capital, which corresponds to the average annual rate of return expected by shareholders and creditors to remunerate their investment and the risks associated with it.

[9] It should be noted that even if the NPV of the aided project is zero, its internal rate of return remains positive and the project can therefore be considered profitable by the company.

[10] Communication from the Commission of 19 October 2022 on the Framework for State aid for research, development and innovation (2022/C 414/01)).

• dissemination activities during the first industrial deployment phase: collaborations with SMEs, Research and Technology Organisations and startups, open infrastructure policy with the provision of pilot lines for R&D purposes, visits, prototype testing;

• dissemination activities in sectors or value chains that are not directly targeted by the IPCEI (this may, for example, relate to a collaborative research project aimed at introducing a technology developed under an IPCEI in a different sector).

III. The IPCEI Microelectronics illustrates the positive impact of this type of project

The IPCEI Microelectronics, authorised at the end of 2018 by the European Commission, supports industrial projects aimed at strengthening the expertise in advanced technologies within the micro/nanoelectronics sector. The Commission's authorisation decision was taken in view of the identified market failures in this sector and the contribution of this IPCEI to the EU's objectives of innovation and strategic autonomy.

The common project of the Microelectronics IPCEI is structured around the five technological fields covering the entire value chain:

• The energy efficient chip field aims to deploy FD-SOI disruptive technologies[11] throughout the value chain. These are intended to meet, in particular, demands on the automotive, Internet of Things (IoT) and space markets;

• Power semiconductors have many applications (electric drives, simple static motors, portable tools and energy conditioning needs...). The objective of this segment is to strengthen R&D, innovation and production technology to accelerate the introduction of innovative technologies along the relevant value chain;

• The Smart Sensors field aims to strengthen the cutting-edge capabilities of the European sensor industries in the automotive, medical and consumer sectors, and then to take a new step by expanding into new markets such as the IoT, through R&D investments and initial industrial deployment;

• The field of advanced optical equipment is essential for the value chain of the electronics industry, particularly in order to make progress in the field of technologies below 10 nanometers. It will become a major tool to increase the performance of highly complex nano-electronic devices, particularly necessary for data storage and processing techniques, which underpin digitisation.

• The purpose of compound materials is to create a semiconductor foundry and to set up market-specific supply chains through collaborations with several European partners and new production facilities.

The list of beneficiaries of the IPCEI Microelectronics and their respective nationalities are presented below (see Table 2).

[11] Leti's ' Fully Depleted Silicon On Insulator' technology is based on the addition of a thin layer of insulating silicon oxide to transistors, ensuring efficient and energy-efficient operation compatible with progress in miniaturisation.

Graphic 1: Phases of the IPCEI procedure

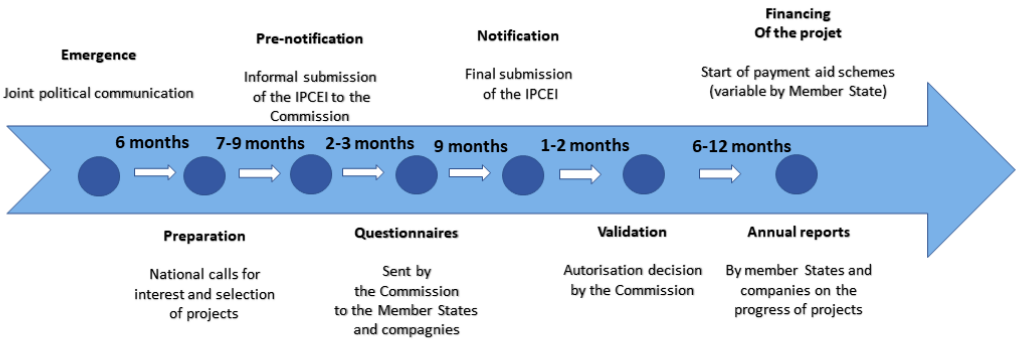

Table 2: Technology fields and companies benefiting from the IPCEI Microelectronics

Source: décision de la Commission européenne du 13.12.2018 « SA.46705 (2018/N) – *France on Important Project of Common European Interest* (IPCEI) Microelectronics », paragraphe 27.

The financing of the Microelectronics IPCEI is based for French projects on the "Nano 2022" programme, announced in March 2019, which foresees the realisation of an amount of EUR 5 billion of investment by companies, of which EUR 3.3 billion for expenditure eligible for State aid. The scope of "Nano 2022" is, however, wider than that of the Microelectronics IPCEI, thus including industrial projects which fall under other aid schemes[13]. The Nano 2022 programme provides for state funding of EUR 886 million, including both grants (EUR 686 million) and a subsidised loan to Soitec (EUR 200 million). In addition to the support provided by the State, the Nano 2022 programme is based on additional public funding of EUR 230 million from local and regional authorities as well as contributions from the European Commission through the "ECSEL" and "PENTA/EURIPIDES" mechanisms[14]. The public funds mobilised have a central and structuring role for the projects supported, as illustrated in the case of Soitec, described in Box 2 below. At the end of 2022, public funding under the "Nano 2022" programme represents 83% of the target total of EUR 886 million. The five project leaders[15] whose projects were notified made around EUR 2.3 billion of investments over the period 2018-2022.

This public support plan should also accelerate innovation. The Nano 2022 programme has enabled many innovations that have led to more than 900 patent filings and 1,500 publications (see Table 3). These technological advances are fostered by the IPCEI framework for three main reasons. First of all, only expenditure incurred by the project leader during the R&D and first industrial deployment phases can benefit from a grant[16]. The aid paid then makes it possible to compensate for the positive externalities linked to the R&D and first industrial deployment phases, with an incentive effect for companies. Secondly, the common project is based, on the one hand, on the identification of technological fields in which companies collaborate and, on the other hand, on the articulation of these fields with

[13] The amounts of public aid provided for in this framework are higher than the amount of aid authorised by the Commission for the French projects of the IPCEI Microelectronics due to the larger extension of the scope of the Nano 2022 programme.

[14] The ECSEL Joint Technology Initiative is part of the European Horizon 2020 programme and the European strategy to support key technologies. The PENTA programme, dedicated to micro-nanoelectronic systems and applications, aims to enhance vertical cooperation between semi-conductor industrialists and electronic systems.

[15] In the framework of IPCEIs, project leaders take on a coordinating role for each relevant technology field.

Projects selected under an IPCEI usually consist of three phases: an R&D phase, a first industrial deployment phase as well as a mass production phase. However, according to the updated IPCEI Communication in 2021, it is also possible to finance a strictly capacity infrastructure project if it contributes significantly to the achievement of the EU's objectives in the environment, energy, transport, health or digital sectors or if it contributes significantly to the improvement of the functioning of the internal market.

Box 2: Soitec's facilities in Isère receive support under the Microelectronics IPCEI

As part of the IPCEI Microelectronics, Soitec, which produces substrates for semiconductors, has made significant investments in three separate buildings, all located at its Bernin, Isère site. On the Bernin 1 site, the annual production capacity will be increased by 50000 plates of 200 mm. On the Bernin 2 site, preparatory work is planned to allow an extension of the building to increase the production capacity of the plant by 150000 plates by 300 mm per year. As Soitec's R&D activities were relocated from the Bernin 3 site to a joint laboratory with the CEA, it should be possible to produce POI substrates (Piezoelectric Substrates on Isolant specifically for 5G radio frequency components). Beyond the increase in the site's capacity, one of the major contributions of the Bernin site is the innovative SmartSic process which enables very significant energy saving (estimated between 50 and 70% compared to a conventional process) due to the reduction of the required temperature of the furnaces used in the manufacturing process of the components. In addition, semiconductors from this manufacturing process have good energy conversion properties (which lowers the rate of electricity loss).

each other, which makes it possible to improve the organisation and functioning of value chains. Finally, participants' obligations relating to knowledge dissemination activities are also a vehicle for the dissemination of R&D. Knowledge dissemination effects occur not only between the main European clusters and within the microelectronics sector, but also in downstream markets and sectors.

Finally, the innovations developed under this IPCEI make it possible to improve the environmental performance of chips. The Microelectronics IPCEI aims not only to increase European chip production but also to improve the environmental performance of these chips, which is the result of several factors. First, the existence of 'environmental economies of scale' translates into a proportionately smaller increase in the use of resources relative to the increase in production. In other words, the average environmental resource cost per chip produced decreases as the amount of chips produced increases. Secondly, the reduction in energy intensity is linked to the energy performance of the technologies used. Due to technological progress and investment, the production process is more resource efficient. Thirdly, the improvement of the environmental performance of chips results from the implementation of recycling process objectives.

Several examples from the Microelectronics IPCEI show this improvement in environmental performance:

- greenhouse gas emissions have also significantly decreased according to STMicroelectronics for low consumption chips as well as smart sensors thanks to investments made to process perfluorocarbons;

- for downstream industries such as connectivity, electricity consumption is also positively impacted, with a reduction in electricity consumption of an estimated 5G antenna of 30-40% .bures ;of an estimated 5G antenna of 30-40%[17].

[17] Interim evaluation report of the Nano 2022 programme posted on the website of the Secretariat-General for Investment.

Table 3: Patents and publications associated with the Nano 2022 programme 2018-2021

Type of beneficiaries	Number of publications or co-publications	Number of patents
Project leader (aid beneficiary/direct participant))	356	688
Academic and industrial partner of the project leader (indirect participant)	1 190	233
Total direct and indirect participants	1 546	921

Scope : direct participants in Nano 2022.
Source : Survey of participants.

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