Core building blocks for national calls for expression of interest

IPCEI on Innovative Nuclear Technologies (INT)

Next steps

A strategic national selection will follow the calls for expression of interest to maintain focus, foster cross-border, meaningful and value adding collaborations, and ensure the overall integration of the IPCEI.

Conditions of participation

1. **Possible status in the IPCEI eco-system**

Direct participant:

By integrating together individual projects, the IPCEI builds an eco-system. One type of participation to this eco-system is as a 'direct participant'. Direct participants are companies that have an RDI/FID project with high financial and/or technological risks that needs significant support to materialise, and that are looking for partners at different levels of the value chain, to develop their project. The companies have applied to the call for expression of interest and have been selected by their national authorities to become an IPCEI direct participant. To receive State aid based on IPCEI rules, they have to meet a number of criteria described in section 2 below.

Associated or indirect partners:

There are other possibilities to contribute to the eco-system of an IPCEI, as associated or indirect partners.

Associated partners are companies that have an RDI/FID project that underwent the pre-selection procedure on national level following a call for expressions of interest. However, the project does not take part in the pre-notification process of the European Commission, because the national authorities do not plan to grant aid to the project based on the IPCEI rules. Associated partners contribute to the objectives of the IPCEI through collaboration(s) with at least two IPCEI direct participants or associated partners in the context of their IPCEI projects for large enterprises or ROs, and at least one for SMEs. At least one of the effective cross-border collaborations should be with an IPCEI direct participant. National authorities are in charge of assessing the associated partners' contribution to the IPCEI depending on the funding instrument, most frequently the General Block Exemption Regulation (article 26(6)(d)).

Indirect partners contribute to the objectives of the IPCEI through collaboration(s) with at least one IPCEI direct participant or one associated partner. Typically, they do not carry out any RDI/FID project of their own but supply equipment/services to direct participants. A clarification of the roles of associated and indirect partners in an IPCEI ecosystem is provided on the website of the Joint European Forum for IPCEIs.

The specific status of each applicant will be discussed with the national authorities during the design phase.

2. Requirements for direct participants in an IPCEI

All requirements for direct participation in an IPCEI are detailed in the **Technical guidance on conditions and process for participation in an IPCEI for RDI/FID projects**.

- **Major innovation**: the individual project must be highly innovative and must aim to considerably advance existing technologies or develop new technologies going beyond the state of the art of the sector.
- **Integration**: all individual projects participating in an IPCEI must be complementary to each other and together form an integrated IPCEI project. This integration is achieved through the establishment of effective cross-border collaborations among direct participants of the IPCEI (see primary objectives).
- **Positive spillover effects**: the benefits of an IPCEI must not be limited to the companies or the sectors concerned but must be of wider relevance and application to the economy or society. Spillover effects entail a mandatory commitment to disseminate know-how generated thanks to the State aid stemming from your individual project to other levels of the value chain, up- or downstream markets within the bounds set by applicable international nuclear non-proliferation commitments, as specified in the Treaty on the Non-Proliferation of Nuclear Weapons.
- **Funding gap**: the company has to demonstrate that its project would not be carried without State support because it displays a 'funding gap'. In other words, without public funding the company will not implement the project. The company has to provide realistic and credible financial projections justified by company internal documents or independent studies.[1]
- **Contribution to EU objectives and strategies**: each IPCEI aims to significantly add value to the EU economy and society. The specific objectives of IPCEI INT are described in the rationale of the IPCEI.
- **Other requirements**: the individual project must contribute to overcome important or systemic market failures, the company has to contribute to the

[1] As set out in recital 33 of the IPCEI Communication, the allowable aid amount is determined by two limits:

1. The discounted value of the aid may not exceed the funding gap of the project, which is calculated as the difference between the positive and negative cash flows over the lifetime of the investment, discounted to their current value on the basis of an appropriate discount factor.
2. The sum of nominal aid payments may not exceed the eligible costs of the project, which are listed in the Annex to the IPCEI Communication and comprise the following:
    a. Only costs directly related to and necessary for the project are eligible, such as costs of feasibility studies, costs of materials and supplies used for the project, and personnel costs incurred for the R&D&I activities.
    b. Capital expenditures (e.g. for instruments and equipment, or for buildings, infrastructure and land) are only eligible to the extent and for the period used for the project, which is the period during which RDI activities take place, including the RDI linked to a first industrial deployment phase, but excluding mass production or commercial activities. The depreciation timeline and methodology should follow the practice used in the beneficiary's company accounts, following applicable national accounting rules.

In the INT IPCEI, some projects may involve substantial capital investment and a long asset lifetime, most of which falls into the mass production or commercial phase. Therefore, only the depreciation of those capital assets during the first few years will be eligible. In such cases, eligible costs may be lower than the funding gap and therefore become the limiting factor for the aid and for the realisation of the project.

financing of its own project, the individual project has to comply with the 'Do no significant harm' principle, and the aid received must not lead to undue distortions to competition and trade.

3. Process as a direct participant in IPCEI INT

The lifecycle of an IPCEI consists of four phases: (i) identification, (ii) design, (iii) assessment, and (iv) implementation. After the identification phase, once Member States have endorsed an IPCEI candidate in a high-level meeting of the JEF-IPCEI, the design phase starts. During the design phase, the participating Member States, led by the coordinator Member States, shape the IPCEI, decide on its scope and select and screen projects on national level. The companies selected to participate in the IPCEI as direct participants will contribute to the chapeau document, which sets out the objectives, scope and projects included of the IPCEI INT and will be (pre-)notified to the European Commission at the same time as their individual projects. The phase concludes with the IPCEI pre-notification to the European Commission, thus initiating the assessment phase in view of the authorisation decision of the European Commission.

4. Process as an associated partner in IPCEI INT

The process is the same as that described for direct participants, with the exception of the pre-notification procedure to the European Commission, which does not apply to associated partners provided that the aid is consistent with a national legal basis adopted pursuant to Article 25(6)(d) of the General Block Exemption Regulation (GBER) covering the financing of these associated partners for their participation to the IPCEI INT, and which enables granting aid without notification to and prior approval by the European Commission. However, Member States will be expected to receive contributions from associated partners regarding the preparation of the chapeau document.

5. Process as an indirect partner in IPCEI INT

As mere collaborators of direct participants or associated partners, indirect partners do not follow the same process, particularly as they do not necessarily receive public funding. The selection of indirect partners is at the discretion of each Member State, and the proposed collaboration falls under the responsibility of each direct participant or associated partner. Indirect partners are not (pre-)notified to the European Commission nor contribute to the chapeau document.

National specificities

Each Member State will have to set the deadlines to reply to the calls for expression of interest in line with the timeline agreed at European level with the participating Member

States of the IPCEI INT[2], its methodology to evaluate/score the applications received and provide the contact details.

Legal basis and guidance on IPCEI

Following Article 107(3)(b) of the Treaty on the Functioning of the European Union (TFEU), aid to promote the execution of an important project of common European interest or to remedy a serious disturbance in an economy of a Member State may be considered compatible with the internal market.

In 2021, the Commission published the currently applicable Communication on the criteria for the analysis of the compatibility with the internal market of State aid to promote the execution of IPCEIs (OJ C 528, 30.12.2021, p. 10–18).

The latest versions of the IPCEI templates are available at Guidance & Templates - Competition Policy - European Commission.

The Technical guidance on conditions and process for participation in an RDI/FID IPCEI explains the criteria that must be fulfilled in order to join an IPCEI as a direct participant, as an associated or as an indirect partner.

The IPCEI website provides useful general information on IPCEI.

Disclaimers

Belgium, Croatia, the Czech Republic, Finland, France, Germany, Hungary, Italy, the Netherlands, Poland, Romania, Slovakia, Slovenia, Spain and Sweden are simultaneously launching calls for expression of interests in the context of building a new **Important Project of common European Interest on innovative nuclear technologies ('IPCEI INT')**. IPCEI INT will materialise only if enough individual projects in at least four Member States are selected following the national calls for expression of interests.

Depending on their national specificities, and as long as they respect the joint European calendar for the IPCEI INT and in particular the matchmaking session(s), each Member State may decide to organise its calls for expression of interests in one or two stages [for Member States to discuss whether they plan one or two stages – the text of the call would need to be adjusted to that].

- When the call for expression of interests is organised in two stages, the companies will be asked in the first stage to fill in the IPCEI INT application template, which corresponds to a shorter version of the Project Portfolio as well as the preliminary

[2] This means that Member States must have selected their direct participants and associated partners with a view to inviting them to take part in the matchmaking event, which is scheduled to begin in mid-December 2026.

Funding Gap **('FG')** template or the Funding Gap Template (RDI-FID) available on the COMP website.

- In a second stage, the companies having been invited to do so by the Member States will have to provide a full **Project Portfolio ('PP')** and a comprehensive **Funding Gap** analysis, in accordance with the latest standard templates published by the European Commission. The latest versions of these templates are available at Guidance & Templates - Competition Policy - European Commission. Limited parts of the PP will eventually be adjusted for the purpose of IPCEI INT.

If the call for expression of interest is organised in one stage only, all companies applying to the call will be expected to provide the full PP and a comprehensive FG analysis, in accordance with the latest standard templates published by the European Commission. Limited parts of the PP will eventually be adjusted for the purpose of IPCEI INT.

Submission of the description of the individual project does not give rise to any claim for funding. It is explicitly stated that any project funding is based on a technical, legal and financial assessment of the project, the available budget, the integration of the project into the specific IPCEI and the European Commission's approval under State aid law. No guarantees are therefore given as to the final amount of any State aid, including to companies invited to participate in stage 2.

Rationale of the IPCEI INT

1. **Definition of an IPCEI**

IPCEI may represent a significant contribution to economic growth, jobs, the green and digital transition and competitiveness for the Union industry and economy. Usually, an IPCEI is an 'integrated project', that is to say, a group of individual projects inserted in a common structure aiming at the same objective(s).

IPCEI can either focus on (1) **research, development, innovation ('RDI') and/or first industrial deployment ('FID')** or (2) on the construction of important **infrastructure** open for third party use.

IPCEI INT is focusing exclusively on RDI and FID.

2. **Current challenges in the sector**

Nuclear technologies already provide promising applications for Europe's industries, but the development of the most recent of these technologies still faces several challenges. Nuclear projects in general are characterised by high upfront capital costs, long development timelines, rigorous regulatory frameworks, constrained access to specific raw materials and fuels, safety, safeguards and strict security requirements as well as

exposure to geopolitical and policy-related uncertainties. These constraints create additional barriers for market-introduction of promising innovative concepts in the EU. This contributes to investment risks that are particularly high for first-of-a-kind projects and cannot be efficiently addressed at a company-level alone.

Enhanced cooperation and coordination at EU-level allows Member States and EU companies to pool financial resources, share risks, and coordinate investments to increase impact and speed up market introduction. It also facilitates common action and coordination to ensure secure and resilient access to nuclear-specific materials and build and strengthen a European nuclear fuel supply chain, covering the full nuclear lifecycle, including innovation in the fuel-cycle, nuclear facilities decommissioning and waste management aspects. This creates benefits as it allows Europe to address security of supply and geopolitical related challenges. **An IPCEI would provide a suitable instrument to mutualise efforts, foster cross-border industrial partnerships, create investor confidence with a multiplier effect on attracting additional private investments, all to accelerate the deployment of highly innovative nuclear technologies across the EU** while upholding the highest nuclear safety and safeguards standards in line with international best practices and obligations.

3. Objectives of the IPCEI INT

The IPCEI on innovative nuclear technologies can accordingly contribute to address four key industrial and societal challenges for the EU:
- (i) climate neutrality, through the production of low-carbon energy;
- (ii) foster competitiveness and mobilise job creation, through strengthening EU industrial innovation and leadership in innovative nuclear technologies;
- (iii) strategic autonomy and security of supply, reducing dependence on fossil fuels and exposure to external influences;
- (iv) innovative health solutions building on the medical applications of nuclear technologies.

4. Eligible work fields

This IPCEI should encompass RDI and FID of technologies[3], focusing on the development of innovative technological designs or innovative technological addition to existing designs but also covering the value chain that supports the operationalisation and market introduction of these designs.

The fields covered include nuclear energy generation but also radioisotope production.

[3] IPCEIs cannot support the mass production phase, i.e. full commercial installation beyond the R&D and first industrial deployment phase. Other legal bases are applicable to assess State aid for projects during the mass production phase e.g., TFEU for SMRs or the Clean Industrial Deal State Aid Framework (section 6) for manufacturing of components for fission plants.

To this end, **a three-workstream IPCEI** is now proposed, designed to address the challenges of innovative nuclear technologies across all stages of the value chain, while ensuring coherence, maximising cross-border collaboration and generating EU-wide spillovers:

- **A first workstream focusses on innovative reactor technologies including reactors for production of low-carbon electricity, cogeneration or heat production, radioisotope production, propulsion uses and off-grid applications as well as radioisotope power systems.**
- **A second workstream focusses on innovation in the front and back-end of nuclear fuels, such as innovations in the production of nuclear fuels or the production of target materials[4] for medical applications, as well as innovation in the management and/or valorisation of spent fuel.**
- **A third workstream focusses on innovation in materials, components and services needed to develop, build, operate and decommission nuclear reactors or facilities, or value chain services for the timely delivery of radioisotopes.**

The proposed workstream structure could be adjusted following the outcome of the calls for expressions of interest and the match-making process. In this regard, it is recalled that only individual projects which comply with the eligibility criteria of the IPCEI Communication[5] may be included in the perimeter of this IPCEI.

Appendix 1: Objectives of the IPCEI INT

The IPCEI on innovative nuclear technologies can accordingly contribute to addressing four key industrial and societal challenges for the EU:

- **(i) climate neutrality, through the production of low-carbon energy**

[4] Target material refers to substances introduced into the reactor (within the core or in dedicated irradiation positions) core specifically to be irradiated by neutrons exposed to neutron flux in order to induce specific nuclear reactions. Unlike fuel, whose primary function is to sustain the chain reaction which is consumed to keep the reactor running, target materials are used to produce radioisotopes for medicine and industry, for materials testing, or for scientific research.

[5] All requirements for direct participation in an IPCEI are detailed in the IPCEI Communication and the Technical guidance on conditions and process for participation in an IPCEI. They include:

- **Major innovation**: project must be highly innovative and must aim to considerably advance existing technologies or develop new technologies, going beyond the state of the art in the sector concerned.
- **Integration**: all individual projects participating in an IPCEI must be complementary to each other and together form an integrated IPCEI project. This integration is achieved through the establishment of effective cross-border collaborations among direct participants of the IPCEI.
- **Positive spillover effects**: the benefits of an IPCEI must not be limited to the companies or the sectors concerned but must be of wider relevance and application to the economy or society.
- **Funding gap**: the company has to demonstrate that its project would not be carried without State support because it displays a 'funding gap'.
- **Contribution to EU objectives and strategies**: each IPCEI aims to significantly add value to the EU economy and society.
- **Other requirements**: the project must contribute to overcome important or systemic market failures, the company has to contribute to the financing of its own project, the project has to comply with the 'Do no significant harm' principle, and the aid received must not lead to undue distortion to competition and trade.

This objective directly supports the European Union's target of **climate neutrality by 2050**, as established by Regulation (EU) 2021/1119 (*European Climate Law*). Consistent with the **European Green Deal** legislative framework**,** the **EU should reach net-zero by 2050. European Member States will therefore have to complete an ambitious energy transition, substituting fossil fuels in the electricity sector, energy-intensive and hard-to-abate industries and the district heating sector with low-carbon energy, while also addressing emerging high-consumption users (e.g., electric mobility, computing load for AI training and use or data centres). SMRs possibly ensure a more flexible operation in response to grid demands.** In the longer term, nuclear fusion could complement this contribution in support of climate neutrality, with ongoing development already generating relevant technological spillovers.

- **(ii) foster competitiveness and mobilise job creation, through strengthening EU industrial innovation and leadership in innovative nuclear technologies**

An IPCEI on innovative nuclear technologies can play a pivotal role in enhancing the EU's industrial competitiveness, innovation and labour market resilience in the long term. Supporting the development and first industrial deployment of innovative nuclear technologies can foster strategic value chains for high-tech manufacturing, engineering services, and nuclear supply industries - sectors that are essential to future low carbon energy systems and innovation ecosystems.

This aligns with the Commission's Competitiveness Compass and broader industrial policy framework, which emphasise innovation, strategic technologies and the creation of quality jobs and skillsets across Member States as core drivers of EU prosperity and competitiveness. Integrated European value chains for innovative nuclear technology can also attract skilled labour and drive job growth in R&D, start-up and scale-up activities, digital engineering and advanced manufacturing, thereby reducing external dependencies and strengthening the EU's strategic autonomy.

- **(iii) strategic autonomy and security of supply, reducing dependence on fossil fuels and exposure to external influences**

This objective is aligned with **Article 194 TFEU**, which provides that Union energy policy shall ensure the **security of energy supply** and promote the development of new forms of energy. It further supports the objectives of the **European Green Deal** and the **REPowerEU Plan**, both of which aim to reduce dependence on imported fossil fuels, enhance energy resilience, and strengthen the Union's **strategic autonomy** in a challenging geopolitical context. In relation to this framework, nuclear technologies can contribute to security of supply by providing reliable low-carbon energy, supporting long-term strategic autonomy, while respecting Member States' autonomy in choices in energy mix.

Moreover, the nuclear value chain involves high quality knowledge, critical components and materials, fuels and advanced manufacturing capabilities as well as highly skilled expertise. More European cooperation will help reduce dependencies on third country suppliers for components, fuel cycle services and technological know-how. The IPCEI would contribute to the strengthening of the domestic European nuclear industries and strengthen the market and knowledge position of Europe in these newly emerging technologies.

- **(iv) innovative health solutions building on the medical applications of nuclear technologies**

This objective is aligned with the EU4Health programme 2021-2027, particularly the Europe's Beating Cancer Plan, and the Euratom R&T programme 2021-2027. The role of nuclear medicine for cancer treatment, through the use of ionising radioisotopes, was acknowledged by the launch of the Strategic Agenda for Medical Ionising Radiation Applications (SAMIRA) action plan in February 2021. Securing the supply of medical radioisotopes, and facilitating innovation and technological development in the value chain, will contribute to this objective, supporting the development of important health solutions. The European Radioisotope Valley Initiative will further the objectives regarding the development and monitoring of medical radioisotopes production in the EU, contributing to resilience and strategic autonomy in this important field.

Appendix 2: Eligible work fields of the IPCEI INT

1) **WS1: Nuclear reactors**

The first workstream "Nuclear reactors" will focus on the conception, design, development and first industrial deployment of innovative reactor designs, including those for production of low-carbon electricity, cogeneration or heat production, radioisotope production with reactors and accelerators-based technologies, as well as reactors for propulsion uses and off-grid applications. This workstream will also cover innovative technological addition to existing designs. Eligible fission technologies will primarily include innovative designs, e.g., light-water reactors (LWR), high temperature reactors (HTR), liquid metal cooled fast reactors (LMFR), molten salt reactors (MSR), some of which are currently supported under the European Industrial Alliance on SMRs as well as microreactors. First-of-a-kind reactor deployment would enable the early demonstration of these innovative reactor designs. The development of integrated designs for fusion reactors would also be covered within this workstream. Innovative designs for medical radioisotopes production based on nuclear reactors and radiological facilities (accelerators, for example) as well as the development of new radioisotopes useful in the medical segment will also be included in this category, as well as radioisotope-based technologies and applications.

Four types of market failures justify public intervention in this workstream. The first is the suboptimal level of private funding due to imperfect and asymmetric information between funders and investors regarding critical and uncertain success factors (such as regulatory aspects) and potential financial risks, and the commercial viability of the technologies involved. Second, the development of new reactors faces coordination challenges in investment, as the uncertainty of their development causes lacking development in upstream fuel cycle segment as well as demand by end users and energy operators. Third, the development of reactors is directly linked to the reduction of environmental externalities, which are not accounted as such by the market. And finally, the existence of positive externalities related to technological spillovers and cross-sectors innovation (such as in advanced manufacturing or disruptive digital technologies) that are not fully valued by the market.

2) **WS2: Fuel and radioisotopes**

The second workstream "Fuel and radioisotopes" will focus on innovation in production and management of nuclear fuels for energy generation, advanced and innovative fuel cycle solutions and target materials for medical applications. Different technologies require the development and industrial qualification of diverse innovative fuels,

such as TRISO particles for HTR, fuel salts for MSR, MOX fuel for fast reactors, HALEU for advanced reactors and medical isotopes production, or deuterium, tritium (including breeding and handling), and lithium for fusion. In addition, this workstream will encompass projects related to the management and/or valorisation of radioactive waste and spent fuel, with a focus on the full lifecycle and on circular economy approaches, including the recovery and reuse of valuable materials for both the production of new nuclear fuels, as well as non-power applications such as the production of radioisotopes for medical or space applications. Furthermore, this workstream will also include RDI/FID projects related to the production of target materials used to generate promising radioisotopes for medical applications**:** this covers processing and testing facilities (to the extent used for the RDI/FID) [6] as for example separation, purification, labelling, or recovery of enriched materials facilities.

The nuclear fuel supply chain is facing several market failures, hindering its financing and autonomous emergence. Being tightly linked to nuclear energy production, the nuclear supply chain is indirectly subject to the associated technological development and deployment risks, and the uncertainty of future nuclear energy demand. Moreover, nuclear projects have a time horizon that is often too long for investors. Both those technological and financial risks are a source of uncertainty for investors and could have a negative impact on investments into such projects. Public support would therefore help mobilising the necessary funds, de-risking/reassuring private investors and the creation of a multiplier effect on private investments. Similarly, in the field of nuclear medicine, private investors are often reluctant to fund isotope production due to high upfront costs, long payback periods, and the regulatory requirements (asymmetric information) specific to health products.

3) **WS3: Materials, components and services**

The last workstream "Materials, components and services" will focus on the transversal industrial capabilities by providing innovation in the materials, components and services needed to design, develop, build, operate and decommission a nuclear asset, whether for power generation (electricity, heat, propulsion) or radioisotope production. It will encompass the transversal developments that support the entire sector (both fission and fusion), including the conception and realisation of radiation-resistant and high-performance materials, the implementation of innovative manufacturing processes (including digitalisation and automatisation, qualification and certification tools / facilities for new components), as well as the design and construction of pilot lines of innovative facilities to perform such activities. This

[6] For more details on eligible costs (e.g. instruments, buildings, contractual research), see annex of the IPCEI Communication.

workstream will cover the development of components especially suited for each reactor technology, from both fission and fusion designs. Specialised engineering services required for the deployment, maintenance and decommission of innovative reactors, or the innovative services for the prolongation, upgrade and decommission of existing nuclear assets will also be included. Furthermore, it will cover innovation in services pertaining to the secure supply of medical radioisotopes and radiopharmaceutical, facilitating the timely and cost-effective delivery of treatments.

Products and services supporting the nuclear sector relate to several market failures. First, there are significant coordination issues within the European nuclear supply chain, each economic agent waiting for the others to be the first to make substantial investment. Second, regarding transversal developments, such as the need for new materials, or new components, it can be difficult for economic operators to value R&D efforts without coordinated action, which therefore hinders innovation in the sector. Thus, the supply chain can face a vicious circle: investment cannot occur without a strong enough demand, but it should take place several years in advance to offer a reliable and operational solution when nuclear projects will emerge. Particular attention should be given to strengthening European and regional supply chains, including the development of manufacturing capacities in Member States.