

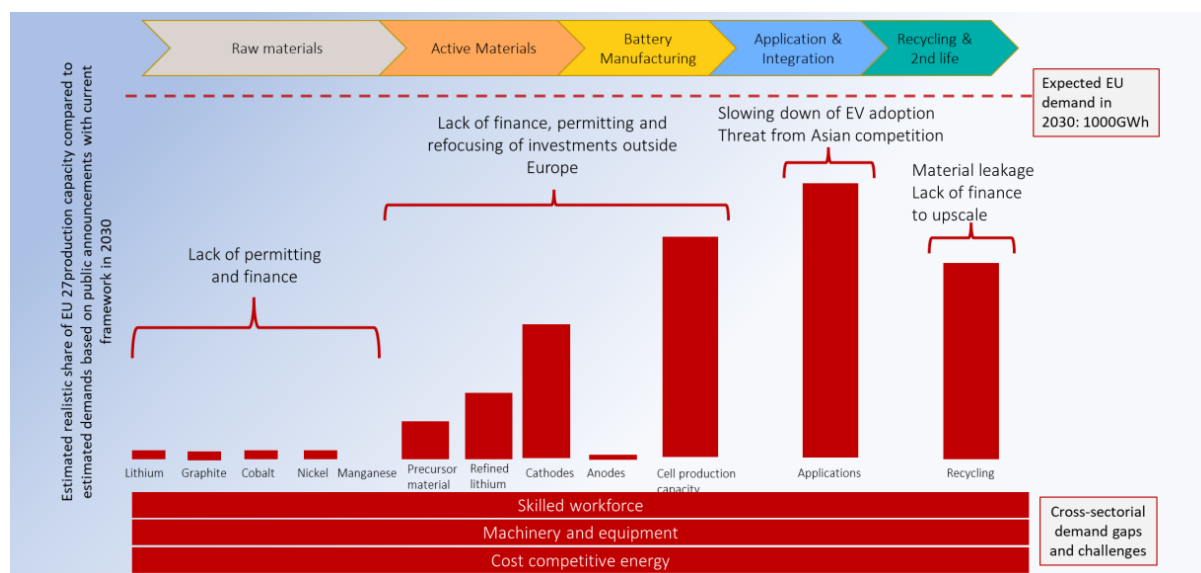
OPTIONS PAPER FOR AN INNOVATION FUND (IF) STAKEHOLDER CONSULTATION ON SUPPORT TO THE BATTERY MANUFACTURING INDUSTRY IN EUROPE

INTRODUCTION AND PURPOSE OF THIS PAPER

The Innovation Fund ('IF') supports the commercial demonstration of innovative first-and early-of-a-kind low- and zero carbon technologies that are key for achieving the EU's climate neutrality target. So far, Innovation Fund support is mostly being provided in the form of "regular grants", following the assessment of proposals against five award criteria. Support is disbursed partially before the projects' financial close and during construction, and partially after entry into operation upon reaching GHG-abatement milestones.¹

Since 2023, IF grants can also be awarded through competitive bidding, with currently a first auction for renewable fuel of non-biological origin (RFNBO) hydrogen production on-going. Those grants will be disbursed exclusively after the projects' entry into operation², directly linked to the amount of RFNBO hydrogen produced. Further, the Fund can also provide contributions to blending operations under InvestEU, and in any other form laid down in the EU Financial Regulation if deemed necessary for the achievement of the objectives of the Innovation Fund, as outlined in the ETS Directive.

Battery manufacturing is a sector that has always been eligible under the IF. The demand for batteries in the EU is forecasted to increase significantly, driven by the EU regulations regarding the limitation of CO2 emissions for light and heavy-duty vehicles, as well as increased power system flexibility needs. Europe already hosts several battery manufacturing sites (approximately 175 GWh in 2022³). **Battery production in the EU could reach 458 GWh by 2025 and 1083 GWh by 2030, on track to meet the forecast EU demand, but this depends on final investment decisions still to be made, and hence on the technical and economic performance of the first European battery cell manufacturing projects.**⁴ As outlined in Figure 1, the largest gap between EU domestic production and demand along the battery value chain is expected for critical raw materials, anodes and precursor material production.



¹ This type of grants is based on provisions of the Chapter II of the Commission Delegated Regulation (EU) 2019/856 ('IF Regulation')

² This type of grants is based on provisions of the Chapter IIb of the Commission Delegated Regulation (EU) 2019/856 ('IF Regulation')

³ BNEF

⁴ 2023 [EU Competitiveness Progress Report](#)

Figure 1: The biggest capacity gap in the European battery value chain is not on cell production capacity, but on precursor material, Anodes and refined Lithium (Source: InnoEnergy & European Battery Alliance)

Although the picture is positive today compared to e.g. solar PV manufacturing, battery production in the European Union faces two main challenges. Firstly, most battery chemistries are highly dependent on critical raw materials, several of which are highly concentrated in few countries. **Higher prices for raw materials and high upstream dependence on third countries create a challenge for the European battery value chain, both in terms of cost-competitiveness and resilience.** Secondly, some currently announced projects are at risk of not being implemented in the light of **significantly more competitive foreign production or more advantageous public support abroad.** European industry is at a comparative cost disadvantage, with almost 50 percent higher unit manufacturing costs compared to best-in-class producers in South Korea and China and significantly higher electricity input costs.⁵ Apart from subsidies, this cost gap is largely determined by material costs, which are considerably lower in Asia due to more strong supply chains in terms of vertical integration of material supply, processing and manufacturing. In addition, European companies are still gaining experience in successfully upscaling large scale battery cell manufacturing.

Over the last years, European efforts to support the battery manufacturing industry have focused not only on supporting new technology developments, but also in scaling up production capabilities through the development of the gigafactories. These large-scale production installations facilitate the creation of economies of scale and the integration of supply chains, with consequent gain in production efficiencies and reduction in final product price. There are currently 40 such projects⁶ announced across Europe, most of them integrating cell manufacturing and battery assembly.

The availability of public subsidies that could help de-risking investments in battery cell manufacturing or the upstream value chain has been more limited than in other areas of the world (e.g. the US IRA has an estimated provision for battery cells and modules of US\$ 30.6 billion in the period 2022-2031⁷). In this context, EVP Šefčovič made a specific [announcement](#) relating to [a proposal](#) on the EU-UK Trade and Cooperation Agreement at the end of 2023. Recitals 12 and 13 of this proposal reiterate the need to support manufacturing of the “*most sustainable batteries in Member States*” and indicate that “*the Commission will set up a dedicated instrument under the Innovation Fund [...] This instrument, which will be launched in 2024, will provide funding of up to € three billion for the next three years*”.

This paper analyses the pros and cons of three broad options to increase support to EU battery manufacturers through the IF:

- 1) A fixed premium awarded through an auction for one element in the battery value chain.
- 2) A dedicated topic under the existing IF “regular grants” for projects across the battery value chain.
- 3) A dedicated loan facility, possibly combined with IF grants for projects across the battery value chain.

Regardless of which option(s) is ultimately chosen, it needs to be carefully investigated if there is **a sufficient pipeline of projects** that have not yet reached “start of works” (requirement under regular grants and auctions of the IF, for Auctions-as-a-Service from DG Competition perspective, and under additionality aspects of the EIBs InvestEU programme). Also, a minimum level of competition will be especially crucial for the success of a potential auction.

Another key consideration will be the **pace of progress in relation to carbon footprint and other product requirements under the EU Battery Regulation**, which include for example on carbon footprint (consecutively):

⁵ Agora Energiewende and Agora Industry (2023): “Ensuring resilience in Europe’s Energy Transition: The role of EU clean-tech manufacturing”

⁶ <https://cicenergigune.com/en/blog/world-map-gigafactories>

⁷ <https://www.forbes.com/sites/christinemcdaniel/2023/02/01/the-cost-of-battery-production-tax-credits-provided-in-the-ira/?sh=7018548679ef>

the definition of the methodology (2024), a carbon footprint declaration (2025), a label (2026) and mandatory minimum requirements (2028) for electric vehicle batteries. Whilst EU funding can play some role in setting future standards/requirements, it should be avoided to anticipate standards/requirements through funding conditions at a time when methodologies and thresholds for tracking the performance are not yet established under the Regulation. In principle, all IF instruments can have provisions related to sustainability, performance, and resilience of batteries either via eligibility or award criteria. Assessing those will, however, increase complexity on application requirements and project monitoring.

SUPPORT OPTIONS

1) FIXED PREMIUM AUCTION FOR ONE PRODUCT ALONG THE BATTERY VALUE CHAIN

A fixed-premium auction for battery manufacturing, based on the blueprint of the RFNBO hydrogen auctions, is in principle possible to organise under the IF. Before starting to develop the *design* for an auction for battery manufacturing, the risks of an auction and whether it is indeed the best tool for manufacturers should be assessed. We see the following key considerations for an auction on battery manufacturing:

1. **Auctions work best for homogenous goods**, where each unit is identical (e.g. 1kg of H₂) and therefore bid-prices are perfectly comparable. Batteries, let alone batteries *and* various upstream products, are not a single homogenous good. **For an auction, a single product would have to be chosen for support.** To create comparability for a product such as battery cells, minimum product standards may be needed. Such standards currently do not exist for all relevant parameters (lifetime, efficiency and other performance aspects, carbon footprint, recyclability, supply chain resilience or other sustainability criteria) in a unified and easy to verify way. The **EU Battery Regulation**, which is establishing some of those standards, will be implemented through a number of separate Delegated Acts between now and 2031, and **many of its definitions will come too late for being used in an operational way in a battery auction to be launched soon.**
2. **There is a tight competitive landscape of European and international players active in Europe** that can realise projects of significant size. At the same time, there needs to be a suitable and mature enough project pipeline as a pre-condition to ensure sufficient competition in an auction. To be able to assess the competitive landscape for an auction, a more in-depth market analysis will be needed to assess how many projects are at a stage that they are ready for construction in the period 2025-2028, but pre start of works⁸ and final investment decision.
3. An important multiplier of the hydrogen auction is the **“Auctions-as-a-Service”** feature that allows to leverage national funds with the benefit of faster state aid clearance. This feature is, however, dependent on the existence strong expected competition both at EU and Member State level. A precise definition of the auctioned good will also be key.
4. There should be **no cumulation with other public support to create a level playing field**, otherwise projects compete based on the best national funding situation, not the most-cost-effective and best project/technology. No cumulation is also a necessary feature considering that auctions allow to fund 100% of the funding gap and allowing cumulation would lead to a heavier application and required checks to avoid overcompensation.
5. Considering the size of support under recent battery manufacturing State aid cases (e.g. Northvolt), the EUR 3bn of IF support in form of grants awarded through auctions as opposed to loans/guarantees and as opposed to regular grants that can be stacked with other public support is **likely to only support very few projects.**

⁸ Definition as per CEEAG: “Start of works” refers to the first firm commitment that makes an investment irreversible. The buying of land and preparatory works such as obtaining permits and conducting preliminary feasibility studies are not considered as start of works. Contracts which have been entered into force before the application for support count as start of works only if they entail a significant financial contribution from the beneficiary compared to the overall project value and content.

6. With a fixed-premium auction, there would be no disbursements before entry into operation and payments would be based on unit of outputs (“unit contributions”), not project milestones with slightly lower flexibility than “regular grants” to adapt to changing market conditions.
7. The fixed premium payment remunerates only against production, making it a good instrument for technologies that are finding challenges in overcoming the green-premium. Auctions that allocate a production-based subsidy leave technology- and project development risks with the project promoter to a much larger degree than grants that include pre-financing components. The flip side of this is that projects with still very high technology / construction risks are less well suited for auctions.
8. This also implies **no or few checks of the funding gap or costs at application, grant award and entry into operation** and reliance entirely on competition in the auction and the chosen ceiling price to avoid overcompensation.

In principle, two fundamental auction options are possible:

	Pro	Con
Auctioned good defined as kWh of battery cells produced over 10 years, bids on EUR/kWh of produced battery cell capacity. Lowest bids win.	Blueprint of H2 auction can be used.	Given few expected bidders and large bid-size, bidding on lowest price but with an open total grant amount will likely result in large marginal bids and therefore large budget leftovers.
Auctioned good defined as GWh/y of manufacturing capacity, allocated based on budget slots of e.g., EUR 200million. Bids will be on largest manufacturing capacity built for that support. Highest bids win. Payments would still be tied to output per year, not to capacity built.	Given few expected bidders and large bid-size, pre-defining the budget slots and bidding on largest capacity will avoid large marginal bids and therefore large budget leftovers.	Budget slots would need to be defined and might not correspond to the whole projects as planned by the manufacturers. Payments linked to installed capacity have the risk of promoting production capacities disconnected from actual demand, so they need to be carefully linked to actual output.

2) DEDICATED TOPIC UNDER THE INNOVATION FUND REGULAR GRANTS FOR PROJECTS ACROSS THE BATTERY VALUE CHAIN (MINING EXCLUDED)

Battery manufacturing projects have always been eligible for the IF “regular grants” and since the 2022 Large Scale Call (LSC), there has been a dedicated topic for cleantech manufacturing, including batteries, in recognition of the importance of the sector for the EU and its challenges to maintain its competitiveness. A budget of EUR 0.7bn was earmarked for this topic in 2022 and was doubled to EUR 1.4bn for the currently ongoing call. An alternative option to a fixed-premium auction is to open **under the “regular grants” a dedicated topic for battery manufacturing only** that will have an earmarked budget and enable peer-to-peer competition between batteries manufacturing projects. Creating such a topic would require only small adaptations to the call for proposals and application process – i.e. is perfectly feasible by the end of 2024.

IF grants target the first, second and n-th of a kind commercialisation projects that still face a funding gap (called “relevant costs”). As of 2022 LSC there is also the “mid-size pilots” topic offering support to demonstration projects that would be too large for Horizon Europe and less cost-efficient than those that compete under the other IF LSC topics. In this regard IF is perfectly complementary to the portfolio of other EU funding instruments (Horizon Europe, CEF, InvestEU etc.).

The IF has already awarded seven battery manufacturing projects, including one project on battery gigafactory and a pipeline is beginning to build.⁹ However, there would be only one “seal of sovereignty project”¹⁰ and only one project was selected for Project Development Assistance. Pipeline of battery manufacturing projects applying to the IF’23 call will be carefully evaluated in this respect. There is also an on-going simplification effort to make the application process easier and evaluation faster¹¹. Annex II lists all large- and small-scale battery manufacturing projects supported under the IF so far. A good spread in terms of geography as well as position in the supply chain can be observed.

IF “regular grants” are awarded following the assessment of project proposals against five award criteria: (1) GHG abatement, (2) degree of innovation, (3) replicability, (4) project maturity and (5) cost efficiency. Grants take the form of lump-sum payments disbursed upon the achievement of project milestones – **up to 40% before the Financial Close** with a minimum of 10% is reserved for the period after the Entry into Operation. Payments are tied to achievement of GHG abatement – with tolerance of up to 25%¹² to be applied to the whole monitoring period, which allows quite some flexibility to adapt to market conditions. The **early disbursement allows to support construction costs**, as heavy cash outflows can be met without the need for loans or equity. Projects have up to 4 years to reach Financial Close but set themselves the deadline for Entry into Operation (excessive time to entry into operation tends to be penalised under the project maturity criterion). There is no completion bond.

The size of the IF grants depends upon each project’s “relevant costs”: net extra costs that are borne by the project proponent because of the application of the innovative technology related to the reduction or avoidance of the GHG emissions. Relevant costs are de facto the **project’s funding gap**. IF grants can **support up to 60% of the relevant costs** of the project. During project implementation, lump-sum payments are not related to actual costs, but to the achievement of project milestones.¹³ As of the 2023 call for proposals, the relevant cost methodology has been simplified¹⁴. If projects do not have a funding gap or they request an IF grant higher than 60% of their relevant costs, they are not eligible – EIB loans (see section below) and cumulation could be considered in respective cases.

The regular grants are very well suited to support **heterogenous technologies such as batteries storage** that can deliver products with different performance. Under the IF “regular grants”, **projects in battery technology can compete not only on costs but also on performance** (under degree of innovation criterion), **resilience** (under replicability criterion) **and sustainability** (under degree of innovation and replicability criteria). Under the grants, the scope of eligible battery manufacturing projects is large (i.e., excluding only raw material mining, but including production of active materials, anodes, cathodes, cells, packs etc.). This means **projects from the whole supply chain can apply** and complete on all five award criteria. A similar approach taken by the US programme of grants for battery manufacturers that is complementary to the IRA tax credits – see Annex 1.

The performance, resilience and sustainability aspects would be factors of competition while of course batteries produced would have to comply with existing standards and EU legislation to be sold on the EU market. The IF

⁹ So far under all IF calls eight projects on battery manufacturing were awarded and a further 14 projects applied (1 project that would be awarded a “seal of sovereignty”, and 13 projects that did not pass all evaluation thresholds or A&E checks).

¹⁰ Projects that met all the minimum requirements but were not awarded due to budget limitations.

¹¹ E.g. for batteries a template on GHG abatement calculation has been elaborated: see [Tools and Guidance - European Commission \(europa.eu\)](#) and see below on relevant costs methodology

¹² Of GHG abatement estimated in the application, not delivered.

¹³ Relevant costs calculations are, however, not only assessed during the project evaluation but checked again during the grant preparation and verified at the project’s entry into operation.

¹⁴ Project costs can be calculated as the estimated net extra costs of the project (so-called ‘no reference plant’ approach) or the net extra costs relative to a conventional technology installation (so-called ‘reference plant’ approach). As of the 2023 call, the ‘no reference’ approach is the default one.

laureates could be standard setters for the upcoming “battery passport” and indeed build their competitive advantage in those aspects.

Because IF grants can support up to 60% of the project’s ‘relevant costs’, **regular grants allow for cumulation with State aid¹⁵ or other EU funding¹⁶**. An IF grant alone is, in most cases, sufficient to enable the realisation of the projects. In other cases, however, projects need to secure additional public support in the form of State aid or contribution from other EU funding programmes, to finance up to the remaining 40% of the relevant costs. Cumulation occurs when public support from different EU or State sources is used to finance the same project (or the two projects with overlapping costs) as the IF grant. Example of a battery storage project cumulating different sources of public funding is GigaArtic and likely this will not be the last one considering that such national support is possible under the TCTF. Considering the size of public support needs (e.g. the EUR [900mn of German State aid for Gigafactory Heide](#)) **stacking different public supports** might be a possibility to support more projects/target bigger ones.

3) BLENDED FINANCE PRODUCTS IN COOPERATION WITH THE EUROPEAN INVESTMENT BANK

Considering the limited availability of Innovation Fund resources that can be dedicated to supporting the battery manufacturing industry, it may be worth exploring other, repayable and thus more cost-efficient mechanisms, such a dedicated loans or programmes combining loans and grants. The European Investment Bank could be a partner for implementation of such programmes. Three initial options below could be envisaged:

1. Facility combining IF Grant + EIB senior loan.

Under such a blending instrument, projects would apply for loans from EIB and grants from the Innovation Fund under a coordinated application approach. They would in principle be able to receive two types of funding corresponding to different needs: a loan, providing upfront capital, and a grant, covering long-term funding gaps.

Once the EIB loan due diligence is kicked-off, the projects would then apply to the IF. The projects would therefore be able to present a financial model including the EIB loan, which would increase their financial maturity levels, and would also benefit from the due diligence process with EIB. This is a concept somehow similar to the one already done under the [Connecting Europe Facility Alternative Fuels Infrastructure Facility \(CEF AFIF\)](#). Under the AFIF programme it is only possible to apply for CEF funding once the EIB loan is approved.

This option would increase the projects’ likelihood of reaching financial close and it would bring a financially disciplining effect of loans to the project. The implementation of such a facility would however require the creation of a coordination and cross-reliance mechanism between EIB and the IF’s executive agency (CINEA) in the evaluation processes from both sources of funding. Developing such a mechanism may have a longer lead time due to the need to establishing the proper coordination between the EIB and Innovation Fund application processes

2. Increased volume of senior loans from the EIB, supported by guarantees from the EU Innovation Fund to EIB.

This option consists of increasing the volume and average ticket sizes of senior loans from the EIB, to have more financing and impact in this sector, by providing stronger mitigation of risks with additional guarantees. Through an additional IF budgetary guarantee to the EIB a wider number of battery projects could receive financing and ticket size may also be possibly increased. This option would particularly benefit projects that no longer have a funding gap but require access to significant and large amounts of financing. For example gigafactory investments such as the recent [EIB’s loan to Northvolt](#) would benefit from such type of support.

¹⁵ Also in the form of promotional loans based on State guarantees.

¹⁶ Funding from programmes such as Horizon Europe, Connecting Europe Facility but also InvestEU loans.

This also brings a higher leverage rate vs grants, the financially disciplining effect of loans and a high likelihood of reaching financial close. The project would benefit from a reduced administrative burden as only the EIB due diligence process would be applicable.

3. Increased volumes of venture debt from the EIB, supported by a dedicated top-up guarantee under InvestEU from the EU Innovation Fund

As explained in the introduction to this paper, smaller battery manufacturing projects that focus on early stage innovation, demonstrators, and scale-ups face specific challenges in finding funding due also to their riskiness. Venture debt products offered by the EIB are tailored to projects that have this type of high risk profile.

Projects seeking venture debt financing from the EIB can already benefit from the thematic venture debt financing under the InvestEU guarantee, , although the availability of resources under that scheme is quickly reaching exhaustion. A dedicated top-up from the IF for battery manufacturers would ensure that the EIB has continued venture debt resources to support the most innovative companies and secure dedicated resources to focus on the battery sector. An example of a similar approach was developed under the Health Emergency Preparedness and Response (HERA) InvestEU contribution. This option could be built upon existing InvestEU schemes and be operationalised in relatively short timeline.

Beyond the three described options, further schemes of collaboration between the IF and the EIB products could be explored, such as combining loans described in points 2 and 3 above with grants. However, developing these new types of schemes would require further analyses and, therefore, longer development times .

SUMMARY TABLE

Table 1: Summary table with pros and cons of different options

Instrument	Pros	Cons
1) Fixed premium auction	<ul style="list-style-type: none"> - Application process and evaluation are simpler and faster. - Payments are simplified, linked proportionally to production (e.g per kWh of battery) and delivery, not project milestones. - Possibility to obtain a grant matching the entire funding gap – “100% of relevant cost” as per IF definitions - no need for stacking the IF grant with other public support. - If solutions are found to considerations in the “cons” column, an auction would have a similar type of effect as the US IRA tax credits, i.e. fixed support per kWh of batteries output, although on a smaller scale (budget available). - Completion bond will be required to enter the auction, enhancing probability of project completion and allowing for more streamlined application process. - Creation of a level playing field across the EU since the EU auction will not allow cumulation of aid.. 	<ul style="list-style-type: none"> - Does not directly address innovation along the whole value chain: There can only be one specific auctioned good. - Auctions require a homogenous product so price/unit is a comparable unit. Batteries are not homogenous, and no official certification for minimum standards exists yet (and will not exist in the short term). - Assessment of sufficient competition required. Auction without competition leads to strategic bidding and overcompensation. - Setting up an auction needs dedicated documentation and is likely to take longer to develop than a dedicated window in the existing grant scheme. - Projects mostly compete on costs only. Battery Regulation would provide product standards and thresholds, but not before 2028. - Under a fixed premium auction, payments will only be received by the project upon certified and verified production. The mechanism does not directly solve the need for pre-financing or the challenges in securing advance payments from off-takers.

<p>2) Dedicated topic under the IF regular grants</p>	<ul style="list-style-type: none"> - Possibility of a dedicated topic for battery manufacturing only (earmarked budget and peer-to-peer competition). - Fast launch feasible. - Larger application scope than for single-product auction - projects from the whole supply chain (excluding raw materials mining) could apply. - Number of projects already applying in the past show good spread in terms of geography and place in the supply chain. - Grants are disbursed upon the achievement of project milestones – up to 40% before the Financial Close allowing to support construction cashflows. - Projects in battery technology can compete not only on costs but also on performance and sustainability that will be delivered by their innovativeness. - Cumulation with State aid or other EU funding is allowed (cumulation rules have to be observed). 	<ul style="list-style-type: none"> - More complex application process than in case of auctions . - Reporting more complex than in the case of auctions (reporting on milestones, need to measure and get verification of the GHG abatement). - Grants cover up to 60% of the funding gap and cumulation with other public funding might be cumbersome. - No completion bond required, less guarantee to reach Financial close and Entry into Operation. - Methodology to determine potential support may be less suited for this kind of clean tech projects. Projects need to demonstrate funding gap to receive IF's funding
<p>3) Blended product: debt funding from EIB possibly combined with grant support from IF</p>	<p>Possibly higher leverage rate through repayable instruments (vs. grants).</p> <ul style="list-style-type: none"> - Financially disciplining effect of loans beneficial in the long-term for competitiveness of the sector. - Higher likelihood of projects to reach Financial Close. In case of blending through top ups of additional guarantee, this is a basic requirement in EIB's due diligence. - In the case of IF guarantees to the EIB, facilitated access to debt and increased ticket size of the loan (both in the case of senior or venture debt) - When blending through additional guarantees or top-ups, the project only has one application process (that of the loan). <p><u>Specifically for combination of loans and grants</u></p> <ul style="list-style-type: none"> - Tackling different financing needs of projects. The loan addresses upfront capital needs, the grant can cover a project's funding gap. - When combining loans and grants, synergies can be achieved between EIB due diligence process and IF's evaluation to strengthen their financial maturity levels. 	<p>The use of loans requires higher maturity levels than grants for projects since return of funds are expected.</p> <p><u>Specifically for combination of loans and grants:</u></p> <ul style="list-style-type: none"> - Higher reporting burden during implementation due to double reporting to CINEA and EIB.

1	ReLieVe: Recycling Li-ion Batteries for electric vehicles	2021 Large-scale	France	Li-ion Battery recycling for production and refining of black mass	Grant signed
2	NorthSTOR PLUS: Industrialising Green Optimised Li-ion Battery Systems for ESS The Northstor+ story: introducing the world's greenest battery – Video	2021 Large-scale	Poland	GW scale manufacturing of battery energy storage	Grant signed
3	ELAN: Upscaling Vianode innovative synthetic graphite production technology for a responsible electrification of Europe	2022 Large-scale	Norway	Battery components	Grant signed
4	Giga Arctic: Building a European future for clean batteries to accelerate the renewable energy transition	2022 Large-scale	Norway	Battery cells	Grant signed
5	BBRT: BASF Battery Recycling Tarragona	2022 Large-scale	Spain	Battery recycling materials	Grant signed
6	Green Foil project: Low CO₂ footprint battery foil for Li-ion battery	2020 Small-scale	Sweden	Manufacturing of aluminium foil for Li-ion batteries	Grant signed
7	Listlawelbattcool: An energy and resource efficient battery cooler technology	2021 Small-scale	Czechia, France, Spain	Battery cooler technology for Electric Vehicles	Grant signed

