Study providing analytical support for the financial instruments and programmes to facilitate investment in the energy sector: the Recovery and Resilience Facility

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Written by Ecorys, Ramboll and VIS Economic & Energy Consultants
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ADEME	French Environment and Energy Management Agency
BAU	Business-As-Usual
CCfD	Carbon Capture for Difference
CEF	Connecting European Facility
CGE	Computable General Equilibrium
CO2	Carbon dioxide
CoR	European Committee of the Regions
DG ENER	Directorate-General for Energy
DG REFORM	Directorate-General for Structural Reform Support
DNSH	Do No Significant Harm
EBRD	European Bank for Reconstruction and Development
EIB	European Investment Bank
EIF	European Investment Fund
ERDF	European Regional Development Fund
ESIF	European Structural and Investment Fund
EU	European Union
EV	Electric Vehicle
FMFIB	Fund Manager of Financial Instruments in Bulgaria
GHG	Greenhouse Gas
MFF	Multiannual Financial Framework
NECP	National Energy and Climate Plan
NGEU	Next Generation EU
NRRP	National Recovery and Resilience Plan
RES	Renewable Energy Sources
RRF	Recovery and Resilience Facility
RRP	Recovery and Resilience Plan
SME	Small and Medium-Sized Enterprise
SG RECOVER	The Recovery and Resilience Task Force - Secretariat General
SO	Specific Objective
TEN-E	Trans-European Networks for Energy
TEN-T	Trans-European Transport Network

Executive summary

This is the final report of the "Study providing analytical support for the financial instruments and programmes to facilitate investment in the energy sector: the Recovery and Resilience Facility (RRF)". The study aims to assess the expected impact of the RRF, through the energy-related measures included in Member States' Recovery and Resilience Plans (RRPs), on supporting the clean energy transition and on the development of suitable financing solutions for projects in the energy sector. By doing so, this study gathers and provides evidence to help the European Commission identify and mitigate the challenges that hinder the effective implementation of the energy-related measures in the RRPs to maximise their positive impacts on EU Member States, foster the decarbonisation of countries' economies, and achieve the European Green Deal's objectives.

To achieve these objectives, the study relied on a step-by-step approach. First, we performed an extensive review of the most relevant literature exploring the impacts of the RRF, including qualitative and quantitative analyses, on the 2030 renewable energy targets, energy efficiency targets and greenhouse gas (GHG) emissions as well as on the development and use of financial instruments for energy projects. Then, a detailed analysis of the National Recovery and Resilience Plans (NRRPs) and the National Energy and Climate Plans (NECPs) of the 27 EU Member States was carried out to assess and compare the possible additional impact on energy and climate targets of the energy-related measures included in the NRRPs. The planned investments and reforms as reported in the NECPs served as a business-as-usual (BAU) scenario. However, it should be noted that such a BAU scenario does not factor in the fact that, due to the crisis, the investments and reforms included in the "business-as-usual" scenario may not have taken place given fiscal constraints. The comparison of this BAU scenario with the measures planned under NRRPs was done by category of energy projects, covering the whole energy sector from energy efficiency in buildings and industry to renewable energy production, energy infrastructure, hydrogen, and sustainable transport.

In parallel, we analysed the impact of the RRF on the use and development of financial instruments for projects in the energy sector, examining the instruments developed by Member States, assessing the synergies between the RRF funding and other sources of funding, and identifying good practices favouring complementarity with alternative financing solutions. The findings from the desk research were complemented by insights gained from interviews with Member States' representatives, which proved to be essential in filling in gaps and complementing the information collected from available sources. Finally, we developed policy recommendations aimed at addressing existing obstacles regarding the design and coverage of energy measures in the RRF and their contribution to the achievement of MS energy targets. The policy recommendations and findings of the study were discussed and elaborated in a workshop with experts and practitioners from academia, think tanks, and European and other international institutions with expertise on EU funding instruments, including the RRF .

The detailed review of the literature and the analysis of the NRRPs and NECPs revealed that **most of the proposed energy-related investments and reforms primarily help achieve existing energy and climate targets, which is in line with the overall ambition of the RRF,** in the context of the post-pandemic economic crisis. The majority of Member States indeed did not increase their ambitions in their national energy transition strategies to meet the EU climate targets, rather they invested in projects that were already planned to achieve existing targets as set in their NECPs. This was also confirmed by Member States' representatives, as some Member States used the RRF funding to expand the volume or the timeline of existing support schemes to minimise the associated administrative burden and achieve effective climate action in the short timeline available. Conversely, while in other cases **new measures were identified in the NRRPs, the estimated impacts of these interventions were assessed to be limited**. Specifically, in 16 of the 27 NRRPs, the proposed measures were

found to have a high likelihood of leading to somewhat higher climate targets in at least one of the energy categories.

The analysis of the categories of energy projects covered by the investments and reforms presented in the NRRPs revealed that **more than half of the investments and almost half of the reforms included in the NRRPs of EU Member States target Sustainable transport and Energy efficiency in buildings**. This is well depicted in the distribution of funds across energy-related categories, with 34.4% and 30.2% of the RRF funds being allocated to the former and the latter, respectively. Conversely, Hydrogen and Energy infrastructure received significantly less RRF funding across most EU Member States.

The review of the financial instruments for energy-related projects proposed in the NRRPs highlighted that **eight out of 27 Member States planned to use or develop at least one financial instrument related to energy projects**, with some instruments being based on previously existing ones. For 15 Member States, no energy-related financial instruments were identified, however, several NRRPs mentioned financial instruments but did not specify them further (i.e., proposed a preparatory study to define them, proposed them in a mix of measures without clarifying the specific amounts allocated to the financial instrument or the link to energy projects was unclear) or mentioned them as part of a reform. Lack of time, lack of private capital markets and worries about duplicating existing financial instruments were cited by Member State authorities as reasons for not including more. Financial instruments were not mandatory, however the Commission suggested their use but also recommended to the Member States to rely on existing structures as the timeline of the RRF would make it difficult to develop new structures. Likely also, for this reason, only limited guidance on financial instruments was provided initially, and only the revised guidance following REPowerEU provided more information on their benefits and use.

The limited interest in financial instruments can also be explained by the fact that the RRF grants offer 100% financing and do not require any national co-financing. This does not apply to the RRF loan compartment, which however was only used by a few Member States that were also more likely to include financial instruments in their NRRPs. Member States can still apply for RRF loans until 31 August 2023 providing some room to develop further financial instruments. Nevertheless, there **could have been scope to further develop financial instruments for energy projects**. However, the unprecedented crisis and short timeline did not allow for much room to do so. Therefore, considerations should be made to develop off-the-shelf guidance and good practices for financial instruments such as those already provided by the fi-compass platform and that can be easily adapted and used by Member States. In addition, recognising the existing obstacles of financial instruments, for example, the administrative complexity and coordinating issues, some Member States have already put in place mechanisms to overcome these barriers that could represent replicable good practices in other Member States (e.g., setting up of a central investment platform, and the use of technical assistance as well as European financial institutions to support the design and implementation of financial instruments).

Similarly to what we identified when assessing the measures and funding across categories of energy-related projects, **the majority of financial instruments were used for energy efficiency interventions in industry and buildings** (in particular the former), while other types of projects did not receive much attention. Reasons for this may include the low maturity of technologies, which applies to hydrogen and potentially some renewable energy technologies, but also the large-scale and often public nature in the case of energy infrastructure and sustainable transport projects, which have a relatively high need for concessionality to address external costs. In the case of renewable energy technologies, there is also a higher availability of grants and state aid, which is generally preferred by project promoters and would compete with any new financial instruments. In terms of the type of financial instruments proposed, the **most common types were loans**, followed by guarantees

and equity; but on several occasions, the measures in the NRRPs combined two or more types of financial instruments.

Finally, the **analysis of the effects of RRF financial instruments in the energy sector pointed out that the Member States expect significant multiplier effects** stemming from the proposed financial instruments, although with some differences and, most importantly, acknowledging that it is not possible to provide accurate values at this stage as most instruments are not yet in place. Additionally, due to limited information, it was not possible to draw any conclusions regarding the degree of complementarity between some financial instruments included in the NRRPs and other funding sources as well as regarding the creation of additional funding volume or replacement of national investments. While a few stakeholders shared concerns that the publicly-backed financial instruments had a negative impact on the development of private instruments, Member States shared their expectations that the financial instruments could address existing investment gaps in their economies caused by economic uncertainties and thereby unlock private investments.

1. Introduction

1.1. Overview of this study

This is the final report of the project "Study providing analytical support for the financial instruments and programmes to facilitate investment in the energy sector: the Recovery and Resilience Facility". The project, running from April 2022 to December 2022, was commissioned by the European Commission (DG ENER) and performed by a consortium consisting of Ecorys, Ramboll, and VIS Consultants.

In the context of the unprecedented COVID-19 pandemic that started in 2020, the European Union (EU) established the NextGenerationEU (NGEU) recovery package to shape the future of Europe recovering from the economic and public health crisis as well as fostering the ongoing efforts to mitigate and adapt to climate change.

As part of these efforts, the RRF is the key instrument to help the EU and its Member States emerge more robust and resilient from the crisis, face the challenges, and reap the opportunities brought by the green and digital transitions. The RRF made EUR 723.8 billion in loans and grants available to the Member States[1], but to access the funding each Member State was asked to develop a National Recovery and Resilience Plan outlining the intended reforms and public investment projects, as per the requirements set in the RRF Regulation[2] and guidelines published by the EU Commission.

The RRF has now become one of the key instruments to support the decarbonisation efforts of the EU Member States, with a substantial amount of funding allocated towards investments and reforms in the energy sector, for example, to improve energy efficiency in buildings, industry, and to promote the uptake of renewable energy and hydrogen.

Given the unprecedented financial support provided by the RRF on energy-related measures, this recovery instrument will also likely impact the use and development of sustainable financing solutions aimed at supporting projects in the energy sector, with potential synergies arising between the RRF funding and other sources of funding.

With the aim of better understanding the potential impacts of the RRF in the energy sector, this study assessed the energy-related measures included in the Member States' NRRPs, on supporting the clean energy transition, and on the development of suitable financing solutions for projects in the energy sector. Specifically, the study had the following two objectives:

- Assess the expected impact of the energy-related measures included in the NRRPs on supporting the implementation of the NECPs;
- Assess the potential impact of financing solutions for projects in the energy sector. included in the NRRPs.

Based on the findings in these two areas, policy recommendations for the consideration of the European Commission were developed to highlight how to better support the green transition and the European Green Deal objectives as well as the energy targets enshrined in the NECPs through the NRRPs.

[1] EUR 385.8 billion in loans and EUR 338 billion in grants

[2] Regulation (EU) 2021/241 of the European Parliament and of the Council of 12 February 2021 establishing the Recovery and Resilience Facility

1.2. Overview of this report

This report is organised into the following chapters:

- **Executive summary**
- **Chapter 1**. *Introduction*
- **Chapter 2**. *Methodological approach*. Summary of the applied methodology.
- **Chapter 3**. *Impact of the RRF on reaching energy and climate targets*. Analysis based on the review of the NRRPs and NECPs and complementary interviews with experts.
- **Chapter 4**. *Impact of the RRF on the use of financial instruments for energy projects*. Analysis based on the review of NRRPs, interviews with experts and the review of the literature.
- **Chapter 5**. *Discussion and policy recommendations*. Presents the policy recommendations suggested to support investments in the energy sector in the framework of the RRF.
- **Annex A**. *List of financial instruments*.
- **Annex B**. *Country fiches of the NRRPs of the 27 Member States* (a separate document).
- **Annex C**. *Detailed assessment of the energy measures in the RRPs and the NECPs* (a separate document).
- **Annex D**. *Detailed assessment of the identified financial instruments* (a separate document).

2. Methodological approach

This chapter presents a summary of the methodology adopted for the analysis in line with the objectives mentioned above.

The first step of the work was to identify and classify the energy-related measures presented in the NRRPs and NECPs, to facilitate the analysis in the subsequent steps and present the findings in a coherent and well-organised manner.

The study covered the following six categories of energy projects as presented in Table 1. The focus on measures with an explicit impact on the energy transition differs from the definitions used for specifying intervention areas for climate and environmental tracking in Annex VI of the RRF Regulation. Notably, interventions related to the circular economy, land use, or adaptation to climate change were only included if an impact on one of the energy categories was intended or obvious, for example involving waste to energy in a circular economy initiative.

Table 1. Definition of energy categories

Energy category	Description
Energy efficiency in buildings (renovation)	Projects related to more efficient use of energy in buildings. For example, energy renovation and the installation of heat pumps.
Energy efficiency in industry and other	Projects related to more efficient use of energy in industry or other fields. For example, research and development of new processes and technologies, or enabling a change to renewable energy sources.
Renewable energy production	Projects linked to the deployment of renewable energy sources. For example, new solar and wind generation capacity.
Hydrogen	Activities associated with the use of renewable hydrogen as an alternative source of energy (except in the transport/mobility sector). For example, new hydrogen production capacity, transport terminals, or the development of hydrogen-based technologies in the industry.
Energy infrastructure	Projects aimed at expanding/improving the network of energy infrastructure except infrastructure targeted at supporting electric/hydrogen vehicles. For example, energy storage capacity, smart grid development, electricity grid reinforcements, etc.
Sustainable transport	Projects linked to the low-carbon transition of the transport sector. This category covers all modes of transport and all types of measures aimed at decarbonising the transport sector, including the promotion of low- or zero-carbon technological solutions, the promotion of a modal shift and infrastructure development, and the reduction in the demand for transportation. For example improvement of the rail network, public transport, or Electric Vehicle (EV) charging stations,

The NRRPs are strategic documents structured in a coherent way to present the priorities of the governments of the different Member States to help their economies recover from the crisis caused by the COVID-19 pandemic. In most cases, these documents report the following information in this order: (i) a description of the main characteristics of the plan and its key objectives, (ii) a description of the reforms and investments by mission/pillar and components

of the plan, (iii) complementarity with other initiatives and implementation of the plan, and finally (iv) presentation of the expected macroeconomic and social impacts of the plan.

While the NRRPs follow a similar structure, the review of the measures included in each Member State revealed a high degree of heterogeneity in terms of the measures and policies proposed within each key mission/pillar and component, including the climate and energy-related ones. In many cases, the analysis also identified measures belonging to one or more energy categories or with other objectives[3], but containing an energy-related dimension (e.g., centred around digitalisation or focusing on the promotion of the circular economy in industrial sectors and agriculture). In these cases, an additional effort was put into deciding whether or not to include such measures in our assessment, and the analysis targeted the investments and reforms which intend to produce an effect in terms of decarbonisation of the energy system or reduction of energy consumption.

Despite the vast assortment of measures and policies, no additional categories of energy projects were identified from the review of the NRRPs and NECPs, and all collected measures were classified into the original six categories. Yet, the scope of the original category Electric mobility was broadened to include all measures related to Sustainable transport. The analysis, therefore, included measures aimed at promoting the electrification of not only road transport but also railways and air and marine transport, as well as measures supporting the modal shift to low-carbon means of transport and promoting more climate-friendly mobility alternatives. In fact, in their NRRPs, numerous Member States included a package of measures including reforms with long-term effects and investments aimed at reducing emissions in the transport sector not only via electrification, but also through the implementation of policies to reduce transport demand and (or) to shift demand towards less carbon-intensive transport options[4].

The categories were then used as a basis for the analysis in the literature review, in assessing the energy-related measures in the NRRPs, and finally in assessing the financial instruments reported in the national plans.

2.1. Literature review

Starting from the definition of the energy categories and running throughout the project, a literature review was performed to collect and assess any existing qualitative and quantitative analyses on the impact of the RRF on the 2030 renewable energy targets, energy efficiency targets and GHG emissions, as well as on the impact of the RRF on the development and use of financial instruments for energy projects. The focus was mainly on policy reports, academic papers, articles, white papers and other media. Given that the RRF is a relatively new funding facility designed in 2020 and coming into effect in 2021, the review was limited to literature published since 1 January 2020. The list of reviewed sources was updated with the progress of the study as more literature was published on this subject matter.

A list of key words was defined in two categories to collect and shortlist relevant sources:

- *Overarching key words*: These key words were included in every search and used in every combination with fine-tuning key words. Acronyms were also used where relevant.

[3] In their NRRPs, Member States describe the reforms and investments that they plan to implement with the support of the RRF to address all the country-specific recommendations (CSRs) and advance the green and digital transitions.

[4] Member States such as Portugal or Denmark introduced a more generic 'Sustainable mobility' component in their NRRPs to decarbonise transport via implementation of policies targeting the three pillars of sustainable mobility: Avoid, Shift, and Improve, as well as to include the adoption of alternatives to the electrification such as biofuels.

- *Fine-tuning keywords:* These keywords were applied in conjunction with the overarching keywords, sometimes with each other, but not without the overarching keywords.

The complete list of the used keywords is provided in Table 2.

Table 2. List of keywords used in the literature search

Overarching keywords	
• Recovery and Resilience Fund (RRF) • Recovery and Resilience Plan (RRP)	• Energy (projects) • Names of Member States
Fine-tuning keywords	
• Financial instruments • Financial mechanisms • Project funding • Energy projects • Blended instruments • Grants • Loans • Financing • Next Generation EU (NGEU) • Economics • Public-private partnership • Additionality • Complementarity	• Multiplier • Effectiveness • Best practices • Value added • Coherence • Energy efficiency • Renewable energy sources (RES) • GHG emissions • E-mobility • Climate tagging • NECP • Hydrogen • Climate targets.

The resulting body of reviewed literature consisted of 57 documents. These were catalogued in a Member State Excel database that captured the key information from each document (Title, Author, Year, Organisation, Subject) and reviewed to collect their relevant inputs in relation to the objectives of this study.

2.2. Analysis of the impacts of NRRPs on reaching energy and climate targets

Following the initial literature review, the focus of the research switched to the analysis of the NRRPs of the 27 EU Member States concerning the expected impact on energy-related measures. To assess the impact, the relevant measures (investments and reforms) of the NRRPs were reviewed and compared to the measures and instruments foreseen in the most recent NECPs published prior to the RRF. The objective was to provide a detailed understanding of the impacts and benefits stemming from the implementation of the NRRPs in comparison to the previously planned measures as entailed in the NECPs (i.e., the business-as-usual scenario). Hence, the objective was to understand if the measures in the NRRPs were aligned with the targets in the NECPs, if they possibly went beyond the targets in some areas, or if the focus of the NRRPs was different from the needs defined in the NECPs.

The analysis consisted of the following activities:

- desk research and **analysis of the NRRPs** to identify the policy measures in the considered categories of energy projects (Energy efficiency in buildings and

renovation, Energy efficiency in industry and other, Renewable energy production, Hydrogen, Energy infrastructure, Sustainable transport);

- desk research and **analysis of the NECPs** and contextual documents to compare the impact of NRRPs with the business-as-usual scenario of investments and reforms previously included in the NECPs and other national strategies and plans adopted or planned before the publication of the RRF;
- **expert interviews** to fill research gaps and add further insights on the expected impacts of the RRF in reaching climate and energy targets, as well as on the use of financial instruments; and
- **cross-analysis and reporting** of the gathered information and data to produce a summary (i.e., country fiche) per Member State and in an aggregate manner at EU-level.

The qualitative analysis of the NRRP and NECP of each Member State has been organised to provide a thematic assessment for each category of energy project. This is presented in Section 3 where the findings from the assessments of the NRRPs and their comparison with the NECPs are presented, as well as in the country fiches in Annex B which provide a deep dive into the plans of each Member State.

It should be noted that the NRRPs differ in terms of structure and content since they are tailored to the specific needs of Member States. While the overarching assessment framework was developed to provide a rigorous analysis that can inform how the RRF performs at the aggregate EU level, in practice, the important differences between NRRPs impact the analyses at the level of individual Member States. The results are also presented in detail in the country fiches in Annex B.

2.3. Analysis of the expected impacts of the RRF on the use and development of financial instruments

The goal of the second area of attention was to conduct a qualitative and, where sufficient data availability allowed, quantitative analysis of the impact of the RRF on the use of financial instruments in the energy sector. More specifically, the analysis aimed to (a) address the impact of the RRF on the development of financial instruments in the energy market, and (b) investigate the synergies between the RRF and existing financing solutions for energy projects.

This analysis consisted of two activities:

- A **data collection** based primarily on an in-depth analysis of the energy-related financial instruments described in NRRPs as well as interviews with relevant experts; and
- an **additional literature review** focused specifically on how similar issues have been dealt with in previous funding exercises;

Together, these activities address the following four specific objectives (SO):

- SO1: Assessing the impact of the RRF on the use and type of financial instruments for supporting energy projects;
- SO2: Assessing the impact of the RRF on the uptake of private financing solutions for energy measures;

- SO3: Assessing the impact of the RRF on the multiplier effect of public funding for energy measures;
- SO4: Assessing the potential for complementarity or substitution between RRF funding and other sources of funding for energy measures.

The activities for this analysis were conducted jointly and in parallel with the analysis of energy measures described in Section 2.2 following an assessment template. Findings on the financial instruments for energy projects identified in individual Member States are also summarised in the country fiches (see Annex B).

Lack of concrete information was a challenge as so far only one energy-related financial instrument has met its first milestones and others are yet to be implemented. Descriptions of the foreseen financial instruments also vary greatly in detail across different Member States. We, therefore, had to complement the review with qualitative information from interviews with Member State representatives and the workshop with experts. In addition, due to the funds being disbursed on an ongoing basis, the assessment base was updated regularly during the project. Regular consultation of new disbursements, as well as interviews at different points in time, were critical in ensuring relevant new insights were accounted for. Identifying potential instances for complementing or substituting other funding was a key consideration for this task; however. this was difficult to assess due to a lack of evidence.

Finally, due to the unprecedented nature of the RRF and that financial instruments were not a mandatory requirement for Member States, only a few studies focus explicitly on the role of financial instruments in the RRF. Therefore, apart from the review of the NRRPs, interviews with Member State authorities and the workshop with experts, insights were drawn also from more general literature on the use of financial instruments in the energy sector, corresponding to alternative funding programmes.

2.4. Development of policy recommendations

The last part of the study was dedicated to developing and assessing policy recommendations based on the analysis performed under the previous activities. The developed recommendations aim to provide the European Commission with suggestions on how to address the possible obstacles hindering the implementation of NRRPs, what complementary measures would be needed to have a long-lasting impact on supporting the green transition and the European Green Deal, and how to asses such impacts. Furthermore, possible avenues to further develop and broaden the analysis were identified to expand the longer-term added value to the study.

This part of the analysis consisted of the following activities:

- **Collection of relevant inputs** from all previous activities, including relevant literature review, analyses performed on NRRPs and use of financial instruments;
- **Assessment of conducted interviews**, which included forward-looking questions and provided insights into the drafting, implementing, and monitoring of NRRPs;
- **Shortlisting of most relevant preliminary recommendation**s obtained from previous activities. This included an internal workshop with the complete research team, and further desk research to substantiate and finetune selected recommendations.
- Finally, a **validation session** was conducted with academics and policy experts to discuss the findings of the study in general and the proposed policy recommendations specifically. The inputs received were integrated with the finalisation of the proposed policy recommendations.

As mentioned above, the key consideration in developing the policy recommendations was to build on the findings of the previous activities based on the analysis of the NRRPs, NECPs, and interviews with experts from the different Member States. The heterogeneity of the NRRPs, however, increased the difficulties to generalise the policy recommendations that could initially be inspired by trends affecting only a few Member States.

Additionally, the current lack of literature, especially on quantitative studies on the impact of the RRF on energy and climate targets, was continuously monitored. While only a limited number of quantitative studies analysing the impact of the energy-related measures included in the NRRPs were identified, possible avenues for future research were established to fill the gap in available studies (see Section 5.2). This included both quantitative and qualitative avenues of future research, for example, using modelling techniques such as Computable General Equilibrium (CGE) models to assess the investments in energy projects included in the RRF and analyse their impact on reaching energy and climate targets by comparing them against a “current policy” scenario that excludes the RRF.

3. Impact of the RRF on reaching energy and climate targets: Analysis of the NRRPs and NECPs

In this chapter, we **present the findings of the analysis of the impacts of the RRF on reaching energy and climate targets**. These findings are based on the review of the **National Recovery and Resilience Plans** and **National Energy and Climate Plans** provided by the Member States and complemented by interviews with experts and a literature review. The analysis and comparison of the NRRP and NECP of each EU Member State have been organised to provide a thematic assessment for each category of energy project. This is well represented in the following sections and the country fiches providing a deep dive into each Member State. As introduced in the previous section, energy-related measures have been classified into six categories of energy projects which cover the full range of project initiatives in the energy sector.

Our review of the energy and climate investments and reforms proposed in the NRRPs is based on an analysis of the NRRPs of all 27 EU Member States in their latest, publicly available version, as well as additional publications and data sources. At the time of writing (November 2022), all NRRPs except the one for Hungary, have been endorsed by the EU Commission and approved by the Council of the European Union.

As stated in Chapter 2, **the focus of this study is on energy-related measures in the NRRPs**. The following analysis includes reforms and investments with an *explicit* impact on the energy transition, applying a narrower measure mapping compared to the climate tracking methodology defined in Annex VI of the RRF Regulation, since this study focused on measures with an *explicit* impact on the energy transition

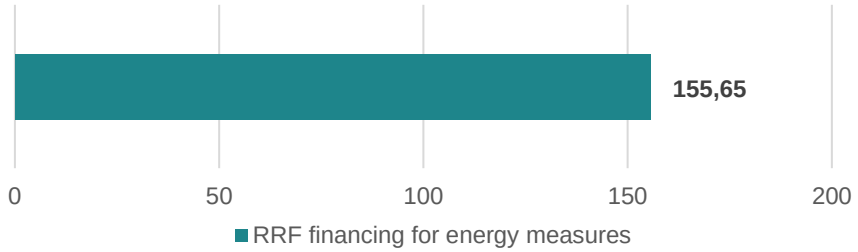
3.1. Overview of energy-related investments and reforms in the Member States NRRPs

In total, **512 individual measures in these categories are included across the 27 NRRPs**: 376 (73.4%) of these measures are investments, 133 (26.0%) are reforms and three (0.6%) are combined reforms and investments.

As shown in Figure 1, the **total RRF financing dedicated to energy measures amounts to EUR 155.65 billion**.[5] In addition to this, Member States plan to supplement the RRF financing with additional means from national budgets or through financial instruments. Thus, the total financing volume mobilised by the RRF for energy measures is higher than the figure presented. However, reliably quantifying this number is not possible as the specificity of NRRPs on the issue varies across Member States.

[5] It should be noted that this amount includes only measures with an explicit impact on the energy transition, a narrower sub-set of measures compared to the climate tracking methodology. Therefore, there may be differences between the amounts listed in this report and other analyses of the RRF.

Figure 1. Financing volume of NRRP energy measures (in billion EUR)



The analysis reveals that **all NRRPs include at least one reform or investment in the fields of energy efficiency in buildings and sustainable transport.** This stems notably from the constraints introduced in the RRF Regulation of a minimum share (37%) of climate-related investments, as a prerequisite for the positive assessment of NRRPs by the European Commission. However, few Member States have included measures targeting energy efficiency in industry and other sectors and renewable energy production, which are listed in 22 NRRPs. On the contrary, investments and reforms targeting hydrogen and energy infrastructure are reported in 16 and 18 NRRPs, respectively. These findings are illustrated in Table 3, which provides an overview of the Member States' NRRPs and, specifically, indicates which categories of energy-related investments and reforms can be identified in each plan.

Out of the reviewed 27 Member States, Czechia, Luxembourg and Sweden did not include in their NRRPs any measures in three out of the six energy-related categories. While some NRRPs do not report initiatives in all energy categories, it might be that all categories, including hydrogen and energy infrastructure, are mentioned in the plan without, however, any specifically related investment or reform. This comparison also has to consider the different financing volumes made available to different Member States, as countries with smaller plans received smaller shares of the overall RRF volume.

Table 3. Categories of energy-related investments and reforms identified in the NRRPs

MS	Energy efficiency in buildings (renovation)	Energy efficiency in industry and other	Renewable energy production	Hydrogen	Energy infrastructure	Sustainable transport
AT	X	X	X	X		X
BE	X	X		X	X	X
BG	X	X	X	X	X	X
HR	X	X	X	X	X	X
CY	X	X	X		X	X
CZ	X		X			X
DK	X	X		X	X	X
EE	X	X	X	X	X	X
FI	X	X	X	X	X	X
FR	X	X		X	X	X
DE	X	X		X		X
EL	X	X	X		X	X
HU	X		X		X	X

MS	Energy efficiency in buildings (renovation)	Energy efficiency in industry and other	Renewable energy production	Hydrogen	Energy infrastructure	Sustainable transport
IE	X	X	X			X
IT	X	X	X	X	X	X
LV	X	X	X		X	X
LT	X		X	X	X	X
LU	X					X
MT	X	X	X			X
NL	X	X	X	X		X
PL	X	X	X	X	X	X
PT	X	X	X	X		X
RO	X	X	X	X	X	X
SK	X	X	X	X	X	X
SI	X	X	X		X	X
ES	X		X	X	X	X
SE	X	X				X
SUM	**26**	**22**	**21**	**18**	**18**	**27**

Assessing these findings in more detail, Table 4 below provides an overview of the number and distribution of the 512 energy-related investments and reforms across the energy categories. The numbers in Table 4 are slightly higher than the 512 individual measures reported previously because some measures fall into more than one energy category. For instance, substantial overlaps are found between renewable energy production and energy infrastructure as well as between energy efficiency in industry and hydrogen. In these cases, they are strongly related or even depend on each other, which results in a combination of categories.

The distribution of measures varies widely within the different energy categories, with investments being much more common than reforms. Whilst it is hard to infer strong conclusions from a comparison of the number of investments compared to reforms, the prevalence of investment measures may be explained by the easier decision-making process that investments entail compared to reforms. In addition, since the RRF is a funding instrument, Member States are also incentivised to include more investment measures to make use of their funds. Member States authorities highlighted the short timeline for developing the plans and risks of reduced RRF financing if NRRP reforms are not implemented as a potential explanation, which did not allow for extensive national political negotiations and prioritisation of less complex measures. However, the financial support provided by the RRF played an important role in balancing budget implications of these reforms and therefore gave Member States the means to continue implementing these measures, which are required for achieving previously defined targets.

When looking at the countries listing the highest number of measures per energy category, France, Italy and Spain stand out in many categories, which is in line with their significant shares of total RRF funding. Other countries that proposed numerous investments and reforms in comparison to other Member States include Bulgaria, Czechia, and Belgium.

As shown in Table 4, hard-to-abate sectors (transport, buildings, and industry) account for the majority of measures. The majority of investments and reforms are directed towards

sustainable transport (33% and 28% of the total investments and reforms, respectively), followed by energy efficiency in buildings (renovation) and renewable energy production. When looking at the absolute numbers, it becomes obvious how **significantly more investment measures and, to a certain extent reforms, targeting transport and buildings** have been included in the NRRPs of EU Member States **compared to those targeting hydrogen and energy infrastructure**.

As a result, planned measures will increase demand for clean electricity (e.g., programmes that encourage the purchase of heat pumps and electric vehicles), but there are fewer measures aimed at increasing the production of green electricity (e.g., projects in clean electricity generation). The measures on energy efficiency in buildings and industry will help to limit the overall energy demand. This focus on demand-side action addresses the challenges in market financing for decentralised investments by households and public institutions. Supply and infrastructure projects are needed to match demand, but these can be more easily financed by the private sector. This also explains why the RRF funds fewer of this type of projects.

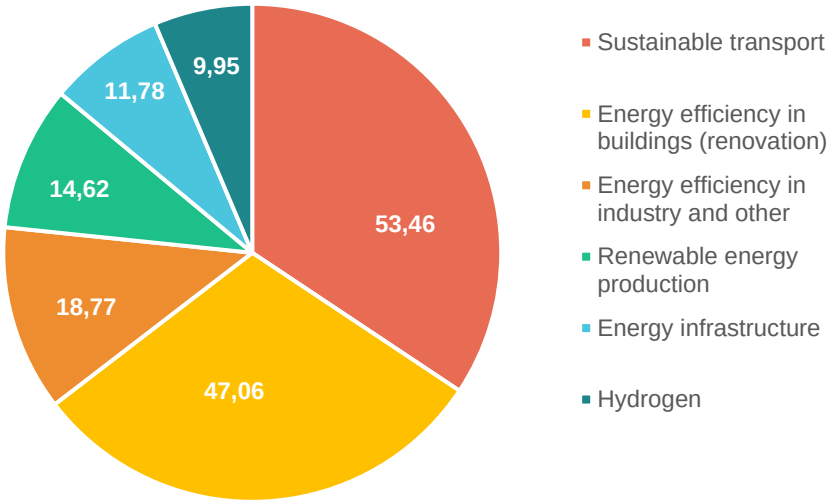
Table 4. Overview of energy-related investments and reforms in the NRRPs

Energy category	Investments		Reforms		MS with the most investments and reforms per category
	No.	**%**	**No.**	**%**	
Energy efficiency in buildings (renovation)	107	26%	29	19%	BE, CZ, FR, IT, ES
Energy efficiency in industry and other	59	14%	24	16%	DK, FR, IT, SI
Renewable energy production	48	12%	35	23%	BG, IT, LT, ES
Hydrogen	24	6%	9	6%	BE, IT, RO
Energy infrastructure	37	9%	11	7%	BG, IT, ES
Sustainable transport	133	33%	43	28%	BE, HR, CZ, FR, ES
SUM	**408**	**100%**	**151**	**100%**	

Based on the in-depth review of the NRRPs energy measures, the share of energy-related investments across the energy categories is illustrated in Figure 2 below. The distribution across the categories corresponds to that of the number of investments and reforms as presented in Table 4. **Most of the funds have been directed towards sustainable transport (34.4%), followed by energy efficiency in buildings (30.2%).** The rest of the categories constitute the remaining 35.5 % of the total investment. Within this, energy efficiency in industry and renewable energy production accumulate the largest amounts of investment.

Almost all Member States have a distribution of financing across categories that is similar to the overall one. The five biggest GHG emitters in the EU (Germany, France, Spain, Italy and Poland), have used even more of their high-impact climate investments in these sectors but also placed substantial attention on hydrogen.

Figure 2. RRF energy-related investment by category (in billion EUR)



3.2. Expected impact of the energy-related investments and reforms in the NRRPs

This section summarises the qualitative comparison of the NRRPs and NECPs of the EU Member States and presents the results of the assessment of the additional impacts of the measures in the NRRPs compared to a business-as-usual scenario of previously planned investments and reforms. Specifically, we summarise the results across Member States at the aggregate level for the considered energy categories; a more detailed assessment for each country's NRRP is available in the separate Annex B containing all the country fiches.

The NRRPs and NECPs are significantly different documents in terms of purpose, structure and content, with very different levels of detail regarding the planned investments, reforms, and targets within the energy and climate spheres. The NECPs represent mid- to long-terms strategies containing measures that are not necessarily funded. Therefore to address financing gaps and as laid out in the RRF regulation to "*enable a swift delivery of the targets, objectives and contributions set out in NECPs*", the NRRPs should be "*consistent*" with NECPs to be eligible (art. 17). This bridging of the financing gaps in NECPs was especially needed during the crisis and while recommended, there was no ambition to go with the NRRPs beyond NECPs targets.

Additionally, the objectives and priorities of the RRF relate to economic recovery rather than specific decarbonisation or energy targets. Therefore, in the development of the NRRPs, a standardised methodology for the assessment of the impacts on energy consumption, RES share, or GHG emissions was not provided or required. This limits the depth of their comparison with NECPs quantitative objectives and the analysis that can be performed to assess their impacts. The overall quantified assessment of the energy and climate impacts of measures can only be found in the countries' NECPs. As stated, NECPs are non-binding, high-level strategy documents that do not consistently present details about the implementation and funding of initiatives, which makes the identification of overlap difficult and potentially ambiguous. When information on the planned measures and their expected impacts was missing or was not complete, we relied on the available information on the overall targets by energy category.

Relying on this information, we were able to do a comparison between the expected impacts of the measures included in the NRRPs with the targets and measures presented in the NECPs. For each energy category, we assessed to which extent the RRPs contributed to the implementation of the NECPs and the likelihood of reaching even higher energy and climate targets considering the impacts of the investments and reforms included in the NRRPs. To complement this comparison, we also made use of the information reported in additional national strategies and plans, for example, the national hydrogen strategies and climate action plans.

The results of the comparison have been characterised under five different categories, and a traffic light system has been introduced to simplify the interpretation and allow better understanding. The five categories represent the assessed likelihood for the NRRPs' energy measures of reaching higher energy and climate targets compared to the NECPs. The five categories are the following:

- high (highlighted in **green**);
- medium (highlighted in **orange**);
- low (highlighted in **red**); and
- not assessable, where the level of detail in the NRRP or NECP was insufficient to make a comparison; and
- no measures, where an NRRP did not include any measures in that category.

The detailed comparison between the energy measures in the NRRPs and the NECPs of all EU Member States has been categorised and summarised using matrixes in MS Excel. These documents are reported in Annex C.

Results of the comparison between NRRPs and NECPs

Table 5 summarises the results of the qualitative comparison of the energy-related investments and reforms included in the NRRPs and NECPs by Member State and energy category.

The first element that emerged from the analysis was the **encountered difficulty in achieving a clear and definite conclusion on the effective likelihood** of NRRPs measures on reaching higher energy and climate targets compared to the measures in the NECPs. This was due to, in some cases, missing qualitative or quantitative information on the expected impacts of such measures in terms of, for example, GHG emission reductions, reduction in energy consumption, or additional installation of renewable energy capacity. Another issue that in certain instances limited the assessment was the difficulty in verifying whether certain measures were included in both the NRRPs and the NECPs; this difficulty was produced by the differences between the two documents discussed above. Nevertheless, these issues were partially mitigated following further rounds of assessments of the plans, a review of additional literature, and insights from the interviews with experts.

Given the limitations in comparability and the early stage of implementation of the NRRPs, a consistent assessment for all Member States against a scenario without the RRF is impossible, and the likelihood assessed at the moment of writing may develop over time with the progress in implementation. When the information was sufficient to perform the comparison, the analysis highlighted that **across all Member States and categories, the investments and reforms listed in the NRRPs will make a contribution to reaching the targets in the NECPs**. The limited impact is mostly linked to the fact that some of the investments and reforms presented in the NRRPs were already among the measures listed in the NECPs. However, the RRF Regulation outlined this option as RRF financing can ensure the implementation of measures that otherwise may have had to be stopped or postponed in the context of the COVID-19 crisis and its economic and budgetary implications. Therefore, even in those cases where the NRRP

do not include measures exceeding the targets set out in he NECPs, the comparison to a no-RRF scenario would likely still suggest that the NRRP contribute to a higher likelihood of reaching the NECP targets.

Table 5. Overview of the assessed likelihood of reaching higher energy targets of NRRPs' measures

MS	Energy efficiency in buildings (renovation)	Energy efficiency in industry and other	Renewable energy production	Hydrogen	Energy infrastructure	Sustainable transport
AT	Low	Low	Low	Not assessable	No measures	Low
BE	High	Low	No measures	High	High	High
BG	Low	Medium	Medium	Low	Low	Not assessable
HR	Medium	Low	Low	High	Medium	High
CY	Low	Low	Medium	Not assessable	Medium	Medium
CZ	Low	No measures	Low	No measures	No measures	Medium
DK	High	High	No measures	Medium	Not assessable	High
EE	Medium	Not assessable	Low	Not assessable	Low	Low
FI	High	High	Low	Not assessable	Not assessable	High
FR	High	High	No measures	Medium	Medium	High
DE	Medium	High	No measures	High	Low	Medium
EL	Low	Not assessable	Not assessable	Low	Low	Low
HU	Medium	No measures	Low	No measures	Medium	Low
IE	Medium	Not assessable	Low	No measures	No measures	Not assessable
IT	High	Low	Medium	Not assessable	Low	Low
LV	Low	Low	Low	No measures	Low	Low
LT	Low	No measures	Low	Not assessable	Not assessable	Low
LU	Not assessable	No measures	No measures	No measures	No measures	Not assessable

MS	Energy efficiency in buildings (renovation)	Energy efficiency in industry and other	Renewable energy production	Hydrogen	Energy infrastructure	Sustainable transport
MT	Not assessable	Low	Low	No measures	No measures	High
NL	Low	Medium	High	High	No measures	High
PL	High	Low	Low	High	Not assessable	Medium
PT	Medium	Medium	Medium	High	No measures	High
RO	Low	Not assessable	High	High	Low	Not assessable
SK	Low	Medium	Low	Medium	High	Medium
SI	Medium	Medium	High	No measures	Medium	High
ES	Not assessable	No measures	Medium	High	Medium	Medium
SE	High	High	No measures	No measures	No measures	Medium

In 16 of the 27 NRRPs, the proposed measures were found to have a high likelihood of leading to higher climate targets in at least one of the energy categories. In many other categories and the remaining 11 Member States, this was not the case. Yet, even in these latter cases the RRF provided an additional financing source to relieve the stress on national budgets. These points were also confirmed by many of the interviewed experts who clearly outlined that some Member States introduced in their NRRPs measures to help achieve previously enacted energy and climate commitments rather than achieving more ambitious targets.

The assessment by energy category reveals that the strongest increase in ambition can be observed in sustainable transport. For nine NRRPs, it is assessed that the additional measures will very likely help Member States in achieving higher decarbonisation targets. In seven cases, the analysis suggests that the probability of achieving higher targets in this category is low. A substantial portion of the investments in the transport sector are in road transport infrastructure, and a significant portion was dedicated to the automotive industry to support the uptake of private low-carbon vehicles such as electric vehicles (EVs). Therefore, some plans have been criticised for missing the opportunity for a comprehensive green transformation of the transport sector, including a modal shift to public transport, which would substantially lower the GHG emissions of the sector[6].

Regarding other energy categories, in eight NRRPs we assessed that the measures will likely help to achieve more ambitious targets in terms of hydrogen deployment, and in seven in energy efficiency in buildings, while few assessments were deemed as highly ambitious for energy efficiency in industry and renewable energy production. Lastly, only the NRRPs of

[6] See for example: https://foes.de/publikationen/2021/2021-04_FOES_DARP.pdf

Belgium and Slovakia have been judged as ambitious enough to deliver higher targets in the energy infrastructure category. In Belgium, this originates from investments in an energy island to connect future offshore wind turbines. In Slovakia, the most impactful measure is the investment in the flexibility of electricity systems to accommodate more RES generation.

Cross-validation with Member State authorities

Following the analysis of the NRRPs and NECPs, a series of interviews allowed us to discuss these findings with the national representatives in charge of the development and administration of their respective NRRP. One objective of these interviews was to validate findings and close remaining gaps in the understanding of the RRP measures. However, they also delivered additional insights into the development process and decisions that led to the formulation of the NRPPs as they are today. This section presents the key takeaways from the discussions.

Overall, the analysis of the contributions gained via interviews with the national representatives revealed two main considerations regarding the design of the RRP investment measures.

One the one hand, **some Member States employed a high degree of selection and planning to ensure optimal additionality** to currently existing measures, plans and funding programmes. This design was described as driven by an aim for targeted impacts in energy areas, regions or stakeholders that were previously less supported. Therefore, the measures can be very specific and addressed to pre-identified projects or beneficiaries. In this way, overlaps with existing programmes such as funding from the Cohesion Fund can be minimised. This approach often led to the introduction of new measures that were not included in the NECPs.

On the other hand, **some Member States decided to expand the volume or timeline of existing support schemes** and described this as their leading principle. In these cases, relying on existing mechanisms enabled a more rapid and less burdensome implementation for both authorities and beneficiaries. The expansion of funding measures that use competitive calls to select the supported projects was mentioned as one promising way to achieve fast and effective climate action. However, the short timeline and demanding reporting requirements for the NRRP development were described as additional important drivers in the decision for an expansion of existing measures. As a result of this approach, the measures of the NRRPs overlapped to a large extent with the ones defined in the NECPs or other national strategy documents.

The challenges in the comparison between the two plans were also described by the interviewees. In particular, the quantified impact assessment differs for measures in the NECPs and the NRRPs. The former focuses on GHG emission reduction, renewable energy and energy efficiency, while the latter does not have this explicit dimension as part of its assessment. As a standardised assessment and reporting of GHG emissions reduction was not part of the NRRPs' development, such information was not always available and could not necessarily be compared to the NECPs. The measures in the NRRPs are also often more granular than actions in the NECPs.

Additionally, Member States across Europe confirmed the mentioned **need for RRF funding and the NRRP measures to achieve energy and climate targets as defined in previous commitments** to the EU. The COVID-19 pandemic amplified the challenges of fundamental changes to societal and economic mechanisms required for the energy transition. This limited the formulation of more ambitious targets in a period of high uncertainty.

The potential of energy and climate impacts coming from reforms was also considered by Member States when drafting their NRRPs. The analysis of NRRPs and the discussions with Member States' representatives highlighted that several reforms had already been agreed upon at the national level.. Several reforms were planned already before the introduction of

the RRF and the NRRP, or follow from changes in EU legislation (e.g., Energy Efficiency Directive). As mentioned above, interviewees pointed to the challenges in timing and political risks to reach agreements on new reforms as a main cause for the conservative approach. However, the impact of the reforms was also described as broader and longer-lasting than investments. Especially tax reforms for energy use from fossil fuels compared to renewable energy sources were described as impactful measures which are expected to lead to higher GHG reductions by applying to a large part of the economy. Another example of impactful reforms according to the interviewees was the improved permitting systems that lead to faster uptake for RES projects. Selecting such reforms as part of the NRRP further increases the pressure and incentives to implement them, and can therefore have relevant impacts on the climate and energy targets.

The financial support by the RRF ensures that these reforms, which are required for achieving previously defined targets, remain possible by balancing budgetary restrictions and maintaining political focus on these priorities. This is the case also for reforms that may have been already agreed or planned before the introduction of the RRF.

Analysis of the existence of substitution effects caused by RRF financing

In this analysis, the effects of RRF financing need to be considered in light of possible substitution effects on other forms of financing for the energy transition from national budgets or with an impact on the debt position of a Member State. A clear and quantified analysis of this issue is not possible as such impacts were not described in the plans. However, in line with the findings above, the results of the comparison between NECPs and NRRPs as well as some existing studies point to the potential replacement of financing between the proposed and existing measures when these were similar in terms of design[7]. Indirectly and at a more general level, this was also mentioned by Member State interviewees who explained the preference for grant allocations over loans due to advantageous budget implications and reduced stress on national budgets which ensured the continuation of implementing initiatives for achieving energy efficiency, RES increase and GHG emission reduction. Literature cautions also that RRF investments could substitute Cohesion Policy programmes considering the RRFs lower administrative burden and higher priority combined with the limited absorption capacity in Member States[8].

Potential synergies, for example between the RRF and Cohesion Policy due to their common themes and the potential of the RRF making use of well-established structures of Cohesion Policy, are highlighted as well in literature[9]. This was also confirmed in our discussions with Member States who highlighted the experience within their respective Ministries in managing EU funds as beneficial in implementing the RRF. However, concerns were also raised about the unprecedented nature of the RRF and its large scope that required the involvement of parts of the administration less familiar with EU funding.

With the currently available data, positive nor negative consequences of substitution or continuation cannot be confirmed or quantified for specific Member States or the overall RRF. An ex-post assessment after the completion of the RRF timeline could be useful to understand the impacts of substituting public investments. For private investments and financial instruments, further analysis and discussion is presented in Chapter 4.2.2.

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[7] See for example: https://foes.de/publikationen/2021/2021-04_FOES_DARP.pdf

[8] J. Barbero, A. Conte, et al. (2022) The impact of the recovery fund on EU regions: a spatial general equilibrium analysis, Regional Studies.

[9] Ibid.

3.3. Conclusions

Overall, it is not possible to assess how the situation would have been across the 27 Member States if the RRF had not been created. The unprecedented crisis caused by the COVID-19 pandemic and the current early implementation stage of the NRRPs means that consistent values for assessment and comparison are not available. However, this analysis has led to some key findings.

Across the Member States, sustainable transport and energy efficiency in buildings are the focus areas for investments and reforms. This applies to the number of NRRPs with measures in these areas, the overall number of measures across NRRPs, and the financing volume dedicated to these measures. Additionally, sustainable transport was also the topic on which the highest number of Member States (9) are likely to have created a higher level of ambition.

The numbers were more limited for the other energy categories following the easier access to private financing for large commercial projects compared to decentral projects on household side. Yet, hydrogen stands out with eight Member States likely to achieve higher ambition. This is due to the increased attention placed on hydrogen as a fuel substitute in its development and pre-commercialisation stage compared to the time of adoption of the NECPs.

Investments outnumber reforms in all of the plans and all of the energy categories. Whilst it is difficult to draw clear conclusions from a simple comparison between the number of investments compared to the number of reforms, this may be explained by the focus on economic recovery from a crisis, which sparked unprecedented funding but also by the short timeline for developing NRRPs. This led to a preference in national governments to include investments rather than reforms. However, some reforms may prove vital and highly impactful for the systemic and long-term decarbonisation of energy systems.

Combining the findings from the literature review, the comparison of NRRPs with NECPs and the interviews with Member States' representatives, it is concluded that **the proposed measures primarily help achieve existing energy and climate targets, as defined by the EU, in the context of the post-pandemic economic crisis (compared to an alternative scenario without the RRF)**.This is not surprising given that the RRF Regulation and the NRRPs were not conceived as means to increase NECPs ambition but to help implement them. In addition sixteen Member States use the NRRPs to increase their ambition in at least one energy category. In many other countries, the instruments were needed to ensure continuity in reaching targets, at a time when healthcare, medical supply chains and economic pressures required the utmost political attention and could have diverted resources from those targets.

4. Impact of the RRF on the use of financial instruments for energy projects

In this chapter, we present the findings on the impact of the RRF on the use of financial instruments for energy projects. These findings are based on the review of the NRRPs provided by the Member States and complemented by interviews and a literature review. It should be noted that currently, only one financial instrument has fulfilled its first milestones, so our assessment is based mainly on what is described in the NRRPs[10]. We start by first defining financial instruments and presenting some general findings from the literature before presenting an overview of the financial instruments identified in the NRRPs and conclusions on how the RRF affected the use of financial instruments for energy projects.

The specifications for this study identify loans, guarantees, equity, quasi-equity, and (green) bonds as possible financial instruments. Financial instruments differ from grants as they are repayable forms of financing, while grants are non-repayable[11]. The text box below further defines the types of financial instruments.

Definition of types of financial instruments

- **Loan:** An agreement which obliges the lender to make available to the borrower an agreed sum of money for an agreed time and under which the borrower is obliged to repay that amount within the agreed time.
- **Guarantee:** A written commitment to assume responsibility for all or part of a third party's debt or obligation or for the successful performance by that third party of its obligations if an event occurs that triggers such guarantee, such as a loan default.
- **Equity**: Provision of capital to a firm, invested directly or indirectly in return for total or partial ownership of that firm and where the equity investor may assume some management control of the firm and may share the firm's profits.
- **Quasi-equity:** A type of financing that ranks between equity and debt, having a higher risk than senior debt and a lower risk than common equity. Quasi-equity investments can be structured as debt, typically unsecured and subordinated and in some cases, convertible into equity, or as preferred equity.
- **(Green) bonds:** Bonds are financial instruments that finance projects and provide investors with regular or fixed-income payments. A green bond is specifically earmarked to raise money for climate and environmental projects.
- **Risk sharing instrument:** A financial instrument which allows for the sharing of a defined risk between two or more entities, where appropriate, in exchange for an agreed remuneration.
- **Fund of funds**: A fund set up to contribute support from a programme or programmes to several financial instruments. Where financial instruments are implemented through a fund of funds, the body implementing it shall be considered to be the only beneficiary.

[10] The Greek Loan Facility has fulfilled its first milestones by launching its call among commercial banks. For more information on milestones, see: https://ec.europa.eu/economy_finance/recovery-and-resilience-scoreboard/index.html?lang=enhttps://ec.europa.eu/economy_finance/recovery-and-resilience-scoreboard/index.html?lang=en.

[11] It should be noted however that there are also forms of repayable grants, which are for example used in EU Cohesion Policy.

Source: European Commission (2015) Guidance for the Member States on Financial Instruments – Glossary and World Bank Group (2021) What you need to know about IFC's Green Bonds.

While considered private instruments, in the context of public funding programmes such as the RRF, financial instruments like the ones described above, are a form of public intervention. In general, public interventions are justified when they support investments that would otherwise not be undertaken because of their low viability, but which are considered to be in the wider public interest. Additionally, the private sector may be unwilling to carry out a certain project for reasons which do not relate to the viability of the project itself. This is the case when confidence in the overall performance of the economy is low. In such a scenario, a project may not successfully attract investment. In this regard, the RRF aims to stimulate investment after the COVID-19 crisis.

Concerning energy projects, a central issue is that projects in renewable energy, energy efficiency and energy infrastructure require large upfront investments which can complicate their commercial viability even under normal economic circumstances. In addition, projects in energy efficiency (and also smaller residential renewable energy projects) face the challenge of being very decentralised and split into many small projects. Given these barriers, energy efficiency and renewable energy are two of the sectors that can benefit the most from the use of publicly supported financial instruments[12]. Government funding is essential for the development of these sectors. Consequently, the role of financial instruments is only feasible when the investment is income-generating or cost-saving[13].

It might seem that financial instruments are not attractive for beneficiaries when there are grants available, but financial instruments have some advantages with respect to grants[14]:

- Financial instruments are more sustainable because funds are normally repaid, allowing the possibility of reinvestment;
- Similarly, financial instruments can make more cost-effective use of public funds partly because funds may be recycled, but also because of their potential to attract private funds. [15] In doing so, publicly backed financial instruments might also support the development of new private financial markets.
- Financial instruments can improve project quality since the obligation to repay can act as a performance incentive.

Publicly backed financial instruments generally are distributed through intermediaries such as national or European development and promotional banks, financial institutions as well as investment and business agencies. These institutions then manage the funds and further distribute them to commercial banks. A novel aspect of the RRF is the enhanced role it gives to such financial institutions.[16] When assessing the energy-related financial instruments within the RRPs, we found that four Member States (Bulgaria, Croatia, Greece and Romania) involved the European Investment Bank (EIB), the European Investment Fund (EIF) or the

[12] The Clean Energy Ministerial (CEM). High Upfront Costs, available at:https://www.cleanenergyministerial.org/resources-cesc/finance/barriers/high-upfront-costs/

[13] EPRC (2017) Improving the take-up and effectiveness of financial instruments, available at: https://ec.europa.eu/regional_policy/sources/docgener/studies/pdf/improve_effective_fei_en.pdf

[14] Faiña, A. et al. (2012), "Expert evaluation network delivering policy analysis on the performance of Cohesion Policy 2007-2013. Task 1: Financial engineering"

[15] In 2016, an evaluation of financial instruments in cohesion funding found however limited evidence of the capacity of public financial instruments to draw in private capital with many ESIF co-funded instruments using public capital alone (See: Whishblade, F. (2017) Improving the take-up and effectiveness of financial instrument). More recently, an uptake of financial instruments can however be observed under the EIF and InvestEU.

[16] A. Bartzokas, Giacon, R. and Macchiarelli, C. (2022) Exogenous Shocks and Proactive Resilience in the EU: The Case of the Recovery and Resilience Facility. Available at: https://www.lse.ac.uk/european-institute/Assets/Documents/LEQS-Discussion-Papers/EIQPaper177.pdf.

European Bank for Reconstruction and Development (EBRD) in their proposed financial instruments. Others mention also national development or investment banks.

Financial instruments in other EU programmes

Financial instruments relevant to the energy transition can be found in various EU programmes. For example, the European Regional Development Fund (ERDF) provides loans and guarantees for projects contributing to climate neutrality. Similarly, the Connecting Europe Facility (CEF), while mainly using grants, provides also guarantees, performance-based grants, co-financing structures and project bonds through CEF Energy to help project promoters to access the necessary financing for energy-related projects. Finally, the EIB also offers a full range of financial instruments. These are provided directly or through national development banks or private banks and include equity finance, mezzanine finance, and loans and guarantees. As such the EIB is also in charge of implementing 75% of the InvestEU programme, which brings together EU financial instruments, and the EIF, which supports SMEs

Source: Agora Energiewende (2022) Matching money with green ideas. A guide to the 2021–2027 EU budget.

4.1. Overview of the use of financial instruments for energy projects in the NRRPs

This section presents the results of our review of the financial instruments related to energy projects proposed in the NRRPs of the EU 27 Member States. Table 6 and Table 7 provide an overview of the number of financial instruments per Member State and energy category. Further details are provided in Annex A.

Table 6 shows that 8 out of 27 Member States had a total of 12 financial instruments to support energy projects.[17] Some of the planned instruments were created specifically for the NRRPs. However, some of them are based on existing or previous financial instruments. For 16 Member States[18], no financial instruments were identified, and several NRRPs mentioned financial instruments but did not specify them further (i.e., did not specify their RRF funding in case of mixed measures) or mentioned them as part of a reform. A list of unspecified instruments can be found in Annex A.

[17] It should be noted that the Commission Notice published after REPowerEU identified 15 RRPs that include a total of 53 financial instruments with a volume of EUR 22.4 billion (EUR 19.9 billion financed with RRF loans). This disparity is due to our research taking a more focused view and focusing only on funded instruments and those instruments that can clearly be associated with energy-related projects. See: Commission Notice (2022) Guidance on Recovery and Resilience Plans in the context of REPowerEU.

[18] The following Member States did not include any financial instruments in their NRRPs: Austria, Belgium, Czech Republic, Denmark, Finland, Hungary, Ireland, Italy, Latvia, Malta, Netherlands, Portugal, Slovakia, Slovenia, Spain and Sweden. The Czech NRRP mentions that part of the RRF funds could be implemented through voluntary financial instruments at the national level and that priority investments could receive strategic co-financing with loans and capital contributions from the EBRD. However, this does not constitute the creation of financial instruments under the RRF and was therefore disregarded.

Table 6. Number of financial instruments per Member State

Member State	Financial instruments	Description
BG	2	Two specified financial instruments under the Economic Transformation Programme are relevant to energy projects, Fund 2. Green Transition and Circular Economy, and Fund 3. Investment in Climate Neutrality and Digital Transformation. EUR 75 and 30 million of RRF funding has been dedicated to the financial instrument elements, guarantee and equity, of these funds.
EE	1	One financial instrument, Green Fund, is a green technology investment program. It consists of direct investment and investments through venture capital, and it is managed by a public company SmartCap. EUR 100 million of RRF funding has been dedicated to the financial instrument.
FR	1	One financial instrument that has EUR 250 million RRF funding allocated in, The Recovery Participatory Loans, provides loans and state guarantees to companies, to fund energy transition operations, for example. It is specifically tailored for the RRP.
DE	1	One concept for a pilot project for a financial instrument is to introduce carbon contracts for difference (CCfDs), dedicated EUR 550 million of RRF funding.
EL	1	One financial instrument, the RRP Loan Facility, makes use of different distribution channels (international financial institutions, commercial banks, Member State compartment of InvestEU) to provide corporate bond purchases or syndicated loans. As a broad instrument, it covers categories of energy efficiency in industry, renewable energy production as well as energy infrastructure.
LV	2	Two instruments, one for energy efficiency of multi-apartment buildings (loans and grants) and the other for increasing energy efficiency in business (loans and capital rebates). They are provided by state-owned development finance institution Altum and have been dedicated EUR 74.8 million and EUR 120.6 million from the RRF.
PL	1	One instrument, a fund providing equity, loans or combined investments, aims to support low- and zero-emission solutions in the field of sustainable mobility.
RO	3	All three financial instruments target energy efficiency in the industry (Portfolio guarantee for climate action and Fund funds for digitalisation, climate action) and for buildings (Financial instrument for investments in energy efficiency in the residential and buildings sector). Provided through the European Investment Bank and the European Bank for Reconstruction and Development. A portfolio guarantee for investments in energy efficiency and renewable energy is partly covered by InvestEU, and complementarity from InvestEU is possible for the Fund of funds for digitalisation, and climate action.
Total	**12**	

Note: In addition to the listed instruments, we observed 8 mentions of other financial instruments. Due to a lack of information and/or the early stage of developing these instruments, they were not included in the analysis. Annex A presents the full list of unspecified FIs.

Our analysis revealed that **financial instruments were most commonly used to support energy efficiency in industry**, both in terms of RRF funding and the number of instruments. These instruments were aimed in particular at providing guarantees or loans to companies to implement energy efficiency investments. Apart from financial instruments targeting energy

efficiency in industry, we found **two financial instruments targeting energy efficiency in buildings**. The cost savings generated by such energy efficiency projects enable the beneficiary to pay back the respective loan(s), which is a factor driving the use of financial instruments in this area. However, as experts pointed out in the workshop, the long repayment periods represent a challenge, often requiring co-financing and complementarity with grants to make these investments attractive for project promoters[19]. Furthermore, for energy efficiency in housing, one-stop shops are needed to simplify processes and make them accessible and reduce the lack of awareness of the benefits of investing in energy efficiency. Our review of NRRPs found several examples of investment or reform measures in Member States that aimed to set up such one-stop shops.[20] Other obstacles that have been highlighted include the decision-making process and financing for energy efficiency renovations in multi-apartment buildings and the limited capacity of financial intermediaries to provide financing based on the expected savings following the implementation of energy efficiency measures[21].

For renewable energy projects, we found evidence of only one specified financial instrument, which is a fund under the Bulgarian Economic Transformation Programme[22]. The underuse of financial instruments in the renewable energy sector has already been recognised in the literature. A study[23] conducted by the EIB on the use of financial instruments in Member States with the ERDF showed that the share of financial instruments in the renewable energy sector represents only 1.6% of all financial instruments implemented in five sectors which are deemed to have the potential for the ERDF. The reasons given are (i) the competition with grants and other subsidies available for renewable energy (and lack of possibilities to combine grants with financial instruments), (ii) the cumulation of state aid in this sector, and (iii) the fragmentation of resources across programmes and the unnecessary restriction in eligibility. In particular, the first and second reasons likely also apply to the underuse of financial instruments for renewable energy in the NRRPs.

The **low number of financial instruments for energy infrastructure and sustainable transport** can be attributed to the typically large size of projects in these areas and that they are often regulated assets. Due to these aspects, these projects are often carried out by public authorities or public companies and, thus, are typically funded directly by public money. The imperative role of local and public authorities in these projects presents further obstacles as they may experience insufficient access to technical assistance for the design and implementation of financial instruments. As public authorities face pressures to limit their deficits, the lack of technical assistance exacerbates the capacity of these authorities to encourage the private sector to fund certain investments via complex or advanced financing structures.[28] Projects in these areas are also often reliant on grants to facilitate their

[19] EIB (2020) The potential for investment in energy efficiency through financial instruments in the European Union. Available at: https://www.fi-compass.eu/sites/default/files/publications/energy-efficiency-model_0.pdf.

[20] For example, Bulgaria's NRRP includes a reform for a one-stop shop that aims to reduce the administrative burden (both for households and companies) by accompanying the renovation process through technical assistance and advice. Similarly, Cyprus' NRRP includes a reform to set up digital one-stop shops for RES projects permitting and for energy renovation in buildings.

[21] The EIB has published a model for a financial instrument with a grant component to support energy efficiency. This model provides an example of how the programming, design and implementation requirements can be applied to deliver market-oriented financial instruments to support energy efficiency projects. For more information, see: https://www.fi-compass.eu/sites/default/files/publications/energy-efficiency-model_0.pdf.

[22] It should be noted that there are also other financial instruments that cover renewable energy, such as the Estonian Green Fund and the Greek Loan Facility, however these cover multiple energy categories.

[23] EIB (2020) *Stocktaking study on financial instruments by sector. Progress to date, market needs and implications for financial instruments*, FI-Compass. Available at: https://www.fi-compass.eu/stocktaking-study-financial-instruments-sector.

implementation due to the non-bankable components of many projects. The availability of EU funded RRF grants which may cover 100% of project costs has therefore been also a more attractive choice than financial instruments. In addition, these types of projects are often also covered by TEN-E and TEN-T, and the funding is distributed through the Connecting Europe Facility (CEF) and may also be covered by InvestEU. It is, therefore, not surprising that the financial instruments we identified in these two areas target companies investing in their infrastructure. For example, in one case, the instrument supports companies investing in energy storage to complement the companies' investments in renewable energy sources[24]. Similarly, the one identified financial instrument for sustainable transport targets companies that want to invest in zero-emission mobility (and energy) solutions to establish new products.

There are **no financial instruments targeting hydrogen**, which can be attributed to the nature and maturity of the technology, as more mature technologies allow for more market-based financing, while less mature technologies often rely on grants.[25]

Our review of the NRRPs showed that **about EUR 5.99 billion of RRF funding was allocated to energy-related measures through specified financial instruments**. Compared to financial instruments in other EU funding instruments, this can be considered sizeable. For example, compared to the ERDF and Cohesion Fund for 2014-2020[26], where EUR 3.3 billion (EUR 275.9 million for renewable energy projects) was allocated in financial instruments, RRF funding is significantly higher. Nevertheless, due to the limited available information, the RRF allocations are not always specific to one financial instrument but rather measure-specific, which can skew the monetary amounts presented in Table 7, since some measures have several components with only one of them being a financial instrument relevant for energy projects. For example, some financial instruments are paired with grants under a specific RRF measure. Additionally, in some cases, the allocation of the financial instrument to energy projects is also not clear, as some instruments cover both energy-related projects and other types of projects and are not split by sector or subsector.

[24] However, there are also exceptions to this case as one financial instrument targets in particular large-scale infrastructure investments through equity financing. It focuses though on both energy storage and charging infrastructure and not on traditional energy transmission.

[25] EIB (2020) *Stocktaking study on financial instruments by sector. Progress to date, market needs and implications for financial instruments*, FI-Compass. Available at: https://www.fi-compass.eu/stocktaking-study-financial-instruments-sector.

[26] EUR 3.3 billion covers all the sectors in the funds; Renewable Energy; Urban Development and Transport; Environment; Information and Communications Technology (ICT) infrastructure; and Research, Development and Innovation in SMEs. See: EIB (2020) *Stocktaking study on financial instruments by sector. Progress to date, market needs and implications for financial instruments*, FI-Compass. Available at: https://www.fi-compass.eu/stocktaking-study-financial-instruments-sector.

Table 7. Overview of financial instruments per energy category

Energy category	No. of financial instruments (incl. those that cover multiple categories)	RRF funding, EUR million	No. of unspecified financial instruments* (incl. those that cover multiple categories)	Description of type of financial instruments
Energy efficiency in industry and other	6 (8)	2,819	2 (4)	One guarantee and two loan financial instruments as well as combination instruments of loan and equity, loan and capital rebate and one categorised as other (carbon contracts for difference). The two unspecified ones contain a loan and a combination of bond and guarantee.
Renewable energy production	1 (3)	2,285	0 (2)	A combination of equity and loan financial instruments. The unspecified one is a mix of loan and guarantee
Energy efficiency in buildings (renovation)	2 (2)	732.99	1 (1)	Includes a combination of guarantee and loan and a guarantee instrument. An unspecified instrument consists of an Energy Savings Contract, as well as plans for, e.g. capital rebate.
Energy infrastructure	2 (2)	475	0 (0)	An equity instrument and an instrument combining a loan facility and equity platform.
Sustainable transport	1 (1)	114	2 (2)	A combination of equity and loan financial instruments. The unspecified ones include a reform to update a guarantee financial instrument and one instrument that will be developed following a preparatory study.
Hydrogen	-	-	-	-
Multiple categories**	2	175	2	Includes a guarantee and an equity financial instrument. Unspecified instruments are a combination of loan and guarantee financial instruments as well as a reform to set up a national decarbonisation fund which will include a guarantee financial instrument.
Total	**15**	**5.992,40**		

*Note: The total is larger than the number of financial instruments identified earlier, due to some Member States proposing financial instruments that cover several energy categories. The total number of instruments covering an energy category, including the ones covering multiple categories, is in parentheses. *Unspecified financial instruments are financial instruments mentioned in reforms or those mentioned in investment measures as complementary, but without any indication of RRF funding. **Multiple categories include one Bulgarian and one Estonian financial instrument, which both cover Energy efficiency in industry and Renewable energy production.*

In terms of the type of financial instruments used, **we found that the most common types proposed in the NRRPs were loans (6), followed by guarantees (4) and equity (4)**. The remaining financial instruments were categorised as capital rebates (1)[27] or other (including Carbon Contracts for Difference). It should be noted that in several cases, measures within the NRRPs combined two or more types of financial instruments. In particular, these were combinations of loans with guarantees, equity or a capital rebate.

4.1.1. Rationales for the inclusion of financial instruments related to energy projects

In their NRRPs, Member States put various justifications forward for the inclusion of specific financial instruments. Often these start from **broader justifications for public intervention**, which would also apply to grants. These address, in particular, market failures, support economic recovery or target wider policy objectives related to the green transition, resilience and innovation. These more general rationales include issues such as the lack of liquidity of companies, lack of access to financing due to high commercial interest rates and lack of scale and small project sizes leading to high development and financing costs. Beyond these broader justifications, the level of reasoning provided also varies between the Member States, some provide much more detail, pointing towards specific examples of national issues (e.g., reports on access to finance in their economy, lack of private capital), while others stay at a higher level, highlighting common EU challenges (e.g. need for investments to green the economy) .

Based on the NRRPs and interviews with Member State representatives, we identified the following **five main rationales for including financial instruments in the NRRPs.** These reasons relate to our review of energy projects, but can also be applied more broadly:

1. To leverage public funding and attract additional resources;
2. To incentivise the development of private finance for the green transition;
3. To reduce the dependency on grants for adressing market failures; and
4. To speed up drafting and implementation of the NRRPs by reusing pre-existing and succesful instruments.;
5. To limit the long-term impact on the public deficit when relying on RRF loans.

Concerning the first rationale for **leveraging public funding,** Member States' representatives highlighted the ambition to attract additional resources, both public and private. In particular, proposed schemes foresee encouraging additional private investments in energy efficiency, renovation and renewables by providing guarantees, affordable loans or partial funding for eligible investment projects. These instruments target both industries but also private citizens when it comes to renovation. Some Member States specified particular expected multiplier effects (see also Section 4.2.1), however, in most cases, they remained vague.

In addition to leveraging public funding, some Member States **aimed to incentivise the development of private finance** supporting the green transition. This relates to the challenge of finding financing for companies and, in particular small and medium-sized enterprises (SMEs), which was noted by Member States such as Bulgaria, France and Romania as a

[27] Also, Bulgaria plans to introduce a capital rebate in its program to improve energy efficiency in the housing stock, where owners would receive a loan which would be turned into a partial grant once performance indicators are met. However, this is only in planning according to a Member State representative. In our analysis, the measure is categorised as an unspecified one as it is unclear how much (if any) of the RRF funding would be allocated to this.

reason for proposing a financial instrument. In particular, Romania noted that the COVID-19 pandemic led to a reduction in the financial supply as financial intermediaries became more selective in their lending activities. The types of financial instruments addressing the lack of available financing were diverse; however, in many cases they included guarantees. The lack of private financing for energy projects is often related to the nature of energy projects, which often have a long duration, high risk and high investment needs, or are decentralised, such as residential and industrial energy efficiency projects. For that reason, some Member States (France and Latvia) proposed to make financing available particularly for longer-term investment[28]. Greece and Romania also mentioned the challenge for building owners to stem the high upfront costs combined with long return on investment periods of renovation work and the issue of energy poverty.

Another issue that was reported in the interviews as a reason for introducing financial instruments is the **dependency on grant funding,** with beneficiaries preferring to delay investments pending the availability of grants. In particular, it was noted that there is a low awareness of financial institutions on the investments in energy efficiency, which, combined with the fragmentation of markets (especially for renovation in the residential sector), leads to a preference towards grants. Therefore, some financial instruments, specifically those combined with grants, were introduced to help their economy to move away from grant funding to private financing.

The fourth reason we found is a rather practical one. Member States that included financial instruments in their NRRPs often built on existing instruments or used blueprints of previous ones that worked well. One of the common rationales was the possibility to **build on or reuse pre-existing instruments**, which made it easier to include them in the new plans. For example, the Latvian RRP introduced a tool combining guarantees, loans and grants to improve the energy efficiency of multi-apartment buildings, which was based on previously used instruments under structural funds.

Finally, one reason that is less transversal, but applies to RFF funding from the loan compartment is the aim **to limit impacts on public deficits**. Especially for Member States such as Greece, Poland and Romania which also rely on RRF loans, financial instruments are more attractive as they are repayable forms of financing. This allows later recylcing or reuse of the funds for the same policy purpose, which reduces the long-term impacts on public deficits and thereby supports fiscal sustainability.

4.1.2. Rationales for the exclusion of financial instruments related to energy projects

Since a large number of Member States (19 out of 27[29]) did not include any financial instruments for energy projects to-date, we also investigated through interviews with Member State representative, the reasons for not including financial instruments. In comparison with the reasons for including financial instruments, the ones for excluding them are mainly practical. In particular, we found the following five reasons:

1. no obligation in the RRF legislation to use financial instruments;

[28] For example, in France, the Participatory Recovery Loan (PPR) should support the financial solidity of companies by providing long-term financing that fits into the financing structure between equity and debt. Similar, Romania in its reasoning for including financial instruments highlights a 2020 EIB investment survey that showed that 12 % of Romanian firms can be considered financially constrained with collateral requirements posing one of the largest challenges.

[29] Considering also unspecified financial instruments (i.e. those mentioned in reforms or as complementary measures in investment without specifying any amounts), the number of Member States without financial instruments decreases to 16.

2. lack of time to create and set up new financial instruments, therefore not fitting the timeframe of the preparation of the RRPs;
3. limited awareness of guidance available to Member States on developing, including or reusing financial instruments in their NRRPs;
4. lack of existing private finance markets to tap into with financial instruments; and
5. concerns about duplication as financial instruments already existed in other funds or through other initiatives.

The main reason for Member States not including financial instruments is the simple fact that financial instruments were not envisaged as a mandatory delivery mechanism under the RRF. This led to many Member States preferring grants over financial instruments in disbursing their RRF funding. Grants are also more familiar to Member States and convenient for potential recipients. In interviews, some Member States indicated that grants and other forms of subsidies are simpler to implement and manage[30]. They are also preferred by beneficiaries, which was also confirmed by an expert who argued that there is a clear preference for grants if both options are available. Therefore, since there was **no obligation to include financial instruments** in the NRRPs[31], many Member States found it more convenient to stick to grants in their measures.

A second reason identified is that the timeframe for creating NRRPs was relatively short, and thus **lack of time to set up (and implement) new financial instruments** were mentioned as an obstacle for financial instruments in the NRRP. Financial instruments are generally seen as more long-term instruments. One expert explained that with financial instruments, a layer of complexity is added as one can award a trusted entity, such as a national development bank, with the funding, but that entity has then to go through a financial intermediary, who then would still need to issue the instruments and make risk calculations. This increases the administrative burden and time needed compared to grants. Therefore, they were not seen as fitting the timeframe of the preparation of the NRRPs and simplicity is preferred when fast results are needed. Two Member State representatives also were worried about the rather strict targets under the RRF with their biannual milestones, which make financial instruments in their implementation even more risky compared to grants.

Building on the lack of obligation and limited time available, considering that the RRF offers 100% financing for its grants, there are also **no real incentives for Member States to recycle the funding** or include private financing. As stated above, this does not apply to the loan compartment of the RRF and we, therefore, see also that the few Member States that decided to make use of their loan compartment were keener to include financial instruments (e.g., Poland, Romania and Greece). Additionally, compared to other EU funding programmes, **Member States did not receive extensive formal guidance for introducing financial instruments**[32], even though the updated guidelines following REPowerEU provided more

[30] For example, regarding private renovations to improve energy efficiency, grants are seen as a more efficient option to incentivise renovations due to the simplicity of the process compared to loans. However, Latvia's RRP includes a financial instrument combining guarantees, loans and grants for private renovations. It is based on private banks' reluctance to finance renovations of apartments owned by private people or associations.

[31] In the original guidance document provided by the European Commission, the Commission suggested their use while also cautioning Member States to rely on existing structures as the timeline of the RRF will make it difficult to develop new structures. It should be noted however, that additional guidance was provided informally by the Commission during the negotiations on the NRRPs.

[32] While the original guidance document provides one page of information on financial instruments, this mainly focused on operational aspects, i.e. type of financial instruments, the information which would need to be included in the NRRP, how to make use of the Member State compartment of InvestEU, while it does not provide any further guidance on the set-up and implementation of financial instruments nor any good practices. For more information, see European Commission (2021) Guidance To Member States Recovery And Resilience Plans, SWD(2021) 12 final Part 1/2.

details including also reasons and benefits of including financial instruments as well as examples of the types of financial instruments already included. It also makes specific suggestions for the type of financial instruments that could be included (i.e. guarantee instruments to de-risk energy efficiency renovation schemes, public-private partnerships for renewable energy sources investments, and equity investments in companies or equity funds supporting the green transition) which is recommendable[33].

Moreover, the **lack of existing private finance markets** to tap into financial instruments was observed as one of the obstacles to establishing new instruments under the NRRPs. For example, a representative from one Member State mentioned that financial instruments were considered not to be beneficial in the energy sector due to the immaturity of capital and venture capital markets. Another one explained that a past financial instrument had failed due to the lack of private capital. This was also confirmed by one expert during the validation workshop who argued that it is not possible to leverage private investments as capital markets in some less advanced economies are much shallower than in other Member States.

Finally, in some countries, **financial instruments already exist in other funds or measures**, outside of the NRRP, for example, in Structural Funds and Cohesion Funds, and separate green bonds in Denmark. Setting up new instruments with similar objectives would have overlapped with the other existing instruments, and in the short timeframe, it was difficult to assess complementarity and the need for additional ones.

4.2. Expected multiplier, complementarity and substitution effects of financial instruments

As part of our analysis of the financial instruments, we analysed the expected multiplier effect of public funding for energy measures as well as the complementarity or substitution between RRF funding and other sources of funding for energy projects both at the national and EU level. There is a limited number of financial instruments included in the RRF, thus, it is not possible to draw conclusions about the multiplier, complementarity and substitution effect across the EU27; however, we can provide insights on possible trends.

4.2.1. Multiplier effect

The aim of analysing the **multiplier effect** is to see if financial instruments in the NRRPs can lead to higher national income and consumption, that is to say, multiply the initial amount used in a financial instrument and generate positive economic effects. In the context of energy-related measures, it is possible, for example, that an instrument providing additional funding to companies attracts additional private funding. Many of the Member States do expect their instruments to encourage additional investments in energy-related projects. For example, Estonia's Green Fund which targets green technology companies aims to contribute to raising additional private capital and thereby increase the supply of capital in the field of green technologies.

Some countries provided more detailed estimations of the multiplier effects of their instruments. Bulgaria expects multiplier effects of three times for one of its energy-related funds under the Economic Transformation Programme, an expectation they confirmed in an initial evaluation by the EIF, and two times for the other fund. The minimum estimate for the

[33] The Annex of the REPower EU guidance provides additional information on the use of financial instruments under the RRF, based on the experience gathered with the preparation and implementation of the initial RRPs. For more information, see Commission Notice, Guidance on Recovery and Resilience Plans in the context of REPowerEU, available at: https://commission.europa.eu/system/files/2022-05/c_2022_3300_1_en_0.pdf.

added value of the Romanian Portfolio guarantee for climate action is four times the initial amount. However, Romania's RRP specifies that the exact amount would be determined by the operational agreements to be signed. The rationale for the Greek Loan Facility highlights a large investment gap currently in Greece, which implies that there is a significant pool of mature private investments leading to significant positive long-term multiplier effects without specifying the expected multiplier effect. In its key principles, it is specified that RRF loans under the facility will be leveraged with third-party financing at a minimum level of 50%, including own equity and loans by commercial banks. Moreover, France estimated that its Recovery Participatory Loans could mobilise up to EUR 20 billion of additional funding. It would make the expected multiplier effect of the initial RRF funding of EUR 250 million rather ambitious.

Based on the limited information available in the NRRPs, we concluded that **several financial instruments are expected to have a multiplier effect**. However, it is noteworthy that these numbers and expectations have been presented by Member States, and since the instruments have not been fully implemented, there is limited **data to estimate their final value.** Hence, at this stage, it is difficult to prove the accuracy of the expected multiplier effects.

4.2.2. Complementarity and substitution

Additionality and complementarity with other EU programmes and instruments have been enshrined as key principles in the RRF regulation[34]. However, academic work[35] highlights past issues in the deployment of financial instruments under the European Structural and Investment Funds (ESIF) related to the lack of well-timed implementation, a limited project upstream capacity and substitution for national funding. Considering this aspect as well as the creation of the RRF in a short time-frame to address the COVID-19 related economic crisis, it is crucial to review wether there are any risks in regard to not-adhering to these principles. When analysing the complementarity and substitution effect for RRF for energy projects we analysed multiple angles of complementarity and substitution, namely between:

- RRF funding and use of financial instruments (outside of the RRF);
- Financial instruments included in the RRPs and other funding sources;
- Financial instruments included in the RRPs and InvestEU.

Regarding the **complementarity for energy-related financial instruments between the RRF and other private funding** or the development of financial instruments outside the RRF, the evidence we found was conflicting and could not be substantiated. Stakeholder feedback indicated that there were financial instruments in the pipeline, but their development was stopped once the RRF came about. This would indicate that there has been a substitution effect and the RRF led to decreased private-sector spending. In contrast, however, some Member States authorities shared their expectations that the publicly supported financial instruments could address investment gaps for various types of investments including energy-related projects in their economies caused by economic uncertainties and thereby unlock private investments that are currently withheld. In line with this, it is likely that these financial instruments were simply put on hold due to the unprecedented economic situation caused by

[34] See Art. 9, which states that "*support under the Facility shall be additional to the support provided under other Union programmes and instruments. Reforms and investment projects may receive support from other Union programmes and instruments provided that such support does not cover the same cost*", Regulation (EU) 2021/241.

[35] A. Bartzokas, Giacon, R. and Macchiarelli, C. (2022) Exogenous Shocks and Proactive Resilience in the EU: The Case of the Recovery and Resilience Facility. Available at: https://www.lse.ac.uk/european-institute/Assets/Documents/LEQS-Discussion-Papers/EIQPaper177.pdf.

the pandemic and naturally public support measures (including publicly backed financial instruments) filled the gap.

There is also **conflicting evidence on the complementarity between financial instruments included in the RRPs and other funding sources**. For instance, Bulgaria highlighted complementarity to the ERDF, while Estonia and Latvia highlighted complementarity to private investors and private banks. Some of the Member States, such as France and Bulgaria, used financial instruments to complement grant schemes. In Greece, loans provided by the state should cover a maximum of 50% of the investment costs, with the financial institutions' participation at a minimum of 30%, and debtor participation amounting to at least 20%. regards to coherence, Member States indicated in their NRRPs the use of other EU funds; for example, Romania indicated alignment with ESIF. While the literature highlights the possible synergies between RRF and Cohesion Policy given some common themes and the potential of the RRF to make use of the well-established structures of Cohesion Policy, it also cautions against possible risks. In particular, RRF investments could substitute Cohesion Policy programmes considering their lower administrative burden and higher priority combined with the limited absorption capacity in Member States. Already, there have been delays in the launch and implementation of the 2021-27 Cohesion Policy programmes indicating limited administrative capacity to absorp all of the available funds. However, further analysis is needed to explore the complementarities between the two policies.[36] Furthermore, as indicated in Section 4.1, there is a need for better complementarity between grants and financial instruments for energy projects, especially regarding energy efficiency to ensure the investments are attractive to project promoters.

Finally, while some Member States did not indicate the use of InvestEU and preferred loans from the private market or national funding as these are easier to access, there are some indications of **complementarity between financial instruments included in the RRF for energy projects and InvestEU**. Some Member States indicated that InvestEU will be used to complement measures and financial instruments. For example, the Greek NRRP indicates that Invest EU will be used to complement the loan facility for energy efficiency and demonstration projects in SMEs or larger enterprises; Romania, in its financial instrument for investments in energy efficiency in the residential and buildings sector, indicated that it would include an uncapped portfolio guarantee, partially covered by the InvestEU Romania compartment. Other Member States, which included financial instruments indicated that complementarity with InvestEU is possible, but it is not clear yet whether this will be realised.

4.3. Findings on obstacles and good practices for energy-related financial instruments

In addition to the review of the multiplier, complementarity and substitution effects; the analysis of financial instruments in the NRRPs identified potential obstacles, good practices and lessons learned, namely:

- **Key obstacles:** Factors that hinder the complementarity between RRP measures and alternative financing solutions, as well as the uptake of financial instruments;
- **Good practices:** enabling factors that favour complementarity between RRP measures and alternative financing solutions, as well as the uptake of financial instruments.

[36] J. Barbero, A. Conte, et al. (2022) The impact of the recovery fund on EU regions: a spatial general equilibrium analysis, Regional Studies.

4.3.1. Obstacles

According to the research conducted by the EIB, the main obstacle during the implementation of financial instruments, vis-à-vis the ERDF programme, was related to difficulties in integrating financial instruments into the current environment of grants. Here, the main issues were the[37]:

- insufficient political support;
- lack of market sponsoring; and
- administrative complexity.

From our assessment of the NRRPs and in particular the interviews with Member State representatives, we can conclude that these issues likely also apply to the implementation of the NRRPs and energy projects. The rationales for not including financial instruments described earlier, showcase issues such as a lack of existing private capital markets to tap into[38], a lack of time to create and set up new financial instruments, as well as concerns about duplication risks of already existing financial instruments in other funds. These point to both a **potential lack of market sponsoring** and **administrative complexity** being critical obstacles when implementing the financial instruments and ensuring their complementarity with existing financial instruments and other measures.

Member States that included financial instruments in their NRRPs also highlighted similar challenges. Two Member States highlighted that different ministries were contributing to the NRRPs and for implementation, there are also different ministries involved, which again will have to coordinate with each other, but also with the units involved in implementing other EU and national programmes. In one case, **a lack of political will** due to the absence of a government and upcoming elections was also mentioned as the key cause leading to delays in the signatures of financing agreements with EU institutions. One Member State also remarked on the issue of dealing with several funds, each with its own smaller projects, which require much coordination and thereby complicate ensuring complementarity[39].

A potential obstacle could also be that a majority of the implemented financial instruments are delivered via long-term loans or guarantees. The use of such long-term financial instruments typically targets leveraging investments from the private sector by de-risking investments and offering more flexibility in the investment project design and duration. The operationalisation of such long-term-oriented financial instruments is, however, constrained by the **limited duration of the RRF**.

Another obstacle in implementing financial instruments that were pointed out in our consultation with experts is a **lack of awareness and ownership among the public and stakeholders** caused by a lack of their involvement in many countries. In contrast, however, the literature also points towards the uniqueness of the RRF of creating ownership, by asking national authorities to design and implement their national plans.[40] Nevertheless, continued public involvement in the management of the RRF spending and transparency will be crucial

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[37] EIB (2020) *Stocktaking study on financial instruments by sector. Progress to date, market needs and implications for financial instruments*, FI-Compass. Available at: https://www.fi-compass.eu/stocktaking-study-financial-instruments-sector.

[38] For example, one Member State pointed out in their interview that a past financial instrument was not successful because the private financing was difficult to obtain, which was one of the reasons for them not to consider financial instruments.

[39] For this reason, to ensure complementarity, one Member State opted to prioritise and strengthen existing measures and not propose any new financial instruments.

[40] A. Bartzokas, Giacon, R. and Macchiarelli, C. (2022) Exogenous Shocks and Proactive Resilience in the EU: The Case of the Recovery and Resilience Facility. Available at: https://www.lse.ac.uk/european-institute/Assets/Documents/LEQS-Discussion-Papers/EIQPaper177.pdf.

to increase efficiency and awareness, which would also help with the uptake of financial instruments.

Strict eligibility criteria can also be an obstacle to the success of a financial instrument after it has been implemented. This was reported in the case of a pre-existing green loan scheme targeting micro-enterprises and SMEs, which has a minimum loan requirement of EUR 50,000 and a maximum of EUR 1,000,000 and must be complemented with company equity of the same amount. Such characteristics, however, limit the possibilities of integrating this financial instrument in different settings, sectors or energy and depend on the access of companies to private financing. The instruments are managed by a public investment bank and several commercial investment banks. It has, however, seen limited use.

Apart from these obstacles caused by the time limitation of the RRF, it was, however, also pointed out by two Member State representatives that the shorter-term character of the NRRP measures could be beneficial, as many of the measures will be implemented earlier. This **could help bridge the gap between the programming periods** of the longer-running programmes under cohesion and structural funds. Others also remarked that simply the fact of their ministries both being responsible for ERDF and RRF programmes, helps with complementarity.

4.3.2. Good practices and lessons learned

It is difficult to identify good practices and lessons learned at this stage, considering that many of the measures under the NRRPs are only being rolled out now and that in particular financial instruments take longer to set up. In many cases, it remains to be seen whether the financial instruments work as intended and how well they complement other existing instruments. One Member State when asked about good practices they follow, remarked that they expect to draw lessons from their first call to be launched under one of their NRRP's financial instruments. Nevertheless, based on their description and our exchanges with Member States' representatives, we can draw some lessons regarding the design of financial instruments. These are presented in the following paragraphs and complemented with findings from an assessment of financial instruments in other EU programmes.

The good practices that we identified can be summarised as follows:

- setting up a **central platform or one-stop shop** to ensure coordination and complementarity between different programmes;
- use of **technical assistance and advisory service both for Member States** to build structures supporting the design and implementation of financial instruments, and for beneficiaries to ensure the success of projects;
- **knowledge sharing and use of blueprints** of successful financial instruments from past programming periods or developed by EU institutions and other Member States;
- **partnering with experienced financial institutions** for the implementation of financial instruments;

- the **perfomance-based nature of the RRF** with the introduction of milestones and targets linked to the release of funds, which facilitates monitoring of progress and creates additional incentives for timely implementation[41].

One Member State representative highlighted the issue of dealing with a myriad of different measures in the form of both grants and financial instruments. To address this, they are **developing an investment platform as a one-stop shop** for financial instruments and grants in the area of energy efficiency. This is complemented by a proposed reform to set up a national fund to better integrate existing funds in the field. This not only improves complementarity but also transparency and ease of access for potential beneficiaries, which would support addressing the issues of a lack of awareness and ownership. Experts in our validation workshop confirmed that the centralisation of government assistance is key as it supports capacity building and the provision of external support.

The above-described platform is being set up with the help of a **technical assistance project** provided through the Technical Support Instrument of DG REFORM. The need for technical assistance to build capacity for preparing quality projects on both national and local levels was also pointed out by experts in our validation workshop. Such technical support was also recommended to complement the funding provided to the beneficiaries. A stocktaking study by the EIB[42] also identified technical assistance as key to developing capacities both for public authorities and project promoters, as these can (i) increase the level of understanding of the pre-requisites needed for both financial instruments to be successful but also for projects to be capable of receiving of a financial instrument support; (ii) raise awareness about existing publicly-supported financing; (iii) address complexities within individual projects accelerating investment readiness; and (iv) support reaching the project maturity required by investors and develop investment-ready business models.

A few Member States also explained that they were able to build on **blueprints from pre-existing financial instruments**. In particular, some of the Ministries involved in designing the NRRP referred to their experience working with similar instruments under ESIF and other programmes. Reusing existing instruments and building similar structures also ensures familiarity of commercial banks with the processes of an instrument supporting its uptake. In another case, a Member State added a financial instrument supporting large infrastructure projects, which is a new measure for them, but which has been designed by the EIF in 2021 and will be rolled out also in other Member States. The transfer of knowledge gathered during the implementation of a financial instrument between Member States (and within Member States) can offer valuable insights, and it is considered good practice to take advantage of experience accumulated within a Member State and to adapt it to one's needs[43].

Linked to the use of blueprints of financial instruments, Member States authorities also referred to **partnering with European or national financial institutions**. For example, some Member States involve the EIB to support them in creating and setting up the financial instrument (e.g. selecting financial intermediaries and managing the funds), which can then also be paired with advisory support from the EIB. Another Member State authority referred to a national development and finance institution, which would support in managing the funds. Involving

[41] This good practice does not only apply to financial instruments, but to the funding programmes as a whole. It nevertheless should be mentioned here as in particular financial instruments can be time consuming to implement and difficult to monitor in their roll-out as they involve intermediary organisations. Therefore, the milestones can be particularly beneficial for financial instruments.

[42] EIB (2020) *Stocktaking study on financial instruments by sector. Progress to date, market needs and implications for financial instruments*, FI-Compass. Available at: https://www.fi-compass.eu/stocktaking-study-financial-instruments-sector.

[43] Ibid.

such institutions allows Member State authorities to free up capacity and rely on their accumulated expertise.

Implementing the RRPs: A first view on good practices

A good example of the **involvement of European financial institutions is the Greek Loan Facility**. In its key principle, it was outlined that the involvement of multilateral organisations to manage the RRF loans and co-finance shall be substantial. The facility signed operational agreements with the EBRD and the EIB with the former agreeing to manage up to EUR 500 million and the latter EUR 5 billion. In addition, following a tender, six Greek commercial banks were selected as implementing partners. In particular, the implementation of the components managed by the EBRD has received active interest from the private sector. The successful execution of these transactions by European financial institutions with loans providing much-needed investment is believed to have a strong signalling effect among the private sector and corporate finance. Similarly, Romania involved the EIB in its 'Fund of funds for digitalisation, climate action and other areas of interest' and the EBRD in the 'Financial instrument for investments in energy efficiency in residential and buildings sector'.

Regarding **knowledge sharing, the French Springboard for the ecological transition** was introduced in the French RRP and implemented by the French Agency for the Ecological Transition (ADEME) and has reportedly experienced considerable success in reaching many SMEs active in various sectors and regions. According to a consulted stakeholder, this success resulted from the broad range of eligibility criteria and the avoidance of competition for the subsidy, which often results in long discussions and lengthy application processes. While being a grant-based measure and not a financial instrument per se, this example highlights how knowledge is already being shared among Member States, since it was reported in our interviews that public authorities from other Member States had approached ADEME to consult on its design and implementation strategy to increase their understanding and possibly replicate, to an extent, the measure's framework.

Finally, regarding the **use of technical assistance** to complement the setting-up of financial instruments and the development of **one-stop-shops**, the Bulgarian RRP built on an existing project under the Technical Support Instrument which is mapping existing funds available in Bulgaria to create an investment platform as a one-stop-shop. Bulgarian financial instruments specified under the Economic Transformation Programme will be able to benefit from this structure and the proposed reform to establish a National Decarbonisation Fund. Regarding **coordination across different EU funds**, Bulgaria also had a good experience with the Fund Manager of Financial Instruments in Bulgaria (FMFIB), a Holding Fund that manages EU shared management resources through 13 different financial instruments on behalf of five Bulgarian managing authorities and which is a case study on the FI-Compass.

Source: Based on Member State interviews; A. Bartzokas, Giacon, R. and Macchiarelli, C. (2022); and EIB (2021).

4.4. Conclusions

A majority of Member States opted to fully rely on grant-based measures for energy projects and only eight Member States specified energy-related financial instruments within their NRRPs. Based on this, one could conclude that the RRF did not lead to the increased use of financial instruments in the energy sector. However, one should consider that financial instruments were not mandatory as a delivery mechanism under the RRF. In addition, limited time, administrative burden and the fact that the RRF grants offer 100% financing and do not require any national co-financing, also reduce incentives for Member States to include financial instruments. **Despite these factors, the RRF led to the uptake of some financial**

instruments, which implies that there was at least some positive impact on the use of financial instruments. In addition, we see in particular a few large financial instruments in energy efficiency, where much investment is needed. Nevertheless, **there could have been scope for further development of financial instruments in the energy sector**. Considering the updated guidance with REPowerEU including a further focus on financial instruments and the ability for Member States to apply for RRF loans until 31 August 2023, there is still the opportunity for more financial instruments for energy projects to be developed. In particular, in combination with RRF loans financial instruments are more attractive as the funding is repaid and can be recylced thereby reducing the impact on public deficits.

Taking a closer look at the types of financial instruments for energy-related measures, we find that **the majority focused on energy efficiency in the industry followed by energy efficiency in buildings**. In comparison, other types of energy-related projects received not much attention, likely due to reasons such as the maturity of the technology (hydrogen), oversaturation with grants and state aids (renewable energy), and the large-scale and often public nature of these projects (energy infrastructure and sustainable transport) among other reasons.

The reasons for not including financial instruments in some Member States to-date were mostly practical. They include the argument that they were not obligatory and that there was limited formal guidance on including them, the lack of time to create and implement them, the lack of existing private finance to tap into, and concerns about duplicating existing financial instruments. In contrast, apart from the reason for reusing pre-existing financial instruments, the reasons for including financial instruments were less practical and included the possibility to leverage public funds, incentivise the development of private finance, and reduce grant dependency on their economy.

Regarding multiplier effects, there is limited information available, but in general, Member States expect their financial instruments **to have a multiplier effect**. However, the expected effect varies across Member States and in most cases is not specified at all or left to assessment once the financial instrument will be set up.

It was pointed out that many measures/financial instruments had already been part of national plans, however, it is not clear whether there had been national funding for them and if so, how the unprecedented situation of the pandemic affected this funding. Considering also the unique economic situation, there are indications that the RRF measures and financial instruments will unlock private investments and close the investment gap. There is inconclusive evidence of **complementarity between some financial instruments included in the RRPs and other funding sources** with some literature pointing towards the challenge of coordinating the different funding streams and ensuring absorption by public authorities. However further specific research on the complementarity with other EU funds is required.

Potential obstacles to the implementation of the financial instruments and their complementarity with other measures related **to insufficient political support, lack of market sponsoring, administrative complexity, and lack of awareness and ownership**. In particular, issues of coordinating between different funds, ministries and with other government levels (EU, regional) and the ensuing complexity in light of the short timeframe, seems to be a key obstacle. Furthermore, the issue of a lack of private capital markets and the competition for limited financial resources has also been brought up, specifically in Member States with less advanced economies. Political support can become an issue when governments and therefore, priorities change.

To overcome these potential obstacles, several **good practices** were identified in our assessment. These include ensuring coordination, transparency and complementarity of funding through a central investment platform; the use of **technical assistance to support** the design and implementation of financial instruments as well as project promoters; sharing

knowledge and reusing pre-existing financial instruments, and involving experienced financial institutions such as the EIB or EBRD.

5. Discussion and policy recommendations

Based on the evidence collected, analyses presented, and conclusions drawn, this chapter presents the policy recommendations that we developed to support investments in the energy sector in the framework of the RRF. Specifically, the recommendations aim to suggest measures to assess the impact of the RRF on achieving energy targets, and measures that could highlight what complementary measures could be implemented to ensure a strong and long-lasting positive impact of the energy projects within the NRRPs.

In addition, this chapter reflects on issues that emerged during the development of this study which warrant further investigation. The last section, therefore, presents some ideas on potential avenues for future research on the topic.

5.1. Presentation of policy recommendations

Before presenting the policy recommendations elaborated in the development of this study, it is important to note that these recommendations reflect the state of play of the RRF in November 2022. At the time of writing, the implementation of NRRPs is still in its early stage. Therefore, a more structured assessment of impacts once the RRF has been fully implemented could provide more details and recommendations on shortcomings to address in future policymaking.

Our proposed policy recommendations are grouped around two topics. These are:

- Measures to assess the impact of the RRF on achieving energy targets;
- Complementary measures to ensure a long-lasting effect of the RRF.

The next sections present our policy recommendations across these topics. We first present the key findings of the study, followed by the recommendation to address them.

Assessing the impact of the RRF on achieving energy targets

Key finding 1: At this juncture, it is **difficult to quantify the expected impact** of energy measures within the NRRPs on GHG emissions. While some Member States included estimates in their NRRPs on how measures would reduce for example CO2 emissions, not all have done it at a similar level of detail.[44] It was required for 37% of funding to be allocated to climate spending, which was checked at the Member State level by following the Climate Tracking Methodology outlined in Annex VI of the RRF Regulation. However, this assessment does not entail an estimate of the contributions to climate targets.

Due to the different levels of detail and methodologies chosen at the stage of drafting the NRRPs, a commonly agreed methodology is needed to assess the expected impacts. Such common indicators are part of the recovery and resilience scoreboard in Regulation (EU) 2021/2106, which also includes the requirement for regular reporting under the European Semester[45]. The following three indicators are of particular interest in supporting the clean energy transition:

[44] Germany for one used a traffic light system based on a qualitative assessment and only provided for a few measures numbers on expected GHG emission reduction, while Bulgaria and France have done more detailed assessments.

[45] All Member States are required to report to the Commission twice a year in the context of the European Semester on the progress made in the achievement of their RRPs, including the operational arrangements, and on the common indicators.

- savings in annual primary energy consumption;
- additional operational capacity installed for renewable energy; and
- alternative fuels infrastructure (refuelling/recharging points).

Further to these indicators and reporting requirements, Member States are already required to report every two years – following a progress reporting template – on the progress in regards to their NECP targets. Considering our finding on a lack of comparability between the measures outlined in the NRRPs and their expected impacts with the measures and targets included in the NECPs, we believe further analysis can be carried out by **better using the existing reporting requirements and applying a common methodology to assess energy impacts**.

Recommendation 1

- To address the different levels of detail and methodologies chosen at the stage of drafting the NRRPs, the European Commission should **develop a simple methodology for assessing the GHG emission reductions related to investment measures** in terms of their savings in annual primary energy consumption, additional renewable energy capacity and alternative fuels infrastructure installed. This could be done using the existing common indicators. The methodology should differentiate between different types of investments (e.g. additional renewable energy sources, energy efficiency in buildings and industry)[46] and allow to derive estimates for GHG reductions of measures. Considerations should also be made in case measures could lead to additional energy consumption (e.g. for measures in the domain of hydrogen or electromobility).
- To avoid doubling efforts between reporting requirements for the NECP and the European Semester, the **European Commission reviewed its NECP progress report template to assess if it properly incorporates the RRF (and REPowerEU) as a funding source.** RRF is now being included in progress reporting as one of the available funding sources. While this review is valuable and streamlines reporting, NECP reporting could further reflect on the contribution to reducing GHG emissions of individual NRRPs' measures.

Objective

- The aim is to arrive at a clearer understanding of how current RRF measures contribute to the energy targets of Member States and complement other existing (and planned) measures. Such an analysis would allow the Member States and the European Commission to better assess the contribution of the NRRPs to the overall EU energy (and climate) targets for 2030 and 2050. While the integration of RRF as a funding source is underway in NECP reporting, creating a clearer link between the measures funded by such a facility and their contribution to GHG reduction would be a valuable addition.

[46] For example, for its Cohesion Policy, the European Commission provided guidance on financial tracking of investments with climate impact, see: https://cohesiondata.ec.europa.eu/stories/s/Tracking-climate-related-investments/a8jn-38y8.

Complementary measures to ensure a long-lasting effect of the RRF

Key finding 2: Member States largely relied on grants as opposed to financial instruments for energy projects in the NRRPs to quickly reach beneficiaries and foster the uptake of measures. There are multiple reasons for this decision. First, financial instruments were not required by the RRF Regulation. Second, **grants were more attractive options** due to the lack of time in preparing the plans, the short timeframe for implementing the NRRPs, and their simplicity compared to setting up new financial instruments. The latter is probably the most significant reason, as setting up new ones is further complicated by the lack of existing financial instruments to be used as blueprints. Finally, the lack of financial instruments is partly explained by the specific nature of certain energy projects (i.e. large energy infrastructure and sustainable transport projects are carried out by public authorities and thus are typically funded directly by public money or that more mature technologies allow for more market-based financing, while less mature technologies often rely on grants as is the case for hydrogen).

Recommendation 2

- The Commission could further strengthen its guidance to the Member States in designing financial instruments[47] for different types of energy projects, taking into account their specific nature e.g. in terms of maturity. To this end, it could raise awareness of the available support, e.g. via the Technical Support Instrument, and develop a report on the financial instruments successfully implemented across NRRPs with steps to replicate them. This could be incorporated with or used to complement existing guidance prepared by the EIB under the fi-compass.
- In particular, considering the possibilities of complementing public funding with private finance and reusing money after repayment through financial instruments, the European Commission could – to the extent possible, given the specific nature of certain energy projects – encourage Member States with sufficiently developed private financial markets to make use of their currently underused loan compartments to set up new financial instruments. This could also allow Member States that had their RRF allocation reduced due to updated economic indicators to find ways to finance RRF measures they would otherwise not be able to fund. The guidance and possible replicable blueprints of financial instruments mentioned above could help Member States in setting these up more easily.

Objective

- This recommendation aims at developing financial instruments for energy projects to boost private financial participation. This will help ensure a long-lasting impact on the RRF after its funding channel runs out as money can be reinvested after repayment.

[47] See for example recent publications from the FI-Compass on financial instruments for energy efficiency in buildings: https://ec.europa.eu/regional_policy/en/newsroom/news/2022/06/21-06-2022-commission-and-eib-launch-two-new-blueprints-for-repowereu-and-new-european-bauhaus-financial-instruments.

5.2. Further research

A key finding of this study is **the lack of research available on the RRF and its potential impacts** on achieving energy targets. Partially, this is due to most measures not yet being implemented and only a few having been launched. Therefore, any existing assessment is preliminary and relies on estimates provided by Member States in their RRPs. With recommendation 3.1 we suggest developing further analysis of the impact of emissions on the basis of the existing reporting by the Member States, which could prove useful for the NECP. However, beyond the aspect of monitoring by Member States (and the European Commission), we also identified a few other areas of research that could benefit from further investigation. These research areas related to financial instruments, complementarity between the RRF and Cohesion Policy funding, the revision of energy targets in the NECPs and the impacts of energy projects within the NRRPs:

- Ex-post assessment of the multiplier effect of financial instruments for different energy categories. This would provide an assessment of how well they functioned in terms of crowding in private financing and creating private investments for the energy transition[48]. This recommendation is valid for all EU instruments.
- Recent evidence on the complementarity between RRF and Cohesion Policy funding remains inconclusive. Literature points towards both potential synergies in implementation of measures as well as risks of substitution.[49] Member States, on the other hand, indicate that the funds are complementary. Therefore, a thorough assessment of the relationship between Cohesion Policy funds and the RRF in the energy field is warranted to unpack the relationship between the two once both are firmly in place to be properly assessed.
- With the adoption of revised NECPs in 2023, a further comparison could reveal insights into the role of NRRP measures as part of the national policy mix to achieve the updated energy and climate targets. This analysis can help validate the results of this study and identify the energy categories and targets to which the highest contributions have been made.
- Assessment using CGE modelling of investments in energy projects included in the RRF to analyse their impact on reaching energy and climate targets in 2030, 2040, and 2050 under different scenarios (comparing against a baseline scenario that excludes the COVID-19 recovery funding and policies). Such an approach will be especially useful in estimating the gap between the planned recovery spending and the investments in the energy field needed to meet the Paris Agreement goals.[50]

[48] For an example of a study done for ESIF, see: https://www.imf.org/en/Publications/WP/Issues/2021/04/30/The-Fiscal-Multiplier-of-European-Structural-Investment-Funds-Aggregate-and-Sectoral-Effects-50249.

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Annex A – List of financial instruments

In the following two tables, we present the specified and unspecified financial instruments identified in the NRRPs. The first table lists the specified instruments, including also the allocated RRF funding, energy categories, types of financial instruments as well as short descriptions of each instrument. The second table shows the instruments that were mentioned in the NRRPs but were lacking some elements of information (e.g., allocated funding from the RRF) needed for a more detailed analysis.

Table A.1 Specified financial instruments in the NRRPs

Member State	Name of the financial instrument/measure	Funding from RRF (EUR million)	Energy category	Type of financial instrument	Short description
BG	Economic Transformation Programme - Fund 2: Green Transition and Circular Economy	75	Energy efficiency in industry and other; Renewable energy production	guarantee	One element of the fund is a guarantee instrument for renewable energy sources and energy efficiency.
BG	Economic Transformation Programme - Fund 3: Investment in Climate Neutrality and Digital Transformation	30	Energy infrastructure	equity	Equity instruments for infrastructure projects (project financing) to produce and store green energy as well as charging infrastructure and digital infrastructure.
DE	Pilot programme for carbon contracts for difference	550	Energy efficiency in industry and other	other	Pilot programme for CCfDs, the exact concept is being developed.
EE	Green Fund	100	Renewable energy production; Energy efficiency in industry and other	equity	Investment program for green technology companies, offering direct investments and investments in private venture capital funds.
EL	RRP Loan Facility - Energy efficiency and demonstration projects in SMEs or large enterprises	4,128	Energy efficiency in industry and other; Renewable energy production; Energy infrastructure	loan; equity	Measure includes several separate financial instruments aiming to promote private investments, especially in the areas of renewable energy, energy efficiency and smart energy systems.
FR	Recovery Participatory Loans	250	Energy efficiency in industry and other	loan; guarantee	Distributed by credit institutions, the instrument makes it possible to finance, over the long term, investment operations and development projects (e.g. for energy transition).
LV	Improving the energy efficiency of multi-apartment buildings and transition to renewable energy technologies	74.817306	Energy efficiency in buildings (renovation)	loan; guarantee	The objective is to promote energy efficiency improvement, smart energy management and the use of renewable energy resources at apartment buildings by offering guarantees, loans and grants.

LV	Energy efficiency improvement measures, deployment of renewable energy technologies and R&D activities	120.586	Energy efficiency in industry and other	loan; capital rebate	The objective is to encourage companies to invest in R&D, especially in energy efficiency and transition to renewable energy sources, by offering loans and capital rebates.
PL	Support for a low-carbon economy	114	Sustainable Transport	loan; equity	The fund will provide equity and debt support for corporate investment projects related to the development of industry for low and zero-emission solutions in the field of sustainable mobility and energy.
RO	Portfolio guarantee for climate action	200	Energy efficiency in industry and other	guarantee	Portfolio guarantees, implemented by European Investment Fund, aim to, for example, improve the energy efficiency.
RO	Fund of funds for digitalisation, climate action and other areas of interest	300	Energy efficiency in industry and other	loan	The instrument provides large companies access to finance while one third of the allocation will be dedicated to green transition investments.
RO	Financial instrument for investments in energy efficiency in residential and buildings sector	50	Energy efficiency in buildings (renovation)	guarantee	Instrument for investments in energy efficiency and renewable energy, including an uncapped portfolio guarantee.

Table A.2 Unspecified financial instruments in the NRRPs

Member State	Name of the financial instrument/measure	Funding from RRF (EUR million)	Energy category	Type of financial instrument	Comment
BG	National Decarbonisation Fund	0	Energy efficiency in industry and other; energy efficiency in buildings (renovation); renewable energy production	other; guarantee	Reform
BG	National Trust EcoFund (NDEF)	0	Sustainable transport	guarantee	Reform
BG	Energy efficiency in the building stock: measures to improve energy efficiency in the country's housing stock	608.17	Energy efficiency in buildings (renovation)	other	Unspecified. As the measure has several elements, it is unclear what is the exact amount of RRF funding allocated to the financial instrument.
CY	State funded equity fund: Cyprus Equity Fund (CEF)	N/A	unspecified	equity	Unspecified. The objective area is broad and will be specified in 2023. Hence, the instrument's link to energy projects is not clear.
FR	Pret Vert (Ademe-Bpifrance green loan)	N/A	Energy efficiency in industry and other	loan	Unspecified. Lacking the information on the allocated RRF funding.
FR	Relance bonds (OR)	N/A	Energy efficiency in industry and other	bond; guarantee	Unspecified. Lacking the information on the allocated RRF funding.
HR	Increasing the structural sustainability of the economy and fostering the green transition	N/A	Energy efficiency in industry and other; renewable energy production	loan; guarantee	Reform
LU	Aid scheme for charging stations	N/A	Sustainable Transport	N/A	The design of the financial instruments will depend on the results of a preparatory study.

Annex B – Country fiches

The individual country fiches of the NRRPs of the 27 Member States are presented in a separate document labelled ‘Annex B Country fiches’.

Annex C – Detailed assessment of the energy measures in the RRPs and the NECPs

A separate Excel file presenting the assessment of the energy related measures across the 27 NRRPs and their comparison with the measure within the NECPs. The file has been submitted separately labelleded ‘Combined RRP and NECP Assessment EU27’.

Annex D – Detailed assessment of the identified financial instruments

A separate Excel file presenting the detailled assessment of the identified financial instruments related to energy projects across the 27 NRRPs. The file has been submitted separately labelleded ‘Combined FI Assessment EU27’.

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