AUSTRIAN INSTITUTE OF TECHNOLOGY

# National recovery packages, innovation, and transformation

Project for the Austrian Council for Research and Technology Development

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# 1 Introduction

The COVID-19 pandemic hit Europe hard, and measures to contain the spread of the COVID-19 have resulted in a deep recession in 2020. To fight this recession, national governments have mobilised considerable funds to support the economy and prepare for a rebound in the following years. In addition to national efforts, the European Commission has initiated NextGenerationEU, a 750 bn EUR package to support Europe's recovery, and the Recovery and Resilience Facility (RRF) as its biggest component. The aim of this package is to make Europe's economies more resilient to future challenges while supporting them in the green and digital transitions.

Immediate support for the economy is important to stabilize employment and prevent vicious cycles that appeared during the Great Depression of the 1930s. However, these measures may also hamper change for good when they only aim at restoring the status quo before the crisis. Times of crisis are always times of transformation and innovation – this may also be true for the COVID-19 crisis of 2020 and 2021.The crisis may provide a good environment to push for transformative innovation. The rapid development of vaccines against COVID-19 is a strong sign for the adaptability of national innovation systems to new challenges, and the sense of urgency for change is high. However, one may also ask if national funding and the EU recovery packages are agile enough to support new ideas, new firms and new business models, as potential triggers of transformation.

Against this background, the project will analyse Austria's response to the economic effects of the crisis from an innovation and transformation perspective. In particular, the project will look at the recovery packages from the perspective of the 'protect-prepare-transform' framework proposed by the EU Expert group on the Societal and Economic Impact of Research and Innovation (ESIR, 2020): the need to **protect** the overall wellbeing of individuals during the crisis, the need to **prepare** for future pandemics and crises and the need to **transform** the European economy and society towards more resilience against future crises. The analysis will include national funds as well as Austria's Recovery and Resilience Plan (RRP), i.e. its proposal to the Recovery and Resilience Facility (RRF) of the European Commission. This multi-level nature of the recovery measures is further complicated by regional initiatives to mobilise further resources such as EU Structural Funds to fight the COVID-19 crisis.

In a first step, we will briefly outline the conceptual framing of the study, which not only serves to position the transformative potential of the recovery packages in the context of other policy measures in place, but also underpins the analytical framework used subsequently to structure the analysis. We will then screen and analyze the national measures as well as Austria's RRP along various questions: what is the size in different categories, and who are the recipients? What measures are included that help to sustain innovation activities, and promote the creation of novelty in a broad sense? What is dedicated to strengthening R&I capacities at large, for promoting digitalisation, sustainability, or climate action? Are there measures that pursue a directional and transformative ambition, in line with new missions? To what extent could they even support transformations? In a next step, we will compare Austria's RRP with those of other EU countries. This comparison will highlight the investment priorities of Austria's RRP. The report finishes with conclusions that will wrap up Austria's investment priorities as laid out in its national programmes as well as its RRP and discuss the "transformation" aspect of these measures.

# 2 Conceptual and analytical framework

## 2.1 Conceptual underpinnings

*Towards a policy mix that "protects, prepares and transforms"*

The COVID-19 pandemic has re-confirmed the need to better gear public policy towards societal challenges and transform our social and economic systems in a way that is more resilient. It is also reflected in the overarching political ambitions that the EU and its Member States pursue, and which are captured by the strategies underpinning the "twin" (i.e. green and digital) transition, the European Green Deal, the commitments to the Johannesburg summit ("people, planet, prosperity") and the calls for strategic autonomy (JRC, 2021).

In a straightforward way, these ambitions are also reflected in "protect-prepare-transform" framework proposed by the EC High-Level Group ESIR after the outbreak of the COVID-19 pandemic (ESIR, 2020, p. 3): "We must ensure that, together with the scientific and expert community, we direct investment towards enhanced protection from the adverse impacts of social, economic and environmental shocks; better preparation to face emerging large-scale risks; and deep transformation to be able to reconcile sustainability with resilience in the future."

The systemic nature of the transformation ahead of us bears important consequences for public policy, and the contributions of research and innovation (R&I)-related policies will be crucial in this context. It implies devising R&I policies that will frame and shape the emergence of a resilient system of innovation. In this light, the massive financial volume of the COVID-19 measures – both at national and European level - provides the opportunity to utilise them not only for fighting the immediate consequences of the crisis, but also for triggering a resilience-enhancing change process in economy and society, underpinned by a reconfiguration of innovation systems. The analysis of the Austrian Recovery and Resilience Plan (RRP), which is part of the NextGenerationEU initiative, and of the national COVID-19 recovery measures therefore focuses in particular on the resilience-enhancing and transformative potential of the two recovery packages, for which the contribution of R&I-related elements will be crucial.

Analytically, it is guided first of all by the “protect-prepare-transform” framework which serves as orientation for assessing the level of ambition pursued with the different COVID-19 measures. Second, assessing the measures taken also calls for a comprehensive policy mix perspective, looking at the joint effects of national COVID-19 measures and the Recovery and Resilience Plan, both set within the context of the wider national policy landscape. According to Rogge and Reichardt (2016) a policy mix is based on three main elements: i) policy strategies, ii) mix of policy instruments, and iii) policy processes, which should to consistent, coherent, credible and comprehensive in order to be fully effective.

*Policy strategy: From innovation to transformation and resilience*

Conceptually, the heuristics of systems of innovation was a main building block of research and innovation policy over the past three decades. In view of the transformative and resilience-enhancing ambitions pursued with the RRF it is necessary to broaden the conceptual framing in two main regards. First of all, it is necessary to consider not only the innovation-related measures of the packages, but whether attention is paid to ensuring that innovative solutions will be taken up and diffuse in economy and society, and whether any structural or institutional changes are initiated that could have transformative or resilience-enhancing effects. This implies widening the range of actors and strategies considered, and their influence on processes of socio-technical transformation during and after the crisis. In particular, it requires taking into account R&I funding as well as sectoral policies with their respective investment plan and regulatory initiatives, as well as wider institutional conditions for innovation and change, thus

pointing to novel challenges of enhanced policy coherence across policy fields and levels.

Second, there are additional cross-cutting strategic requirements to be taken into account in all kinds of policies. These refer in particular to the necessity to enhance the resilience to future crisis, and they can address matters of (cyber-)security, integrity of supply chains, strategic autonomy, or the “do not significant harm” principle. Overall, this suggests referring to building ‘resilient systems of innovation and transformation’ as guiding strategic concept for innovation policy in the context of the COVID-19 crisis and beyond.

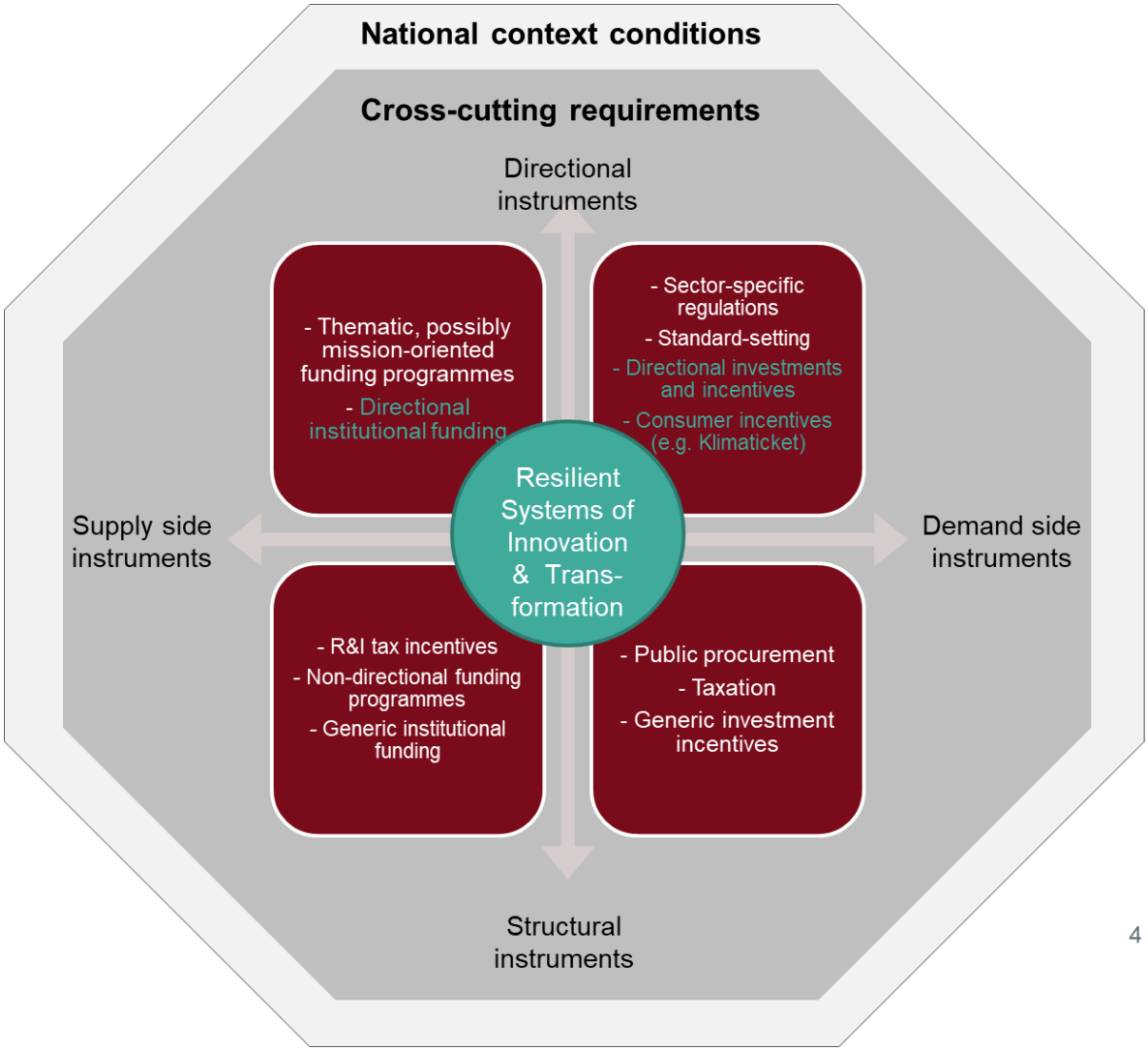
*Policy instruments: The role of government in transformation dynamics*

If “protect-prepare-transform” is taken seriously, then this requires drawing upon a sound understanding of how processes of transformative change come about. In the innovation and transition studies literature, there are different theoretical frameworks available that stress the interactions between specific learning spaces („niches“) and wider institutional contexts („regimes“), set within wider socio-cultural context conditions, as decisive for the emergence of transformation or transition processes (Geels and Schot, 2007). This multi-level perspective suggests the need for policy interventions, which have been summarized as responding to a combination of market failures, structural system failures and transformational system failures, with corresponding types of instruments (Weber and Rohracher, 2012; Larsen, 2019). Moreover, transformation processes depend on a wide variety of determinants and policies from different fields. Against this backdrop, the effects of national and European recovery measures need to be seen in conjunction, and as embedded in the existing portfolio of policy instruments.

Figure 1 outlines a framework for capturing strategic and instrumental features of the policy mix for addressing resilience and transformation. It distinguishes between structural and directional instruments, and between supply-side and demand-side instruments. These two dimensions span up the space of policy instruments that make part of the mix, whereas the strategic orientation is referred to as resilient system of innovation and transformation in the centre of figure. The framework also distinguishes between existing (written in white) and new policy instruments (in green), showing some select examples for illustration. This is important for assessing whether the COVID-19 measures have actually been truly additional to existing policies, or whether already planned initiatives have been presented under the umbrella of COVID-19 measures to accelerate and fund their introduction. Of course, it is also possible to revise existing

instruments, e.g. those with a structural emphasis can in principle be adjusted in the course of time to give them a more directional twist.

**Figure 1: Positioning of selected policy measures as part of a mix of policy instruments in a resilient system of innovation**




Source: own illustration

Cross-cutting requirements (e.g. in terms of resilience criteria) are taken into account as well as national context conditions (Polt et al., 2021), which influence the kind of strategies and instruments regarded as acceptable, as well as the policy and governance processes. For reasons of simplicity of the graphical representation, no explicit distinction is made between EU-level measures and national level measures is made.

Against the backdrop of the “protect-prepare-transform” framework, the COVID-related strategies and instruments discussed in this report are expected be found in the upper

two sectors of Figure 1 in order to strengthen their directionality. This would also be a correction of the general trend in science and technology policy in recent years which favoured non-directional funding such as R&D tax incentives (Appelt et al., 2019). Austria is among the OECD economies that provide the most generous support in terms of tax credits as a percentage of GDP (OECD, 2021).

*Policy processes and governance: Developing and implementing policies in times of crisis*

What novel COVID-19 related measures are put in place, and how they are subsequently implemented is a matter of governance structures and processes. In particular, these structures and processes have a strong influence on the composition of the packages proposed. For instance, the level of consultation and the range of actors and stakeholders involved in the development of the recovery packages are likely to have an influence on the types of instruments and specific measures considered. In addition, as is the case for the European RRF and its national implementations, specific milestones, often tied to major reforms, need to be met in order to release payments from the recovery fund. In addition, the implementation of the COVID-19 related measures hinges upon the capabilities in public administration of putting new measures adequately in place, at a time when the ability to act and learn fast in response to the COVID-19 crisis is imperative. These considerations can be summarised as the level of agility in policymaking and policy implementation as a third conceptual building block underpinning this study, drawing on five main characteristics of agile innovation policy: flexibility, proactivity, participation, ambidexterity and reflexivity (Weber et al., 2021).

## 2.2 Analytical framework

In order to guide data collection and analysis, this study is based on an analytical framework that is derived from the conceptual building blocks sketched above. It is based first of all on the three elements of the policy mix (strategy, instruments, processes), applied to the combination of RRP and national measures, in conjunction with other existing policies.

As a second analytical dimension, a set of analytical dimensions is used that draws on the “Protect, Prepare, and Transform” framework, on some well-established policy evaluation dimensions, and on a subset of characteristics of agile innovation policy:

- Ambition, based on the three categories of protect, prepare and transform;

- Additionality, referring mainly to the input side, i.e. whether additional resources and/or instruments have been mobilised as part of the recovery packages;

- Coherence, i.e. whether the various measures taken are part of an integrated strategy and are complementary to each other (e.g. national and RRP measures);

- Agility, i.e. whether the measures have been developed in a flexible, proactive and participatory way.

With these two analytical dimensions in mind, the main questions are addressed:

- What measures have been taken in response to the COVID-19 crisis, and how can they be characterised in terms of a policy mix?

- Is the combination of policies, national packages and RRP suitable to meet the resilience-enhancing and transformative ambitions reflected in the “Protect, Prepare, and Transform” framework?

- What hints and recommendations does this analysis suggest for further measures to be taken not only in response to the current crisis, but also in anticipation of futures ones?

Methodologically, the analysis is based on a combination of desk research and interviews. Interview guidelines were informed by the conceptual and analytical framework.

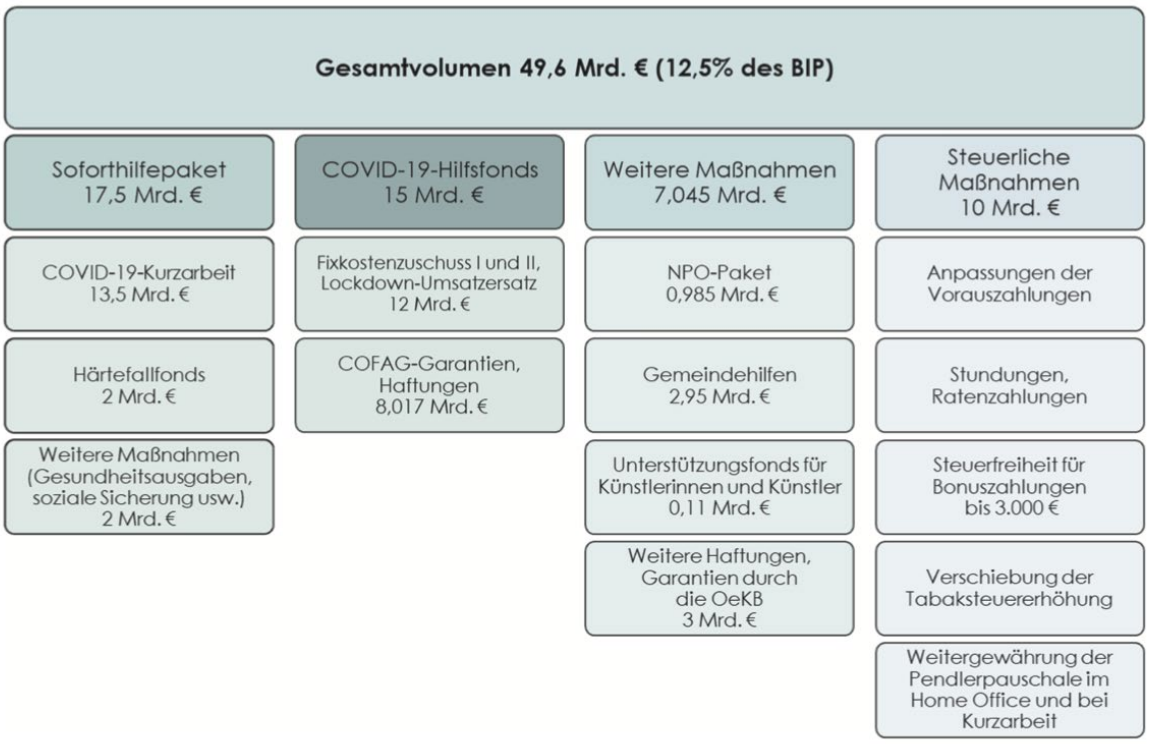
# 3 National measures against the COVID-19 crisis

## 3.1 Keeping the economy afloat

The analysis will at first look at the measures by the Austrian federal government and discuss their relationship to innovation, digitalization, and sustainability. This part will build on documents by the Austrian national government and secondary literature that analysed the recovery plans. National measures against the economic consequences of COVID-19 have been introduced immediately after the outbreak of the crisis in spring 2020. Public expenditure in these COVID-19 funds amounts to 49.6 bn EUR for 2020 and 2021 (Loretz et al., 2021). This equals 12.5 % of Austria’s GDP in 2019.

The main goal of national funds against COVID-19 is to keep the economy afloat and secure the survival of enterprises; they include, for example, immediate relieve measures (17.5 bn EUR), mainly in the form of subsidies for short-term work. Another important component is the COVID-19 fund, (15 bn EUR) which is mainly spent on subsidies for fixed costs and lost turnover. Other funds (seven bn EUR) support municipalities and support organisations. Another big share goes into tax relieves for enterprises (10 bn EUR). Figure 2 gives an overview of the measures based on Loretz et al. (2021). The numbers in Figure 2 are the budgetary provisions for each measure and may be lower if less firms or individuals than expected apply for funding.

**Figure 2: National measures against the effects of COVID-19, 2020 and 2021**




Source: Loretz et al. (2021)

The measures described above clearly focus on protecting firms and employees from the adverse effects of the crisis. They foresee only little funds for research, innovation or transformation, apart from the fact that stabilizing revenues is also important for the ability of firms to finance innovation and R&D. Measures that are more in line with the transformation goal are included in another programme “konjunkturstabilisierende Maßnahmen” or “Konjunkturpaket”, initiated in June 2020 (BMF, 2020, p. 12). The Federal Government has initiated the Konjunkturpaket to support the recovery of the

Austrian economy. It includes various measures with an intended long-term impact, including the “KlimaTicket Ö” (a pass for all public transport in a certain region or countrywide), investments in public transport, renovation of buildings, or renewable energy.

## 3.2 The Investitionsprämie

From the transformative perspective, the most interesting part of the Konjunkturpaket is the so called “Investitionsprämie” (investment premium). The Investitionsprämie grants a non-repayable subsidy of seven percent for investments and doubles this subsidy to 14% for investments in sustainability, digitalization, and life sciences. The measure was open for applications between September 1st, 2020 and February 28th, 2021. It entered into force of July 24th, 2020 and all projects should be finished by February 2025.

The origins of the Investitionsprämie date back to early 2020 when it was clear that COVID-19 restrictions will lead to a severe drop of economic activity and that a major stimulus was necessary to kick-start growth. The initial volume of the measure was 1.9 bn EUR. However, the Austrian government was overwhelmed by the number of applications and the readiness of Austrian firms to invest, so the volume has been increased to 3 bn EUR in December 2020, and finally to 7.8 bn EUR in May 2021. This was due to intense promotion and the involvement of tax consultants which diffused the news, among other factors. Again, these figures are budgetary provisions; The actual volume of the Investitionsprämie will depend on how many applicants were able to start their investment projects until the end of May 2021. There may also be applicants who invest less than initially planned. The most recent budget forecast by the Austrian Ministry of Finance estimates that the final volume of the Investitionsprämie may be closer to about 5.7 bn EUR (BMF, 2021b, p. 121) because some firms may finally refrain from their investment plans.

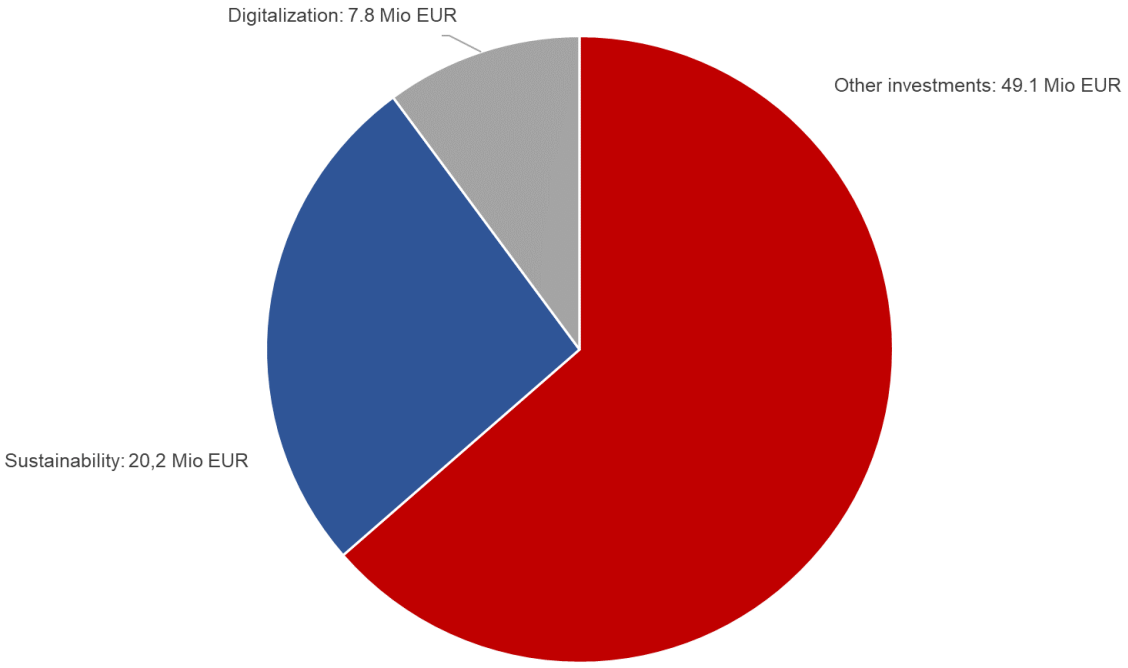
The Investitionsprämie is quite unique in the European Union in terms of its aims, regulations and volume; according to a recent evaluation (Schneider et al., 2021), only Malta, Luxembourg and Japan currently grant similar generous subsidies for investments. Thus, it’s an exception to the observation that Austrian economic and innovation policies are very much aligned with the EU level and initiatives in other Member States. The intervention logic of the Investitionsprämie is simple: a general measure open to all types of enterprises should stimulate investments during the crisis when firms are too cautious to invest because of the adverse business climate and worsening expectations.

Moreover, the measure should also increase the competitiveness of Austrian firms in the long run.

The Investitionsprämie is relevant from a transformation perspective for various reasons: First, its volume is considerable. Based on the applications received by the end of February 2021 granted subsidies of 7.8 bn EUR are related to investments worth up to 78 bn EUR. This is a huge sum given that total investment in Austria amounted to 95 bn EUR in 2020, even if the volume will finally be smaller. It seems that the funding agency aws and the Ministry was surprised by the number of firms willing to invest.

Second, the Investitionsprämie is not limited to small and medium-sized enterprises (SMEs) and open to all sectors, which makes it an exception among subsidies not related to R&D or regional funds. Investment projects, however, must not exceed 50 Mio. EUR, which limits the subsidy for single projects to seven Mio EUR for sustainability and digitalisation investments and 3.5 Mio EUR for other investment projects. Despite these generous limits, 67% of all funding will go to small firms, and 82% to small and medium-sized firms.

**Figure 3: Investment volumes related to the Investitionsprämie**




Source: Data provided by Austria Wirtschaftsservice, cut-off date June 2021, own illustration

Third, the Investitionsprämie supports considerable investments in sustainability and digitalization. 38% of the financial support requested by applicants (a volume of up 2.8 bn EUR) is related to sustainability, another 15 % (up to 1.1 bn EUR) are earmarked for digitalization investments. In terms of investment volume, we can expect up to 20 bn EUR of investments for sustainability, and 7.8 bn EUR investments for digitalization (see Figure 3). The volumes in the Figure also include those parts of the Investitionsprämie that are funded by the RRP.

To put these numbers in perspective, the Austrian business sector invested around 4.2 bn EUR in software, data processing and communications equipment in 2019 according to the Austrian structural business statistics ("Leistungs- und Strukturerhebung") by Statistik Austria. Digitalization projects supported by the Investitionsprämie over a period of five years are twice the size. Austria's government funded environmental investments with 422.7 Mio EUR in the three-year period 2017-2019 (Frühmann et al., 2020), the Investitionsprämie will be six times this amount for a period of five years. Expenditure for environmental issues by enterprises amounted to 10.9 bn EUR in 2018 (Statistik Austria, 2021). Again, the Investitionsprämie is twice the size of these expenditures, although both categories are not fully comparable. An ex-post evaluation of the contribution of the Investitionsprämie to Austria's digital and sustainability transformation would be needed to assess the contributions and effects in detail. The current evaluation which took place in the first stages of the Investitionsprämie provides only limited insights on this topic.

The Guidelines issued by the Federal Ministry for Digital and Economic Affairs (BMDW, 2020) give more insight into the sustainability and digitalisation projects supported by the Investitionsprämie. In the annex the document lists examples for possible investment projects. The list includes investments in heat pumps, biomass plants, micro grids, district heating, thermal solar systems and thermal building renovation, green hydrogen, electric mobility, circular economy, or waste reduction, just to name a few. The evaluation (Schneider et al., 2021) finds that the largest fields of investment include photovoltaic systems, energy storage, e-mobility, and reductions of energy consumption.

Digitalization investments according to the Guidelines should focus on artificial intelligence, cloud computing, 3D printing, blockchain and Big Data, the digitalization of business models and processes, cybersecurity, e-commerce, remote working, and new capabilities in firms to use e-government. The annex lists hardware, software, and infrastructure (networks, cloud server, but not R&D as possible investments. The digitalization track of the Investitionsprämie nevertheless has also a strong innovation

focus, by supporting firms to introduce new technologies that may in a next step be the basis for new products and processes.

The Investitionsprämie is a big push forward for sustainability and digitalisation. However, it was a sense of urgency to fight the economic crisis, rather than a sense of urgency to tackle global warming or improve digital competencies, that led to this instrument. It may not have been possible to establish such a large measure without the economic threat from the COVID-19 crisis. In this perspective, the phrase that “times of crises are times of opportunities” proved true for the measure.

# 4 Austria’s Recovery and Resilience Plan

National measures to ease the economic effects of COVID-19 are complemented by Austria’s participation in the Recovery and Resilience Facility (RRF) – a key instrument initiated by the European Commission at the heart of NextGenerationEU aiming to help the Member States to emerge stronger and more resilient from the crisis. Austria’s Federal government submitted its national Recovery and Resilience Plan (RRP) to the EC by end of April 2021 (BMF, 2021a), and the EC accepted Austria’s proposal on July 13, 2021, based on a very positive evaluation by the European Commission (EC, 2021).

## 4.1 Structure of Austria’s Recovery and Resilience Plan (RRP)

Austria’s RRP proposes projects worth of 4.5 bn EUR. The final volume will be between 3.4 and 4.5 bn EUR, depending on Austria’s share on the EC gross domestic product in 2021. Austria’s RRP consists of reforms and investments. The main investments of the plan are investments in eco-friendly mobility, in particular investments in railroad infrastructure (542.6 Mio EUR or 12.1% of total, see Table 1), broadband investments (891.3 Mio EUR or 19.8%), and measures to promote the ecological transformation of businesses (504 Mio EUR or 11.2%).

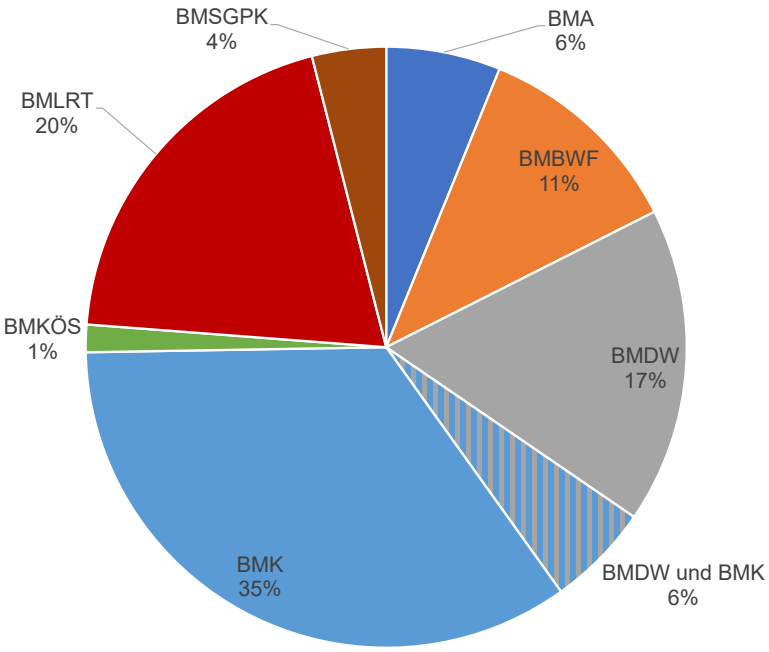
**Table 1: Structure of investments in Austria's RRP**

| Heading | Component | Volume (EUR million) |
|---|---|---|
| *Sustainable recovery (1,508 Mio EUR)* | 1.A Renovation wave | 209 |
| | 1.B Eco-friendly mobility | 849 |
| | 1.C Biodiversity and circular economy | 350 |
| | 1.D Transformation to climate neutrality | 100 |
| *Digital recovery (1,828 Mio EUR)* | 2.A Broadband expansion | 891 |
| | 2.B Digitalisation of education | 172 |
| | 2.C Digitalisation of the public administration | 160 |
| | 2.D Digitalisation and ecological transformation of businesses | 605 |
| *Knowledge-based recovery (868 Mio EUR)* | 3.A Research | 212 |
| | 3.B Re-skilling and up-skilling | 277 |
| | 3.C Education | 129 |
| | 3.D Strategic innovation | 250 |
| *Just recovery (296 Mio EUR)* | 4.A Health | 125 |
| | 4.B Resilient municipalities | 104 |
| | 4.C Arts and culture | 67 |
| | 4.D Resilience through reforms | 0 |
| | Total | 4500 |

Source: BMF (2021a)

Another way to look at Austria's RRP is through the lens of ministerial responsibilities. Figure 4 gives an overview of the investment volumes of Austria's RRP by the different federal ministries. Here, the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK) administers the largest share of Austria's RRP, followed by the Federal Ministry of Agriculture, Regions and Tourism (BMLRT) in charge of investments in digital infrastructure, and the Federal Ministry for Digital and Economic Affairs (BMDW). Two Important Projects of Common European Interest (IPCEI) on hydrogen and microelectronics are jointly administered by BMK and BMDW. The Federal Ministry of Education, Science and Research (BMBWF) follows as depicted in Figure 4.

**Figure 4: Investment volumes of Austria's RRP by Federal ministries**

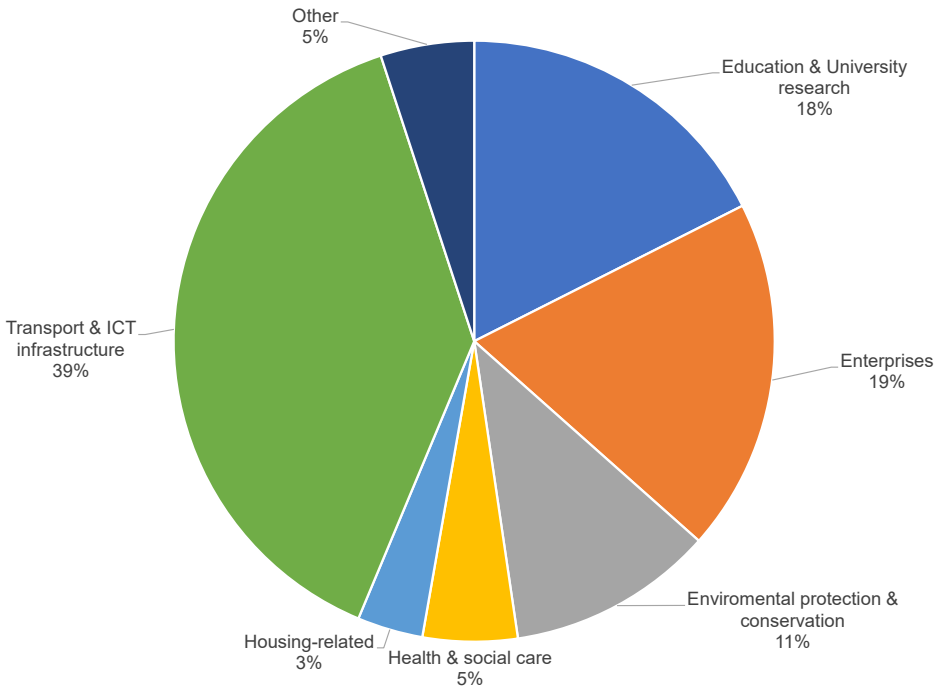



Source: Bundeskanzleramt (2021)

In terms of recipient sectors, almost 40% of the funds are invested in transport and ICT infrastructure, while enterprises and the education sector receive around 18% each (see Figure 5). Funds for enterprises also include two ICPEIs. Other includes the digitalization of the public sector as well as culture. The share of research- or innovation-related measures in a broad sense is a bit below 462 Mio EUR or around 10% of the total RRP. Around half of these funds will go to Austrian universities. The largest of the research-related measures are the IPCEIs on hydrogen and microelectronics, together 250 Mio EUR, followed by Quantum Austria, a research programme towards quantum physics worth 107 Mio EUR, by the foundation of the Austrian Institute of Precision Medicine (75 Mio EUR), and the financing of digital research infrastructure at universities (30 Mio EUR).

There is a quite clear separation along recipients and ministries. While BMLRT and BMK focus on transport and ICT infrastructure, BMDW and BMWFW (together with BMA, the Federal Ministry of Labour) are in charge of education, research, and enterprises. A second focus of the BMK is environmental protection and conservation. BMK is also in charge of innovation and technology, however, surprisingly, there are no measures related to these fields by the BMK, apart from the two IPCEIs jointly organized with BMDW.

**Figure 5: Investment volumes of Austria's RRP by recipients**




Source: BMF (2021a), own calculations.

From reading the headlines in Table 1, the transformative agenda seems much stronger in Austria's RRP than in its national COVID-19 related measures. However, both activities are difficult to compare, first because the RRP has a target of 37% for climate and sustainability and another 20% for digitalization according to the underlying EU regulation (European Union, 2021). Second, because we have to consider a big overlap between the two schemes; some measures are mainly funded from national sources and only co-funded by the RRP. Examples are the Investitionsprämie described above, railway infrastructure, the substitution of oil heating, or primary education. This makes it inevitable that a considerable share of the RRP is based on known investment plans.

A second important component of the European RRF, besides investments, are reforms. The Austrian RRP contains 25 different reforms, compared to 34 investment measures. Central strategic initiatives, such as the "ökosoziale Steuerreform" (eco-social tax reform), the "Mobilitätsmasterplan 2030" (mobility master plan 2030), or the "FTI-Strategie 2030" (strategy for research, technology, and innovation 2030) are included in the RRP as reforms. Other important reforms include the introduction of a country-wide pass for public transport ("KlimaTicket Ö") or new legislation for renewable energy and heating.

## 4.2 Origins and intervention logic of Austria's RRP

The basic framework of the RRF laid out by the European Commission leaves a lot of room for different national priorities and instruments. What exactly shaped the Austrian RRP?

First, instead of choosing completely new directions, the Austrian RRP is of course not isolated, but firmly rooted in policies and policy measures of the Austrian government. As mentioned above, central strategic initiatives of the Austrian government are also part of the RRP. The same is true for individual projects such as investments in railroads, the Investitionsprämie, or the KlimaTicket Ö which all found their way into the Austrian RRP. Thus, consistent with the finding for France, Germany and the UK by Geels et al. (2022), the crisis was also in Austria an opportunity for accelerating pre-existing developments. Some of these measures will also have an effect even after the phasing out of the RRP. However, the RRP stresses that two thirds of the measures are new investment projects which have not been considered in Austria's federal budget so far (BMF, 2021a, p. 7). A second factor which contributed to the strong relationship of the RRP with national measures is the short time for preparations, which paved the way for existing initiatives to enter the plan. The stakeholder consultation started quite late, with was due to the time constraints. This may have left out many alternative approaches or measures.

Evidence from interviews conducted for this study indicates that Austria's RRP was mainly the result of the inputs of the public administration, less by external experts. There was a public consultation organized by the Federal Chancellery, but it seems it yielded only little: from the 174 proposals received in the stakeholder consultation, only 72% referred to the fields of the RRP, and more than half of them would not have passed the "do no significant harm" principle (BMF, 2021a, p. 67). Moreover, it seems that the competences of the ministries define the focus of the Austrian RRP to a high degree and topics with are cross-ministerial with joint responsibilities have less likelihood to enter into the RRP. An example is Green tech innovation which is cross-ministerial between BMK (towards R&D and innovation) and BMDW (towards diffusion), or the improvement of digital skills in the workforce which touches the competencies of digitalization as well as labour.

The preparation of the Austrian RRP was co-ordinated by the Federal Ministry of Finance. The inputs at the level of individual projects came bottom-up from the expert level in the individual departments ("Fachabteilungen") of the ministries. In addition, there were also co-ordinators in each ministry who consolidated the proposals. This may also

have had a filtering function. The Austrian RRP states that two thirds of the measures are new investment projects not yet included in the federal budget (BMF, 2021a, p. 7). One may assume that a lot was already in the pipeline because it seems not feasible to plan large infrastructure projects such as rail construction in a few months. Many projects, however, got new impetus from the RRP.

The intervention logic of the European Commission's RRF has two levels. At the European level, the EC makes clear that measures should address the challenges identified in the country specific recommendations from 2019 and 2020 and no intervention should be proposed that is against the "do no significant harm" principle, meaning that benefits cannot be achieved at the cost of significant environmental damage. Each Member State must devote 20% of their national RRPs to digitalization and 37% in support the green transition. No projects are allowed that may become a burden for national budgets after 2025 and Member States are requested to suggest adequate control and audit mechanisms. Moreover, the EC requests that the RRPs of the Member States have to include reforms as well, and links payments from the national RRPs to milestones for reforms and investment projects.

At the national level, Member States are free to choose the intervention mechanisms of their RRPs within the rules set by the EC as framework conditions for participating in the RRF. Its not possible to list all of them here. Austria's RRP relies to a considerable degree on the financing of tangible and intangible investments, less on subsidies. The reforms pursued by the Austrian RRP provide a multitude of intervention logics.

## 4.3 The transformative content of the recovery packages

In a third step, we analysed the degree to which the RRPs put forward a transformation towards more sustainability and support digitalization. The "protect-prepare-transform" framework suggests directing investment towards enhanced *protection* from the adverse impacts of social, economic and environmental shocks; better *prepare* to face emerging large-scale risks; and deep *transformation* to be able to reconcile sustainability with resilience in the future. In the following Table 2 we allocated each of the investments of the Austrian RRP to the three categories. "*Protect*" in the context of this project, means to shield vulnerable groups from the impacts of the crisis. These are measures with an immediate effect; they can, but do not necessarily include technology investment. "*Prepare*" and "*transform*" focus on change in the medium term. The criterium to distinguish between "*prepare*" and "*transform*" categories is based on the extent to which the investment employs proven or new, unproven technology.

**Table 2: Austria's RRP in the "protect-prepare-transform" framework**

| Protect | Prepare | Transform |
|---|---|---|
| Combating energy poverty | Investments in empty bottle return systems | Transformation of industry towards climate neutrality |
| Biodiversity Fund | Construction and retrofitting of sorting plants for waste | Digitization of SMEs |
| Provision of digital end-user devices for pupils | Promotion of the repair of electrical and electronic equipment (repair bonus) | Digital investments in companies |
| (Digital) research infrastructures at universities | Digitization Fund Public Administration | Ecological investments in companies |
| Policy package for Remedial lessons ('Förderstundenpaket') | Financing of retraining and further education measures | Quantum Austria - Promotion of Quantum Sciences |
| Promotion of primary care unit projects | Expansion of early childhood education | Austrian Institute of Precision Medicine |
| Electronic Motherhood Passport Platform | Replacement of oil and gas heating systems | IPCEI Microelectronics and Connectivity |
| Renovation of the Vienna Volkskundemuseum and the Prater Ateliers | Promotion of emission-free buses and infrastructure | IPCEI Hydrogen |
| Digitalisation wave cultural heritage | Promotion of emission-free utility vehicles for businesses | Implementation of community nursing |
| Early help for socially disadvantaged pregnant women | New rail infrastructure and electrification of regional railroads | |
| | Gigabit-capable access networks | |
| | Climate-friendly town centers | |

Source: own presentation

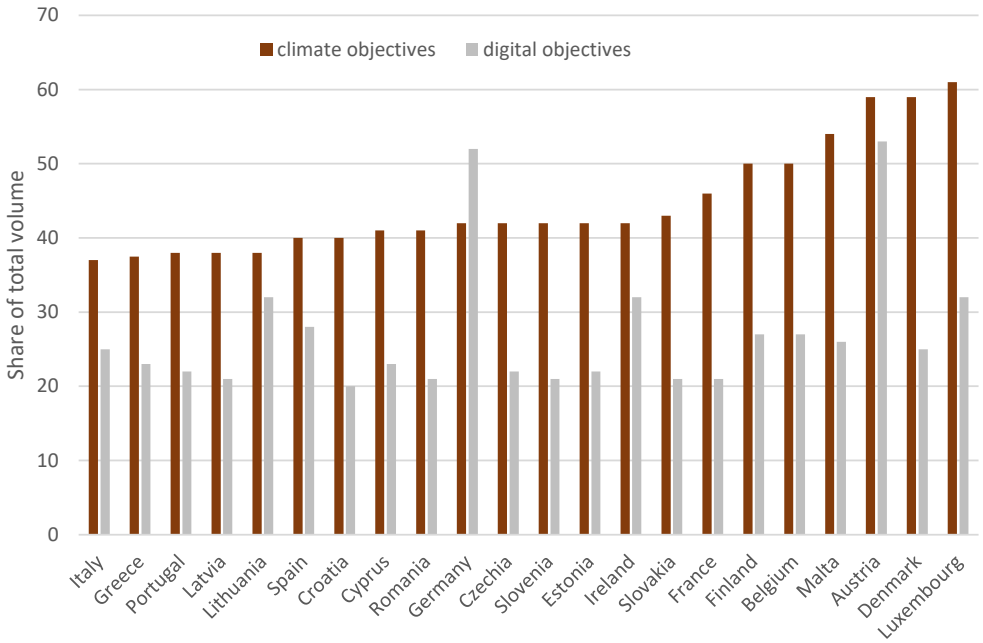
From the table it seems that the largest number of investment measures fall under the "*prepare"* category, while "*protect"* and "*transform"* have a nearly equal number of investment measures. In terms of volume, "*prepare"* is clearly the largest category with around half of the total investment volume in the Austrian RRP. So, the "*prepare"* part seems quite large in the RRP, thereby contrasting national measures which mostly focussed on protect. Investment projects with a high degree of Innovative content are most likely to be found in the "*transform*" category, for example when firms invest in new, unproven technology to reach climate neutrality, hardware that allows them to introduce new digital services, or if new processes to manufacture green hydrogen are developed.

Moreover, the transformative content of Austria's RRP should be assessed in comparison to other countries. A first source for such comparisons is the European Commission who has rated the transformative impact of each national RRP by assessing the share of investments which go into climate and digital objectives (European Commission, 2021). In order to count as climate investment, Member States had to explain how these

projects will contribute to the green transition, and they were required to meet the “do no significant harm” criterium (European Union, 2021). Similar rules were in place for digitalization.

Figure 6 gives an overview of the share of climate and digital objectives in RRPs of 22 Member States. Austria got a very good assessment by the EC who finds the third-highest share of climate objectives and the highest share of digital objectives (together with Germany) in Austria’s RRP. From the Figure, it seems that countries with small RRP investment volumes such as Denmark, Luxembourg or Austria have all high scores while the two countries with the largest RRP volumes, Italy and Spain rank quite low. This is not necessarily due to a lack of ambition, but rather a result of the fact that these countries can select the projects with highest impact and do not invest in projects with a more general economic impact.

**Figure 6: Share of climate and digital objectives in national RRF plans according to the evaluation of the European Commission**

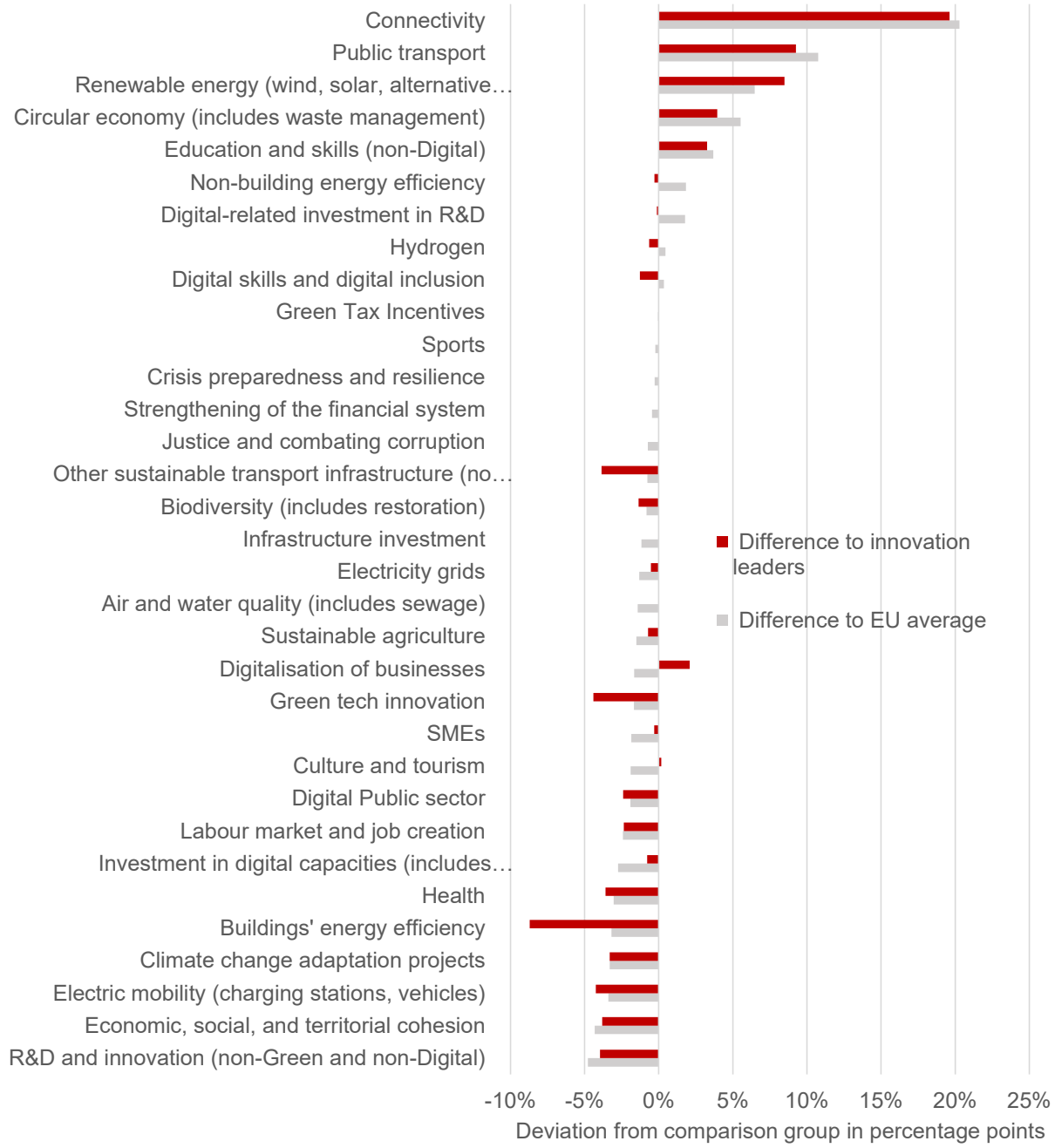



Source: European Commission (2021), own calculations

Brueghel, a Think Tank based in Brussels, provides a detailed breakdown of the RRP investment projects of all EU Member States (Brueghel, 2021). We compared the shares of different topics on the total budget in Austria with those of all EU Member States and the Innovation Leaders Sweden, Finland, and Belgium from the European Innovation Scoreboard. A positive value indicates that the share is higher in Austria's RRP compared to the other groups. Data for Denmark is not available from Brueghel. The figure below presents this data.

The data reveals some important differences in the distribution of investments between Austria and other countries. The share of the first four categories – investments in connectivity, public transport, renewable energy, and circular economy – is considerably higher compared to other countries and the clear focus of Austria's RRP. The share of connectivity, for example, is 20 percentage points higher in the Austrian RRP. This does not mean that other countries invest nothing in connectivity; Italy and Poland spend more on connectivity than Austria in their RRPs; however, its not their focus compared to other projects. This specialisation is consistent in comparisons to EU average as well as the Innovation Leaders (see Figure 7).

**Figure 7: Share of different positions in Austria's RRP and deviation from the average of the EU and the Innovation Leaders.**




Source: Brueghel (2021) based on data by the European Commission, own calculations

Investments in digital skills and in digital public administration, in contrast, are below average in Austria's RRP. This resembles Austria's position in the EC's Digital Economy and Society Index (DESI)[1] where Austria ranks better in terms of digital public services and human capital than in terms of connectivity. Other fields where Austria devotes less in relative terms than other countries include fields outside climate and digital objectives: non-Green and non-Digital R&D and innovation, Economic, social, and territorial cohesion, or health. The only exception may be electric vehicles and energy efficiency of buildings.

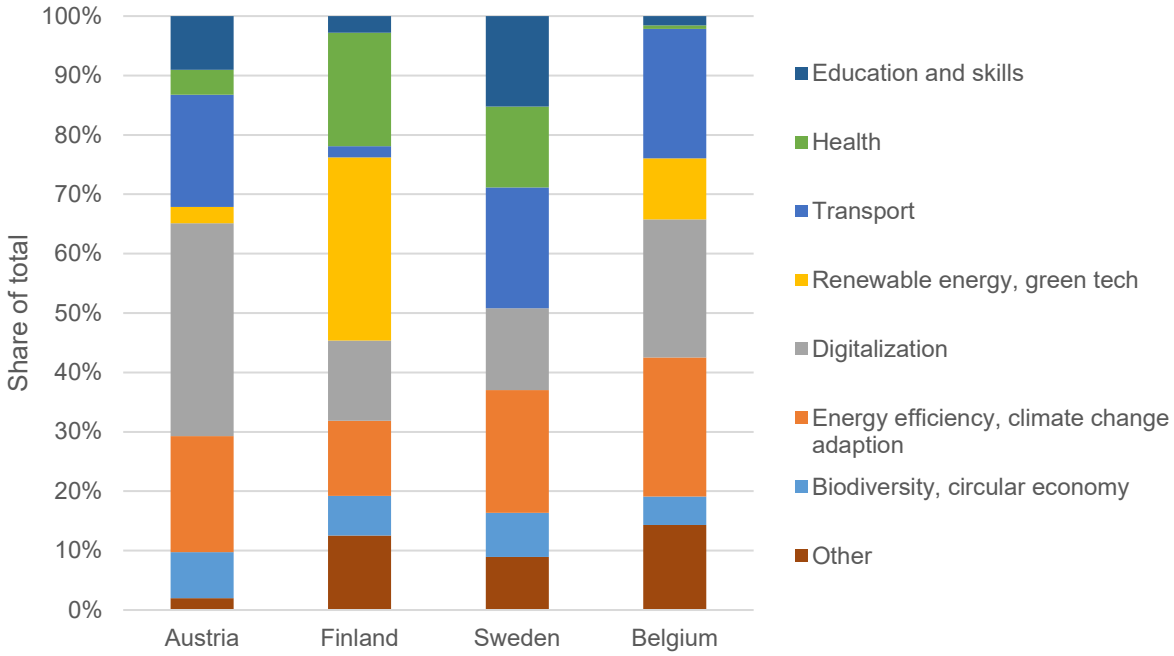
The number of investment positions where Austria spends less in relative terms than the EU average or the Innovation Leaders is considerably larger than the number of positions where Austria spends more which indicates that the specialisation is indeed strong. Altogether, the distribution of funds in Austria's RRP reveals a strong focus of the plan on the two EC priorities, digitalization, and climate. Comparisons, however, should consider that the national RRPs do not exist in isolation, but are accompanied by national recovery plans in most countries. An explanation for differences in the RRPs may be that some areas of green and digital transformation are mainly funded by national sources. Geels et al. (2022) for example reports that the national recovery plans of France and Germany include around five bn EUR for railway infrastructure in each country and nine bn EUR for hydrogen in Germany and two bn in France.

Figure 8 takes a closer look at the RRPs of Austria, Belgium, Finland and Sweden in relative terms based on the Brueghel data. The RRPs of these countries are quite similar in their volumes (AT: 4.5 bn EUR, BE: 5.9 bn EUR, FI: 2.1 bn EUR, SE: 3.3 bn EUR). The structure, however, differs considerably; we have already mentioned Austria's high share of investments in broadband infrastructure (digitalization) and public transport; both can also be found in Belgium. In contrast, the investment focus of Finland's RRP is clearly on energy (renewable energy, energy efficiency), and Green tech innovation, but also on health. In fact, Green tech innovation with a volume of 420 Mio EUR is even the largest position in Finland's RRP according to Brueghel, while it consists only of the IPCEI Hydrogen in Austria and possible investments under the umbrella of the Investitionsprämie. Belgium also invests in hydrogen technologies. Sweden has also a focus on mobility in its RRP, but in contrast to Austria, Sweden's investments mainly go

1 https://digital-strategy.ec.europa.eu/en/policies/desi-austria

into electric mobility including charging stations and vehicles (520 Mio EUR) which is a small position in the other three countries.

**Figure 8: Investment structure of the RRPs in Austria, Finland Sweden, and Belgium, in bn EUR**



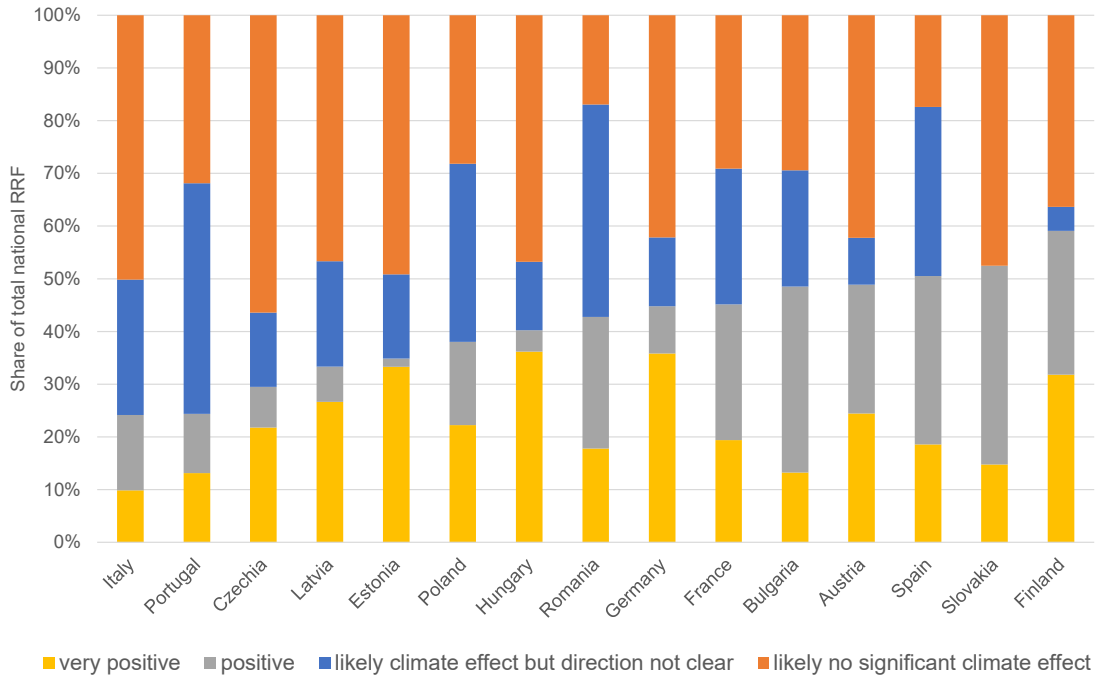

Source: Brueghel (2021) based on data by the European Commission, own calculations

As conceived by the European Commission, the RRF is an investment programme. Thus, R&D and innovation are clearly not its focus. This becomes clear when we sum up R&D and innovation related activities in a broad sense (digital-related R&D, Green tech innovation, hydrogen, other R&D and innovation). The share of these activities is around seven percent in Austria and Sweden, 17% in Belgium and 21% in Finland.

In order to understand better the transformative potential of Austria's RRP we also have to get some qualitative assessment of the measures and its potential impact. For the climate objectives, the Wuppertal Institute, a German research organization, offers such a qualitative assessment of the investments in sustainability for each national RRP.[2] Figure 9 depicts the outcome of this assessment; countries are grouped from the left to the right according to the share of their RRF which has been rated positive or very positive.

2 https://www.greenrecoverytracker.org/

**Figure 8: Assessment of climate objectives in national RRPs, Wuppertal Institute**




Source: https://www.greenrecoverytracker.org/

Austria is, again, in a quite favourable position here, together with Finland and Slovakia. Spain, as a country with a large RRP volume, can also join this group at third place, while Italy, Portugal and Czechia are rated quite low, with less than 30% of their RRPs considered as having a positive or very positive impact on climate goals.

# 5 Conclusions

European countries as well as the European Commission have raised considerable funds to overcome the economic effects of the COVID-19 crisis, make their economies more resilient in the future, as well as speed up transformation towards a greener and more digital economy. At the European level, the Recovery and Resilience Facility (RRF) is the main instrument to achieve these goals. This report analyzes the Austrian efforts to combat the economic consequences of COVID-19 with a focus on the Austrian Recovery and Resilience Plan (RRP), submitted to the RRF.

A first important difference between Austria's RRP and its national measures is size: while the Austrian RRP includes investments of up to 4.5 bn EUR, Austrian national recovery funds are around ten times the size. Moreover, while national efforts are very

much targeted towards "*protect*" – for example subsidies for short-time work and lost turnover – the RRP is more focussed on objectives related to climate and digital transformation. The exception is the national instrument of the Investitionsprämie, a subsidy for investments that is 14% of the project volume for digital and green investments. "*Protect"* and "*transform"* have a nearly equal number of investment measures in the RRP, and in terms of investment volume, "*prepare"* is clearly the largest category with around half of the total investment volume in the Austrian RRP.

Austria's RRP is small compared to those of Italy, Spain, or France. However, comparisons presented in this report suggest that the transformative content of Austria's RRP is quite high compared to the EU average, but also compared to smaller countries such as Finland, Sweden, or Belgium. It does include a high share of investments targeted to climate or digitalization objectives, and the climate measures will likely also have a high impact according to international comparisons.

National measures, RRP and other existing national policies should be seen in conjunction, as being part of an **integrated strategy**. In this regard, Austria did pretty well; it had the advantage that the Regierungsprogramm (joint programme) of the government was quite recent (2020) at the time of drafting the RRP. Several initiatives laid down in this programme went also into the Austrian RRP. Examples are the Ökosoziale Steuerreform, the Klimaticket, but also strategies such as the Mobilitätsmasterplan 2030 or the FTI-Strategie 2030.

A number of investments are co-financed by RRP and national sources alike, and the topics addressed by the Austrian RRP are very much in line with EC guidelines laid out in the regulation. The RRP, however, did not only take up these initiatives, but moved them to a new, **more binding character** by tying milestones to the national reforms to ensure the full commitment to the reforms and their implementation timeline. These milestones should be seen as an opportunity because they can fulfil a self-binding function for national strategies and thus help avoid diluting it. Thus, milestones would also be useful building block in purely national programmes and should also be part of possible future rescue packages.

The RRP, however, also shows some room for improvement from a transformative viewpoint. Innovation towards transformative change may require a different intervention logic than subsidies for other investments. Weber et al. (2021) show in a number of case studies that agile technology policy measures towards radical change need **more**

**‘ownership’, pro-activity, and a stronger interaction** between public agencies and the participants of funding measures. Such a level of pro-activity, however, is very difficult to implement in a large programme such as the European RRF. In this perspective, the RRF faces similar challenges like Horizon 2020 or Horizon Europe. Moreover, there is a clear trade-off between the speed of preparation and the pro-active character of programmes. For future initiatives, it is recommended to strengthen such pro-active components in the programmes even it this takes longer for preparations and requires a higher administrative effort.

From a transformative viewpoint, one may also criticize that there are no measures in the Austrian RRP to bring in new actors into climate policies or to build new networks between actors. COVID-19 revealed the challenge of creating a programme with the involvement of many stakeholders in a short time. The pandemic required reactions across several areas that did not follow the distribution of competences between ministries. The RRP, however, was largely a result of interactions between different ministries and different departments within these ministries. There was a stakeholder consultation, but it yielded only little inputs which found their way into the RRP. This was surely due to the very limited time available for the preparation of the RRP, but maybe also due to a lack of infrastructure to organize stakeholder involvement. Thus, in order to be prepared in case of a new crisis, we should design **governance processes for faster coordination among different areas of government, public administration and stakeholder** in order to be able to react both faster and in a more coherent way. This includes also horizontal alignment between ministries.

Moreover, there is considerable funding for climate action in the RRP, but very little funding for green innovation – the RRP, to a large degree, strengthens existing markets, technologies, and actors. The funding for green innovation could be increased by turn non-directional measures in national funding schemes into more directional ones, for instance by introducing a thematic focus with higher funding for a limited time, similar to what was done in the Investitionsprämie. There is also very little in Austria’s RRP that aims at spurring the creation of markets for new environmentally friendly technologies, apart from investments in new transport equipment to meet public demands. Some see such demand-oriented innovation policy as a cornerstone of transformative policies (Edler and Georghiou, 2007; Edler and Fagerberg, 2017). This is, however, not only a characteristic of the Austrian RRP, but inherent to the concept of the RRF itself.

The Austrian RRP has a strong focus on physical investments, focussing on physical investments in rail and broadband infrastructure while expenditure for digital skills development is below average. This focus is not accompanied by support for firms to develop new business models and services that allow the firms to exploit these investments. One may argue that this is in the responsibility of the enterprises; however, empirical evidence suggests that firms often fail when it comes to the commercialization of information and communication technologies (Teece, 2018). The national Investitionsprämie addresses these topics by explicitly mentioning the digitalization of business models and processes as one of its focal areas (BMDW, 2020, p. 28). However, its not possible to get financial support for digital innovation or the development of new business models by the Investitionsprämie, either. Thus, future recovery plans should put **more emphasis on business models and skills development** to accompany these investments and help firms to innovate.

In a broader perspective, advancing digitalisation and improving the means for **co-operation among research organisations** working on key areas (e.g. health, digital security, energy, …) could also strengthen the resilience and agility of the whole R&I system. New forms of global co-operation made it possible to develop vaccines in such a short time (Kreiling and Paunov, 2021), and the way science and industry in different countries worked together on this task may be a model for future co-operation patterns. Policy should make sure that Austrian organisations are able to participate in these co-operative endeavours. This may not only be a question of technology, but also of available resources and competences. Another important field are areas that help strengthen the **resilience of advanced critical infrastructures**, e.g. through investment in cybersecurity or alternative forms of (sustainable) energy supply (e.g. hydrogen). These areas are included in the Austrian RRP but should be increased if new recovery packages are necessary in the future.

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