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Regulatory Experiments and Incentive Regulation – Experiences with the SINTEG-regulation

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Abstract

With the increasing decentralization and digitalization of the power supply, the need for innovation in the regulatory framework to adapt the institutional framework to the changing requirements is also increasing. The SINTEG regulation and analogous approaches for regulatory sandboxes were a step in this direction, but their implementation still leads to key obstacles to regulatory innovation. In particular, the limited scope of application, the administrative burden and the lack of incentives for participants were identified in expert interviews as central weaknesses of the current regulatory experiments based on the SINTEG regulation. Therefore, in this article, we propose two approaches with the experimental budget and the application of Regulatory Innovation Trials (RIT) to further develop existing concepts for regulatory experiments and to enable innovations within the regulatory framework (e.g. the inventive regulation of network operators).

1. Introduction

The increasing relevance of decentralised distributed and digitally conencted assets for the energy system is also putting the regulation of grid operators to the test. It is open to debate whether and how the regulation of network operators currently represents an obstacle to innovation in the grid sector and which instruments could be used to reduce these barriers within the regulatory framework. In this article, we take up the current debate on the need for innovation in the energy sector and focus on the need for regulatory innovations or regulatory experiments that are necessary to adapt the regulatory framework to the changing needs in the energy sector and to enable a diffusion of new applications and technologies in the energy sector.

While large parts of the current debate focus primarily on digital innovations and the development of new business models in the context of the decentralization of energy supply, the EU and also the German government have already recognized that the existing regulatory framework can inhibit the development of innovative solutions (cf. EU COU 2020). There are three key challenges in this context: First, innovations in the context of the power grid are often hampered by the existing regulatory framework (e.g. the incentive regulation or network charging) (cf. Haffner et al., 2019; Fenwick et al., 2015), but there is still a lack of framework conditions to enable regulatory experimentation to adapt regulation to the new requirements (cf. Jamasb et al. (2020)). Secondly, innovation activities by network operators often require network users to be actively involved in development and testing. However, there is currently a lack of incentives for network users to participate in such innovation activities or to make investments in order to become part of the innovation process (cf. approaches to output-oriented regulation in Brunekreeft et al (2020)). Thirdly, as in all sectors of the economy, innovation activities by network operators lead to spillover effects because the knowledge generated is a public good (Arrow, 1962), so that without the internalisation of these spillover effects, the innovation activity of network operators remains below the economically efficient level.

In order to address these three challenges and to promote regulatory experiments, the application of regulatory sandboxes is increasingly becoming the focus of public funding of research projects. Internationally, too, similar developments are emerging in various sectors (for an overview, see Schittekatte et al. (2021); for Italy see Lo Schiavo et al. (2013); for the

Netherlands see van der Waal et al. (2020)). In addition to the currently running regulatory sandboxes, this approach has already been tested within the framework of the SINTEG projects. SINTEG stands for "Smart Energy Showcase – Digital Agenda for the Energy Transition" and comprised a total of five demonstration projects that focused on challenges and solutions for new (especially digital) applications in the energy sector and were funded by the German Federal Ministry for Economic Affairs and Climate Action for this purpose. The legal basis of the SINTEG projects was the SINTEG Regulation (SINTEG-V), which created a framework to enable the projects to deviate from specific regulatory requirements (e.g. necessity of cooperation in the development of flexibility platforms). In addition, the SINTEG-V provided the basis for financially compensating network users in the event of an economic disadvantage resulting from participation in the project. The SINTEG projects are of particular relevance, as this is the first comprehensive funding programme in Germany that explicitly aimed to test regulatory experiments, such as those made possible by SINTEG-V. Therefore, in the present analysis, we often focus on this program and the experiences of those involved with SINTEG-V.

As part of a study for the transmission system operator TransnetBW (cf. Brunekreeft et al 2021), we identified four barriers that should be overcome in order to increase the innovation activity of grid operators through interviews with experts from the SINTEG projects. These barriers relate to (1) the legal uncertainty caused by vaguely defined circumstances for exemptions from the regulatory framework, (2) economic risks, such as the recognition of expenditure incurred in the context of regulatory experimentation, (3) the limited incentives for network users to participate in such experiments, and (4) the narrow scope of existing regulatory experimentation spaces such as SINTEG. These barriers have a particular impact on innovation at the interface between network users and network operators and on the use of digital applications.

In the following, we address these obstacles and propose two specific approaches to overcome them. On the one hand, the Federal Network Agency could grant an ex ante experimentation budget for network operators, which they could use to incentivise third parties (in particular network users) to participate in innovative experiments in order to be able to test active coordination with network users without taking on a major economic risk. In addition, Regulatory Innovation Trials (RITs) could be used to test new regulatory approaches in deviation from the status quo and thus to test explicit regulatory innovations, for example with regard to the further development of incentive regulation or network fee regulations.

These recommendations are based on a detailed analysis, which we summarize in this paper as follows. First, chapter 2 defines regulatory experiments and describes the difference between regulatory sandboxes such as SINTEG-V and Regulatory Innovation Trials (RIT). Chapter 3 presents the identified weaknesses of the SINTEG approach. Chapter 4 addresses these identified vulnerabilities and proposes two approaches, an experimentation budget and the application of RITs, which in our view could be suitable to increase the innovation activity of regulated network operators. Chapter 5 summarises the key points.

2. Definition and delineation of regulatory experiments

In principle, regulatory experiments can be described as follows (cf. Bischoff et al., 2020): Regulatory experiments are usually initiated top-down (by regulators). They include flexible and project-based exemptions within the existing regulatory framework. The regulator is

responsible for the drafting and approval process and actively supports the participants during the course of the project. The design of regulatory experiments is highly dependent on the national institutional context (i.e. the degree of liberalization of the energy market). Experiments involve different goals and target groups, which are usually limited by specific criteria.

Regulatory experiments make it possible to test new technical solutions and business models under real conditions and to gain insights into regulatory problems that arise during the implementation of innovations. In addition, they enable learning processes that help the regulator to make regulation more effective in the context of highly technological innovation dynamics. Bennear and Wiener (2019) therefore also speak of adaptive regulation in this context. Last but not least, regulatory experiments can help to establish new stakeholder networks, accelerate the exchange of new ideas, promote public acceptance, and thereby strengthen the efficiency of future regulation.

As shown in Figure 1, two main types of regulatory experiments are distinguished (cf. Bischoff et al., 2020 and Bauknecht et al., 2021, p.1). The distinction depends primarily on whether regulation is only a framework for experimentation or whether regulation itself is the focus of experimentation.

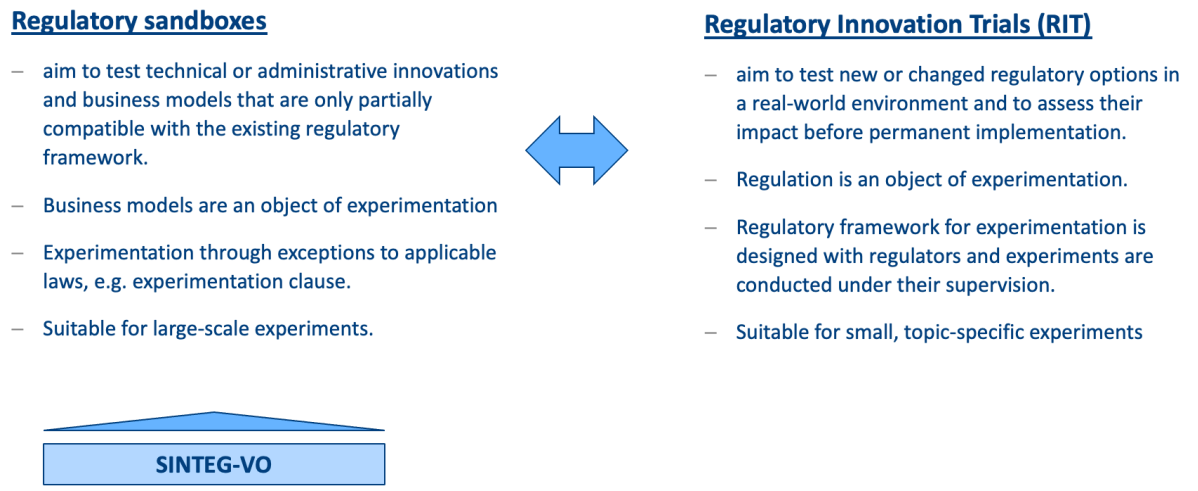

Figure 1: Main types of regulatory experiments (source: own illustration based on Bischoff et al. (2020) and Bauknecht et al. (2021))

Regulatory sandboxes are designed to test technical or administrative innovations and business models that may conflict with the existing regulatory framework. At the same time, they allow regulators to learn about innovations and develop the appropriate regulatory framework. On the part of the regulator, exceptions to applicable laws are permitted. The relevant experimentation clause usually includes legislative changes for a limited period of time and scope, as well as mechanisms for financial support for innovative activities. The derogations from the existing regulatory framework are set for different periods (e.g. 2 years in the UK and 10 years in the Netherlands). Economic aspects (reimbursement of costs, etc.) are in most cases determined individually for each individual project and are usually not disclosed. Although the approach is relatively new, regulatory sandboxes have already been introduced in several sectors, such as energy, banking and healthcare, in different countries.

The "SINTEG Showcase" and the SINTEG-V are also an example of an experimentation clause.

Regulatory innovation trials (RIT)[1] are primarily aimed at adapting the regulatory framework itself. They aim to test new or changed regulatory options in a real-world environment and to assess their impact before they are permanently introduced. In this case, regulation itself becomes an object of experimentation. Within the framework of these experiments, concrete recommendations for action are to be drawn up with regard to a change in the existing framework conditions, which can be incorporated into the future development of regulation. Regulatory learning plays an important role in this. RIT can be carried out in terms of time, space and the number of participants. They also need to be embedded in existing legal frameworks. The regulator plays an important role in the design of a RIT and is actively involved in its implementation.

In the following, we will take a more specific look at the SINTEG-V and the experience with this experimentation clause in order to show why a broader approach in the sense of RIT is needed to drive regulatory innovation. As described above, the SINTEG program was the first comprehensive funding program with an explicit reference to regulatory experiments. Therefore, the findings of this programme provides an essential basis for the further development of regulatory experiments in Germany.

3. Experiences with SINTEG and identified need for action

The SINTEG funding programme "Smart Energy Showcase – Digital Agenda for the Energy Transition" was launched by the BMWK in 2015. The aim was to develop new solutions for regulatory challenges of the energy transition within framework that was limited in space and time. Five model regions ("SINTEG showcase") were funded. The solutions developed in the showcases included, among other things, the application of digital innovations and the creation of new business models, such as digital flexibility marktes for network operators.

In order to achieve these goals, the Federal Government issued the "Ordinance on the Creation of a Legal Framework for the Collection of Experience in the Intelligent Energy Showcase – Digital Agenda for the Energy Transition" (SINTEG-V) in 2017. Within the framework of the five SINTEG projects, the SINTEG-V creates an experimentation clause that opens up an experimental space for the development of model solutions for a limited group of participants (the project participants). In addition, the SINTEG-V regulates the compensation of economic disadvantages that the participants may incur as a result of the project activities. Such a disadvantage arose, for example, for grid users in the context of the projects due to the participation in a trial of flexibility procurement by the network operators, as the flexibility payment for renewable producers in the project was lower than the current compensation for curtailment. Grid users include endconsumers, operators of electricity storage or power-to-X plants, as well as operators of renewable energy plants. For these network users, the responsible network operator will reimburse them for the economic disadvantages resulting from the project activities.

[1] Regulatory Innovation Trial (RIT) is the new term for which the Regulatory Innovation Zone (RIZ) was used until recently.

According to § 6 of the SINTEG-V, the disadvantages incurred in periods in which 1) there was a network bottleneck or the network operator had to apply measures to avoid a network bottleneck or 2) the value of the hourly contracts for the price zone on the sports market (day ahead or intra-day) was zero or negative are recoverable (Federal Government, 2017; BNetzA, 2018).

Paragraph 12(3) of the SINTEG-V provides that subscribers are obliged to provide evidence to the Federal Network Agency in order to verify the economic disadvantages incurred. This evidence includes documentation of the periods in which the disadvantages arose and evidence that the disadvantage incurred was a direct consequence of the project activity. The documentation and the associated supporting documents must be submitted in accordance with § 10 para. 3 SINTEG-V and need to be certified by an auditor (Federal Government, 2017; BNetzA, 2018).

According to § 12 para. 5 SINTEG-V, further economic disadvantages of the subscribers will continue to be reimbursed by the network operators from the respective account for fees or levies. In accordance with Section 11 of the SINTEG-V, any remaining economic benefits must be paid out to the network operators, who use them to reduce network charges. For the network operators, this means that the disadvantage compensation process (§ 5, § 6 and § 12 SINTEG-V) is cost-neutral and does not include any additional financial incentives. It is also essential that any economic benefits from participation in the experiments in accordance with § 11 SINTEG-V must also be reimbursed to the grid operators as described above. This payment is then offset against the network charges in accordance with Paragraph 12(5) of the SINTEG-V, so that neither the subscribers nor the network operator receive any direct benefit, but theoretically the total network charges for all network users would be reduced (albeit only marginally).

As part of the above-mentioned study for TransnetBW (cf. Brunekreeft et al 2021), interviews were conducted with various representatives of the showcases and from the context of the SINTEG projects in order to capture the experiences with the SINTEG-V. Overall, the SINTEG programme has provided a framework for the interaction of new players from different industries and stages of the value chain, thus enabling the development of new approaches and ideas (e.g. for new business models). In particular, according to the interviewees, the SINTEG-V motivated individual project partners to participate in SINTEG projects who would otherwise not have participated in such research projects. This is particularly true for the participants who were not directly involved in the application for the projects, but who were able to be involved via the SINTEG-V after the start of the project.

Most of the experiments within the framework of the SINTEG-V focused on the application of § 5 of the SINTEG-V. This scheme allowed participants to set up an online platform for a flexibility market in the context of a model region, without having to make it available to all network users on a non-discriminatory basis. Without this regulation, the development of the platforms in the context of model projects would not have been possible. On the other hand, it was noticeable that although the project participants carried out experiments, hardly any applications for compensation for disadvantages were submitted to the BNetzA (§ 6-9, § 12 of the SINTEG-V), even if such a disadvantage has arisen. As a result, an essential core of SINTEG-V remained unused.

For the purposes of this analysis, it is of particular interest to consider the obstacles to experimentation in the context of showcase projects in the application of SINTEG-V. As summarised in Table 1, the identified barriers are described below in four thematic areas: 1) legal uncertainty, 2) economic risk, 3) administrative burden, and 4) narrow scope.

Obstacles	description of the problem	suggestion for improvement
Legal uncertainty	Ex-post regulation - application of the rules uncertain after experimentation	Project-specific exemptions through individual administrative acts
Economic risk	ex-post mechanism for reimbursement of costs and lack of (monetary/non-monetary) incentives for the participation of stakeholders	Introduction of actor-specific incentives
Administrative effort	Bureaucratic verification procedure and lack of legal and administrative advice from the regulator	Simplified procedure (de minimis limit) and active support from the BNetzA/BMWK
Narrow scope	Narrow definition limited scope of application	definition of flexible project-oriented rules

Table 1: Hurdles and suggestions for improvement of the experimentation clause in SINTEG-V (source: Own compilation based on the statements from the interviews)

Obstacle 1. Legal uncertainty

To the knowledge of the authors, the interest of the showcase participants in applying for compensation for disadvantages was rather low. This reluctance to apply the experimentation clause may be due to a number of factors: the two-stage reimbursement procedure, which was quite bureaucratic, complicated and costly, or the uncertainties resulting from the ex-post reimbursement mechanism.

As a further legal uncertainty, it was identified that the offence was not precisely defined in the SINTEG-V. Project participants were only able to claim compensation for disadvantages in situations where there was a shortage or negative prices. However, the regulations in the SINTEG-V were imprecise with regard to the detection of network bottlenecks and the classification of technological solutions and plant types. Therefore, uncertainties could arise as to how exactly the verification should work in practice. The situation for the participants was further complicated by the fact that the SINTEG-V did not enter into force until the projects had already started their work. As a result, regulatory issues identified in the course of the projects but having a reference point in the regulatory framework that was not covered by the SINTEG-V could not become part of the experiments.

Obstacle 2. Economic risk

The ex-post procedure for compensation for disadvantages also gave rise to a risk of cost recognition, as it was not foreseeable ex ante and there was no experience of which costs would be recognised by the BNetzA and to what extent.

In addition, the SINTEG-V did not include any monetary incentives for the participation of other project participants that went beyond the mere support of the consortium partners. Although there was financial support in the SINTEG funding programme for the consortium partners, the

SINTEG-V was explicitly not intended to provide any additional incentives for participation, but only to compensate for financial disadvantages for the flexibility providers, or only for participants who were worse off compared to other project partners. It is therefore questionable whether the existing incentives of the SITNEG-V were sufficient to motivate the business-oriented actors to take a higher risk in the sense of innovation activity.

Obstacle 3.

Furthermore, the effectiveness of the SINTEG-V may have been limited by a potentially high administrative burden for the application procedure. In particular, the procedure for the reconciliation of evidence was carried out in many individual steps and at each of these steps the applicants had to submit numerous proofs of the facts. In addition, the evidence had to be certified by the auditor in order to verify that there was indeed an economic disadvantage for the applicant actors. This cumbersome resolution procedure may have been disproportionately burdensome for smaller players (small businesses, small installations and small consumers).

In addition, the SINTEG-V lacked a learning mechanism for the authorities to learn from the processes and to be able to adapt the SINTEG-V accordingly in the future.

Obstacle 4.

The rather narrowly defined scope of application and periods for compensation for disadvantages laid down in the SINTEG-V may also have constituted a relevant obstacle to innovation. This was also evident in the course of the interviews that there is a need for broader and more in-depth regulatory experiments than was made possible by SINTEG-V. The following example illustrates this: The role of network operators was unclear in the SINTEG-V. In addition to the network operators who were actively involved in model projects, there were also network operators who, although not active players, were obliged to take on certain tasks, were not covered by the SINTEG-V and its compensation for disadvantages. A specific regulation on where the network operators could be involved in the project activities and under what conditions would have increased the usefulness of the clause for the network operators concerned. As a result, the project participants offset the necessary expenses with their own funds and reduced the experiments to a minimum in order to keep their own financial losses at a low level.

The group of participants was also rather narrowly defined in the SINTEG-V, so that the regulations were only applicable to a certain group of actors and in practice mainly large industrial plants could make use of them, but smaller network users were disadvantaged.

In the next section, we take up the identified challenges of SINTEG-V and present approaches to address what we consider to be particularly relevant obstacles.

4. Two approaches to increase regulatory innovation

In light of the problem areas outlined above, we propose two courses of action to improve incentives and promote regulatory innovation. These two recommendations for action can be considered in isolation from each other, but are not mutually exclusive; on the contrary, they may be more likely to complement each other.

4.1. Recommendation for action 1: Experimentation budget

First of all, we propose the introduction of an experimentation budget to address the barriers identified above. The starting point here is the experimentation clause in the SINTEG-V, which creates a compensation for disadvantages: the existing regulations potentially result in economic disadvantages for participants in regulatory experiments, which are intended to be remedied by the compensation for disadvantages. As shown above, the experience with the experimentation clause in the SINTEG-V has been rather sobering. Above all, the regulation was perceived as too bureaucratic and there was a lack of real incentives to participate in the experiments, beyond compensation for disadvantages. The experimentation budget proposed here addresses these points.

An experimentation budget is similar to the experimentation clause in SINTEG-V, but the responsibility for implementation lies with the network operators. The central idea is that the network operators, after approval by the BNetzA, have an ex-ante defined budget at their disposal, which they can make available to third parties participating in an experiment, for example to compensate for disadvantages or, more generally, to incentivize participation. The network operators determine the experiment, the participants and their incentives. The task of the regulator is then limited to determining the budget and monitoring abuse, i.e. monitoring the proper use of the budget.

The experimental budget can be designed across network operators; the respective budgets would then flow into the corresponding revenue ceilings of the network operators involved. According to the principle of the budget approach, the revenue ceiling is adjusted annually to the agreed budget.

The implementation of the experimental budget is the responsibility of the network operator. The network operator is then free, for example, to award a kind of lump-sum participation bonus. There are several advantages to this approach:

- The experimentation budget explicitly refrains from cost-neutral compensation for disadvantages and instead relies on proactive incentives to participate. This enables the network operator to motivate network users to participate in the projects through an economic incentive. As a result, however, the participants would assume a certain risk (for example, if the bonus does not compensate for all economic disadvantages).
- Another advantage of setting the flat-rate participation bonus ex ante is that it significantly reduces legal uncertainty for the recipients of the bonus. While there is uncertainty about the amount and timing of disadvantage compensation in an ex-post system, such as that provided for in SINTEG-V in the context of disadvantage compensation, this would be remedied by an ex-ante system with lump sums.
- The administrative effort for implementing the budget is largely the responsibility of the network operators. In this context, the effort for these could be significantly reduced by eliminating the obligation to provide proof for every compensation, as applied in the case of the compensation for disadvantages under the SINTEG-V.
- If the administrative hurdles are effectively reduced by the experimental budget, a broader group of actors could be involved in the experiments.

In particular, when implementing the experimental budget, the size of the budget should be set in such a way as to achieve a sufficient incentive effect without generating excessive costs. In

addition, care must be taken to ensure that the implementation is carried out in accordance with state aid law, as the participation bonus is paid to external third parties, which could also be companies in pan-European competition.

4.2. Recommendation 2: Regulatory Innovation Trial

The need to enable regulatory experiments has already been recognized by the legislator. Within the framework of SINTEG-V and analogous approaches that apply to regulatory sandboxes, it should become possible to deviate from the existing regulatory framework in order to test innovations. As already described in Chapter 2, however, a distinction must be made between two approaches: Both the SINTEG-V and regulatory sandboxes aim to test technical and administrative innovations and business models, whereby the limits of the existing regulatory framework are affected but not exceeded. Internationally, these approaches are described as regulatory sandboxes. This approach is characterized by the fact that the development of new business models is the central object of experimentation.

This should be distinguished from RITs, which aim to test new or changed regulatory options in a real-world environment and to assess their impact before permanent implementation. The key here is that the regulatory framework for the experiments is designed with the regulatory authorities and that experiments are carried out under the supervision of the regulator. Thus, RITs are specific instruments for testing an adaptation of regulation. For example, a RIT would be a good way to test approaches such as the experimental budget proposed here for their effectiveness and applicability. A RIT itself is not a specific funding instrument, but it allows for the flexible and unbureaucratic development of such instruments.

The following framework conditions should be taken into account in a concrete implementation and should initially be further specified:

- Object of experimentation: The regulation from which deviations are to be made must be specified precisely. In particular, it should be clear where the regulation leads to barriers and the alternatives to be tested should be specified precisely.
- Limitation of time: Depending on the object of the experiment, different periods of time may be appropriate for the experiment. Therefore, the concept should also allow for potential differentiation in the duration of the experiments.
- Financial incentives: Ex ante it should be clarified which actors are affected by the experiment and how, which actors are of particular relevance to the experiment and should therefore be incentivised to participate, where financial disadvantages may occur, and how these financial disadvantages can be addressed. In addition, it should also be clarified how any financial benefits will be handled.
- Interfaces with the regulator: In order to ensure regulatory learning on the part of both the actors in the energy system and the regulator, a detailed monitoring and evaluation concept should be developed to ensure a regular exchange between the actors involved in the experiment and the regulatory authority. On the one hand, this is to ensure that no undesirable negative effects or distortions occur in the overall market activity as a result of the experiments, or that these distortions can be responded to accordingly by the regulator if they occur. On the other hand, this is intended to ensure an exchange of content on the findings of the experiments with the regulator in order to enable the most efficient possible translation of the findings from the experiments into the regulatory framework.

The key advantage of RITs is that innovative regulatory approaches and their design details and impact can first be tested before the ARegV is formally amended. The basis of the RITs would then be a regulation within the incentive regtulation of the network operators (AregV) that would grant the possibility of RITs. The details of the design, framework conditions and regulatory requirements of the actual experiments should then to be worked out with the BNetzA in an administrative file (Fietze, 2020). Another advantage is that the ARegV does not have to be adapted directly, which means that innovative regulations can be tested more quickly and flexibly.

One challenge for the implementation of a RIT is the lack of experience with this approach. A RIT is a test procedure and in this sense requires a specific design and methodology to evaluate the results. This turns out to be difficult in practice (cf. Bischoff et al., 2020).

4.3. How can qualifying projects be determined?

For both approaches, the experimental budget and the RIT, the selection of qualifying projects is critical in order not to integrate new inefficiencies through the two aaproches into regulation. The basic idea of the above recommendations is explicitly that they are only used in qualifying use cases and do not become the rule of incentive regulation. In order to keep the effort reasonable, a minimum limit for the project size (e.g. in turnover) should be applied.

The application is therefore limited to a small class of clearly definable and identifiable projects. However, the question arises as to how the projects could be selected. We see two variants for this.

Option 1: Qualifying projects are specified in the ARegV.

First of all, a procedure similar to the one currently implemented in § 23 ARegV for investment measures could be applied in order to qualify the projects for the experiment budget or RIT. Although § 23 ARegV does no longer apply from the 4th regulatory period and was replaced by § 10a ARegV by the capital cost comparison, the provisions of § 23 ARegV are still helpful as an orientation for a possible implementation of the present proposal. The background to § 23 ARegV was that the investment incentives for some projects under the standard scheme of incentive regulation were insufficient. For this reason, such projects fall within the scope of the investment measures under § 23 of the ARegV; essentially, § 23 ARegV eliminates the delay until the next regulatory period in the case of an investment. Paragraph 23(3) of the ARegV specifies that the network operators themselves submit the application; i.e. § 23 ARegV is not automatically applied.

The qualifying project groups are specified in § 23 para. 1 ARegV, e.g.:

1. Grid expansion measures intended to connect electricity generation installations in accordance with Paragraph 17(1) of the Law on the Energy Industry (EnWG);
2. The integration of installations covered by the Renewable Energy Sources Act and the Combined Heat and Power Act.'

The groups are in themselves quite general, but there is a distortion associated with each group, in the sense that the investment incentives under the basic regulation of the ARegV are not sufficient. The wording in the first example also suggests that government requirements

are often affected, for which the network operators have neither freedom to invest nor can determine the timing of the investment.

The exact wording of Paragraph 23(1) of the ARegV reads as follows:

'The Federal Network Agency shall approve investment measures for expansion and restructuring investments in the transmission and transmission networks to the extent that such investments are necessary for the stability of the overall system, for integration into the national or international interconnected grid or for a needs-based expansion of the energy supply network in accordance with Paragraph 11 of the Energy Industry Act.'

This wording is not applicable to the subject matter of this essay. First, the emphasis is on investment (i.e. CAPEX), whereas in the present context of regulatory experimentation, OPEX is more concerned. Second, this essay focuses on innovative, high-risk projects that are not the focus of § 23 ARegV. Thirdly, Paragraph 23 of the ARegV concerns projects aimed at ensuring the stability of the system as a whole; The topic in this essay, on the other hand, primarily concerns digitization projects, which can have a wide variety of goals. An alternative formulation for "innovative measure" comes from Art. 13b StromVV (as of 01.01.2021) in Switzerland.

"An innovative measure for smart grids is the testing and use of novel methods and products from research and development for the purpose of increasing the security, performance or efficiency of the grid in the future."

In the above formulation, the innovation measure emphasizes the use and testing of the innovation. In addition, the objective is so broad that it also includes increasing the efficiency of the network.

Option 2: The network operator submits an application

An alternative approach to identify suitable projects for the experimental budget or RIT would be an open application process, which could be initiated by the network operators. In this context, two essential criteria can be applied:

- A minimum scope that ensures that transaction costs are not prohibitively high compared to the scope of the project. This demand could be extended as a kind of social cost-benefit analysis by showing that the project has positive net welfare effects.
- A second requirement would be to justify the alternative procedure by demonstrating that there is a project-specific regulatory bias in the basic procedure.

  Similar criteria have already been established in a different regulatory context. Article 13 of the PCI Regulation 2013 (EC, 2013) aims to improve incentives for higher risk projects of common interest (PCIs), including through priority premiums. A priority premium is a risk-equivalent project-specific increase in the permissible return on capital. The priority premium should be requested by the promoter from the relevant regulator. ACER (2014) has developed a 7-step procedure for these applications, with the burden of proof on the promoter:

- Step 1: Availability of information about project risks

- Step 2: Identify the nature of the risk from a regulatory perspective
    - The risk of cost overruns
    - The risk of timeouts
    - The risk of stranded assets
    - Risks related to the determination of actual costs incurred
    - Liquidity risk

- Step 3: Risk mitigation measures by project promoters
- Step 4: Assess systematic risk and determine the cost of capital
- Step 5: Risk mitigation measures already applied by NRAs
- Step 6: Quantify the risk
- Step 7: Comparable project

Steps 2 and 3 are particularly important here. These include the requirement that the applicant network operator credibly demonstrates that the project-specific risk is higher than for usual projects and is therefore not covered by the average fixed return on capital. Such proof is challenging, but in the above procedure, the burden of proof lies with the network operator rather than the regulator. In principle, an analogous approach could be used in the selection of projects that should fall under the experimental budget or RIT, whereby it would then be necessary to develop an analogous catalogue of requirements suitable for the given topic. As a guideline, the regulations for the selection of PCIs are quite suitable.

5. Conclusions and outlook

The energy transition requires significant innovation activities, including the participation of grid operators. In addition to technical innovations, such innovation activities are usually aimed at the use of new digital approaches where the pressure to innovate is particularly high. Especially for innovations for the use of digital applications, there are the following central challenges, which are insufficiently addressed by the existing regulations on innovation activities (§ 25a ARegV) and the experimental spaces (SINTEG, regulatory sandboxes, etc.).

On the one hand, innovations are often limited by the existing regulatory framework. Therefore, there is a particular need for innovation activities to further develop the regulatory framework. However, there is currently still a lack of suitable framework conditions that enable such regulatory experiments. On the other hand, the innovation activities of network operators often require that network users are also actively involved in development and testing. However, there is currently a lack of incentives for network users to participate in such innovation activities. In addition, innovation activities lead to spillover effects: an innovator bears the costs of the innovation process, but the benefits of a successful innovation benefit a much larger group without the innovator benefiting fully from these benefits.

The limitation of innovative activity within the existing regulatory framework can be illustrated by the SINTEG projects carried out. To this end, experiences with the SINTEG projects were analysed. The following barriers to the effective use of SINTEG-V have been identified:

- legal uncertainty, in particular as regards the precise definition of the offence covered by the SINTEG-V;
- economic risk related to the ex-ante cost recognition procedure and the lack of monetary incentives for the participation of other project participants;

- administrative burden, related to the application process, and
- narrow scope, which covers the group of potential project participants and focused on a few regulatory exceptions.

In this paper, we propose two complementary recommendations for action on the topic of innovations and regulatory experimentatin. Both can be designed across network operators in order to promote cooperation.

On the one hand, the introduction of an experimentation budget: An experimentation budget is similar to the experimentation clause in SINTEG-V, but the responsibility for implementation lies with the network operators. The central idea is that the network operators have an ex-ante defined and approved budget available for third participants in an experiment, e.g. to incentivize participation.

Second, the introduction of Regulatory Innovation Trials (RIT): A RIT aims to test new or changed regulatory options in a real-world environment and assess their impact before they are permanently introduced. RITs would therefore also be suitable for testing approaches such as the experimentation budget proposed here for their effectiveness and applicability. A RIT itself is not a specific funding instrument, but it allows for the flexible and unbureaucratic development of such instruments.

The proposals presented here outline an approach to increase the innovation activity of network operators in the context of regulatory experiments. However, there are still various questions in this context that require further investigation. In addition to a more specific design of the instruments outlined, the question arises on the one hand as to how the costs of the respective projects can be differentiated from other project activities of the network operators, in particular in order to reduce disincentives. On the other hand, further research should be carried out on how exactly the projects that should be implemented under the RIT or the experimentation budget can be identified and evaluated in order to ensure that these projects do indeed address a regulatory barrier and bring economic added value.

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