

Ei R2023:11

Innovation centre and regulatory sandboxes

Model proposal and implementation for the energy markets in Sweden

The Swedish Energy Markets Inspectorate (Ei) is an authority that is commissioned to strive for well-functioning energy markets.

The overall objective of our work is for Sweden to have well-functioning distribution and trading of electricity, district heating, district cooling and natural gas. We shall also address the concerns of customers and strengthen their positions in the markets.

In concrete terms, this means that we supervise the compliance of companies with the regulatory frameworks. We are also responsible for drawing up the rules of the game and for informing customers about their implementation. We regulate the terms and conditions for the monopoly companies that operate the electricity and natural gas networks, and we supervise the companies in the competitive energy markets.

Energy markets need rules of the game – we ensure that those rules are followed.

Foreword

The energy system is changing and will continue to change at a pace and scale that is becoming increasingly apparent. In the ongoing energy transition, innovation has a crucial role to play in tackling current and future challenges. Increasingly higher demands are being placed on regulatory authorities to deal with complex problems and to be ready to deal with the as yet unknown.

In its operational plan for 2022, the Swedish Energy Markets Inspectorate (Ei) states that the challenges arising from the energy transition combined with society's increased demand for electricity require extensive changes to the regulatory framework in the energy area. For this reason, Ei has initiated a project to investigate the conditions and has drawn up a proposal for how a model for experimentation and regulatory learning in the form of regulatory sandboxes can be implemented in Sweden. Regulatory sandboxes constitute a policy tool that makes it possible to grant time-limited exemptions from selected parts of regulatory frameworks for experimentation in real environments.

Ei considers it appropriate to implement a model for experimentation and regulatory learning in stages, starting with an innovation centre. Ei intends to establish an innovation centre that can serve as a first point of contact for market participants and innovators who are unsure of the rules, processes or principles in the energy markets. An innovation centre will allow Ei to provide information and specific guidance, while the centre can contribute to regulatory learning for the authority.

An innovation centre will mean that the authority is in a better position to meet the needs of the market and the recommendations and proposals on regulatory sandboxes *or regulatory greenhouses* that come from the Council of the European Union, the Commission and CEER, and which aim to facilitate the extensive energy transition that is in progress. This report is an abridged version of the Swedish report *Ei R2023:23 Innovationscenter och regulatoriska sandlådor. Modellförslag och implementering för energimarknaderna i Sverige.*

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Summary

The energy system is changing and will continue to change at a pace and scale that is becoming increasingly apparent. The need to test new products, services and business models in the energy market has increased, while adaptation of the regulatory framework has not always kept pace. Increasingly higher demands are being placed on regulatory authorities to deal with complex problems and to be ready to deal with the as yet unknown. In its operational plan for 2022, the Swedish Energy Markets Inspectorate (Ei) states that the challenges arising from the energy transition combined with society's increased demand for electricity require extensive changes to the regulatory framework in the energy area. For this reason, Ei has initiated a project to investigate the conditions and has drawn up a proposal for how a model for experimentation and regulatory learning in the form of regulatory sandboxes can be implemented in Sweden. The work has been carried out with the help of a consultancy study as well as an external and internal reference group. This report is an abridged version of the Swedish report *Ei R2023:23 Innovationscenter och regulatoriska sandlådor. Modellförslag och implementering för energimarknaderna i Sverige.*

The purpose of the project is to investigate the prerequisites and develop a proposed model for how regulatory sandboxes can be implemented in Sweden, as well as to answer the following questions:

- What form should the legal framework take in order to implement regulatory sandboxes in the energy market?
- What measures can be taken to ensure that the regulatory authority does not favour one actor over others, and how can this be managed?
- Who should choose who can and cannot participate in the regulatory sandbox?
- The authority must not expose consumers to unnecessary risks. How is consumer protection ensured?
- The regulatory sandbox is time-limited – what happens when the time runs out?
- Should funding opportunities be linked to a regulatory sandbox, and if so, what form should funding take?

Ei has engaged a consultant to carry out a study that includes market intelligence and analysis of the design and function of regulatory sandboxes in other countries,

as well as a model proposal for the implementation of regulatory sandboxes in Sweden. The consultancy assignment has been reported separately during the course of the project.¹ Ei has also held focus group interviews, arranged seminars and sent out questionnaire surveys to an external reference group.

Regulatory sandboxes constitute a policy tool that makes it possible to conduct experimentation by granting time-limited exemptions from selected parts of the regulatory framework. This can give innovators and participants the opportunity to test new innovative products, services or business models in real environments under controlled conditions and for a limited time. Experience from other countries shows that regulatory sandboxes have contributed to learning for regulatory authorities by carrying out sandbox activities as well as related information centres or innovation centres. In addition to the regulatory learning, an innovation centre has been shown to provide an important interface with market participants through which the regulatory authority can gain an in-depth view of developments in areas with a high level of innovation.

Regulatory sandboxes are attracting attention in the energy market area within the EU. In November 2020, the Council of the European Union urged the European Commission to continue to use experimentation clauses when drafting and reviewing legislation and to evaluate the use of experimentation clauses. The European Commission's plan (C/2022/3219) of 18 May 2022 to reduce dependence on Russian fossil fuels and to accelerate the energy transition includes a number of recommendations to speed up licensing procedures for renewable energy. The Member States are urged to implement regulatory sandboxes that can grant exemptions from national, regional or local regulatory frameworks for innovative technologies, products, services or work methods.

The exemptions should facilitate licensing for the expansion and system integration of renewable generation, energy storage and other technologies for a fossil-free energy system, in line with the European regulatory framework. Barriers resulting from licensing procedures can affect the future use of innovative technologies for reducing carbon-dioxide emissions and the Commission considers that regulatory sandboxes can encourage innovation and facilitate the adaptation of the regulatory framework in order to include new innovative products, services or strategies (European Commission 2022c).

The Commission intends to present a more detailed strategy for the use of regulatory sandboxes in the second quarter of 2023 (Tillväxtverket 2022, European Commission 2022b). Regulatory sandboxes are also among the tools identified by

¹ Regulatoriska sandlådor inom energimarknadsområdet, Merlin & Metis (2022)

Council of European Energy Regulators (CEER) for achieving dynamic regulation, and are described as a crucial part of the strategy for 2022–2025 (CEER 2021).

A model for experimentation and regulatory learning

The proposal for a model includes an innovation centre and a regulatory sandbox that can be implemented in stages. As a first step, Ei intends to set up an innovation centre, where innovators can find information and guidance on the regulatory framework of the energy market. An innovation centre can be implemented without changing the law, within the framework of Ei's commission to promote the functioning of the markets, which is set out in Regulation (2016:742) with instructions for the Swedish Energy Markets Inspectorate.

An innovation centre can perform many different functions as well as contribute to information, the dissemination of knowledge and regulatory development. Among other things, an innovation centre can provide information and guidance to innovators or other market participants and coordinate the authority's knowledge about new innovations. In the British innovation-driven sandbox, it became evident that a majority of the applications did not need an exemption from the legislation in force since many of the innovations could be tested within the existing regulatory framework. An innovation centre also has the opportunity to participate in and contribute knowledge to Nordic collaborations and any cross-sectoral collaboration initiatives, as well as participate in European sandbox activities within the International Smart Grid Action Network (ISGAN) and CEER.

An innovation centre can provide information about energy market regulation, as requested by market participants, and can therefore increase the pace of innovation in order to facilitate an effective energy transition. Ei can use the innovation centre to provide important guidance on existing legislation without providing information that could be interpreted as an advance decision. Any future implementation of regulatory sandboxes will require further investigation in order to identify which chapters and provisions should be covered by an experimentation clause. An innovation centre can contribute to the investigation on how the legal framework for regulatory sandboxes should be designed.

Overall framework for experimentation and regulatory learning

The model for experimentation could be designed as follows for effective implementation.

- **Governance.** The proposal is that Ei, in its capacity as regulatory authority, should be responsible for designing and managing an innovation centre and any future sandboxes.

- **Policy and innovation-driven sandboxes.** The design objective of a legal framework should be compatibility with both innovation-driven and policy-driven sandboxes, but without a requirement for policy-driven sandboxes to be implemented. In a policy-driven sandbox, the regulatory authority designs the exemption(s) to be tested and the activity is based on the ambition of the regulatory authority to achieve a specific objective. For example, this could be to promote more environmentally friendly electricity generation and more demand flexibility, or to evaluate the design of future regulatory frameworks. In an innovation-driven sandbox, the innovators themselves identify and apply for exemptions with regard to new business ideas that they want to realise.
- **Need for a legal framework.** A regulatory framework for regulatory sandboxes should set out the conditions under which exemptions can be granted as well as specify assessment criteria for the regulatory sandboxes. Assessment criteria and other criteria can ensure that parties applying for a sandbox meet minimum requirements for safe and appropriate testing activities. A prerequisite for providing services subject to licensing is that the activity meets certain basic criteria, in order not to risk damaging the confidence of the market or consumers. An application for a sandbox should be subject to an eligibility criterion that the applicant has carried out consultations with parties affected. The new regulatory framework should specify the conditions under which an exemption decision can be revoked and that exemption decisions can be subject to conditions. Experimentation is associated with risks and a clear regulation sets the frameworks for how to manage these risks.
- **Authorisation and test boundaries.** Parties that operate or plan to operate in the energy market should be granted authorisation to apply for a sandbox through an objective selection based on the principles of legality and equal treatment. Sandbox test boundaries should include specifying the time and scope of the experimentation, as well as having a developed evaluation strategy and exit strategy and a developed consumer protection plan.
- **Time frames.** A suitable duration for a test period may be 2–4 years in order to provide sufficient evaluation data.
- **Funding.** Ei shall not contribute funding to the projects granted exemptions for regulatory sandboxes.
- **Exit strategy and evaluation.** A developed evaluation strategy will help to protect conflicting interests and can provide a basis for regulatory learning for the regulatory authority. An exit strategy is an important tool to ensure that the experimentation is concluded with a view to capitalising on the lessons

learned during the course of the experimentation and that any risks on exit are safely managed. It should therefore be a requirement that an evaluation strategy and an exit strategy are enclosed with the application and form the basis for the licensing assessment procedure. Requirements on the design of the evaluation and exit strategy should be set out in the legal framework, as they are of great importance for ensuring the safe execution of the experimentation. It is beneficial if the exit strategy and evaluation are stated in law as a requirement for the execution of the experimentation. The sandbox activity should be reviewed in independent evaluations on a regular basis.

With the proposals it presents in this report, Ei is in a better position to address the recommendations and proposals on regulatory sandboxes or *regulatory greenhouses* from the Council of the European Union, the Commission and CEER. The Council of the European Union has urged the Commission to continue to use regulatory sandboxes and experimentation clauses when drafting and reviewing legislation. The Commission will present a more detailed strategy for the use of regulatory sandboxes in the second quarter of 2023.

In a recommendation, the Commission highlights the opportunity for regulatory sandboxes to encourage innovation and facilitate the adaptation of the regulatory framework in order to cover new types of technologies, products, services or strategies. The Commission considers that sandboxes can therefore contribute to managing the energy transition and serve as a step towards mitigating the effects of the energy crisis that Europe is facing. CEER has identified regulatory sandboxes as a key part of its strategy for regulatory authorities to be able to address the energy transition.

The changing energy landscape brings challenges, and increasingly higher demands are being placed on regulatory authorities to deal with complex problems and to be ready to deal with the as yet unknown. With an innovation centre, the Ei will be in a better position to meet the demand for regulatory guidance from market participants and other stakeholders, as well as work more pro-actively on innovative solutions whose placement in the regulatory framework is unclear. Ei can also enhance its knowledge of new innovative services, strengthen its collective capacity and meet the need of the market for efficient and effective regulatory development.

1 Background, need and areas of use for regulatory sandboxes

Regulatory sandboxes (also referred to as *regulatory greenhouses*) constitute a policy tool that makes it possible to conduct experimentation by granting time-limited exemptions from selected parts of the regulatory framework. Exemptions can give innovators and participants the opportunity to test new innovative products, services or business models in real environments under controlled conditions and for a limited time.

European regulatory authorities and stakeholders are increasingly recognising regulatory sandboxes and other tools that promote innovation. The Council of European Energy Regulators (CEER) has previously identified regulatory sandboxes as a key tool for dynamic regulation, and they are described as a key part of the strategy for 2022–2025 (CEER 2021). The sandboxes are closely related to and can be considered as complementary to pilot projects, regulatory experiments and pilot regulations (CEER 2022b).

No two sandboxes are identical, but they are adapted to the different regulatory frameworks in which they are to be implemented in order to achieve the requested results. Despite the differences, most sandboxes share three distinctive characteristics. They are time-limited, focused on regulatory learning and involve exemptions from the regulatory framework. Another common denominator is that the objective of the majority of sandboxes is to use innovation to accelerate the energy transition (CEER 2022b).

In Swedish legislation, there are already various examples of types of exemptions for experimentation and enabling innovation in other regulated activities, such as the Ordinance (2017:309) on Trial Operation with Self-driving Vehicles.

Experimentation clauses² are *special provisions* that allow deviations or exemptions from the regulation they are included in. For example, it may mean that not all applicable conditions for a licence to operate need to be met or that certain requirements are waived during a trial period.

² Experimentation clauses, often the legal basis for regulatory sandboxes, are defined as "legal provisions which enable the authorities tasked with implementing and enforcing the legislation to exercise on a case-by-case basis a degree of flexibility in relation to testing innovative technologies, products, services or approaches." (Council of the European Union 2020).

CEER has stated that national energy regulatory authorities face a challenge in keeping up with changes in the energy sector and in ensuring that the regulatory framework in force does not create barriers to innovation (Schittekatte 2021 et al.). Research and innovation are key elements of the energy system of the future in order that Sweden does not fall behind in competition and innovation. Digitalisation and the transition to a sustainable and climate-neutral society promote the development of new products, services and business models, but when new technologies and new services meet existing regulatory frameworks, questions and challenges may arise. CEER highlights the challenges faced by national energy regulatory authorities to keep up with changes in the energy sector, and to ensure that regulations in force do not create barriers to innovation, while continuing to empower and protect consumers during an ongoing energy transition (Schittekatte 2021 et al.).

Regulatory sandboxes have been implemented in a number of countries with energy market regulations similar to those in Sweden. The sandboxes do not have a common standard design, but their design is based on the legal conditions in each country and on considerations of resources, efficiency and needs. Their implementation has also taken place at different times, which means that they have been adapted to the expanded European regulatory framework in the energy market area at different stages of the sandbox process.

The Council of the European Union urged the European Commission in November 2020 to continue to use regulatory sandboxes and experimentation clauses when drafting and reviewing legislation (Council of the European Union 2020b). The Commission's plan (C/2022/3219) of 18 May 2022 includes a number of recommendations to speed up licensing procedures for renewable energy. The Member States are urged to implement regulatory sandboxes that can grant exemptions from national, regional or local regulatory frameworks for innovative technologies, products, services or work methods. The exemptions are intended to facilitate licensing for the expansion and system integration of renewable energy, storage and other technologies for a fossil-free energy system (European Commission 2022a). Barriers resulting from licensing procedures can affect the future use of innovative technologies for reducing carbon-dioxide emissions and the Commission considers that regulatory sandboxes can encourage innovation and facilitate the adaptation of the regulatory framework in order to include new innovative products, services or strategies (European Commission 2022c).

Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity (Electricity Market Regulation) Article 5 also empowers Member States to grant exemptions from balance responsibility for demonstration projects of limited in time and scope. Common guidelines for regulatory sandboxes within the EU are being drawn up and will be presented by

the Commission in the first half of 2023. Common regulatory sandboxes and experimentation clauses for the whole of the EU are also being drawn up (Tillväxtverket 2022, European Commission 2022b).

In Sweden, the Committee for Technological Innovation and Ethics (Komet) has been tasked by the Government to draw up proposals for responsible, innovative and collaborative management that, among other things, relates to the energy transition (SOU 2022:68). They highlight that current and future challenges in the energy system require that new solutions can be used when necessary, but that technological development and regulatory development are currently uncoordinated. The Swedish Agency for Economic and Regional Growth (Tillväxtverket) also highlights the problem of coordination that "[r]egulatory processes are considered to be slower than rapid technological development requires." (Tillväxtverket 2022:10) Komet considers that experimentation is an adaptable approach with the potential to be a structured, exploratory and learning working method for developing and introducing new solutions. On this basis, Komet proposes that the Government should develop a national testing strategy and set up a committee to handle notifications of regulatory obstacles (Komet 2020, 2022).

Cross-sectoral issues can be or be close to being the type of dilemmas sometimes referred to in research as "*wicked problems*". Such problems are characterised by being changeable and difficult to define, among other things, and sometimes require new ways of thinking. Authorities currently find it difficult to deal with complex and cross-sectoral issues and societal challenges, and this can hinder innovation if these challenges are not met by appropriate rules and working methods. In addition, Komet describes that there may also be a lack of clarity among the licensing authorities affected regarding the placement of new innovative solutions in the regulatory framework, and that collaboration between authorities is required in order to address and clarify such issues so that the public sector can jointly take overall responsibility. Komet's conclusion is that working methods in public administration need to become more dynamic and adaptable and that the public authorities need to strengthen their ability to manage cross-sectoral issues (SOU 2022:68).

Komet proposes the establishment of a collaboration accelerator in order to strengthen the ability of Swedish authorities to jointly, pro-actively and with a holistic perspective manage cross-sectoral issues linked to the development or use of new technology and other new solutions. The proposal is that the collaboration accelerator should consist of one or more authorities or a committee that, through collaboration between authorities, can accelerate the effective management of cross-sectoral issues where major societal transitions need to take place quickly.

The idea is that the proposal will contribute to system solutions that can enable, among other things, energy efficiency and climate transition (ibid.).

1.1 Scope for innovation in the existing regulatory framework

The national regulatory framework for the electricity markets already allows for exemptions and dispensations from certain provisions, which can facilitate the development and establishment of innovation and new types of activities. One of the more extensive exemptions applies to Chapter 2, Section 5 of the Electricity Act (1997:857) and an associated regulation's exemption from the requirement that high-voltage power lines may not be built or used without a permit. The permits are called network concessions and, in addition to a licensing assessment procedure, they mean that the holder of the network concession is subject to a connection obligation and associated requirements for the transmission of electricity and network operations. The regulation regulates the types of internal networks, i.e. electricity cables within and between electrical installations for consumption, production and energy storage, which do not have to be included in the licensed electricity network. The exemption of such **internal networks from the requirement for a network concession** means, among other things, that self-generated and stored electricity can be shared between several installations and consumers without initial transmission on the licensed network. When the electricity does not need to be transmitted via the licensed network, customers avoid a number of costs, including energy tax and having to pay for electricity by using their own, provided that the electricity meets the other criteria for being exempt from tax liability under Chapter 11, Section 2, first paragraph 1 and the second and third paragraphs of the Energy Tax Act (1994:1776). Customers will therefore have a greater opportunity to optimise the use of their installations themselves, and reduce the load on the electricity networks.

The Regulation on exemptions from the requirement for a network concession has been updated several times to cover more types of new installations, and there is a legislative proposal for further additions (Ei 2022g). Among other things, provisions on energy sharing have been introduced to facilitate energy communities. However, the regulation is designed to limit the exemptions to the networks listed in the paragraphs and does not leave any scope for general reasonableness assessments (M4202-22). This means that new types of internal networks cannot be tested and evaluated in real environments before new exemptions are written into the regulation. The regulation contains an exemption for research activities within areas of public and private institutions, but not for research or experimentation in what should otherwise be licensed networks. The regulatory framework also does not include time-limited exemptions and there is no licensing assessment procedure for the internal networks.

The licensing assessment procedure for electrical cables at higher voltage levels under Chapter 2, Section 1 of the Electricity Act usually includes both an assessment of the suitability of the cable and an assessment under the Environmental Code. The construction of an electricity cable usually requires additional permits, involving environmental assessments for various types of exemptions as well as right-of-way surveys. Sometimes permits under the Heritage Conservation Act are also required. In 2021, Chapter 2, Sections 27–28 of the Electricity Act were introduced, which **deviate from the complete licensing assessment procedure** when changing existing permits. Pursuant to Section 17 of the Utility Easements Act (1973:1144), Ei can decide that a right-of-way survey may be initiated even before a network concession has been granted, which is an exemption from the normal licensing procedure. Since 2021, it has been possible to decide that only part of the survey shall be allowed to commence. Ei is also working on a government assignment to develop further innovative working methods that can speed up the licensing procedure for the expansion of the electricity network. The assignment is called "Shorter lead times" and will, among other things, identify legal obstacles and propose legislative amendments (Ei 2022c).

Sections 5-6 of the Ordinance (2021:808) on Network Concessions contain provisions on what an application for a network concession for a cable must contain, including technical and economic information that forms the basis for the suitability assessment of the cable that is carried out in accordance with Chapter 2, Section 12 of the Electricity Act. Requirements for other types of applications for network concessions are regulated in Sections 7–14. Section 16 states that Ei is able to grant exemptions from the requirements in individual cases. This means, among other things, that Ei can exercise a certain flexibility regarding the scope and degree of detail in the suitability assessment, in order to **develop its working methods in the licensing procedure**, provided that the authority complies with the objectivity requirement in Section 5, second paragraph of the Swedish Administrative Procedure Act, (2017:900) that the authority must be objective and impartial in its activities. Pursuant to Section 21, Ei can also issue more detailed regulations on the requirements for applications. At the time of this report, no such regulations have been drawn up.

Since 2018, pursuant to Chapter 4, Sections 31–32 of the Electricity Act, electricity utilities have been able to **test new electricity network tariffs** in so-called pilot projects, in order to investigate how the electricity network can be used more efficiently in an innovative way. The aim is to test tariffs that can stimulate demand flexibility, and to develop the tariffs in order to stimulate the type of flexibility that is necessary within a utility's network area. The exemption is only applicable within the local electricity network and includes the requirement that

tariffs may not be designed with regard to the location of the connection in the electricity network. The requirements remain that the tariffs must be non-discriminatory and objective, which means that the same tariff must be offered to all customers within the restricted circle covered by the pilot project. A permit from Ei is required if the testing activities shall continue for more than three years. Ei has received three applications for an extended test period (Ei 2022b).

A number of the provisions in the Electricity Act that impose requirements on network operations also allow Ei to grant **exemptions** to varying extents. For example, the Electricity Market Directive 2019/994 requires the introduction of a prohibition on network companies owning, developing, managing or operating an energy storage facility. If the prohibition causes difficulties for network operations, such problems must be dealt with through the opportunities for exemptions allowed by the directive. In the government bill, the Government has set out that there is no reason to include all of the detailed regulations required in order to facilitate exemptions in the Electricity Act. The Government also does not see any advantage in introducing general provisions in law with regard to this exemption, but considers that the Government should be able to issue regulations to the effect that Ei may grant exemptions (Ei 2022d). The prohibition is regulated in Chapter 3, Sections 39 and 40 of the Electricity Act, and Ei may grant exemptions on the basis of Sections 19–22 of the Ordinance (2022:585) on Electricity Network Operations.

Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity (Electricity Market Regulation), Article 5 empowers Member States to grant exemptions from **balance responsibility for demonstration projects** of limited in time and scope. In the Regulation, a demonstration project is defined as a project that demonstrates first-of-a-kind technology in the Union and represents an important innovation that outperforms previously known technology by a wide margin. The Regulation applies directly as national law and paves the way for the possibility of granting exemptions from balance responsibility in regulatory sandboxes. There are no national regulatory frameworks for how the licensing assessment procedure for such exemptions should take place.

Article 16 of the Electricity Market Directive 2019/994 contains provisions on citizen energy communities, and Article 22 of the Renewable Energy Directive 2018/2001 contains provisions on renewable energy communities. The Government has, in government bill 2021/22:153, assessed that there are no obstacles to forming **energy communities** in Sweden and that there is currently no need for new legislation in order to implement the rules on energy communities in each directive.

Article 38 of the Electricity Market Directive 2019/994 contains provisions on so-called **closed distribution systems**. Member States may stipulate that transmission system operators of certain types of distribution networks shall be exempted from certain specified obligations. The exemption option applies to distribution networks in industrial and commercial areas, as well as in areas where shared services are provided, that are used to maximise the efficiency of an integrated supply system that requires specific operational standards or is maintained primarily for use by the system owner. The obligations that may be subject to the exemptions are listed in the Directive and are considered to constitute an unnecessary administrative burden due to the special relationship between the transmission system operator of the distribution system and system users. The exemptions include provisions on unbundling of network operations from other types of activity, certain market-based procedures and network tariffs. The provisions of the Directive on closed distribution systems have not been implemented in the Electricity Act, but Ei has drawn up a legislative proposal on behalf of the Government (Ei 2022g).

In the market intelligence, an Austrian study found that energy types distributed via networks are usually the most regulated and therefore most in need of sandboxes. District heating and district cooling, with mainly regional distribution, are similarly considered to be subject to less regulation (Veseli et al 2021). Resource limitations have meant that the current project has not been able to identify in detail the need for exemptions for innovation in the existing regulatory frameworks for natural gas, district heating or district cooling. The need for sectoral integration in the energy transition may be a reason to further investigate exemptions for innovation in these regulatory frameworks and the interaction between the energy types that are currently regulated separately.

1.2 Needs and potential areas of use of market participants

The project has assembled an external reference group consisting of a broad mix of participants and representatives from authorities and academia. The dialogue has been conducted in the form of focus group interviews and a questionnaire survey for the external reference group. On behalf of Ei, Merlin & Metis (2022) interviewed market participants, Swedish public authorities and foreign public authorities with experience of regulatory sandboxes. A summary of the views, needs and potential areas of use put forward by the external participants can be found below.

Positive view of regulatory sandboxes among market participants

A majority of the market participants are positive and request regulatory sandboxes. To facilitate the extensive energy transition that Sweden is undergoing

requires an awareness of and a dynamic approach to structural and regulatory changes. Merlin & Metis (2022) highlight that respondents felt that regulatory frameworks have a tendency to fall behind market development and that this may risk slowing down the pace of innovation. Several interviewees expressed the need for a better dialogue with Ei with regard to the regulatory development.

When asked about the potential of the sandbox, market participants consider the sandbox to be a welcome addition in an increasingly changing energy market with its current and future challenges. Furthermore, it becomes clear that many participants are struggling with similar issues. Some respondents highlight the potential value of mutual learning about the development of the market, and the potential for a sandbox activity to promote transparency and innovation in the energy market through the dissemination of assessments and insights.

Regulatory frameworks that are difficult to navigate create uncertainty for market participants

A central theme in the responses from the questionnaire survey and the focus group interviews is that legislation and regulations for the energy market area are perceived as difficult to navigate. This was also confirmed during round table discussions within Ei's EFFEKT dialogue project, where it was found that there is not always clarity about what applies in different regulatory frameworks. The perception of lack of clarity may in turn risk slowing down innovation, as it creates uncertainty among participants if they do not know whether a service or product may or can be used on the market. By including an information centre or innovation centre in the model for a regulatory sandbox, some respondents believe that participants may find it easier to navigate through a varied energy market landscape. Such a centre can also invite more and new market participants to have the opportunity to investigate whether their products, services or business models can be tested in a regulatory sandbox or get clarity on whether they can already be tested within the current regulatory framework (Ei 2022f).

An uncertainty also exists about how regulation and laws are designed and changed in the energy market area. This can be interpreted as another example of regulatory challenges, since the willingness to invest in innovations could be hampered if it was unclear how legislation would be developed in the future. One respondent raises an example of hydrogen infrastructure and the rules of the game in the natural gas market, and how the absence of legislation can inhibit investment.

Market participants are requesting both policy-driven and innovation-driven sandboxes

The interview respondents highlight the demand for both policy-driven and innovation-driven sandboxes and that Ei should take an increasingly proactive role in the development and adaptation of regulatory frameworks based on the needs

of the markets. Furthermore, it is argued that Ei should develop a deeper understanding of the development of the market and technology in order that market conditions can be developed for the needs of the future. It emerged from the interviews that policy-driven sandboxes can be considered to be more inclusive and by definition non-discriminatory, which can lead to better competition since the entire market can participate and learn from the sandboxes.

Perceived barriers and needs

The respondents highlight various examples of business models, products, or services that have been stopped or hindered by regulatory framework limitations, such as electricity network tariffs, dynamic power tariffs as an incentive for flexibility services in the revenue framework regulation, connection procedure, energy communities, standard codes and accounting in connection with investment projects, energy storage as well as increased proportion of biogas in the natural gas network. One respondent points out that electricity legislation is structured for a traditional centralised electricity system and that there have been successive legislative changes, but that there are barriers to balance responsibility and energy sharing within individual properties from photovoltaic installations. The regulatory framework has also been a barrier to smart control at property level.

With regard to which laws, regulations or other rules for innovation are considered to be barriers, participants also gave examples of EU legislation such as the Clean Energy Package and Commission regulations, specifically network connection of generators (RfG) and connection of consumers (DCC). One respondent highlights the lack of national rules of the game for hydrogen and, more specifically, clear practices for application. Some respondents refer to legislation that hinders innovation but does not fall under Ei's area of responsibility, such as consumer legislation, Energy Tax Act (1994:1776) (LSE), and data and security protection.

A further analysis of potential areas of use can be read in the Merlin & Metis (2022) consultancy report. Replies from the respondents need to be further investigated in order to analyse, among other things, future legislation, and what scope for exemptions there is in the European regulatory framework. Some of the areas put forward as barriers to innovation are not always regulatory obstacles, but they show a need for the dissemination of knowledge and clarification of regulatory frameworks. An information centre or innovation centre, among others, can contribute to and provide information and guidance to innovators or market participants when it comes to navigating the regulations.

It is currently possible to test some types of network tariffs within the framework of pilot projects. A potential problem with pilot tariffs, as highlighted by network owners, is that they can extend to too many customers, which can create an

unmanageable situation in some cases. Regulatory sandboxes can facilitate more limited and controlled experimentation. As described earlier in the chapter, pilot tariffs cannot currently be applied when connecting to the regional electricity network or the transmission network. Regulatory sandboxes could possibly fulfil this function.

In other dialogues with market participants, the question has been raised as to whether energy storage can be classified as a separate customer category. New types of energy storage facilities, such as batteries and hydrogen storage, have started to be connected or will be connected to the electricity network. The Electricity Act does not currently contain any special rules on network tariffs for energy storage. If energy storage facilities are considered to be classified as an individual or several different customer categories, special transmission tariffs for the facilities would be permitted. When the tariffs relate to a specific customer category, they can be adapted to the specific conditions of the customer type, and still comply with Chapter 4, Section 16 of the Electricity Act's requirement for objective and non-discriminatory conditions for transmission.

EU Member States have granted exemptions to energy storage from network charges or specific tariff rules. The exemptions may be specific to various technologies, applications or network services, but due to the diversity of storage technologies, potential applications and services, a case-by-case exemption system may be complex and difficult to apply in practice. Storage exemption systems could apply only to transmission charges or distribution charges or to both, with some differentiation (Ei 2022d). The design of such tariffs or exemptions could potentially be tested in regulatory sandboxes.

Input from participants on the design of a regulatory sandbox

The market participants interviewed have a positive attitude towards regulatory sandboxes. Several views emerged from the interviews about how a sandbox could be designed to best meet the needs of market participants. They consider that Ei is the organisation that is in the best position to provide guidance on the existing regulatory framework and to grant any exemptions in the form of regulatory sandboxes. New products, services and solutions that are developed partly form the basis for and can contribute to facilitating the energy transition. It is therefore of great importance that regulatory authorities have an understanding about and knowledge of the development of the industry.

1.3 Needs and identified areas of use at Ei

Needs at Ei

Regulatory sandboxes can benefit Ei's regulatory development work by being a tool for regulatory learning at the authority. An Austrian study suggests that a

well-designed and established structure for testing activities before and during the period of implementation or design of a regulatory framework can make it possible for regulatory authorities to keep pace with technological developments, achieve socio-economic efficiency and meet climate and energy policy goals (Veseli et al. 2021). Experimentation in a sandbox can also provide valuable information on how existing regulatory frameworks can be further developed in order to create incentives for innovation and smart solutions. An innovation centre and sandbox activities could contribute to an increasingly integrated processing of questions and feedback received by Ei for learning and regulatory development.

Regulatory sandboxes can facilitate regulatory learning for regulatory authorities and increase knowledge about innovation. Regulatory learning can take place in different types of sandboxes, but the policy-driven sandbox provides the regulatory authority with the conditions to independently initiate the necessary testing activities. By implementing experimentation and regulatory learning, Ei is in a better position to address the needs of the market for regulatory guidance, and the recommendations and proposals on regulatory sandboxes that come from the Council of the European Union, the Commission and CEER.

Identified areas of use

An Austrian feasibility study from 2021 analyses several potential areas of use for regulatory sandboxes in the **implementation** of the Clean Energy Package and other European regulations (Veseli et al 2021). Among other things, the regulation of energy communities, blockchain technology, smart electricity networks and hydrogen is mentioned. The authors also believe that sandboxes can facilitate more extensive regulatory processes, such as **market integration** and **sectoral integration**. The authors assess that there is probably a similar need for regulatory sandboxes in other EU countries, but point out that the level of detail in the national regulatory frameworks may vary and therefore also the need to adjust and implement detailed regulatory requirements.

The study presents 15 issues whose investigation and implementation could benefit from being tested in regulatory sandboxes. For example, there is mention that **energy communities** are regulated by two European Directives that give Member States the freedom to adapt the implementation in terms of how the communities should be organised and which infrastructures should be included. There is therefore room for manoeuvre to design the energy communities in the national legislation. It would be beneficial to test different variants of design, incentives and business models in policy-driven regulatory sandboxes when the regulatory framework is due to be implemented (Veseli et al 2021). The study also presents three proposals that could benefit from a regulatory sandbox at EU level.

The Government has, in government bill 2021/22:153 assessed that there is currently no need for new legislation in order to implement the rules on energy communities of each respective directive. However, it considered that there are potentially positive aspects in the energy communities that could possibly justify changes to certain regulatory frameworks, and that there may therefore be reason to return to the issue in the future. The Government considered that the changes should in that case concern the content of the activities of the energy communities and not the forms of these.

Ei presented a proposal for a law on energy communities in the report, Clean Energy in the EU (Ei 2020). Like the Government, Ei considered that there are no impediments to forming legal entities with the purposes specified in the directives and that such a legal entity can prescribe the customer rights required by the directives in its statutes or membership conditions. However, Ei considered that there is a significant risk that the communities that are formed will not meet all of the article's requirements. Energy communities should be regulated by law in order to ensure an enabling regulatory framework, as Member States are required to do, and to facilitate, among other things, formation, registration and market participation. Member States may also prescribe that citizen energy communities shall have the right to independently own and operate distribution networks. In its report on closed distribution systems, Ei notes that energy communities that operate networks may, in some cases, be subject to Section 22c of the Regulation on exemptions from the requirement for a network concession, and in some cases be classified as closed distribution systems. In addition, there are constellations of participants that could conceivably form energy communities that are not covered by any of these regulatory frameworks (Ei 2022g).

Government bill 2021/22:153 states that the referral bodies were divided on the question of whether energy communities should be allowed to operate networks. Some see it as an opportunity to create more self-sufficient units outside the public electricity network, while others see risks with regard to parallel networks and electricity security. Some expect extensive reforms of a range of rules in the electricity market, such as exemptions from energy tax or a new regulatory framework for virtual electricity networks, which should help facilitate and enable energy communities. The Government considered that if a specific regulation shall be introduced, there needs to be further investigation into the question of what obstacles exist for energy communities in their promotion of consumer power, sustainability and efficient use of energy. The Government considered that other proposals from the referral bodies could also be investigated in such an investigation.

Article 5 of the Electricity Market Regulation regulates the balance responsibility in the electricity system. All market participants shall be responsible for the

imbalances they cause in the system. They can take their responsibility by either being a balance administrator or delegating their responsibility to another balance administrator. Paragraph 2 of the article states that Member States may grant exemptions from the **balance responsibility for demonstration projects** for innovative forms of technology. The projects must be approved by the regulatory authority and be limited to the time and scope necessary to achieve the purpose of the demonstration. It must also be ensured that the financial responsibility for imbalances lies with another market participant. The licensing assessment procedure for such exemptions can be regulated in the same legal framework as the licensing assessment procedure for regulatory sandboxes.

The government has given a mandate to Ei to promote a more flexible electricity system (I2022/01578). One of the subtasks includes analysing the conditions for establishing regulatory sandboxes that can facilitate further flexibility.

As part of its RePowerEU plan, the European Commission has issued recommendations on speeding up **licensing procedures for renewable energy** (European Commission 2022a). Recommendation 32 on innovative projects encourages Member States to implement regulatory sandboxes. Targeted exemptions from national regulatory frameworks shall be granted in the sandboxes for innovative technologies, products, services and approaches. The exemptions are intended to facilitate licensing for the expansion and system integration of renewable energy, energy storage and other technologies that contribute to fossil freedom. In Sweden, no specific permit from Ei is required to establish renewable production. However, permits are required for related projects mentioned in the recommendation, including permits for connecting cables and related network expansion projects. There are also requirements for the connection of production facilities.

The Commission's recommendations include prioritising the licensing procedures within the framework for permit management, with a presumption that the projects are of high public interest and of interest for public safety. This includes prioritising parallel licensing procedures, both for licensing assessment by different authorities and for related projects, and specifying time limits for each stage of the licensing assessment procedure. Of the licensing procedures referred to, Ei currently processes permits to build and operate connection cables for renewable energy and permits for related network expansion. The recommendations also include requirements for network connection procedures, market barriers and origin labelling of electricity, which are relevant to Ei's activities.

The suitability assessment when granting a network concession for a cable is currently based on technical and economic data that Ei can, under the regulation,

grant exemptions to in individual cases. In SOU 2022:21, Justice for the climate (Climate Law Inquiry), it is proposed that the suitability assessment should be specified in law and regulation. Above all, the proposal means that the technical suitability is described in more detail in law.

Sectoral integration in the energy market affects several of the areas that Ei works with, such as electricity, gas, district heating and district cooling. Interviews with market participants also revealed the need for cross-sectoral exemptions from tax legislation, among other things. In its final report SOU 2022:68, Komet highlighted the need for proactive collaboration between authorities in cross-sectoral issues and proposed that a collaboration accelerator should be established. An innovation centre linked to the sandbox activities can be Ei's interface with such a collaboration accelerator and coordinate issues of sectoral integration.

1.4 Summary observation

In summary, the Electricity Act and associated regulations have developed areas for innovation. Regulatory development work is in progress with further proposals for paragraphs that will facilitate innovation and development work. There is also the option to broaden the existing exemptions, such as by allowing other variants of pilot tariffs and exempting more types of internal networks for innovative activities from the requirement for a network concession. However, the existing regulatory framework on exemptions from the requirement for a network concession is designed as a presumption that the listed types of network are exempt, and with the opportunity to request a binding decision. This means that it is not appropriate to conduct experimentation with internal networks simply by adding a paragraph on the grid type in question, as there are no regulatory frameworks on the licensing assessment procedure and limited time periods. European regulatory frameworks also impose requirements that Member States should be able to grant exemptions from balance responsibility for innovative projects and to have an enabling regulatory framework for energy communities.

Innovation can be conducted within the existing regulatory framework, but there is a risk that certain types of constellations and new participants cannot be fully exploited if the regulatory framework is not adapted to their participation in the electricity market. This may be a question of individual requirements or paragraphs that prevent participants from conducting their activities in a way that is optimal and has the potential to be economically efficient.

Regulatory sandboxes can constitute a tool for testing how such activities could work, and facilitate experimentation that forms the basis for regulatory development. Innovation may also be hindered by a lack of insight into and understanding of the energy market's regulations by market participants. A lack of

regulatory frameworks in certain parts of the energy market may be experienced as an uncertainty, which is a barrier to investment in innovation.

In dialogue with the industry, market participants have also identified regulatory barriers that lie outside Ei's areas of responsibility, such as tax legislation, consumer legislation and data security. The project is limited to dealing only with legislation within Ei's area of responsibility, but Ei has noted that the industry is requesting additional breadth in terms of cross-sectoral innovative testing. An innovation centre at Ei can be an interface for possible future collaboration on such issues.

2 Results and proposals for gradual implementation

The energy system is changing and will continue to change at a pace and scale that is becoming increasingly apparent. The climate crisis and the threat to biodiversity place demands on the production of renewable and environmentally friendly energy, while the transition by several industries to environmentally friendly processes is leading to an increased need for electricity and gas. In the ongoing energy transition, there has been a significant increase of interest in electrification and decentralised electricity production, as well as in the need for demand flexibility and support services at system level. At the same time, attention is drawn to the potential for efficiency improvements through cooperation between different types of energy distribution, so-called sectoral integration between, for example, electricity, gas, district heating and district cooling, which are currently regulated by different legislation.

Innovation plays a crucial role in tackling existing and future challenges and creating a sustainable and socio-economically efficient energy system. An increased pace of innovation has also brought with it new types of market participants, including new forms of energy storage and aggregators. The various aspects of market development have also been characterised by digitalisation. This has meant that the need to test new products, services and business models in the markets has increased, while adaptation of the regulatory framework has not kept pace.

Ei considers that it is appropriate for experimentation and regulatory learning to be implemented in stages. In the first stage, Ei will implement and administer an innovation centre. The innovation centre can provide information and guidance on existing legislation. An innovation centre can be established without a new legal framework, within the framework of Ei's mission to promote the functioning of the markets in the Regulation (2016:742) with instructions for the Swedish Energy Markets Inspectorate. In accordance with Section 5, Ei shall monitor and analyse developments in the electricity, natural gas and district heating markets and propose changes in regulatory frameworks and other measures that promote the functioning of the markets.

Once the innovation centre has been established and has been in operation for some time, any need for regulatory exemptions and the design of any sandbox activities can be evaluated. If regulatory sandboxes shall be introduced, legislative

proposals can be drawn up for supplementary provisions in relevant regulatory frameworks that facilitate exemptions, as well as regulations for a suitability assessment of the impact that may arise on, among other things, consumer protection. In Swedish laws and regulations, the word "experimentation" is used when there is a need for a special regulation in order to carry out experiments in a certain area. Normally, such regulated experimentation is limited in time and must be followed up by an evaluation. Examples of experimentation can be found in the Ordinance (2017:309) on Trial Operation with Self-driving Vehicles.

Ei recognises that the changes taking place set requirements for efficiency as well as collaboration and information exchange. The changing energy landscape brings challenges, and increasingly higher demands are being placed on regulatory authorities to deal with complex problems and to be ready to deal with the as yet unknown. The regulation of the energy market requires stability and predictability on the one hand, and, on the other hand, regulatory frameworks need to be adapted to the innovations in the extensive energy transition as well as new recommendations from the EU. A development towards an increasingly adaptable and future-proof regulation can also facilitate system resilience within the energy market area and create more predictability in constantly changing markets.

2.1 The Energy Markets Inspectorate's innovation centre

The innovation centre that Ei intends to establish aims to act as a first point of contact for market participants and innovators who are unsure of rules, processes or principles related to innovations in the energy markets. Ei can provide some guidance on existing legislation but will not provide information that could be perceived as a preliminary decision. It is the innovator who must ultimately decide how to take a project forward. The innovation centre can also act as a forum for dialogue with industry participants on the design of any sandbox activities and any need for exemptions.

The innovation centre can also contribute to regulatory learning for the authority and to Ei's work on analysing developments in the energy market and market intelligence. Questions from the innovators can highlight how well the existing regulatory framework works and what needs there are for regulatory development. The authority's dialogue with the industry can be strengthened and further developed by means of the centre acting as a common interface for collaboration on innovation and certain regulatory development issues. Synergies can be created by coordinating both external and internal work. For example, Ei's work on sectoral integration and hydrogen could benefit from being included in the centre's coordinated activities, as both areas have strong elements of innovation for both technology and business models and may require future regulatory development.

Insights from the British sandbox were that many applications were received for a sandbox that can already be tested within existing legislation due to participants experiencing some uncertainty in navigating the legislation in force. In the market intelligence, an innovation centre has been shown to provide an important interface with market participants in order to create an in-depth view of developments in areas with a high level of innovation. There has also been testimony that innovation centres can contribute to regulatory learning for regulatory authorities.

There should also be collaboration with other authorities in Sweden to identify any need for cross-sectoral activities. Ei could participate in the collaboration accelerator proposed by Komet, if realised, and use the innovation centre as an interface with other participating authorities. The centre can also participate in Nordic collaborations, as well as participate in European sandbox initiatives within ISGAN and CEER. In the long term, the centre can act as a forum for disseminating knowledge to industry participants and for increasing understanding of the lessons learned from any sandbox activities. Knowledge dissemination is an important part of sandbox activities, as it prevents individual participants from gaining market advantages due to an information advantage.

Ei already has a service obligation to respond to questions received by the authority. There is a strong demand from the industry for Ei to take a more proactive role and provide more extensive guidance or advice. In its final report, Komet points out that the place of innovation in the regulatory framework is unclear, which even licensing authorities may find it difficult to explain. By addressing and clarifying the regulatory framework in collaboration with other authorities, the public sector can take overall responsibility for innovation (SOU 2022:68). On the other hand, there are significant risks in providing advice on regulatory frameworks that are under development, for example, in the implementation of European regulatory framework. Such an expanded advisory function can also be resource-intensive for the authority. We consider that Ei should provide some guidance on existing legislation, but at the same time avoid providing information that could be perceived as preliminary decision. To investigate the possibility of more extensive advice, as there are some examples of in the market intelligence, falls outside the scope of this assignment.

2.2 Model proposal for possible sandbox activities

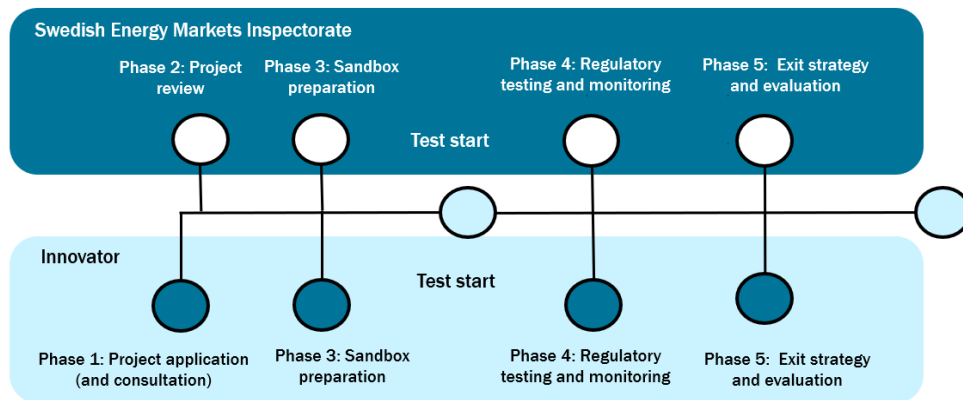
Any exemption provisions and regulations for sandbox activities in the Swedish energy market can be investigated further within the framework of the proposed innovation centre once it has been in operation for some time. If regulatory sandboxes are implemented, it is appropriate for Ei to be the authority responsible for the licensing assessment procedure and administration of the sandbox

activities. Ei has experience of the licensing assessment procedure and supervision of the energy market's regulatory framework, and is in a position to provide guidance and effectively utilise regulatory learning from regulatory sandboxes. The regulatory framework should specify test boundaries for regulatory sandboxes. The test boundaries should include specifying the time and scope of the experimentation, and having a developed evaluation strategy and exit strategy, as well as having a developed consumer protection plan.

Initially, time-limited application periods could be implemented, but details of the application procedure should be developed as part of the further investigation after the innovation centre has been in operation for some time. A suitable test period duration could be 2–4 years in order to provide sufficient data for evaluation. Ei shall not contribute funding to the projects granted exemptions for regulatory sandboxes.

The sandbox process could be as described in Figure 5, with the initial contact via the innovation centre. Participants with questions about the application procedure can receive support from the innovation centre, but they should design the project and application themselves. Innovators should be able to demonstrate that they have the competence and capacity to carry out the experimentation in a safe way. A tentative process map for the sandbox activities, specifically for innovation-driven sandboxes, is shown below.

Figure 5. Process map for sandbox activities (Source: Own elaboration based on Funseam 2022)



As a next step, Ei reviews the application based on pre-selected assessment criteria. An applicant for an exemption should carry out a risk analysis and show how customers may be affected. A consultation with parties affected should be carried out before the application is submitted. Comments on conflicting interests from the consultation should help the applicant to design the project in a safe and effective way, and form part of Ei's basis for decision-making.

If approval is granted, the next step is to prepare sandbox activities and start testing. Continuous monitoring and evaluation should take place while the test is in progress in accordance with an evaluation strategy attached to the application. In a final stage, a final evaluation of the sandbox should be carried out and insights or lessons learned should be shared via a project website. After the experimentation has been completed, the regulatory learning can be coordinated by Ei's innovation centre, which can also share results and analyses.

An exit strategy is an important tool to ensure that the activities can be concluded in an optimal way and capitalise on the lessons learned during the course of the experimentation, and that any risks on exit are safely managed. A developed evaluation strategy is also a key part of the proposed model for sandbox activities, both to protect conflicting interests and to provide a basis for regulatory learning. It is beneficial if the exit strategy and evaluation are stated in law as a requirement for the execution of the experimentation. The evaluation strategy and exit strategy should be attached to the application and form the basis for the licensing assessment procedure. Sandbox activities at the authority should also be reviewed regularly through independent evaluations. Further assessment criteria for the licensing assessment procedure, such as requirements for consultation and participating actors, should be specified in a regulation.

2.3 Answers to the project's questions

The purpose of the project is to investigate the prerequisites and develop a proposed model for how regulatory sandboxes can be implemented in Sweden, as well as to answer questions on different design elements, see below:

What form should the legal framework take in order to implement regulatory sandboxes in the energy market?

If regulatory sandboxes shall be implemented, provisions should be introduced in relevant regulatory frameworks that give Ei a mandate to grant exemptions from selected parts of the regulatory framework. The need for exemptions should be investigated further when the innovation centre has been in operation for some time. The investigation can show whether and how regulatory exemptions for innovative projects that are limited in time and scope can be implemented. If regulatory sandboxes are used, it would be appropriate for Ei to be given regulatory powers in order to specify the details of regulatory sandboxes as well as the suitability assessment of consumer protection and other concerns that must be carried out before exemptions are granted. With requirements and criteria in regulation instead of in law, the sandbox will be more adaptable and can be developed at a better pace with the innovations that need to be tested.

There is a strong trend among European regulatory authorities and legislative bodies to manage regulatory development with dynamic regulation such as regulatory sandboxes. A dedicated legal framework also has the advantage of providing clear frameworks for how experimentation should be conducted, such as for the demonstration projects that can be granted under Article 5 of the Electricity Market Regulation. There is a need for further investigation in order to identify which chapters and which categories of provisions should be included in the exemption option. Analyses in previous sections highlight the difficulty of defining in advance the need for exemptions for innovations due to accelerated technological development.

The innovation centre can appropriately evaluate what needs there are for exemptions. If regulatory sandboxes shall be implemented, the centre can further investigate how a legal framework could be designed, and draw up a legislative proposal and regulatory proposals that give Ei the authority to grant exemptions from relevant regulatory frameworks. The EU's regulatory framework defines limits for national regulatory experiments, but as mentioned earlier, there are examples within the European regulatory framework where Member States are given the authority to grant exemptions or are recommended to implement exemptions for innovative projects. It is therefore important to follow the development of new regulations at European level.

What measures can be taken to ensure that the regulatory authority does not favour one actor over others, and how can this be managed?

No financial resources are offered to participants who apply for a sandbox activity in the proposed model, partly because it may risk giving a participant a competitive advantage over other participants.

It is essential to have transparency in the selection and application process, together with clearly formulated selection criteria. An exemption granted to only one participant requires a higher degree of transparency than an exemption granted to all participants in a certain market. The independent evaluations of the proposed sandbox activities can also include the transparency aspect.

A sandbox activity has the opportunity to contribute to the dissemination of information and knowledge transfer. By sharing lessons and insights from sandbox projects, among other things, information can be made available to other market participants. Even if there are considerations related to security aspects, privacy, IP rights, etc., there are lessons that can be disseminated and contribute to market development. It is also important to share information at an early stage about sandboxes that will be implemented, as well as details about how they are intended to work, so that certain participants do not gain an undue information

advantage. For example, a project page can be used where information is published about applications in progress and approved applications.

Who should choose who can and cannot participate in the regulatory sandbox?

Parties that operate or plan to operate in the energy market should be granted authorisation to apply for a sandbox activity through an objective selection based on the principles of legality and equal treatment. Ei assesses authorisations for the sandbox activities and an assessment should be made for each individual sandbox application. The assessment can be based on prescribed criteria and be based on both the suitability of the project and the applicant's ability to demonstrate that it can conduct the experimentation in line with the previously presented criteria.

The authority must not expose consumers to unnecessary risks. How is consumer protection ensured?

The model includes a proposed evaluation strategy in which the participants continuously evaluate whether impacts on conflicting interests have arisen in the ongoing sandbox. The participants should report, among other things, how consumer protection is ensured and operates, and whether any additional risks have been identified and whether they can be managed. The regulatory authority then has the opportunity to take measures to prevent undue impact.

The regulatory sandbox is time-limited – what happens when the time runs out?

The model includes a requirement for a drawn-up exit strategy to be enclosed with the application. The exit strategy must describe how the testing activity is concluded, and whether financial, systemic or other risks and consequences for the participants affected have been identified at the completion.

The participants must provide the information necessary for the regulatory authority to be able to evaluate whether the regulatory exemption has met the objectives of the sandbox, including information on comments from the participants affected by the experimentation. Once the achievement of objectives has been evaluated, the regulatory authority can use the experiences in an established process for regulatory learning.

Should funding opportunities be linked to a regulatory sandbox, and if so, what form should funding take?

Our assessment is that Ei should not contribute funding. A regulatory exemption means that the participant may gain a competitive advantage over other participants, a risk that may be further reinforced if funding is linked directly to the programme. There may also be a problem linked to the funding possibly being

classified as state aid. Innovators have the opportunity to apply for funding from other authorities.

2.4 The way forward

Given the changing energy landscape and the accelerating development of technology, we share the view put forward in SOU 2022:68 that authorities must promote active co-creation in innovation processes, as well as dare to make it possible to try out new solutions and working methods that can promote innovation. Working methods and processes need to be developed step-by-step in order to facilitate experimentation, while at the same time guiding development towards long-term societal benefit. In the long term, the innovation centre and any sandbox activities should contribute to promoting the function of the market and removing barriers to innovation in the energy market.

Figure 6. An innovation centre to understand, regulatory sandboxes to experiment, and regulatory development to change opportunities for innovation in energy markets. Komet's model to understand, experiment and change in a collaboration.

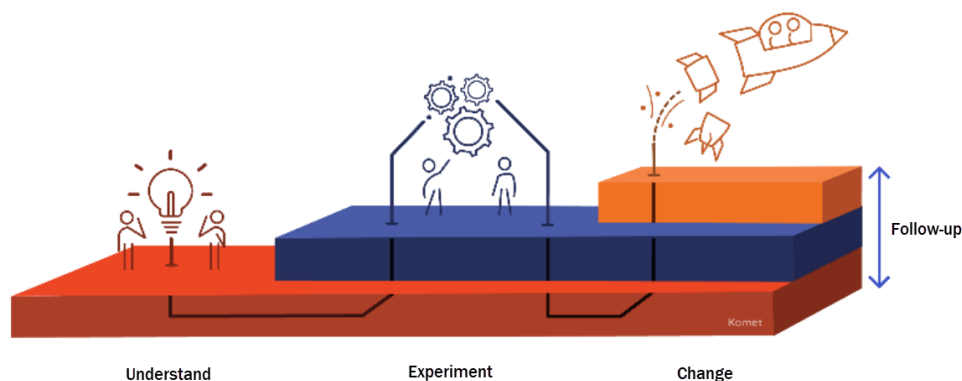


Image source SOU 2022:68

Ei already has a developed ability to respond to questions received by the authority but there is a strong demand from the industry for Ei to take a more proactive role and provide more extensive guidance. Ei intends to establish an innovation centre and the next step will be to initiate such an implementation.

By establishing an innovation centre, we have the opportunity to meet the needs of the market and create the conditions to meet the recommendations and proposals regarding regulatory sandboxes or *regulatory greenhouses* that come from the Council of the European Union, the Commission and CEER.

The Council of the European Union has urged the Commission to continue to use regulatory sandboxes and experimentation clauses when drafting and reviewing legislation. The Commission highlights in a recommendation that regulatory sandboxes can encourage innovation and facilitate the adaptation of the regulatory framework to cover new types of technologies, products, services or strategies. The

Commission considers that sandboxes can therefore contribute to managing the energy transition and serve as a step towards mitigating the effects of the energy crisis that Europe is facing. The Commission will present a more detailed strategy for the use of regulatory sandboxes in the second quarter of 2023. CEER has identified regulatory sandboxes as a key part of its strategy for regulatory authorities to be able to address the energy transition.

The changing energy landscape brings challenges, and increasingly higher demands are being placed on regulatory authorities to deal with complex problems and to be ready to deal with the as yet unknown. With an innovation centre, the Ei will be in a better position to meet the demand for regulatory guidance from market participants and other stakeholders, as well as work more pro-actively on innovative solutions whose placement in the regulatory framework is unclear. Ei can also enhance its knowledge of new innovative services, strengthen its collective capacity and meet the need of the market for efficient and effective regulatory development.

Going forward, further analysis will be needed to determine whether regulatory sandboxes should be implemented and, if so, how the legal framework should be designed. The report has focused to a certain extent on electricity legislation, but the need to implement sandbox activities through experimentation clauses in the Natural Gas Act (2005:403), the District Heating Act (2008:263) and the District Cooling Act (2022:332) may need to be investigated in the future. The need for sectoral integration in the energy transition and interaction between energy types that are currently regulated separately is a reason to further investigate exemptions for innovation in these regulatory frameworks. In the long term, there may also be a need to investigate how possible experimentation for sectoral integration can be regulated.

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