IANOS

SUSTAINABLE SOLUTIONS

for islands' decarbonisation

D2.6 Report on regulatory/legal and financial aspects (T2.2)

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Executive Summary

This report, D2.6, is written for task T2.2 of the IANOS project and is the last deliverable of T2.2. T2.2 of the IANOS project provides a map of the (most) relevant legal, regulatory and financial aspects of the IANOS project and its Use Cases. D2.4 provided a methodology and a set of (annotated) questionnaires, developed in the IANOS project, D2.5 defined and deepened the legal, regulatory and financial aspects by using the experience and knowledge of the IANOS consortium. D2.6 provides an overview of the European Smart Grid Taskforce and the relations between the principles of the European Smart Grid taskforce and the IANOS islands and it's Use Cases. After that, two articles of the Treaty on the Functioning of the European Union will be discussed, as well as how the article concerning State aid relates to the different IANOS islands. The answers given in D2.6 provide clarity to the islands concerning smart grid and state aid legislation and possible room for growth.

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1.Introduction

The objective of task 2.2 in the IANOS project is to provide the IANOS islands with insight on the relevant (applicable) EU legal framework and, more specifically, islands in the Netherlands and Portugal with some further insights on the relevant national frameworks, corresponding to that of the EU. T2.2 should also help other EU islands in doing a similar exercise, to define their own applicable regulatory, legal and financial aspects. T2.2 of IANOS will result in three reports, of which report 1 (D2.4), provides the methodology and interface for T2.2. This interface aims at giving the IANOS islands regulatory insights concerning the legislative framework on the legal and financial aspects of decarbonization efforts. This interface could also be used by islands other than those involved with the IANOS project. Report 1 (D2.4) provides a standard interface, mapping the relevant regulations, grid codes and financial aspects. Report 2 (D2.5) further expanded the interface by translating the IANOS use cases (energy applications/solutions) into a set of elements, applying the questionnaires of D2.4, describing the applicable legal and financial aspects and conditions for the IANOS islands (based on their national legal frameworks and Island specific laws and regulations). The answers to the questionnaires express the experiences of the IANOS partners and aid in quickly finding the relevant laws and regulations and identifying any relevant barriers.

For this report (D2.6) the standard interface is finalized by including *reflections based on the IANOS experiences and the principles of the European Smart Grid Task Force and Article 107 and 167 TFEU, to support/complement the ongoing European harmonization activities*. The full final interface can be found in annex 1.

This deliverable is organized as follows: first a general overview of the European Smart Grid Task Force and its Expert Groups will be given, after which the principles of the Expert Groups will be analysed against the IANOS islands and the IANOS Use Cases. Next, an analysis of art. 107 TFEU (State aid) is given as well as an elaboration on the national legislation of the IANOS islands concerning State aid. Lastly, we will finalize the deliverable with the conclusions of D2.5 and T2.2 as a whole.

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2. European Smart Grid Task Force

This section elaborates on the European Smart Grid Task Force and the five Expert Groups of this Task Force. First, a general overview of the European Smart Grid Task Force will be given. Second, the principles of the different Expert Groups will be elaborated on, after which these principles will be applied to the IANOS islands and the IANOS Use Cases.

2.1. The European Smart Grid Task Force – an overview

The European Smart Grid Task Forces (hereafter "ESGTF") is a Task Force set up by the European Commission (hereafter "the Commission") in 2009. The parties part of the ESGTF are stakeholder representatives from industry, regulators, consumer groups and the Commission.

The ESGTF consists of 5 Expert Groups:

- Expert Group 1 – Standards for interoperability for smart grids deployment;
- Expert Group 2 – Regulatory recommendations for privacy, data protection; and cyber-security
- Expert Group 3 – Regulatory recommendations for smart grids deployment;
- Expert Group 4 – Smart grid infrastructure deployment;
- Expert Group 5 – Implementation of smart grid industrial policy.

The main goal of the ESGTF is to advice the Commission on policy and regulatory directions that are related to developing and deploying smart grids. Till date, the ESGTF has contributed by adopting recommendations and communications, issuing guidelines and a mandate. The (binding) legal power of the ESGTF has its limits, as most of the documents are not binding (recommendation, communication and guidelines). However, the mandate is different in that regard as mandates *are* legally binding. So, the ESGTF has legal power to a certain extent, however, it has not yet issued much legally binding rules etc. However, as the overall objective of the ESGTF is to advice, this is not a surprise.

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Concerning European legislation, the framework for smart grids is mainly found in the Electricity Directive 2019/944 and the Electricity Regulation 2019/943, both part of the EU's 2019 "*Clean Energy Package*". Both the Directive (through harmonization) and Regulation (directly applicable) have influence on the national legislation that is in place regarding smart grids. This relatively new framework made changes concerning protection of electricity customers, the rights of so-called "active-customers", deployment of flexibility, electricity storage and congestion management.[1]

2.2. The Expert Groups of the European Smart Grid Task Force

2.2.1. Expert Group 1 – Standards for interoperability for smart grids deployment

1. What is Expert Group 1 about?

Expert group 1 (EG1) was set up in 2009 to explore smart grid services and operation, and how best to deliver smart grids for the benefit of the energy system and its users. The main objective is to facilitate interoperability of electricity and gas services in retail markets and help promote competition.

2. What are the main functions and tasks of Expert Group 1?

Successful smart grid deployment hinges on the technical standards and provisions designed to allow the interoperability of systems and technologies within a smart grid environment. This is the focus of attention for this expert group.

The main tasks of the Expert Group 1 are the following:

- Map national practices for data access and exchange;
- Identify commonalities, differences, scope for bringing them closer;
- Frame recommendations;
- Advice on what to address in Implementing Act(s).

[1] TNO, '*Rapport Knelpunten Smart Energy*' (2021) < https://www.topsectorenergie.nl/sites/default/files/uploads/Urban%20energy/kennisdossier/Waarde%20van%20Flex/Rapportage%20Knelpunten%20Smart%20Energy%20TKI.pdf>

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3. What does Expert Group 1 want to achieve?

The group provides guidance on how to ensure interoperability, connectivity and ultimately functionality of components and processes for the provision of smart energy grid services.

According to most available definitions, interoperability can be understood in different levels. This Group focuses on "semantic" first and then "syntactic" level of interoperability, i.e., so as to not only to be able to interchange packets of information , but primarily to understand the information contained in those packets. Nevertheless, when new participants enter a market, all layers (technical, business process, etc.) must be considered.

The targeted processes are:

- Traditional processes such as “Change of Supplier” and “Billing”;
- New and Emerging services such as "Download my data" and “Share my data" with third parties for both historical and near-real time data.

4. What has Expert Group 1 contributed so far?

During the period 2017-2018, and according to its agreed Terms of Reference, the group worked on procedures for data access and exchange for both electricity and gas, with the task of collecting information and investigating the way towards interoperable practices in the EU. The respective findings and recommendations are summarised in a report published in March 2019.

This investigation builds upon earlier work performed by the ad hoc group on “My Energy Data”, which was launched on 22 April 2016, with the aim of getting an overview of some of the existing initiatives on data access and data management in the field of energy distribution, to identify possible obstacles for controlled data access and data management, and to explore at EU level the potential for and scope of a possible industrial initiative on a common format for energy data interchange. The ad hoc group produced an interim report on My Energy Data in November 2016.

Based on earlier work of this expert group, the European Commission has issued mandates to European Standardisation Organisations (ESOs) - CEN, CENELEC and ETSI - to develop and update technical standards.

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From Spring 2020 to 2021 the EU Smart Grids Task Force Expert Group 1 has been working on its advice to the Commission regarding the development of implementing acts on access to data and interoperability, in line with its latest Terms of Reference. That includes the drafting of potential requirements to address provisions laid down in Articles 20, 23 and 24 of the Electricity Directive (EU) 2019/944, based on:

- Article 24(1) states: "In order to promote competition in the retail market and to avoid excessive administrative costs for the eligible parties, Member States shall facilitate the full interoperability of energy services within the Union."
- Article 24(2) states: "The Commission shall adopt, by means of implementing acts, interoperability requirements and non-discriminatory and transparent procedures for access to data referred to in Article 23(1)."
- Article 23(1) states "When laying down the rules regarding the management and exchange of data, Member States or, where a Member State has so provided, the designated competent authorities shall specify the rules on the access to data of the final customer by eligible parties in accordance with this Article and the applicable Union legal framework. For the purpose of this Directive, data shall be understood to include metering and consumption data as well as data required for customer switching, demand response and other services."

The identified approach to address the abovementioned provisions leads to the following working programme for the expert group:

- Until Q3 2021: Work on a draft (as close as possible to legal-style text) for an implementing act defining an interoperability approach that is consistent across categories of data (metering and consumption, customer switching, demand response and other services);
- In parallel work on a draft for an implementing act for access to metering and consumption data; both to be submitted to the Commission as the EG1 advice, and inform its formal drafting process, leading to adoption (comitology) in 2022;

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- After that, EG1 will draft its advice to the Commission for Implementing Acts for data interoperability in the case of demand response, customer switching and other services as foreseen by Article 24 of Directive (EU) 2019/944.

Working on potential requirements for these legal acts, it became obvious that not all the findings and not all the guidelines and background information is suitable to be written into law. Nevertheless, these valuable artefacts should not be lost. Therefore, it was decided to consolidate them in the form of a report, as a guidance for follow-up activities, and a place to document the rationale behind the proposed provisions in the abovementioned act. Moreover, it will help ensure consistency for the future acts and draw a red line from the traditional deliverables (reports) produced by the Smart Grids Task Force in the past. EG1 intends to release this document together with the aforementioned drafts.

2.2.2. Expert Group 2 – Regulatory recommendations for privacy, data protection and cyber-security

1. What is Expert Group 2 about?

Regarding cybersecurity in the energy sector, there is already a comprehensive overall legal framework, which requires particular attention as this sector presents certain particularities. Moreover, the Regulation on Risk Preparedness instructs the EU countries to include measures on cybersecurity in their national risk assessment plans. For these reasons, it was necessary to develop a network code on cybersecurity of cross-border electricity flows.

In this light, the ESGTF's Expert Group 2 (EG2) "*Regulatory recommendations for privacy, data protection and cyber-security*" had, as a main task, to set the base for the development of the network code for the electricity subsector, i.e. the electricity system operators of transmission (TSO) and distribution (DSO) networks.

The first recommendations by EG2 were drafted in 2011 and aimed to provide guidance on the essential regulatory requirements for data handling, data safety and consumer protection in Smart Grids. The recommendations follow a holistic and risk-based approach.

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For developing the Network Code and the recommendations on the cybersecurity and data privacy, EG2 took into consideration the EU's Directive on Network Information Security (NIS) and the General Data Protection Regulation (GDPR). In any case, when implementing the recommendations, the national legislation and structures should also be taken into consideration.

While the NIS directive targets the operators of essential services (OES), the goal of the Network Code is to work as secondary legislation creating a security baseline mainly for the operators that are not considered critical. Small and/or medium sized operators usually have neither the capabilities nor the resources to address cybersecurity issues properly.

The objectives of the Network Code are to:

- Protect the energy systems based on current and future threats and risks;
- Support the functioning of the European society and economy in the case of an energy crisis by implementing effective plans for its management;
- Create trust and transparency for cybersecurity in the supply chain for components and vendors used in the energy sector;
- Harmonised maturity and resilience for cybersecurity across EU with defined minimum level while favouring higher maturity using a risk-based approach.

Based on the above and to cover the needs of all operators, EG2 proposed the Network Code to consist of three levels. First, a baseline cybersecurity approach, which will be taking into consideration the capabilities and the resources of all the operators. The second level would be the advanced cybersecurity for the operators of essential services, which will consist of additional measures. Finally, other supportive elements that will be used by all operators as guidance (i.e. Guidance on crisis management and Guidance on Supply Chain Security) and tools (Energy Cybersecurity Maturity Framework) for the implementation of the Network Code. The following scheme (Fig. 1) presents the recommended structure of the Network Code.

In addition to the cybersecurity issues that the operators are facing, there is also the point of data protection and privacy that needs to be handled. In general, the consumer personal data is protected by EU rules on processing and free movement on data. Smart grids and meters may have an impact on personal data

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and privacy, which is why the EU has taken a series of measures to uphold data protection rules. For this, the GDPR regulation is now in place and EG2's work was based on that to develop the Impact Assessment Template to serve only as a guidance on data protection and privacy for data controllers and investors in smart grids. Further work was out of the scope of this group.

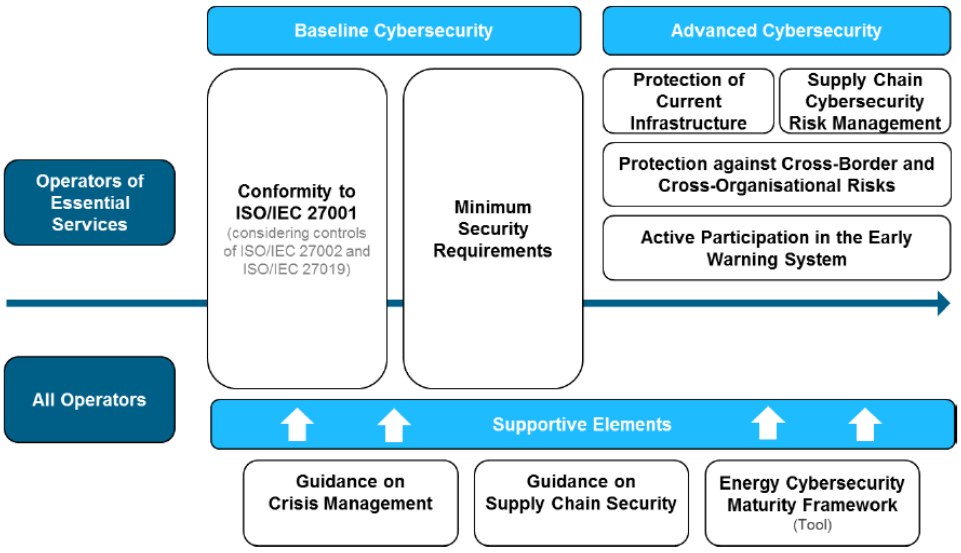

Fig. 1 Recommended structure of the Network Code on Cyber security

2. What are the main functions and tasks of Expert Group 2?

For the elaboration of the recommendations, EG2 had four main tasks. First, to develop the network Code, the EG had to specify the objectives of the code. To do that, the gaps in the existing legislation were identified and also in the recommendations report provided by the Energy Expert Cyber Security Platform (EECSP – "Recommendations for the European Commission on a European Strategic Framework and Potential Future Legislative Acts for the Energy Sector").

Next, four key areas were proposed based on further elaboration of the Network Code's objectives. They were mostly developed in order to have a more framed discussion:

1. European Cybersecurity Maturity Framework;
2. Supply Chain Management;
3. European Early Warning System for Cyber Threats;
4. Cross-Border and Cross-Organisational Risk Management.

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The first two key areas consider the TSO and the DSO as an organization, while the last key areas refer to the interconnected EU electricity network. The relation between the objectives of the Network Code and the identified key areas can be seen in Table 1.

Table 1. Relation of the identified key areas to the Network Code's objectives

Key areas	Network Code's objectives
Organisation	
European Cybersecurity Maturity Framework	Harmonised maturity and resilience for cybersecurity across EU with defined minimum level while favouring higher maturity using a risk-based approach
Supply Chain Management	Create trust and transparency for cybersecurity in the supply chain for components and vendors used in the energy sector
Interconnected EU electricity energy network	
European Early Warning System for Cyber Threats	Protect the energy systems based on current and future threats and risks
Cross - Border and Cross - Organisational Risk Management	Support the functioning of the European society and economy in the case of an energy crisis by implementing effective plans for its management

The next step was to create the structure of the Network Code on cybersecurity based on the analysis of the key areas, as can be seen in Fig.1. The final step was the formulation of the recommendations.

Furthermore, one of the tasks of EG2 was to work on the further development of the Data Protection Impact Assessment Template (DPIA), initiated by the Commission, based on the feedback and the experience gained during a two-year test phase that was launched by the Commission. The outcome was the 4th version of the DPIA.

3. What does Expert Group 2 want to achieve and what has it contributed so far?

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By defining the key areas for the network code, as mentioned previously, EG2 wants to improve the resiliency of the electricity infrastructure in Europe. As such, it produced risk scenarios to prioritise the measures based on the risk foreseen by the electricity system operators (these scenarios are only meant to be used by EG2 for this specific purpose).

The main achievement of EG2 was the publishing of a set of recommendations on the implementation of the Regulation on Risk Preparedness, which instructs the EU countries to include measures on cybersecurity in their national risk assessment plans. These recommendations were taken into consideration by the European Commission in its effort to carry out preparatory work for the Network Code on cybersecurity of cross-border electricity flows.

Moreover, EG2 aimed to achieve the development of a methodology, which allows all energy system operators to set a baseline cybersecurity and the identified operators of essential services to achieve higher protection levels. The mentioned methodology was set up in such a way as to also be applied by other market participants that are not directly affected by the Network Code on cybersecurity, which might subsequently have an impact on the stability of the European energy network.

As a result, the set-up of an information sharing platform with an early warning system for the energy sector will lead to a resilient European energy infrastructure. EG2 recommends active protection on cybersecurity threats, which's success depends on the trust and collaboration across all organisations in the Member States and international allies.

Apart from the development of the base for the Network Code on cybersecurity, EG2 also developed a list of recommended solutions to the identified gaps of the EECP report. The solutions offer the operators the freedom to address cybersecurity by also addressing the organisation specific needs, while achieving the minimum protection level across Europe.

Finally, as part of its activities, EG2 organized a consultation on the recommendations aiming to produce a good practice report for the smart grid asset owners, who would first carry out a risk assessment to better understand

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and implement some or all the security measures proposed based on their risk mitigation decisions.

To conclude, cybersecurity is not a one-time action plan. It needs continuous effort and considering that the electricity generation is not included in the Network Code on cybersecurity and the connected infrastructure and service providers might be indirectly affected by specific requirements, the collaboration of all the involved stakeholders is essential.

Regarding the data privacy and protection, there are EU regulations on their processing and distribution. Considering that smart grids and meters affect this data, EG2 also worked on that by delivering the Impact Assessment Template, which aims to serve only as a guidance to data controllers and investors in the smart grids. It should never be regarded as a legal tool and it does not bypass the GDPR regulation.

In its work, EG2 identified regulatory scenarios for data management, security and protection aiming to establish a respective framework by adopting the regulatory recommendations in the smart grid environment.
The Template Users – Smart Grid and Metering Systems' Operators

- DSOs;
- Generators (e.g. access to data consumption of neighbour consumer(s));
- Energy Suppliers (e.g. handling of billing data, management of debt, preventing and detecting theft or fraud etc);
- Metering Operators (e.g. companies responsible for reading meters, managing the metering infrastructure etc);
- Energy Services Companies (e.g. companies offering innovative services in the field of energy supply, demand response, aggregation, selling bundled etc.), and;
- TSOs (Although, in theory, the TSOs could be Smart Grid operators qualifying as Data Controllers, in practice, current and envisioned models do not foresee that TSOs will be involved in the processing of Personal Data originated from Smart Grids or Smart Metering Systems).

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In the GDPR regulation, it is obligatory to perform a DPIA when a high risk is foreseen in the data handling as it is considered as a process for building and demonstrating compliance by the data controllers.

2.2.3. Expert Group 3 – Regulatory recommendations for smart grids deployment

1. What is Expert Group 3 about?

Included in the ESGTF is Expert Group 3 (EG3), focusing on regulatory recommendations for smart grids deployment. This group is composed of NGOs and trade and business associations, and is mandated to develop a market reference model to explore how regulatory incentives and obligations may affect the ICT sector and therefore help the rollout of Smart grids while protecting the customers. EG3 will provide regulatory and legal recommendations to facilitate the deployment of smart metering and smart grids all over Europe, with the end customer as the key player.[2]

2. What are the main functions and tasks of Expert Group 3?

The functions of EG3 include: enumerating and defining the main actors in smart grids, accordingly to their specific roles and responsibilities; understand and develop the possible relations between market stakeholders and provide regulatory recommendations to stakeholders for the increase of flexibility in the energy sector as well as conduct the investment of stakeholders in Smart Grids.[3]

3. What does Expert Group 3 want to achieve?

The key deliverables of EG3 are; to define a reference market model, options for viable business models and suitable instruments for accelerating the roll-out of smart meters, foster the deployment of smart grids and examine the potential implications of the regulatory frameworks to efficiently facilitate the roll-out process. Additionally, the group is expected to identify the necessary framework

[2] European Commission, "EG3 First Year Report: Options on handling Smart Grids Data," 2010.
[3] European Commission, "Smart Grids: From Innovation to Deployment," 2015.

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conditions for establishing new fields of cooperation (legislative, financial and/or other incentives) between the energy and telecommunication sectors.[4]

4. What has Expert Group 3 contributed so far?

EG3 has been identifying the main barriers and has proposed related recommendations that enhance the development of the Demand Side Response and address any potential regulatory gaps. These barriers and recommendations are built upon the analysis of use cases, which describes projects currently running or undergoing a launching phase (pilot projects, research projects, market designs, both on national and cross-border scale). EG3 has been working successfully since 2014 and its deliverables were published in 2015 and 2019. The latter focused on 1) Access to and use of flexibility for all market parties and 2) framework arrangements between final customers, aggregators and suppliers (or their BRPs) and possibly other actors.[5]

2.2.4. Expert Group 4 – Smart grid infrastructure deployment

1. What is Expert Group 4 about?

Broadly speaking, Expert Group 4 (EG4) is about the deployment of smart grid infrastructures. Within the Europe2020 strategy of the EU, the deployment of Smart Grids plays a key role from both the perspective of economic and sustainable growth. Smart Grids are defined, in the EU context, as "*upgraded electricity networks to which two-way digital communication between supplier and consumer, intelligent metering and monitoring systems have been added*".

The benefits of Smart Grids are widely acknowledged in business, policy as well as academic circles.

The European Commission sees Smart Grids as the backbone of the future decarbonised power system. While there is agreement on the importance of Smart Grids for the European competitiveness as well as sustainability agenda, Smart Grids require new approaches to governance as the 'new' energy sector is fundamentally more decentralised and as climate change brings and increasing

[4] European Commission, "EG3 First Year Report: Options on handling Smart Grids Data", 2013.
[5] European Commission, "European Smart Grids Task Force. Expert Group 3. Demand Side Flexibility Perceived barriers and proposed recommendations", 2019.

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pressure to ensure the energy transition of fragile territories and communities, suchlike on the islands.

Within that perspective, the contribution of EG4 has been about the constraints and capabilities afferent to energy deployment by covering challenges pertaining off-grid.

EG4 has also been about acknowledging, and adapting to, the local parameters to ensure the sound deployment of smart grid infrastructures. In an insular context, community building experiences are stronger than in continental setting, which gives the inhabitants a community-based mindset with an adversarial dimension aware of their isolation and of the fragility and richness of their environment.

This triggers the question of the fragility of the energy supply and transition, and, more generally, the management of the new and increasingly pressing constraint of climate change.

2. What are the main functions and tasks of Expert Group 4?

The main functions and tasks of EG4 were to assess and document the constraint of the deployment of the smart grid on isolated off-grid islands. To do that, EG4 covered issues pertaining to policy and regulatory matters for the deployment of smart grids, but also the difficulties pertaining to the culture and history, geography, financing, technological advancement, perceptions and local way of living variables of the island, and their influence over RES project development.
These can become as many constraints that are first geographically inasmuch as culturally and institutionally distant from the reference framework of the EU. This distance creates and reinforces the technological and conceptual gaps between the remoted islands and EU frameworks. While the EU has an administrative, theoretical and rational scientific-based approach, those islands pursue a more concrete and qualitative approach. The latter does not rely on scientific data or processes, but rather on a daily contemplation and appreciation of the evolving environment. This way, the perception of climate change is translated in the contact with nature.

Henceforth, the goal is to develop a scientific approach taking into account the singularity and the particular way of living of insular and isolated population.

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The ultimate goal of EG4 was to ensure EU-wide consistent, cost-effective, efficient and fair deployment of smart grid infrastructures, while achieving the expected services and benefits for all network users.

3. What does Expert Group 4 want to achieve?

The aim of EG4 was to foster the deployment of smart grid infrastructure throughout the EU while adapting to its diversified local policy, regulatory, technical, socio-economic, and cultural constraints and opportunities.

EG4 ensured the durable and inclusive energic transition in insular context. EG4's goal was to achieve an adapted and locally owned discourse, which will help it overcoming the exclusively technical-rational approach to encompass a broader perspective including locally owned values and symbols.

4. What has Expert Group 4 contributed so far?

EG4 has already conducted several project evaluations against the backdrop of technical, policy and economic requirements, which has contributed to refining not only the project selection process, but also the project application step. Indeed, through their 2013 report, Giordano et al have provided a guidance for European regional groups when proposing and reviewing PCI, under the trans-European energy infrastructure regulation.

The present consortium aims at building on this report to participate in the greater discussion over the energy systems of European overseas territories.

On top of this, EG4 has so far contributed to the promotion of the particular perspectives and expectations of the remoted islands' population in the articulation of the island's energy transition. Besides, EG4 is aware of the concern and acuity expressed by the population regarding the consequences of climate change and energic dependence. Henceforth EG4 has already launched actions to ensure the durable on-boarding of the population while highlighting the challenges afferent to the island's energy independence and transition.

Milestones have already been achieved in the fields of water management, drinking water supply, biodiversity conservation and lagoon protection. Consequently, EG4 is positive about its capacity to build on past successful experiences to move up a crucial notch to achieve the energy transition.

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2.2.5. Expert Group 5 – Implementation of smart grid industrial policy

1. What is Expert Group 5 about?

Expert Group 5 (EG5) is the last expert group established by the ESGTF that kicked off in February 2013. Managed by DG ENER, EG5 aims to add a perspective of industrial policies that the Task Force needed. Europe continuously strives to be more competitive, innovative and resource efficient. Appropriate R&D and innovation projects need to be actively promoted by an industrial policy prospective. EG5 was specially established to deliver in those areas where no or limited action is taken by the other Expert Groups in the ESGTF. In this respect, it strives for convergence and support for the SGTF from the prospective of industrial policy.[6]

2. What are the main functions and tasks of Expert Group 5?

The technology sector in Europe is able to provide all kinds of technologies and components able to significantly change the electricity infrastructure network. However, these changes need to be tackled by policy makers to address regulatory and economic issues. The role of EG5 is to identify short-to-medium term actions in the area of industrial policies that may speed up the deployment of Smart Grids. The specific tasks that EG5 focusses on are the following: Update the inventory of projects in Member States and mapping of lessons learned; propose industrial policies and business opportunities to speed up the smart grids technologies; provide advice for the implementation of light-house projects.[7]

3. What does Expert Group 5 want to achieve?

The final goal is to boost worldwide competitiveness of EU industry in the area of Smart Grids. The implementation of the EU's energy policies needs to focus on creating a pan-European electricity grid infrastructure for the future, thus helping

[6] European Commission, "Expert Group 5 – Industrial Policy for Smart Grids, Smart Grids for Growth and Jobs, New Terms of Reference for 2015-2016", 2014
[7] Ibid; European Commission, "Minutes of the 15th meeting of the Steering Committee of the Smart Grids Task Force", 2013; European Commission, "Minutes of the 16th meeting of the Steering Committee of the Smart Grids Task Force", 2013.

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in interconnecting large-scale energy streams from different renewable sources. This will help in the development of EU and in the creation of new jobs through international partnerships, enabling new markets and services and integrated development through the entire value chain.[8]

4. What has Expert Group 5 contributed so far?

EG5 was officially disbanded in 2018 and it is no longer active in the Smart Grid Task Force. Its final activity involved the following of two studies, namely "On barriers and opportunities for smart grid deployment" and "EC-smart grid lighthouse projects", the results of which were presented in a workshop in February 2018. These studies concluded that smarting European power grids can unlock new business models based on pooling demand and supply sources and identified as the main limiting factor for the development of these opportunities the "resistance to change" (from DSOs and 'national regulators).[9]

2.3. The Principles of the ESGTF and IANOS Use Cases

This section describes the applicability of the different expert groups of the ESGTF to the nine IANOS Use Cases. An overview of the results can be found in the table below

2.3.1. Expert Group 1 – Standards for interoperability for smart grids deployment

4.1 Which IANOS UC's are relevant for EG1?
EG1 focusses on the standards for interoperability for smart grids deployment, therefore the following Use Cases are relevant for this EG: - UC1 *Maximisation of self-consumption in the community using demand-side management* - UC2 *Optimal dispatch of local energy generators and intra-day balancing services* - UC3 *Utilisation of distributed storage solutions for fast response ancillary services* - *UC4 Demand Side Management in Smart Grid methods to support power quality and congestion management services.*
4.2 How could the IANOS UC's benefit from your respective Expert Group?

[8] Ibid (n 6).
[9] European Commission, "Minutes of the meeting for the 23th SGTF Steering Committee meeting held on 8 February 2018 at Brussels", 2018; European Commission, "Executive Summary _ Study on barriers and opportunities for Smart Grid deployment", 2017

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UC1 and UC4 can benefit from EG1 as the Expert Group has extensively worked on the drafting of an implementing act which includes a focus on the approach to demand response. UC2 could benefit from the workings of EG1 as the main focus of the Expert Group is interoperability, UC2 could therefore learn from the approaches of EG1. UC3 could benefit from EG2 as the interoperability between the system is of importance for the utilisation of ancillary services. EG2 could provide guidance concerning this aspect.

2.3.2. Expert Group 2 – Regulatory recommendations for privacy, data protection and cyber-security

4.1 Which IANOS UC's are relevant for EG2?
Answer: Since EG2 is focusing on providing guidance on regulatory and legal recommendations to the various grid stakeholders, relevant to privacy, data protection and cyber-security, the Use Cases that could relate to this EG are: UC1: *Localized energy management systems*, could benefit from the contribution of EG2 with regard to enhancing the development of the *User/Demand Side Response* by addressing possible regulatory gaps on privacy/data protection of end users (consumers), TSOs and DSOs in a smart grid infrastructure, or developing new regulations where applicable. Risk Assessment approaches could also be utilized in order to mitigate risks and guarantee the security of the networks and stability of the supply chain. UC2: Provide a framework for self-assessment of the capabilities and the resources of the Operators (stress tests) with regard to identified threats/hazards to the networks, other than congestion, for example in times of crises (guidance on crisis management on supply chain security) AND develop safeguards to identified threat scenarios. UC4: Same as above. In addition, EG2 can assist smart grid owners by providing good practice methods and initiatives. Smart grid owners would first need to carry out a risk assessment to better understand and implement some or all the security measures based on their risk mitigation decisions.
4.2 How could the IANOS UC's benefit from your respective Expert Group?
IANOS could benefit by the outcomes of EG2 since they can: A) provide the basis for drafting a regulatory framework and/or identifying gaps in existing regulations relevant to data protection and network security, involving all smart grid owners and ultimately assist the implementation of all UCs. B) Help develop uniform guidelines in order for Operators to carry out risk assessments and develop realistic, applicable and cost-effective measures to mitigate identified threats to the continuity and stability of supply

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2.3.3. Expert Group 3 – Regulatory recommendations for smart grids deployment

Which IANOS UC's are relevant for EG3?
Since the function of Expert Group 3 is to identify regulatory incentives and grid stakeholders to promote a more flexible power grid and the deployment of smart grids, the Use Cases that could be related to this Expert Group are: - UC4 – since it identifies and deploys innovative technologies on smart grid methods to support power quality. By involving grid stakeholders, it could be necessary to employ new regulations. - UC1 and UC 5 – since it employs technologies typically used in Smart Grids on the user-side and could gain from new regulatory incentives. - UC9 – since it deals with LEC and citizen engagement, which could need regulatory simplification and explanations to incentivize the general public to participate in smart grid methods.
4.2 How could the IANOS UC's benefit from EG3?
IANOS could benefit from the works of EG3 as it could simplify the relationships between the several stakeholders participating in the use cases. EG3 also could help simplify the regulatory needs of each Use Case.

2.3.4. Expert Group 4 – Smart grid infrastructure deployment

Which IANOS UC's are relevant for EG4?
The relevant Use Cases for EG4 are UC2 (optimal dispatch of local energy generators and intra-day balancing services) , Use Case 3 (utilisation of distributed storage solutions for fast response ancillary services), Use Case 4 (demand side management and Smart Grid methods to support power quality and congestion management services), and Use Case 9 (Active citizen and local energy community engagement).
How could the IANOS UC's benefit from EG4?
UC4 could benefit from EG4's work since its actions aim at enhancing the quality of the grid through smart grid systems. The implementation of intelligent software on the grid will allow efficient use of storage solutions and thus regulate flows in order to respond in real time to demand (UC3). Also, those intelligent programs will allow the energy supply to be directed to match real and geographical needs in a more optimal and direct way without the need for human interventions (UC2). In the same logic, the installation of smart grid systems will make it possible to adapt the flows and avoid congestion. Finally, the involvement of the local population is fundamental for the development of smart grids on remoted islands. While smart grids participate in the increasing efficiency of energy systems, it also allows to promote the renewable energy productions and have both an environmental and social impact on the living

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conditions of the island's inhabitants. For this reason, it is essential to have their support and implication in the projects (UC9).

2.3.5. Expert Group 5 – Implementation of smart grid industrial policy

Which IANOS UC's are relevant for EG5?
N/A EG5 is no longer in operation
How could the IANOS UC's benefit from EG5?
N/A EG5 is no longer in operation

Conclusion

When looking at the above mentioned elaborations, the following schedule can be made concerning the applicability of ESGTF Expert Groups to the IANOS Use Cases:

	EG1	EG2	EG3	EG4	EG5
UC1	X	X	X		No longer in operation
UC2	X	X		X	
UC3	X			X	
UC4	X	X	X	X	
UC5			X		
UC6					
UC7					
UC8					
UC9			X	X	

It is clear that the ESGTF Expert Groups are mainly focussed on the workings of the grid an how the grid can be utilised "smart". Therefore, the schedule does not have any striking features, in that UC1, UC2, UC3 and UC4 are the main focus points.

As the focus of the ESGTF as a whole is on providing advice on policy and regulatory directions to the Commission concerning smart grids, it is not strange to see that the (main) focus of the ESGTF Expert Groups is *not* on decarbonisation of the system or utilisation of waste streams. The deployment of smart grids is, however, of importance in combatting climate change, establishing an internal

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market, and ensuring supply (the three goal of European Energy Policy).[10] So, indirectly, the ESGTF does contribute to the decarbonisation, however not in such a way that the Expert Groups can provide guidance concerning the Use Cases focussing on that topic.

The IANOS UC's:

1. Maximisation of self-consumption in the community using demand-side management;
2. Optimal dispatch of local energy generators and intra-day balancing services;
3. Utilisation of distributed storage solutions for fast response ancillary services;
4. Demand Side Management and Smart Grid methods to support power quality and congestion management services;
5. Decarbonisation of transport and the use of electric mobility to stabilise the energy system;
6. Decarbonising large industrial continuous loads through electrification and local energy generation;
7. Circular economy, utilisation of wase streams and gas grid decarbonisation;
8. Decarbonisation of heating network;

2.4. The Principles of the ESGTF and the IANOS Islands

This section describes the applicability of the work of the ESGTF to the two lighthouse islands and five follower-islands within IANOS.

2.4.1. Terceira

1. How do the findings of the different Expert Groups of the ESGTF relate to your respective IANOS island?
Regulation 610/2019 – 'Regulation of Smart Grid Services for Electricity Distribution' applies to the national territory, including the Azores, regarding smart grids. This regulation establishes the framework to the provision of services within the scope of intelligent electric energy distribution networks, namely with regard to network operators and suppliers. Specifically, the new rules include the following aspects of smart grids: i) requirements for the integration of electrical installations in smart grids; ii) communication from network operators on the availability of smart grid services; iii) activation of smart grid services, iv) ownership and access to consumption data; v) data to be used for invoicing; vi) services related to the electricity supply; vii) reading and making consumption and production data , and making available data to traders and third parties with a right of access; viii) remuneration for services provided in

[10] Meeting minutes from the 1st meeting of the Steering Committee of the Task Force for Smart Grids (2009) https://circabc.europa.eu/ui/group/f5b849d3-26ae-4cba-b9f9-6bc6688c5f58/library/a3c555e3-34c6-4769-bf8e-cb1598dc1887/details

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installations integrated in smart grids; and ix) evaluation of the performance and quality of service of network operators and suppliers in the new services of smart grids. That said, the description relates to interoperability and connectivity (EG1), as well as the resilience of the electricity infrastructure (EG2). Also, of most importance is the focus that EG4 has on the need of adapting the rules and guidelines to specific diversified local policy, regulatory, technical, socio-economic and cultural constraints and opportunities.
1.1 What are similarities between the principles of the different Expert Groups and the laws and regulations of your respective IANOS island?
The main principles of the several Expert Groups are related to the regulation (Regulation 610/2019, for Portugal in general including the Azores). Smart grid infrastructures include not only smart meters, but also data communications and energy systems handling technologies. Decree-Law no. 78/2011 of 20 June introduced the concept of smart metering systems as a way of reinforcing the consumers rights and their active participation in the electricity market. Only with all these elements operating together is advanced services possible. It is also mentioned that network operators that provide these services to consumers are entitled to a tariff incentive.
1.2 What are differences between the principles of the different Expert Groups and the laws and regulations of your respective IANOS island?
We find no substantial differences between the principles of the different EG and the laws and regulations of Terceira Island.

2. How are the principles of the ESGTF incorporated in the laws and regulations of your respective IANOS island?
The Regulation covers matters addressed in the Commercial Relations Regulation, in the Quality-of-Service Regulation and in the Guide to Measurement, Reading and Data Availability. Network operators that provide these services to consumers are entitled to a tariff incentive, that ensures that the benefits resulting from smart grids are shared between consumers and operators, based on the effective provision of all defined services. It should be noted that the electricity market in the Azores is regulated, with only one entity with concession for the electricity distribution and commercialisation. In addition, the Ordinance no. 231/2013, of July 22, approves the technical and functional requirements of smart meters.
2.1 How could the laws and regulations of your respective IANOS island benefit from the ESGTF and its Expert Groups?
Regulation 610/2019 covers the national territory, including the Azores. The Azores could benefit from the conclusions and outcomes of the ESGTF and its Expert Groups, with particular emphasis to EG4, as it aims to ensure lasting and inclusive energy transition in insular context, and to the EG1, regarding the interoperability and the procedures for data access.

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3. Are there findings and/or best practices in IANOS that the ESGTF could benefit from? If yes, what are these findings and/or best practices?
Since Terceira is a total energy island, the lessons learned from the deployment of the use cases on Terceira are replicable on all location without a connection to a main energy grid. Especially the regulatory implications of UC1 on Terceira might be of interest to EG3 (regulatory recommendations for smart grid deployment).

2.4.2. Ameland

1. How do the findings of the different Expert Groups of the ESGTF relate to your respective IANOS island?
Ameland is a testing ground for renewable energy projects, including the deployment of smart grids, in order to become energy independent. Next to that, regarding privacy and data protection the Netherlands has the general Implementation Act General Data Protection Regulation (Uitvoeringswet Algemene verordening Gegevensbescherming), based on EU Regulation 2016/679, to protect the data of users of the smart grids. Also the Electricity law (as well as the Gas law) include provisions on data processing, which relates to EG2.
1.1 What are similarities between the principles of the different Expert Groups and the laws and regulations of your respective IANOS island?
The laws and regulations applicable on Ameland are the same as those applicable on the mainland. The Netherlands does not have specific legislation/regulation focused on smart grids, which adds to the confusions concerning the legal framework thereof. Therefore, most of the Dutch legislation concerning smart grids can be found in the "Elektriciteitswet" (the Electricity law) and the "lower regulation" that stems from this law, including network codes. This Dutch electricity law finds it basis in the EU Electricity Directive, however, the most recent Electricity Directive 2019/72/EC has not yet been harmonized in the Netherlands' legal framework. At this point in time, the Netherlands is in the process of implementing the new Energiewet (Energy law), which harmonizes the Electricity Directive. In 2009 the Dutch Minister of economic affairs established the Dutch taskforce for smart grids ("Taskforce Intelligente Netten"), which operated till 2011. This task force did not come to binding decisions, they did however give recommendations to the Dutch Government. These recommendations led to a budget of 16 million euros for the creation of testing grounds in order to get practical experience regarding smart grids. The Dutch Electricity law does not give a definition of smart grids (they do give a definition of a grid).

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As stated above, with Dutch laws and regulations and the principles of the ESGTF the focus is on data protection (EG2), which includes a Decree Code of conduct Smart Meters.

1.2 What are differences between the principles of the different Expert Groups and the laws and regulations of your respective IANOS island?
One of the differences is that the ESGTF does not focus on tariffs that could be applicable, concerning the use of Smart Grids. Dutch legislation does, and has a special code dedicated to it, the Tarievencode Electriciteit (Tariff code Electricity). The Dutch Electricity Law does mention the interoperability of the electricity networks, but not specifically related to smart grids. Therefore, one of the main differences between the ESGTF and Dutch legislation is that smart grids do not (yet) have a prominent role in Dutch legislation as it has in the ESGTF.

2. How are the principles of the ESGTF incorporated in the laws and regulations of your respective IANOS island?
As stated above in question 1.1, there is no specific type of legislation which focusses on smart grids in the Netherlands
2.1 How could the laws and regulations of your respective IANOS island benefit from the ESGTF and its Expert Groups?
TNO, an independent Dutch research agency, has published a research paper[11] in 2021 concerning difficulties with Dutch laws and regulations concerning smart grids. The main difficulties found by TNO are: uncertainties in the redistribution of system costs, uncertainties about the role of regional network operators, low incentives to provide flexibility due to the connection values being based on peak values, current congestion management is not focused on the long term run and the framework for variable tariffs for transport is unclear. Next to that, the TNO rapport also mentions certain solutions to the current problems. The ESGTF could help in advising the Commission to take steps in creating flexible network tariffs, in order to make the framework more clear, which makes harmonization of Dutch law also more clear. Next to that, in the Netherlands there is currently a double tax on energy storage from your own connection, a change in EU legislation (the European Energy Tax Directive) could change this, e.g. a zero-rate.

3. Are there findings and/or best practices in IANOS that the ESGTF could benefit from? If yes, what are these findings and/or best practices?
Ameland is showcasing an integrated smart energy system that can become a blueprint for the different working groups of the ESGTF. The following aspects

[11] Royal HaskoningDHV, '*Rapport Knelpunten Smart Energy*' [2021] <https://www.topsectorenergie.nl/sites/default/files/uploads/Urban%20energy/kennisdossier/Waarde%20van%20Flex/Rapportage%20Knelpunten%20Smart%20Energy%20TKI.pdf>

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might be of interest:

1. The solar park that will be connected through a DC-connection is technologically superior but faces regulatory challenges. Lessons learned from this pilot can provide input to EG3 and EG4.

2. Cable pooling between a large (industrial) consumer and local RES can provide a cost effective solution to combining supply and demand. Overcoming regulatory issues and deployment challenges can be of value to EG3 and EG4.

2.4.3. Lampedusa

1. How do the findings of the different Expert Groups of the ESGTF relate to your respective IANOS island?
Lampedusa and Linosa are very peculiar islands that, despite being in the Mediterranean, could have more characteristics in common with Bora Bora than other islands and, therefore, with the work done by EG4. Here the key step is the declination of smart grid and off-grid on a simpler, understandable and practical picture for the community. At the same time, the presence of an energy monopoly by the only energy company in the area makes the cooperation between actors and the implementation of industrial policy necessary.
1.1. What are similarities between the principles of the different Expert Groups and the laws and regulations of your respective IANOS island?
More than similarities, the goal is to understand the order of implementation of the principles themselves in a narrow geographic context. Indeed, although at first glance the results of the different EGs should be implemented simultaneously, in the case of the Municipality of Lampedusa and Linosa, it is necessary to take a step back and first understand the ecosystem, how it works and how to engage the different stakeholders and, then, understand what EGs' results deliver to the different groups and in which order.
1.2. What are differences between the principles of the different Expert Groups and the laws and regulations of your respective IANOS island?
As I mentioned above, the energy monopoly that characterizes the islands of Lampedusa and Linosa are a major peculiarity of both political and regulatory nature. The energy network in place on the islands is owned by a private entity that chooses whether or not to authorize potential prosumers. However, this peculiarity could accumulate in other EU islands so new studies should be conducted to understand how to manage relations with local energy companies in the case of a monopoly.

2. How are the principles of the ESGTF incorporated in the laws and regulations of your respective IANOS island?
The Municipality of Lampedusa and Linosa do not have robust regulations when it comes to electricity production and distribution. The new administration,

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therefore, feels the need to address this lack by building a bridge between Europe, the energy company in place and consumers (future prosumers).
2.1 How could the laws and regulations of your respective IANOS island benefit from the ESGTF and its Expert Groups?
The fact that the Municipality of Lampedusa belongs to a special-status Italian region and the monopolization of the energy sector by a single energy company determines a skein to be unravelled upstream of the acquisition of the ESGTF's principles. At the same time, the results coming from EGs 4 and 5 may be the first in order of implementation in the Municipality of Lampedusa and Linosa

3. Are there findings and/or best practices in IANOS that the ESGTF could benefit from? If yes, what are these findings and/or best practices?
From the point of view of the islands of Lampedusa and Linosa, the municipality in the first two years of the IANOS project has mainly focused on developing a strategy to engage stakeholders on the island. What has been discovered is the presence of communities and institutions that are still not aware of the production, distribution and exploitable benefits proper to smart grids. For this reason, practical guidelines for managing and negotiating with different stakeholders in environments far from the mainland are needed.

2.4.4. Nisyros

1. How do the findings of the different Expert Groups of the ESGTF relate to your respective IANOS island?
Findings of the different EGs relate to Nisyros primarily on a regulatory level. Since RES penetration on the island is still basic, limited to home, and especially non-grid connected buildings (isolated) and some community lighting applications, amendment of the national regulatory framework (as outlined below), to incorporate EG outcomes and allow for the realisation and management of smart grids would eventually benefit the energy system and its users, especially on the case of non-interconnected Greek Islands. In general, ΜΔΝ i) outlines the rights and obligations of ΔΕΔΔΗΕ (Hellenic Electricity Distribution Network Operator - HEDNO) as operator of non-interconnected networks, ii) regulates the incorporation of RES/CHP and hybrid generators into the system, and iii) outlines the specifications for conventional generating units to be incorporated into the system. Additionally, the "Code for the Management for the National Distribution Grid (MNDG Code)" (Κώδικας διαχείρισης του Ελληνικού Δικτύου Διανομής Ηλεκτρικής Ενέργειας (ΔΕΔΗΕ/HEDNO – ΦΕΚ 78/2017) deals with issues of interoperability, functionality and connectivity of different power generation technologies.
1.2 What are differences between the principles of the different Expert Groups and the laws and regulations of your respective IANOS island?

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In general, the regulations mentioned above are in par with the general principles of the EGs. However, data management/protection and cyber security are areas where ΜΔΝ and MNDG Code appears to fall short into incorporating the principles of EG1 & EG2 in particular. The findings of these Groups would greatly benefit and contribute to the amendment of the Greek regulatory framework in order to embody technical standards and provisions to allow for the interoperability, connectivity and functioning of the various components for the provision of smart grid services. Also, risk-based measures could be considered in order to improve the resilience of the electricity infrastructure.
2. How are the principles of the ESGTF incorporated in the laws and regulations of your respective IANOS island?
To our knowledge, there are no laws and regulations on a local level to incorporate the principles of ESGTF. To the greater extent, these principles are incorporated in the "Electric Grid Management Code for non-interconnected islands to the Mainland Grid" *(Κώδικας Διαχείρισης Ηλεκτρικών Συστημάτων Μη Διασυνδεδεμένων Νήσων / ΜΔΝ – ΦΕΚ* 304/11.02.2014*)*, which applies for the island of Nisyros, as well as for the rest of the non-interconnected islands of the Aegean. Additionally, the "Code for the Management for the National Distribution Grid (MNDG Code)" (Κώδικας διαχείρισης του Ελληνικού Δικτύου Διανομής Ηλεκτρικής Ενέργειας (ΕΔΔΗΕ/HEDNO – ΦΕΚ 78/2017) tackles issues of interoperability, functionality and connectivity of different power generation technologies. In particular, the content of the Code regulates the rights and obligations of the Hellenic Electricity Distribution Network Operator (HEDNO), as well as the rights and obligations of Network Users and Providers in addition to issues related to the development, operation, Network access, the services provided by the Network Operator and the financial reward thereof
2.1 How could the laws and regulations of your respective IANOS island benefit from the ESGTF and its Expert Groups?
ΜΔΝ (see above) could be updated to adequately address interoperability, connectivity and functionality of the different components and processes (EG1) for the provision of smart energy and services, especially where ΜΔΝ fails to include more advanced applications specified in some of the UCs, for example. Additionally, **ΜΔΝ,** as well as the MNDG Code could benefit particularly from EG2 outcomes, concerning the establishment of measurements increase the resilience of the infrastructure and effectively control and mitigate identified risks, primarily focusing on cyber risks, to the network (employing RA processes). The development of regulations for data management, security and protection, amending the existing regulatory framework, would eventually benefit all users and operators (e.g. DSOs, Energy Suppliers, Energy Services Companies) and path the way for the transition to the smart grid environment. New approaches to governance/regulations, relevant to the outcomes of EG3 can also be incorporated both in the ΜΔΝ as well as the MNDG Code (see 2.

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above) tackling issues of smart metering and smart grid deployment, closing regulatory gaps and taking advantage of new applications, following replication of UCs taking into account the relevant local parameters. The outcomes of the Group in the area of cooperation between the energy and telecommunication sector could also be worth looking into, as the existing regulatory framework, appears to be somewhat limited in scope.
3. Are there findings and/or best practices in IANOS that the ESGTF could benefit from? If yes, what are these findings and/or best practices?
Yes. The outcomes of the IANOS UCs are novel and provide various opportunities for smart grid realization, spanning from home/community to commercial and industrial applications. For example, EG4, focussing on Smart Grid infrastructure deployment, could take advantage of UC2 in the replication of the optimization of energy dispatch, to maximize RES penetration and grid management. The results of this UC will be particularly relevant to optimize the blending between the different sources of renewable power production and the storage capacity. In a similar context, UC3 findings could also be of value to EG4, in the area of energy deployment challenges through the use of distributed storage technologies.

2.4.5. Bora-Bora

1. How do the findings of the different Expert Groups of the ESGTF relate to your respective IANOS island?
Actions in the area of industrial policies to speed up Smart Grids deployment will be the first step to permit the fast and efficient development of smart grids. Therefore, there is a close link between the work done by EG5 and EG4. However, the findings of the EG2 based on privacy, data protection and cyber security don't relate to our EG tasks.
1.1 What are similarities between the principles of the different Expert Groups and the laws and regulations of your respective IANOS island?
Bora Bora, located in French Polynesia, is not a European island. The island is subject to the French-Polynesian rules, then to the French ones – which are most of the times linked directly to the European ones. This comment applies to the next questions too. This being said, the 5 Expert Groups have similarities with the Bora Bora IANOS island, particularly regarding Interoperability (EG1), cybersecurity (EG2), and Smart Grid Infrastructure (EG4) as it brings global information replicable worldwide.
1.2 What are differences between the principles of the different Expert Groups and the laws and regulations of your respective IANOS island?

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The main difference is due to the location. Added to the fact that is it not a European territory, it is located more than 16 000 km from Europe. Thus, all information regarding the European market and the implementation at the industrial scale is not always consistent (EG3 and EG5). Indeed, component suppliers and transportation are different, and the remote location may not attract suppliers as much as the European Market. Also, intrinsic characteristics of the Polynesian network differ from the European ones. For example, the medium distribution voltage in Polynesia is 14 kV whereas it is 20 kV in France. Thus, European regulation may differ from the Polynesian one on particular topics.
2. How are the principles of the ESGTF incorporated in the laws and regulations of your respective IANOS island?
Bora Bora is not a European island, laws and regulations are not always relevant, but it already gives a good insight of the laws and the ones that can be transcripted from French law to French-Polynesian laws.
2.1 How could the laws and regulations of your respective IANOS island benefit from the ESGTF and its Expert Groups?
Since European laws and regulations are known to substantially pave the way in many aspects pertaining to European Smart Grid issues, with convincing sets of proposals which clearly provide interesting leads in different fields, there is no doubt that every progress at EU level can be set up as a credible path to follow for Bora Bora and French Polynesia. The challenge is to gather the information and have it spread relevantly at designated public authorities and entities, and to use it as a leverage to promote positive evolution through objective emulation in the local set of rules and regulations.
3. Are there findings and/or best practices in IANOS that the ESGTF could benefit from? If yes, what are these findings and/or best practices?
We assume any specific EU regulation that is targeted to promote culture and heritage conservation while structuring a roadmap for energy transition (in islands or even in mainland territories) could become a very interesting practice to be translated in the Bora Bora ESG context. IANOS could be used as an active tool to promote the idea and have it implemented in the French Polynesian set of rules and regulations

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3. Treaty on the Functioning of the European Union

This section elaborates more on two articles of the Treaty on the Functioning of the European Union, art. 107 TFEU on State aid and art. 167 TFEU concerning the cultures in the EU. After the elaboration on art. 107 TFEU, state aid regulation applicable on the IANOS islands will be explained.

3.1. Article 107 TFEU[12]

Article 107 of the Treaty on the Functioning of the European Union (TFEU), sets out the rules concerning State aid, the article states the following:

1. Save as otherwise provided in the Treaties, any aid granted by a Member State or through State resources in any form whatsoever which distorts or threatens to distort competition by favouring certain undertakings or the production of certain goods shall, in so far as it affects trade between Member States, be incompatible with the internal market.
2. The following shall be compatible with the internal market:
   a. aid having a social character, granted to individual consumers, provided that such aid is granted without discrimination related to the origin of the products concerned;
   b. aid to make good the damage caused by natural disasters or exceptional occurrences;
   c. aid granted to the economy of certain areas of the Federal Republic of Germany affected by the division of Germany, in so far as such aid is required in order to compensate for the economic disadvantages caused by that division. Five years after the entry into force of the Treaty of Lisbon, the Council, acting on a proposal from the Commission, may adopt a decision repealing this point.
3. The following may be considered to be compatible with the internal market:
   a. aid to promote the economic development of areas where the standard of living is abnormally low or where there is serious underemployment, and of the regions referred to in Article 349, in view of their structural, economic and social situation;
   b. aid to promote the execution of an important project of common European interest or to remedy a serious disturbance in the economy of a Member State;
   c. aid to facilitate the development of certain economic activities or of certain economic areas, where such aid does not adversely affect trading conditions to an extent contrary to the common interest;
   d. aid to promote culture and heritage conservation where such aid does not affect trading conditions and competition in the Union to an extent that is contrary to the common interest;

[12] Consolidated Version of the Treaty on the Functioning of the European Union [2012] C326/47

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State aid can be defined as being "*an advantage in any form whatsoever conferred by national public authorities to undertakings on a selective basis*".[13] These advantages could distort competition and are therefore forbidden. This EU rule limits the power that national governments (could) have in controlling the market. Paragraph 2 and 3 of the article mention the actions that are compatible with the (EU internal) market. Subsidies granted to individuals or general measures open to all enterprises are not covered by this prohibition and do not constitute State aid.

The four (cumulative) criteria that make up State aid are:[14]

1. The support is granted by the State or through State resources;
2. The support favours one or more undertakings (there is a selective advantage);
3. The support distorts or has the potential to distort EU competition, and;
4. The support (likely) affects trade between EU countries.

State aid is controlled by the Commission by requiring prior notifications of new aid measures. After that, the Commission starts a preliminary investigation, after which it can come to one of three conclusions[15]:

1. There is no aid;
2. The aid is compatible with EU rules;
3. Doubts remain about the compatibility of the aid with EU rules, an in-depth investigation will take place.

State aid is not only mentioned in the TFEU, it is also mentioned in other EU legislation. For example, art. 9(2)(a)(iii)(c) of the Renewable Energy Directive, art. 14(11) of the Energy Efficiency Directive and recital 13 of the preamble of the Buildings Directive.

[13] European Commission, '*State Aid Overview*' < https://ec.europa.eu/competition-policy/state-aid/state-aid-overview_en#:~:text=Therefore%2C%20Article%20107%20TFEU%20generally,undertakings%20on%20a%20selective%20basis>
[14] For a more in depth analysis of the different criteria see the notices from the EC on art. 107: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52016XC0719(05)&from=EN
[15] Ibid (n 12)

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Exceptions

There are a few exceptions to the State aid rule that might be applicable in the case of IANOS:

One could say that aid given by Member States, within the framework of IANOS, is compatible with the internal market as it could fall under art. 107(3)(b) TFEU; "*aid to promote the execution of an important project of common European interest (…)*". This article includes a balancing test, in which the Commission does economic as well as social assessments. In these assessments the positive and negative effects of the aid will be examined (the overall balance has to be positive).[16]

Art. 107(3)(c) TFEU could also be applicable, concerning energy objectives.[17] With this article, there is also a so-called "compatibility assessment" where the Commission analyses whether the aid:

1. Facilitates the development of an economic activity, and;
2. Does not unduly affect trading conditions to an extent contrary to the common interest.
    a. Necessity;
    b. Appropriateness;
    c. Proportionality, and;
    d. Transparency of the aid.

Aid given to, for example, technologies that contribute to the reduction of greenhouse gas emissions, aid supporting electrification using renewable electricity/low-carbon electricity and aid for the construction of recharging/refuelling infrastructure are compatible with the internal market.[18]

The European Commission set up a communication with guidelines on State aid for climate, environmental protection and energy.[19]

Paragraph 16(a) of this communication points out that State aid may be compatible with the internal market (under art. 107(3)(c) TFEU) if it is, for example, "*aid for the reduction and removal of greenhouse gas emissions, including*

[16] M. Louisse-Read, '*The balancing test under Article 107(3)(b) TFEU*' [2020] 19 Law of Business Fiannce.
[17] Guidelines on State aid for climate, environmental protection and energy 2022 [2022] C80/01, <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52022XC0218(03)&from=EN>.
[18] Ibid
[19] Ibid

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through support for renewable energy and energy efficiency" or "*aid for the improvement of the energy and environmental performance of buildings.*" A compatibility assessment is still necessary, even if an activity falls under paragraph 16(a).

Relevance

State aid is relevant for the IANOS project, as it is a general EU article that should always be taken into account by its Member States and their governmental organisation. Should a IANOS partner ask for State aid from a Member State and all the necessary steps are taken (notification etc.) there would not be much consequence, should the aid be considered incompatible. The aid would simply not be given. However, when these steps are not taken, and the partner has received the aid prior to the notification, and the aid is deemed incompatible with the market, the Member State has to recover the aid given in order to bring the market back to the original circumstance, as stated in art. 108 TFEU.

However, in the case of IANOS it is highly unlikely that there will be a case of unlawful State aid, as the State aid has to have a negative cross-border effect (the State aid negatively influences the internal market of the EU). Next to that, as stated above, a number of exceptions could be applicable in the case of IANOS.

3.2. State aid regulation on the IANOS islands

3.2.1. Terceira

How is State aid regulated on your respective IANOS island?
The regulation on State aid that applies for Terceira Island comes from the Treaty on the Functioning of the European Union (TFEU), in particular article 107. In this regard, State aid regulation is transversal to the entire Portuguese territory, including the Azores. Besides that, under exceptional circumstances, higher aid intensities may be allowed for other types of aid (such as aid for research, development and innovation, employment, training, energy or environmental protection) whenever granted to companies established in assisted regions, in recognition of the specific difficulties they face – as is the case of the Azores. Therefore, regional bonuses applied to aid granted for these purposes are not considered regional aid. The exceptions to the principle of incompatibility of State aid are provided in Article 107(2) and (3) of the TFEU.

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2. Is State aid regulated differently on your respective IANOS island compared to the mainland? If yes, how?
The state aid regulation for the Azores (including Terceira Island) respects the regulation applied to Portugal mainland. However, under exceptional circumstances, higher aid intensities may be allowed for other types of aid (such as aid for research, development and innovation, employment, training, energy or environmental protection) whenever granted to companies established in assisted regions, in recognition of the specific difficulties they face – as is the case of the Azores. Therefore, regional bonuses applied to aid granted for these purposes are not considered regional aid.
2.1 Are there exceptions for islands, concerning the national State aid rules? If yes, what are these exceptions?
The exceptions to the principle of incompatibility of State aid are provided in Article 107(2) and (3) of the TFEU. The provisions of Article 107(3)(a) of the TFEU should be noted, which establishes that State aid may be compatible with the internal market *"(...) intended to promote the economic development of regions where the standard of living is unreasonably low or where there is serious underemployment, as well as the development of the regions referred to in article 349, taking account their structural, economic and social situation*". One of the (outermost) regions referred to in article 349 is the Autonomous Region of the Azores (consisting of nine islands, one of which is Terceira).
3. Are there differences with how State aid is regulated on your respective IANOS island and the European legislation? If yes, what are these differences?
No.
4. Do you see barriers for the implementation of the IANOS UC's because of State aid regulation? If yes, what are these barriers?
For the executing entities, there is no State Aid, considering that it is an investment support to entities with public capital, under the governance of Regional Government of the Azores' energy competent department, terms in which it is considered that the investment planned for our outermost region is unlikely to affect competition and trade between Member States, for the purposes of article 107 of the TFEU. This said, there are no barriers that prevent the IANOS UCs' implementation.

3.2.2. Ameland

How is State aid regulated on your respective IANOS island?
The laws and regulation on Ameland are the same as on the Netherlands' mainland. Dutch law refers directly to the Treaty of the Functioning of the European Union ("TFEU") through the "Wet Naleving Europese regelgeving publieke entiteiten" (European Public Entities Compliance Act). This Dutch act

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refers directly to EU treaties. Next to those rules, the Netherlands has implemented the "Wet terugvordering staatssteun" (State Aid recovery law). This law includes rules on the recovery of illegally granted State aid by governing bodies, including interest.[20]
2. Is State aid regulated differently on your respective IANOS island compared to the mainland? If yes, how?
No.
2.1 Are there exceptions for islands, concerning the national State aid rules? If yes, what are these exceptions?
No, there are no exceptions for Dutch islands. However, when looking at the islands part of the Kingdom of the Netherlands overseas (Curaçao, Sint Maarten, Aruba and the BES-islands), the EU rules on State aid do not apply as these islands are not part of the territory of the EU and have the OCT-status (Overseas Countries and Territories).
3. Are there differences with how State aid is regulated on your respective IANOS island and the European legislation? If yes, what are these differences?
No.
4. Do you see barriers for the implementation of the IANOS UC's because of State aid regulation? If yes, what are these barriers?
Some proposed RES on Ameland are dependent on joint investments between government and private investors or government subsidies on development of the technology. Both constructs are susceptible to state aid challenges, as the investments have to fall under specific state aid exemptions mentioned in the "Guidelines on State aid for climate, environmental protection and energy "[21]. During and before the development of IANOS. However, these challenges have been mapped and were deemed not applicable to IANOS. Specifically, for the deployment of the SeaQurrent tidal kite (partially funded through the Wadden Fund) an extensive state aid analysis was required as part of the subsidy.

3.2.3. Lampedusa

1. How is State aid regulated on your respective IANOS island?
Ministerial Decree Feb. 14, 2017, defines targets and incentive modalities for renewable energy in Italy's smaller islands not interconnected to the mainland electricity grid. Specifically, it establishes the minimum targets for the development of electricity and thermal energy production from renewable sources to be achieved by December 31, 2020, and the modalities for supporting the investments necessary for implementation. Resolution No. 558/2018/R/EFR defines the tariffs of the remuneration system for electricity and thermal energy

[20] https://uitspraken.rechtspraak.nl/inziendocument?id=ECLI:NL:RVS:2006:AU9416

[21] Guidelines on State aid for climate, environmental protection and energy 2022 (2022) C80/1

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produced from renewable sources in non-interconnected islands and the related access modalities, implementing the provisions of Ministerial Decree 14/02/2017. The proposed arrangements reflects those already in force Nationally. The party in charge of their verification remains the GSE, just as the conditions for the connection of production plants to the electricity grid or those for dedicated withdrawal are the same. What inevitably changes is the determination of incentives, starting with those for electric energy renewable. According to the 2017 decree, the basic unit tariff must be equal to the savings achieved with avoided fuel-technically called "efficient avoided cost"-within a minimum and maximum value specified by plant size. For the purposes of determining this cost (through a formula that, in addition to the price of diesel fuel, takes into account average fuel transportation costs and specific consumption) and the separate threshold values by size.

2. Is State aid regulated differently on your respective IANOS island compared to the mainland? If yes, how?
Partially. The Sicilian Regional Council Resolution No. 177 of April 6, 2022 "Plan of Action and Cohesion (Complementary Operational Program) Sicily 2014- 2020. Allocation of financial resources for Axis 2: Support the implementation of the Green Deal Europe," by which specific objective 2.1 - "Promoting energy efficiency, development of renewable energy and smart grids," and were included, in addition to actions 2.1.1 - "Support for energy upgrading of public assets, including those of the public residential building stock and systems of public lighting" and 2.1.2 - "Support to enterprises for the reduction of energy consumption energy consumption and climate-changing gas emissions," Actions 2.1.3 - "Support for investments of renewable energy communities". In particular, Annex 1 - Description of the Management and Control System - (SI.GE.CO.) which identifies for the management of the POC (Action Plan and Cohesion - Complementary Operational Program- 2014/2020), as Centers of Responsibility (CoR) of the actions and operations, the regional departments, including the Regional Department of Energy.
2.1 Are there exceptions for islands, concerning the national State aid rules? If yes, what are these exceptions?
No.
3. Are there differences with how State aid is regulated on your respective IANOS island and the European legislation? If yes, what are these differences?
No.
4. Do you see barriers for the implementation of the IANOS UC's because of State aid regulation? If yes, what are these barriers?
Both EU regulations, through Directive 2009/72/EC, and Italian national regulations, through Law January 9, 1991, No. 103 (Article 7), prioritize the

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measure of protection of end customers in isolated areas like small islands in terms of supply interruption, and do not provide for measures for the possible integration and operation of different energy providers, so to facilitate energy monopoly. The two factors that constitute the main barriers to the entry of other energy providers are given by the very structure and geographical conformation of the non-interconnected small islands like Lampedusa. Because of their small size, the smaller islands are unable to capture the advantages associated with economies of scale, either on the financial or industrial side; Isolation results in operational constraints in the operation of their own power system, reducing the number of diversification options in electricity supply, which, to meet highly volatile demand profiles in hard-to-access systems, must for now rely on diesel-based generation. There are no other types of barriers to competition, which is why the European legislature did not deem it necessary to introduce a requirement for possible integration and operation of different energy providers in small islands. On the contrary, the vertical integration of the different stages of the electricity supply process - production, distribution and sale - corresponds to an industrial logic that aims to optimize operating costs while ensuring the security of the island's electricity system

3.2.4. Nisyros

1. How is State aid regulated on your respective IANOS island?
State aid is regulated centrally under: Greek Competition Law N3959/2011 (ΦΕΚ Α' 93/20-04-2011) as amended by N3959/2022, on par with Articles 101, 102 & 107 TFEU and directive (EU) 2019/1. Competition in the Greek market is regulated mainly by Acts: 146/1914 and 703/1977 on “Unfair Competition” superseded by the current Act 3959/2011 “on the Protection of Free Competition”. While the former are concerned about the way, in which competition is conducted, the latter aims at ensuring the existence of free and fair market competition taking into account the Common Market context. Greek competition law aims to ensure the proper functioning of the market and in effect, safeguard consumer welfare. The above provisions apply to all undertakings, i.e. both to private and public entities, as long as there is a business activity (functional criterion). Greek Development Law N4887/2022 (**ΦΕΚ Α** 16/4.2.2022) on par with articles 107 & 108 TFEU and commission regulation (EU) No 651/2014 The Greek Development Law 4887/2022, aims to promote the economic development of the country by granting incentives to specific activities and sectors, in order to achieve the digital and technological transformation of businesses, *the green transition*, the creation of economies of scale, the support of innovative investments and those seeking to introduce new technologies, such as robotics and artificial intelligence, the strengthening of employment

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with qualified personnel, the support of new entrepreneurship, the strengthening of tourism and the improvement of competitiveness in high value-added sectors.

The development law of 2022 defines 13 new aid initiatives and introduces for the first time a thematic orientation instead of a horizontal dimension. Each scheme focuses on specific sectors of the Greek economy.

The 13 aid schemes are:

- Digital and Technological Transformation
- Green Transition – Environmental Upgrade
- New Business
- Fair Development Transition
- Research and Applied Innovation
- Agri-food – Primary Production and Processing of Agricultural
- Products – Fisheries and Aquaculture
- Manufacturing – Supply Chain
- Business Extroversion
- Support for Tourism Investments
- Alternative Forms of Tourism
- Large-scale Investments
- European Value Chains
- Entrepreneurships 360 °

2. Is State aid regulated differently on your respective IANOS island compared to the mainland? If yes, how?

Yes, state aid is regulated differently. Nisyros is defined as a "Very Small Island (population <2000)", as per directive (EU) 75/268. In particular, Nisyros is considered to be an *island disadvantageous area*, due to the density of population, per km^2, limited connectivity to the mainland and limited market and development opportunities (on par with the EU directive). As such, it has priority to various State Aid initiatives and schemes, compared to most mainland areas, or islands with bigger population and permanent/more frequent connection to the mainland.

2.1 Are there exceptions for islands, concerning the national State aid rules? If yes, what are these exceptions?

As per above. For example, small islands can often be exceptionally aided by one-off, or periodical State funding initiatives aiming to stimulate growth through public works (roads, port infrastructure and services), or through funding aiming to increase the quality and frequency of connection to the mainland or nearby islands.

3. Are there differences with how State aid is regulated on your respective IANOS island and the European legislation? If yes, what are these differences?

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No major/particular differences are known to exist compared to European legislation concerning insular areas. Greek legislation is widely on par with directive (EU) 75/268 and all relevant EU legislation.
4. Do you see barriers for the implementation of the IANOS UC's because of State aid regulation? If yes, what are these barriers?
To the best of available information, there is no State Aid regulation to pose specific barriers or limitations to any of the conventional technologies utilised in IANOS UCs. On the contrary, in context with the current Development Law (4887/2022) and due to the fact that the island of Nisyros, being, as mentioned in 2. above, is defined as a disadvantageous area, projects concerning the implementation of novel technologies considered in IANOS UCs, would most likely receive state aid/funding in priority. Especially since they fall into the category of *Green Transition*. In any case, it is not anticipated that State aid regulations would pose significant barriers (if any at all) in the implementation/actual replication of IANOS UCs. Such cases would be treated within the general framework regulating State aid on RES/Green Transition for insular areas – disadvantageous areas in particular

3.2.5. Bora-Bora

1. How is State aid regulated on your respective IANOS island?
French Polynesia belongs to French Territories. However, French Polynesia is not located in Europe, nor directly subject to European laws. Over time, Polynesia has gained in autonomy and competence from France. The following article in English summarizes its history: https://www.globalsecurity.org/military/world/oceania/fp-government.htm. In short, several laws, especially 1996 and 2004 strengthen autonomy of Polynesia. *In 1996, new transfers of competences are made to the benefit of French Polynesia and allowing Polynesia to participate to the exercise of certain powers of the State. The 2004 Statute further strengthens autonomy by transferring new powers from the State to the country. The assembly of French Polynesia has the right to vote "laws of the country" within the framework of the exercise of its powers.* In accordance with this principle, French Polynesia is competent in all matters, except those expressly attributed to the State. Below the competences that are still attributed to FRANCE with which Polynesia must comply are summarized. From the Organic law n° 2004-192 of February 27, 2004 on the statute of autonomy of French Polynesia: https://www.legifrance.gouv.fr/loda/id/JORFTEXT000000435515/

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1° To the composition, organization, functioning and attributions of the constitutional public powers of the Republic, of the Council of State, of the Court of Cassation, of the Court of Auditors, of the Court of Conflicts and of any national jurisdiction authority, as well as the National Commission for Computing and Liberties and the Comptroller General of places of deprivation of liberty; 2° To national defense ; 3° In the public and private domain of the State and its public establishments; 4° To the nationality, status and capacity of persons; 5° To public officials of the State; 6° To the contentious administrative procedure; 7° The rights of citizens in their relations with the administrations of the State and its public establishments or with those of the communes and their public establishments; 8° To the fight against the illicit circulation and money laundering, to the fight against the financing of terrorism, to the powers of research and observation of offenses and to contentious procedures in customs matters, to the regime of foreign investments in an activity which participates in the exercise of public authority or relating to activities likely to undermine public order, public security, the interests of national defense or relating to research, production or marketing activities weapons, ammunition, powder or explosive substances. Are also automatically applicable in French Polynesia the laws which carry authorization to ratify or approve international commitments and the decrees which decide on their publication, as well as any other legislative or regulatory provision which, because of its object, is necessarily intended to govern the entire territory of the Republic. None of the competences mentioned above include economy and energy topic. Thus, aid about energy transition and decarbonization are ruled by French Polynesian institutions.
2. Is State aid regulated differently on your respective IANOS island compared to the mainland? If yes, how?
No - mainland of French Polynesia (Tahiti) and Bora Bora are subject to the same laws. However, laws can be different from the one of metropolitan France.
2.1 Are there exceptions for islands, concerning the national State aid rules? If yes, what are these exceptions?
Yes – because Bora Bora is subject first to French Polynesian laws. Then, secondly to the national State. However, there is a strong relation with France, thus many laws and regulations are translated from metropolitan France to French Polynesia.
3. Are there differences with how State aid is regulated on your respective IANOS island and the European legislation? If yes, what are these differences?
Yes – as described above, because of its location not belonging to the European territories.

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4. Do you see barriers for the implementation of the IANOS UC's because of State aid regulation? If yes, what are these barriers?
The government of French Polynesia and France are both willing to develop decarbonised islands as much as possible. Thus, laws are currently being simplified to allow a faster transition. As mentioned above, French Polynesian laws and regulations don't apply automatically when they are appliable in EU, because it has to 1st be translated in the national set of laws and then transferred the French Polynesian government. Thus, the process is time consuming and can be a barrier. Another barrier is the remote location in the middle of the Pacific, more than 6000km away from the closer continent, which can create less attractivity for suppliers and complexify implementation of the project.

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3.3. Article 167 TFEU

Article 167 TFEU states the following:

1. The Union shall contribute to the flowering of the cultures of the Member States, while respecting their national and regional diversity and at the same time bringing the common cultural heritage to the fore.
2. Action by the Union shall be aimed at encouraging cooperation between Member States and, if necessary, supporting and supplementing their action in the following areas:
    - improvement of the knowledge and dissemination of the culture and history of the European peoples,
    - conservation and safeguarding of cultural heritage of European significance,
    - non-commercial cultural exchanges,
    - artistic and literary creation, including in the audiovisual sector.
3. The Union and the Member States shall foster cooperation with third countries and the competent international organisations in the sphere of culture, in particular the Council of Europe.
4. The Union shall take cultural aspects into account in its action under other provisions of the Treaties, in particular in order to respect and to promote the diversity of its cultures.
5. In order to contribute to the achievement of the objectives referred to in this Article:
    - the European Parliament and the Council acting in accordance with the ordinary legislative procedure and after consulting the Committee of the Regions, shall adopt incentive measures, excluding any harmonisation of the laws and regulations of the Member States,
    - the Council, on a proposal from the Commission, shall adopt recommendations.

Art. 167 TFEU mainly focusses on the role that the EU has, to support, coordinate or supplement action of the EU Member States in the area of culture.[22] As mentioned in paragraph 5 of the article, the EU legislator is limited to making incentive measures, which excludes harmonisation at the EU level. As with the article concerning State aid, art. 167 TFEU is an article that should always be held into account when implementing national legislation. However,

[22] https://eur-lex.europa.eu/EN/legal-content/glossary/eu-culture-policy.html

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since the IANOS project itself does not focus on the cultural aspects that are applicable concerning decarbonizing islands, this article is not legally relevant for the IANOS project and will not be further discussed.

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4. Conclusions

Deliverable 2.6

This deliverable, D2.6, contains a comprehensive overview of the Expert Groups of the ESGTF, its applicability to the IANOS islands and the related Use Cases. An overview of the results can be found in the table below:

	EG1	EG2	EG3	EG4	EG5
UC1	X	X	X		No longer in operation
UC2	X	X		X	
UC3	X			X	
UC4	X	X	X	X	
UC5			X		
UC6					
UC7					
UC8					
UC9			X	X	

Next to that, the deliverable provided elaborations on the European Smart Grid Task force and its Expert Groups, as well as elaborations regarding European State aid regulation and National State aid regulation.

The IANOS project and its islands, can benefit from the workings of the ESGTF and its Expert Groups, and vice versa. Stakeholder engagement and data management are subjects, among others, from where the IANOS project could benefit from the ESGTF. Contrarily, the ESGTF can benefit from the IANOS project on subject like integrated smart energy systems and smart grid infrastructure deployment.

Art. 107 TFEU regulates State aid within the EU Member States, in order to prevent competition within the EU to be distorted. Regarding national State aid legislation, the line of thought is mainly the same on the islands, mostly due to the EU legislation in place. However, there are some differences. Some islands might be granted more aid for specific projects on the islands, or have certain incentive schemes in place. Next to that, regarding State aid, islands might invoke exceptions. Some islands, like Terceira and Nisyros, are able to be granted

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exceptions per EU law because of, among others, their size, limited connectivity or location.

The usability of this document and the ESGTF to IANOS and other islands, but also the impact of the Use Cases developed on the lighthouse islands will depend on two developments:

- Continuous monitoring of the use cases on Ameland and Terceira. If relevant lessons learned will be developed during the further roll-out of the pilot, they should be discussed on the relevant expert group of the ESGTF;
- Monitoring of new results of the expert groups, mainly if they are specific to islands.

Task 2.2

Task 2.2 provided an interface to the IANOS islands, and possibly other islands too, in order to give them insights in the applicable legal framework surrounding legal and financial aspect of their decarbonization efforts.

The first deliverable, D2.4, provided the start of the interface by constructing questionnaires for the islands to be filled in during D2.5. This interface mainly consisted of relevant locally enforced regulations, relevant locally enforced grid codes and relevant financial aspects for deep decarbonization. The interface consisted of the following specific subjects; regulated third party access, system operators, mobility, utilization of waste streams and gas grid decarbonization, decarbonization of heating network(s), active citizen and local energy community engagement, VPPs, self-consumption, balancing, storage and power quality and congestion management services. Next to the interface, D2.4 also elaborated on the applicable EU legal framework, being the Electricity Directive 2019/944, Electricity Regulation 2019/943, Gas Directive 2009/73/EC, Energy Efficiency Directive 2012/27/EU and the EU Electricity Network Codes.

During the second deliverable for T2.2, D2.5, de IANOS islands filled in the interface developed in D2.4, and elaborated on the national legal frameworks of Portugal and the Netherlands (annex 4 and 5). With D2.5, the islands did a “quick scan” and found the laws and regulations applicable to the various topics and identified possible barriers for decarbonization. These results included relevant instruments, documents and provisions, relevant decisionmakers, who should be approached in case changes to the existing framework should be made. The

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conclusion of D2.5 stated that it seems difficult to harmonize conditions on all islands since the specific conditions of each island differ. Also, because of restricted interconnection, different standards do and should apply. It was also stated that decarbonization is not incentivized on most islands, while financial conditions have been mostly harmonized (socialized) with the mainland energy system. Next to that, either energy communities already exist, or are not always incentivized. And, except for the island of Lampedusa, the islands that are closely embedded in the mainland energy system (Ameland for example) do not yet facilitate e.g. flexibility for congestion management for balancing up to a large extent. It was concluded that the EU is pushing in the right direction, but steps still need to be taken to allow for deep-decarbonization of the IANOS islands.

D2.6, provided the last extension of the interface by including aspects of the European Smart Grid Task Force (ESGTF) and state aid legislation. Within this deliverable, the applicability of the Expert Groups of the ESGTF to the IANOS UCs were elaborated upon, resulting in the following table:

	EG1	EG2	EG3	EG4	EG5
UC1	X	X	X		No longer in operation
UC2	X	X		X	
UC3	X			X	
UC4	X	X	X	X	
UC5			X		
UC6					
UC7					
UC8					
UC9			X	X	

It was concluded that both IANOS and the ESGTF can learn valuable lessons from each other. The ESGTF can learn from IANOS on subjects such as smart grid infrastructure deployment, and IANOS can learn from the ESGTF on subjects such as stakeholder engagement and data management. Concerning state aid legislation, most of the islands are on the same line, mostly due to the EU legislation in place. There were, however, some differences. Some islands might be granted more aid for specific projects on the islands or have certain incentive schemes in place. Next to that, regarding State aid, islands might invoke

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exceptions. Some islands, like Terceira and Nisyros, are able to be granted exceptions per EU law because of, among others, their size, limited connectivity or location.

All the deliverables of T2.2 combined form an interface (annex 1) which allows for islands within the IANOS project and islands not involved in it, to get insights in their own legislative and financial framework concerning deep decarbonization. This interface allows for islands to do a quick-scan of this framework and identify possible barriers which could help with furthering deep-decarbonization of the islands.

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5. Annexes

Annex 1 – Full interface

The standard interface provides a set of questionnaires, mapping the relevant legal aspects and barriers for the IANOS islands and use cases. Based on this map, deeper insights, including on local conditions, can be produced.

Questionnaires

Based on the description of T2.2, insights on the following should be provided throughout the project:

1) the relevant locally enforced regulations;
2) the relevant locally enforced grid codes;
3) the relevant financial aspects.

For these elements, a number of general aspects are to be included:

1) the general framework, which defines the basic rules and conditions, the relevant authorities and how the applicable frameworks correspond to mainland/national regulations. These aspects are relevant for the relevant locally enforced regulations, grid codes and financial aspects;
2) relevant main legal aspects of the IANOS use cases.
3) The identified aspects represent a map of the relevant regulatory, legal and financial aspects of the IANOS project.

The table below provides a more detailed overview of the general aspects and to what extent they are relevant for relevant locally enforced regulations, grid codes and financial aspects.

Table 1 Overview of relevant aspects map

Map	Locally Enforced Regulations	Locally Enforced Grid Codes	Financial Aspects
1. General Framework	●	●	●
1.1 Relevant authorities	●	●	●

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1.2 Relation with mainland/national regulations	●	●	●
2. Virtual power plant	-	●	◌
3. Maximize self-consumption		●	●
4. Optimal dispatch (intraday) balancing		●	
5. Storage, for fast responsive ancillary services		●	
6. Power quality and congestion management services		●	
7. Electric mobility and e-charging	●	●	●
8. Utilization of waste streams and gas grid decarbonization	●	○	◌
9. decarbonization of heating network	●		
10. active citizen and local energy community engagement	●	●	◌

● addressed	○ not addressed	◌ indirectly addressed	- not applicable/irrelevant

This map is translated into a set of questionnaires, which further map and specify the relevant aspects and conditions based on the experiences of the IANOS consortium, and which will be iterated, expanded and updated throughout the project.

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Questionnaire 1: Locally Enforced Laws and Regulations

In order to assess the applicable locally enforced laws and regulations, this questionnaire provides a map to get insight on:

- The general applicable legal framework on the island regarding energy supply.
- The applicable regulations and laws.
- The degree of autonomy the island has in setting its own regulations and laws.

1. General Framework
1.1. What are the applicable laws and regulations on the Island? Please fill in the table below.

Formal Name of the law or regulation	**Version No./Date**	**Object and purpose**	**Internet link to formal law or regulation**

Explanation:
Please state the applicable laws and regulations, their most recent versions and/or publication dates, their object and purpose (what do they regulate and why, what is their scope) and the official (online) finding place of the law or regulation.

1.1 Relevant Authorities
1.1.1 Who/which authority is responsible for: a) adopting and/or amending specific laws and regulations (see table Question 1); b) enforcing specific laws and regulations?

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Formal Name of the law or regulation	Adopt(ed)	Amend	Enforcement

Explanation:

Please mention here the relevant laws and regulations, governing the electricity, gas and heating market (e.g. electricity, gas, heat or energy law). If relevant, also mention any specific regulations dealing with guarantees of origin, system operation (e.g. on unbundling, system operators tasks), consumer protection in energy markets and supplier requirements (e.g. authorization procedures, licenses, etc.).

1.2 Relation with mainland/national regulations
1.2 Are the laws and regulations governing energy markets the same as those applied on main land?
Answer [20 words max]:

1.2.1 If not, how are they different?
Answer [80 words max]:

1.2.2 If so, in your experience, do the national laws and regulations work well for the island? If not, could you briefly explain why not?
Answer [80 words max]:

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Regulation of System Operators
1.2.3 How are the system operators regulated under the applicable legal regime on the island?
1.2.3.1 Are they unbundled entities or are they exempt from the unbundling requirements?
Answer [40 words max]:
1.2.3.2 Following the above question: are there differences between system operators for electricity, gas and (if relevant) heat network operators?
Answer [40 words max]:

Regulated Third Party Access
1.2.4 How is regulated third party access regulation on the island;
1.2.4.1 What are legally defined reasons for refusing system access (transport capacity)?
Answer [80 words max]:
1.2.4.2 What are the relevant categories of system users? (e.g. 'types' of users, such as households, SMEs, or industry; or based on connection size, for example 1*25A, etc.)
Answer [80 words max]:

Explanation:

The answers to the questions above should provide first insights on the position of the system operators operating at the island, the categories of system users, the relationship between system operators and system users (in terms of system

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access) and how the islands are interconnected to other/main land energy systems.

2. Electric mobility and e-charging
2.1 Are there any specific laws or regulations on electrical mobility infrastructure and charging?
Answer [60 words max]:

2.2 If not, are such specific laws or regulation anticipated?
Answer [10 words max]:

Explanation:

For the use case of e-mobility and charging it is important to assess how e-mobility and charging is perceived in relation to the existing electricity system. E.g. whether it is considered to be 'regular' electricity demand, possibly generation and how it is framed into the existing electricity market structure and regulation. As a first step it is important to define whether any explicit differences from the existing/traditional electricity regulatory framework are in place. Is there a specific legal framework for electric mobility and charging?

3. Utilization of waste streams and gas grid decarbonization
3.1 To what extent does the national legal framework require waste streams to be utilized for energy purposes?
Answer [80 words max]:

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3.2 If the national legal framework requires waste streams to be utilized for energy purposes, are there any specific requirements on such utilization?
Answer [80 words max]:

3.3 Are there any requirements on the forms of energy that need to be produced using waste streams? If so, which?
Answer [80 words max]:

3.4 Are there any requirements on the decarbonization of the gas grid, for example gas quality or composition requirements? If so, which?
Answer [100 words max]:

Explanation:

The answers to the above questions should give an indication of the extent to which waste stream utilization for energy purposes are regulated. They should also indicate how the general (legal) requirements of gas grids require or could contribute the decarbonization of gas grids, e.g. by setting standards or targets.

4. Decarbonization of heating network(s)
4.1 How are heating networks regulated, e.g. is there a heating (network) act?
Answer [80 words max]:

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4.2a If so, does this act or regulation also include requirements on the heat sources connected to the heating network? If so, which?
Answer [80 words max]:

4.2b If so, does this act or regulation also include requirements on access conditions for heating networks? If so, which?
Answer [80 words max]:

4.2c If so, does this act or regulation also include requirements on network tariffs for heating networks? If so, which?
Answer [80 words max]:

Explanation:

In order to understand the legal framework for heating networks and their decarbonization, it is first of all important to understand to what extent these networks are nationally regulated and what the general principles of such regulation are. Unlike electricity and gas network, heat networks (and sources) are not specifically regulated by an EU Directive.

5. Active citizen and local energy community engagement
5.1 To what extent do national or local laws allow energy communities to be active on the energy market?
5.1a Is there a (legal) definition of energy communities in national or local laws? If so, which?

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Answer [100 words max]:
5.1b To what extent do national or local laws provide exemptions for energy communities on general market or system requirements? For example, requirements on system operation, authorization procedures, consumer protection?
Answer [100 words max]:

Explanation:

In order to understand the potential engagement of energy communities, it is important to define what their (legal) position is. In the light of this position, it should be understood whether energy communities should operate as regular market players, or whether they are facilitated differently (e.g. by exemptions for licenses, permits, other (market) regulations, such as tariffs regulations, etc.). This defines the framework in which energy communities can play a role in e.g. demand side response/management.

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Questionnaire 2: Grid Codes

The rationale behind this questionnaire is to get insight on:

- The local grid situation at the island.
- The applicable regulations.
- The degree of autonomy the island has in setting its own grid codes.

1. General Framework

What are the applicable grid codes on the Island? Please fill in the table below.

Formal Name of the code	**Version No./Date**	**Object and purpose**	**Internet link to formal code**

Explanation:

Please mention here the relevant codes, such as codes holding requirements on balancing, congestion management, power quality, grid connections, grid tariffs, grid investment plans, definition codes and codes for system users (demand and generators). Please include a brief description of the object and purpose of each code; what does it regulate, and why? Usually this is stated at the preamble or first articles of the code. Please also include the relevant version number or date of adoption. Please include a link to the latest version of the code, published by the relevant authority.

1.1 Relevant Authorities

1.1.1 Who is responsible for drafting the grid codes?
Answer [20 words max]:

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1.1.2. Who is responsible for adopting the grid codes?
Answer [20 words max]:

1.1.3. What is the procedure for adopting new grid codes, or amend existing ones?
Answer [60 words max]:

1.1.4. How are system users involved in the drafting procedures of the grid codes?
Answer [60 words max]:

1.1.5. How are system users involved in the formal review procedure of the grid codes?
Answer [60 words max]:
1.1.5.1 Do they have a right to submit their views/positions, to be included in the decision-making process by the relevant authorities?
Answer [20 words max]:

Explanation:

Answers to the above questions should help understand who are responsible for both making and adopting the codes; who are responsible for the existing framework and who should take the lead in making amendments if needed. It is also important to understand how new codes or amendments can be made in order to get proper understanding of how complex making amendments might be. To get a better understanding of the dynamics and involvement of system

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users in the drafting and adoption process, a brief description of their options to get involved in either the drafting or formal legislative (adoption) procedure of the grid codes should be included.

1.2 Relation with mainland/national regulations

1.2.1 Are the grid codes applied to the island different from the codes applied to the mainland?
Answer [20 words max]:

1.2.1.1 If so, what are the main differences? More specifically, if any, what are the differences on requirements for congestion management, power quality standards and requirements, balancing and balance responsibility, connection requirements, self-consumption requirements and demand response conditions.
Answer [120 words max]:

1.2.1.2 If not, are there any exemptions, or can they be made to better adapt to specific needs on the island which are not relevant for the mainland grid? Taking into consideration the UCs.
Answer [120 words max]:

Explanation:

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The answers to the above questions help in clarifying the relevant framework for the islands in terms of: power quality, demand side response, congestion management and balancing. Here, the relationship and any potential differences between the islands and national and EU laws- and regulations is also relevant. The UCs help in assessing to what extent a higher degree of island autonomy can be achieved, how system reliability can be increased and how system users (consumers and local energy communities) can be involved in system optimization. Therefore, it is important to understand to what extent the existing conditions correspond to these possibilities and to what extent exemptions apply, or can be made if this would provide societal benefits.

2. Virtual power plant

2.1 Are there any specific provisions with regard to Virtual Power Plants in any of the grid codes?
Answer [20 words max]:

2.1.1 If so, please summarize the scope of the provisions in one-two sentences. Please also include the definition used for VPPs in the code in your answer.
Answer [40 words max]:

Explanation:

In order to get an idea of how the codes are structured around the topics included in the use cases of IANOS, it is important to understand whether these topics are

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explicitly addressed in any of the grid codes. If not, the relevant provisions are purely implicit. This implies that more emphasis is put on the assessment of cases 1 – 4 (dispatching conditions for balancing and congestion management, maximisation of self-consumption (especially in energy communities) and demand-side management, peer-to-peer supply, distributed storage and power quality optimization).

3. Maximize self-consumption

3.1 Are there any specific provisions or requirements with regard to self-consumption in any of the grid codes?
Answer [20 words max]:

3.1.1 If so, please summarize the scope of the provisions in one-two sentences.
Answer [40 words max]:

Explanation:

In order to get an idea of how the codes are structured around the topics included in the use cases of IANOS, it is important to understand whether these topics are explicitly addressed in any of the grid codes. If not, the relevant provisions are purely implicit.

4. Optimal dispatch (intraday) balancing

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4.1 How are balancing mechanisms structured into the grid codes? Is there a specific grid code dealing with balancing?
Answer [20 words max]:

4.1.1 If not, which of the codes include the balancing mechanisms?
Answer [20 words max]:

4.2 How are the balancing mechanisms designed in relation to different system users? Do all system users have to take responsibility for their own balancing, or do the codes exclude some groups of system users from individual balancing responsibilities? If so, who has to balance on their behalf?
Answer [60 words max]:

Explanation:

Balancing is an important aspect of the different use cases. In order to get some basic understanding of how balancing is structured into the grid codes, it is important to know where balancing is placed in the framework of grid codes and who are mainly responsible for balancing (their own portfolio).

5. Storage, for fast responsive ancillary services

5.1 Are there any specific provisions regarding storage in the light of ancillary services in any of the grid codes? (is storage considered differently from other resources used for providing ancillary services?)

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Answer [20 words max]:

5.1.1 If so, please summarize the scope of the provisions in one-two sentences.
Answer [40 words max]:

Explanation:

In order to get an idea of how the codes are structured around the topics included in the use cases of IANOS, it is important to understand whether these topics are explicitly addressed in any of the grid codes. If not, the relevant provisions are purely implicit. For storage, one of the important questions is how storage activities are regulated. For example, as regular consumption (load), when taking electricity from the system, and production (generation) when feeding electricity back into the system, activities. Storage could also be considered as a specific activity, under certain conditions (e.g. for demand-side management).

6. Power quality and congestion management services

6.1 Do the grid codes include a mechanism for congestion management?
Answer [20 words max]:

6.1.1 If so, please summarize the mechanism. Please also include which system users can make use of the mechanism.
Answer [120 words max]:

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6.2 Do the grid codes provide options for system users to provide power quality services for system optimization, which can be acquired/purchased/procured by the system operator? If so, which?
Answer [60 words max]:

6.2.1 Are these options available to all system users?
Answer [60 words max]:

Explanation:

Congestion management and grid optimization is an important aspect of the different use cases. In order to get some basic understanding of how congestion management and grid optimization is organized into the grid codes, it is important to know whether there is a mechanism within the grid codes which system operators could use to acquire congestion management or power quality services from their system users.

7. Electric mobility and e-charging

7.1 Are there any specific provisions with regard to charging infrastructure in any of the grid codes? (i.a. specific connection or system user category)
Answer [20 words max]:

7.1.1 If so, please summarize the scope of the provisions in one/two sentences.
Answer [40 words max]:

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Explanation:

In order to get an idea of how the codes are structured around the topics included in the use cases of IANOS, it is important to understand whether these topics are actually explicitly addressed in any of the grid codes. If not, the relevant provisions are purely implicit. Above answers help in defining the questions for questionnaires 2 and 3.

8. Active citizen and local energy community engagement

8.1 Do the grid codes include any exemptions for active citizens and local energy communities from any of the requirements within the grid codes?
Answer [20 words max]:

8.2 If so, please summarize the scope of the exemptions in one/two sentences.
Answer [40 words max]:

Explanation:

In order to get an idea of how energy communities are positioned in the grid codes, it is relevant to assess whether they are considered as a separate user class, having specific requirements, or whether they are seen as for example regular consumers, as closed distribution systems, or whether their connections are simply seen as demand and/or generation connections.

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Questionnaire 3: Financial Aspects Relevant to Deep Decarbonization

The rationale behind this questionnaire is to get insight on:

- The local financial and energy market situation at the island.
- The applicable subsidies, taxes and energy and transport and distribution price conditions.

1. General Framework
1.a Please describe the relevant price components of the retails price for: a) electricity; b) green gas (if relevant); c) heat. Please include an overview of the relevant price components, being for example: a) relevant taxes; b) service costs; c) transport and distribution costs; d) guarantees of origin and/or CO_2 certificates; e) any other relevant components. Please be as detailed as possible.
Answer [180 words max]:
1.b Please describe any general incentives schemes and subsidies on: a) national; b) local (e.g. municipality, province, etc.) level. The described schemes should target either: a) sustainable energy production; b) energy saving or efficiency investments; c) any other relevant subsidies or incentives. Please note that tax reductions can also be considered as subsidies.
Answer [180 words max]:

1.1 Relevant Authorities
1.1 What are the relevant authorities; a) for setting tariffs for energy (if any); b) for setting tariffs for transport and distribution; c) for issuing/providing subsidies?
Answer [80 words max]:

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1.2 Relation with mainland/national regulations
1.2 To what extent are the financial conditions (e.g. price levels) of the islands comparable to the mainland and the EU conditions.
Answer [80 words max]:

Explanation:

In order to better understand the local markets on the islands and the economic and financial dynamics, it is important to understand how the price of energy (and related costs) is defined, what incentives are provided locally to support RES or energy efficiency, who is able to regulate these conditions and how the local islands conditions relate to national and EU financial conditions.

2. Maximize self-consumption
2 Which incentives are provided, if any, for self-consumption? E.g. tax reductions, direct subsidies for storage or energy management systems, etc.
Answer [80 words max]:

Explanation:

Self-consumption can be stimulated in various ways. They could receive benefits for not using the grid at certain moments in time for example, or they could receive a penalty for using grid capacity, e.g. in case of congestion or power quality issues. The answers to the above questions should help in defining the relevant applicable conditions on the IANOS islands.

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3. Optimal dispatch (intraday) balancing
3. Which incentives are provided to contribute to balancing; which penalties apply for imbalance? To whom do these incentives and penalties apply?
Answer [120 words max]:

Explanation:

System users can contribute to balancing in various ways. Simply because they have to because of their balancing responsibilities, or because they receive benefits by helping other system users with their imbalances. System operators could also provide specific benefits or schemes to increase balance. The answers to the above questions should help in defining the relevant applicable conditions on the IANOS islands.

4. Storage, for fast responsive ancillary services
4. How is storage rewarded (if)? For example: direct subsidies for storage, favourable capacity contracts, demand side response prices, tax advantages, etc.? If no specific advantages apply to storage, are the existing market conditions favourable enough for the integration of storage in the electricity system?
Answer [80 words max]:

Explanation:

System users can have various reasons for investing in storage systems. They can e.g. be persuaded to provide system optimization and congestion management

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services, e.g. by having local flexibility markets, providing attractive prices for reducing or increasing consumption or generation at specific moments in time. The answers to the above questions should help in defining the relevant applicable conditions on the IANOS islands.

5. Power quality and congestion management services
5. How are system users, consumers and producers required or incentivised to contribute to maintaining power quality? For example, demand connection requirements, or reward schemes (e.g. using dynamic network tariffs) by system operators?
Answer [120 words max]:

Explanation:

System users can contribute to power quality in various ways. Simply because they have to due to demand connection or generation requirements, or because they have to engage in demand response schemes. System users can also be persuaded to provide system optimization and congestion management services, e.g. by having local flexibility markets, providing attractive prices for reducing or increasing consumption or generation at specific moments in time. The answers to the above questions should help in defining the relevant applicable conditions on the IANOS islands.

6. Electric mobility and e-charging

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6.1 Are there any direct or indirect subsidies which apply to the development and operation of charging infrastructure?
Answer [120 words max]:

6.2 How are charging infrastructure operators charged for using electricity infrastructure?
Answer [60 words max]:

6.3 How are charging infrastructure users charged for using the charging infrastructure and/or the electricity infrastructure?
Answer [60 words max]:

Explanation:

The development of electric charging infrastructure depends on the demand for it, which is driven by the uptake of electric mobility, targets for the development of electric charging infrastructure, commonly supported by subsidies, and the market and grid conditions (e.g. how much does a connection cost, what tariffs apply, which tax regime does apply, etc.). The answers to the above questions should help in defining the relevant applicable conditions on the IANOS islands.

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Questionnaire 4: European Smart Grid Task Force

1. How do the findings of the different Expert Groups of the ESGTF relate to your respective IANOS island?
Answer:
1.1 What are similarities between the principles of the different Expert Groups and the laws and regulations of your respective IANOS island?
Answer:
1.2 What are differences between the principles of the different Expert Groups and the laws and regulations of your respective IANOS island?
Answer:

2. How are the principles of the ESGTF incorporated in the laws and regulations of your respective IANOS island?
Answer:
2.1 How could the laws and regulations of your respective IANOS island benefit from the ESGTF and its Expert Groups?
Answer:

3. Are there findings and/or best practices in IANOS that the ESGTF could benefit from? If yes, what are these findings and/or best practices?
Answer:

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Questionnaire 5: State aid

1. How is State aid regulated on your respective IANOS island?
Answer:

2. Is State aid regulated differently on your respective IANOS island compared to the mainland? If yes, how?
Answer:
2.1 Are there exceptions for islands, concerning the national State aid rules? If yes, what are these exceptions?
Answer:

3. Are there differences with how State aid is regulated on your respective IANOS island and the European legislation? If yes, what are these differences?
Answer:

4. Do you see barriers for the implementation of the IANOS UC's because of State aid regulation? If yes, what are these barriers?
Answer:

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Annex 2 – Interface Terceira

Locally Enforced Laws and Regulations

1. General Framework

Applicable laws and regulations on the Island

Formal Name of the law or regulation	Version No./Date	Object and purpose	Internet link to formal law or regulation
Regional Decree-Law no. 26/96/A	24-09-1996	Establishes the legal regime for the production of electricity not linked to public service	https://dre.pt/dre/detalhe/decreto-legislativo-regional/26-1996-214967
Decree-Law no.162/2019	25-10-2019	Approves the legal regime applicable to self-consumption of renewable energy, partially transposing Directive 2018/2001	https://dre.pt/dre/detalhe/decreto-lei/162-2019-125692189
Regulation no. 785/2021	23-08-2021	Approves the Tariff Regulation for the electricity sector	https://www.erse.pt/media/pnnjjmyj/articulado_rt-se_11_21-capa_%C3%ADndice.pdf
Regulation no. 620/2017	18-12-2017	Approves the Regulation on Access to Networks and Interconnections (RARI)	https://www.erse.pt/ebooks/regulamentos-manuais-guias/eletricidade/regulamento-de-acesso-as-redes-e-as-interligacoes-setor-eletrico/?p=2
Regulation no. 1129/2020	30-12-2020	Approves the Regulation of Commercial Relations of the Electric and Gas Sectors	https://dre.pt/dre/detalhe/regulamento/1129-2020-152518409
Regulation no. 406/2021	12-05-2021	Approves the Regulation of Quality of Service in the Electric and Gas Sectors	https://www.erse.pt/media/l4rcbxaj/regulamento-n-%C2%BA-406_2021.pdf
Regulation no. 557/2014	19-12-2014	Aprovação do Regulamento de Operação das Redes do Setor Elétrico	https://files.dre.pt/2s/2014/12/245000000/3202032043.pdf
Regulation no. 373/2021	5-05-2021	Approves the Electric Energy Self-Consumption Regulation	https://www.erse.pt/media/zthbik1e/regulamento-n-%C2%BA-373_2021.pdf
Regulation no. 610/2019	2-08-2019	Approves the Regulation on the Services of Intelligent Electricity Distribution Networks	https://files.dre.pt/2s/2019/08/147000000/00074000096.pdf
Regional Decree-Law no. 14/2019/A	12-06-2019	Establishes the incentive system for the production and storage of energy from renewable sources in the Autonomous Region of the Azores, called PROENERGIA.	https://dre.pt/dre/detalhe/decreto-legislativo-regional/14-2019-122549969

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Decree-Law no. 90/2014	11-06-2014	Establishes the legal regime of electric mobility, applicable to the organisation, access and exercise of activities related to electric mobility, as well as the rules for the creation of a pilot electric mobility network	https://dre.pt/dre/detalhe/decreto-lei/90-2014-25676885
Regional Decree-Law no. 21/2019/A	8-08-2019	Defines the strategy for the implementation of Electric Mobility in the Azores	https://dre.pt/dre/detalhe/decreto-legislativo-regional/21-2019-123815991
Regional Decree-Law no. 23/2019/A	6-11-2019	Approves the Legal Regime for Combustible Gas Installations in Properties in the Autonomous Region of the Azores	https://dre.pt/dre/detalhe/decreto-legislativo-regional/23-2019-125902778

1.1 Relevant authorities

1.1.1 Who/which authority is responsible for: a) adopting and/or amending specific laws and regulations (see table Question 1); b) enforcing specific laws and regulations?

Formal Name of the law or regulation	Adopt(ed)	Amend	Enforcement
Regional Decree-Law no. 26/96/A	Approved by the Azores Regional Legislative Assembly	A Regional Decree-Law can be amended through a new Regional Decree-Law. Thus, the entity responsible for the amendments is the Azores Regional Legislative Assembly	The application of this diploma is the responsibility of the Regional Government department responsible for energy matters.
Decree-Law no. 162/2019	Approved by the Council of Ministers and promulgated by the President of the Republic	A Decree-Law can be amended through a new Decree-Law. The entity responsible for the changes is the Council of Ministers	The application of this diploma is the responsibility of the General Directorate of Energy and Geology. In the Autonomous Regions, its application is the responsibility of the respective Government departments with competence in energy matters.
Regulation no. 785/2021	Approved by Energy Services Regulatory Authority (ERSE)	A Regulation may be amended or revoked by another Regulation. The entity responsible for the amends is ERSE	The application of this Regulation is the responsibility of ERSE
Regulation no. 620/2017	Same as above	Same as above	Same as above
Regulation no. 1129/2020	Same as above	Same as above	Same as above
Regulation no. 406/2021	Same as above	Same as above	Same as above

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Regulation no. 557/2014	Same as above	Same as above	Same as above
Regulation no. 373/2021	Same as above	Same as above	Same as above
Regulation no. 610/2019	Same as above	Same as above	Same as above
Regional Decree-Law no. 14/2019/A	Approved by the Azores Regional Legislative Assembly	A Regional Decree-Law can be amended through a new Regional Decree-Law. Thus, the entity responsible for the amends is the Azores Regional Legislative Assembly	The application of this diploma is the responsibility of the Regional Government department responsible for energy matters.
Decree-Law no. 90/2014	Approved by the Council of Ministers and promulgated by the President of the Republic	A Decree-Law can be amended through a new Decree-Law. The entity responsible for the changes is the Council of Ministers	The application of this diploma is the responsibility of the General Directorate of Energy and Geology. In the Autonomous Regions, its application is the responsibility of the respective Government departments with competence in energy matters.
Regional Decree-Law no. 21/2019/A	Approved by the Azores Regional Legislative Assembly	A Regional Decree-Law can be amended through a new Regional Decree-Law. Thus, the entity responsible for the amends is the Azores Regional Legislative Assembly	The application of this diploma is the responsibility of the Regional Government department responsible for energy matters.
Regional Decree-Law no. 23/2019/A	Same as above	Same as above	Same as above

1.2 Relation with mainland/national regulations

1.2 Are the laws and regulations governing energy markets the same as those applied on main land?

No. As a rule, laws and regulations take into account the specificities of the Autonomous Regions or allow for adaptation.

1.2.1 If not, how are they different?

The differences are in the regulated market and the liberalized market. The Network Access tariff is paid by consumers, which results from the sum of the tariffs: Global Use of the System; Use of the Transport Network; Use of the Distribution Network; Logistics Operation of Change of Dealer. Energy and Commercialization tariffs are paid by consumers who are still in the regulated

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market. In the liberalized market, the value is defined by each supplier in a free and competitive way.

1.2.2 If so, in your experience, do the national laws and regulations work well for the island? If not, could you briefly explain why not?
Yes, considering that laws and regulations can be adapted to the specific characteristics of the Azores.

1.2.3 How are the system operators regulated under the applicable legal regime on the island?
1.2.3.1 Are they unbundled entities or are they exempt from the unbundling requirements?
The electricity system in the Azores is operated exclusively by the concessionaire of the electricity transmission and distribution network – EDA – Electricity of the Azores, SA. EDA is the only supplier, applying the supply tariffs regulated by ERSE.

1.2.3.2 Following the above question: are there differences between system operators for electricity and gas and (if relevant) heat network operators?
Yes, there are differences between the operation of electricity and gas networks. The operation of the electricity and gas systems are carried out by different entities. Both systems are regulated by ERSE.

1.2.4 How is regulated third party access regulation on the island;
1.2.4.1 What are legally defined reasons for refusing system access (transport capacity)?
The Regulation on Access to Networks and Interconnections, approved by ERSE, establishes the provisions relating to technical and commercial conditions, the conditions under which access is granted or restricted, and the obligations to provide information. The refusal or suspension of access to the networks is due to non-compliance with the obligations set out in the contract, namely the regulations defined by the regulator. The refusal can also apply for reasons of public interest, service, security (Regulation of Commercial Relations).

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*1.2.4.2 What are the relevant categories of system users? (e.g. 'types' of users, such as households, SMEs, or industry; or based on connection size, for example 1*25A, etc.)*

Electricity customers in the Azores are divided into: Domestic, Commerce and Services, Public Services, Industrial, Public Lighting and Own Consumption. Electricity consumption is divided into Low Voltage (LV) and Medium Voltage (MT). When LV, it is divided into Normal Low Voltage (contracted power less than or equal to 41.4 kVA and without measuring the maximum power in 15-minute time intervals) and Special Low Voltage (contracted power greater than 41 .4 kW and with maximum power measurement in 15-minute time intervals).

2. Electric mobility and e-charging

2.1 Are there any specific laws or regulations on electrical mobility infrastructure and charging?

Yes. ERSE approved Regulation No. 854/2019 - Electric Mobility Regulation, amended by Regulation No. 103/2021. Decree-Law no. 90/2014 introduces changes to the Legal Regime for Electric Mobility established in Decree-Law no. 39/2010. The Regional Decree-Law no. 21/2019/A defines the strategy for the implementation of Electric Mobility in the Azores.

3. Utilization of waste streams and gas grid decarbonization

3.1 To what extent does the national legal framework require waste streams to be utilized for energy purposes?

Decree-Law no. 102-D/2020 approves the general waste management regime, the legal regime for waste disposal in landfills and changes the regime for the management of specific waste flows. As an example, the combustion of tires without energy recovery is prohibited, under the terms of article 54 of the diploma.

3.2 If the national legal framework requires waste streams to be utilized for energy purposes, are there any specific requirements on such utilization?

The integrated centers for the recovery, appreciation and disposal of hazardous waste (CIRVER) must carry out operations for the preparation of alternative fuels

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from hazardous waste for subsequent energy recovery in incineration or co-incineration facilities, and these treatment operations may also be carried out, provided they are exclusively physical, be carried out in other facilities licensed for that purpose.

3.3 Are there any requirements on the forms of energy that need to be produced using waste streams? If so, which?

No.

3.4 Are there any requirements on the decarbonization of the gas grid, for example gas quality or composition requirements? If so, which?

In the Azores there are no requirements for the decarbonization of gas networks. Only butane gas is used, and the specifications for liquefied petroleum gases are those contained in Annex I of Decree-Law no. 89/2008, of May 30th. The Regional Government of the Azores has been discouraging the use of equipment that use gas, by encouraging the acquisition of equipment to produce energy from renewable sources — PROENERGIA.

4. Decarbonization of heating network(s)

4.1 How are heating networks regulated, e.g. is there a heating (network) act?

There are no heating networks in the Azores.

5. Active citizen and local energy community engagement

5.1 To what extent do national or local laws allow energy communities to be active on the energy market?

5.1a Is there a (legal) definition of energy communities in national or local laws? If so, which?

The Renewable Energy Community is a legal person, profitable or not, based on an open and voluntary membership of its members, partners or shareholders, who may be natural or legal persons, public or private, including small and medium-sized companies or local authorities, which are autonomous from its members or partners, but controlled by them, provided and cumulatively, that the members or participants are located in the vicinity. The projects are owned and

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developed by the legal person and that legal person is primarily intended to provide members with environmental, economic and social benefits rather than financial gains (Decree-Law no. 162/2019).

5.1b To what extent do national or local laws provide exemptions for energy communities on general market or system requirements? For example, requirements on system operation, authorization procedures, consumer protection?

ERSE approved the Regulation on the Self-Consumption of Electric Energy (Regulation No. 8/2021). According to article 28 of Decree-Law no. 162/2019, of 25 October, the regime is applicable to the Azores, under the terms and with the adaptations arising from the provisions of article 66 of Decree-Law no. 29/2006, of 15 February, in its current wording, and its specificity in terms of discontinuity, dispersion, geographic and market dimension, under terms to be established in a Regional Decree-Law. As the Azores Electric System is regulated by ERSE, Renewable Energy Communities must comply with the provisions of legislation. Under the terms of Order no. 6435/2020, self-consumption projects or energy communities that concern the use of the Public Service Electricity Network (RESPA) may benefit from an exemption of charges corresponding to General Economic Interest Costs (CIEG), levied on tariffs for access to the network. The exemption will last for a period of 7 years from the start of the operation of the self-consumption project or energy community.

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1. General Framework

Applicable grid codes and legislation on the Island

Formal Name of the code and legislation	Version No./Date	Object and purpose	Internet link to formal code/legislation
There is no published Grid Code. Every energy promoter must follow the grid operator rules.			
RQS – Regulamento de Qualidade de Serviço	2021	National Regulation on quality of energy service. Published by Energy Services Regulatory Authority (ERSE)	RQS
NP EN 50160	2010	Portuguese standard for Voltage Characteristics of electricity supplied by Public Distribution Systems	Available in speciality stores.
RRC – Regulamento de Relações Comerciais	2021	National Regulation on Electrical commercial relations. Published by Energy Services Regulatory Authority (ERSE)	RRC
RARI – Regulamento de Acesso às redes e interligações	2017	National Regulation on Grid access and interconnections. Published by Energy Services Regulatory Authority (ERSE)	RARI
Decreto Legislativo Regional n.º 15/96/A Princípios da organização do sector eléctrico e do regime jurídico da produção, transporte e distribuição de energia eléctrica na Região Autónoma dos Açores	DL 15/96/A	Organisation of the Electric sector and legal regime for the production transmission and distribution of electricity in the Autonomous Region of the Azores	DL 15/96/A
Regime jurídico da produção de energia eléctrica não vinculada ao serviço público	DL 26/96/A	Legal regime for energy production not binded to the public service	DL 26/96/A
RT – Regulamento Tarifário	2021	National Regulation on Grid Tariffs. Published by Energy Services Regulatory Authority (ERSE)	RT
PDIRTD-RAA – Plano de Desenvolvimento e investimento das Redes de Transporte e de Distribuição da Região Autónoma dos Açores	2021	Grid Investment plan for HV and MV in Azores Autonomous Region. Published by Energy Services Regulatory Authority (ERSE)	PDIRTD-RAA

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RAC – Regulamento de Autoconsumo	2021	Self-Consumption Regulation. Published by Energy Services Regulatory Authority (ERSE)	RAC
RME – Regulamento da Mobilidade Elétrica	2021	Electric Mobility Regulation Published by Energy Services Regulatory Authority (ERSE)	RME

1.1 Relevant Authorities

1.1.1 Who is responsible for drafting the grid codes and legislation?

Portuguese National Government and Energy Services Regulatory Authority (ERSE)

1.1.2. Who is responsible for adopting the grid codes and legislation?

The regional grid operator.

1.1.3. What is the procedure for adopting new grid codes and legislation, or amend existing ones?

National/Regional Authorities according to their agenda. Generally, after a first draft, we promote a public consultation and the comments/opinion on the legislation proposal reflect the final version.

1.1.4. How are system users involved in the drafting procedures of the grid codes and legislation?

There are two phases before a new procedure/legislation is published: the drafting phase and the public consultation phase. During the drafting phase, system users have no involvement.

1.1.5. How are system users involved in the formal review procedure of the grid codes and legislation?

Usual procedure is public consultation.

1.1.5.1 Do they have a right to submit their views/positions, to be included in the decision-making process by the relevant authorities?

System users' contributions are analysed and usually accepted. The public consultation can thus result in adaptation/revision of the document.

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1.2 Relation with mainland/national regulations

1.2.1 Are the grid codes and legislation applied to the island different from the codes and legislation applied to the mainland?

Yes.

1.2.1.1 If so, what are the main differences? More specifically, if any, what are the differences on requirements for congestion management, power quality standards and requirements, balancing and balance responsibility, connection requirements, self-consumption requirements and demand response conditions.

There is no regulation for congestion management, balancing and balance responsibility and connection requirements in the Azores. As for the other regulations, there are some adaptations to the islands, that are stated in each document. The level of adaptation can be very extensive, depending on the topic. For instance, the different limits for frequency and voltage in energy quality standards, or different standards for SAIDI, SAIFI and others.

2. Virtual power plant

2.1 Are there any specific provisions with regard to Virtual Power Plants in any of the grid codes and legislation?

No.

3. Maximize self-consumption

3.1 Are there any specific provisions or requirements with regard to self-consumption in any of the grid codes and legislation?

Yes, on RAC – Self consumption regulation published by the Energy Services Regulatory Authority (ERSE).

3.1.1 If so, please summarize the scope of the provisions in one-two sentences.

There is limitation to the self-consumption production unit both on power size and on energy production. This limitation entails, in the case of self-consumption production units for which the possibility of injection into the RESPA of more than 1 MVA is foreseen, the procedure for obtaining an electricity production license

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depends on the previous allocation of injection capacity reservation in the RESPA (Decree-law no. 162/2019, art. 3, no. 6).

4. Optimal dispatch (intraday) balancing

4.1 How are balancing mechanisms structured into the grid codes and legislation? Is there a specific grid code or legislation dealing with balancing?

Not applicable.

4.2 How are the balancing mechanisms designed in relation to different system users? Do all system users have to take responsibility for their own balancing, or do the codes and legislation exclude some groups of system users from individual balancing responsibilities? If so, who has to balance on their behalf?

According to the Regional Decree-Law no. 15/1996/A, the grid operator is responsible to maintain system balance. According to the Regional Decree-Law no. 15/96/A (art. 4), the global technical management of the electricity system in the nine islands is carried out by the concessionaire for the transmission and distribution of electricity in the Azores (EDA – Electricidade dos Açores, S.A.). Technical management consists of coordination of activities carried out by networks and facilities, including the following responsibilities, in terms of production facilities: a) Modulation, in order of merit, of energy production by installations connected to public service networks, depending on consumption needs, system constraints, legal obligations to purchase energy, and available sources; b) Temporary suspension of production facilities activity, depending on consumption needs, and on the clauses of the respective energy supply contracts; c) Authorization for the producer to suspend the activity; d) Indication of characteristics or parameters of production, in order to ensure proper technical conditions of network operation.

5. Storage, for fast responsive ancillary services

5.1 Are there any specific provisions regarding storage in the light of ancillary services in any of the grid codes and legislation? (Is storage considered differently from other resources used for providing ancillary services?)

No.

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6. Power quality and congestion management services

6.1 Do the grid codes and legislation include a mechanism for congestion management?

No.

6.2 Do the grid codes and legislation provide options for system users to provide power quality services for system optimization, which can be acquired/purchased/procured by the system operator? If so, which?

No.

7. Electric mobility and e-charging

7.1 Are there any specific provisions with regard to charging infrastructure in any of the grid codes and legislation? (i.a. specific connection or system user category)

Yes, in the Electric Mobility Regulation, published by Energy Services Regulatory Authority (ERSE).

7.1.1 If so, please summarize the scope of the provisions in one/two sentences.

Public and private electric mobility rules of application. The coding of consumption points of the electric mobility network corresponds to the assignment of a virtual delivery point (CPE) by the Electricity Distribution Network Operators (ORD). the method for coding the points of consumption of the electric mobility network to be adopted by the DROs must comply with the provisions of the Commercial Relations Regulation of the electricity sector in relation to CPE.

8. Active citizen and local energy community engagement

8.1 Do the grid codes and legislation include any exemptions for active citizens and local energy communities from any of the requirements within the grid codes?

No.

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ESGTF

How do the findings of the different Expert Groups of the ESGTF relate to your respective IANOS island?
Regulation 610/2019 – 'Regulation of Smart Grid Services for Electricity Distribution' applies to the national territory, including the Azores, regarding smart grids. This regulation establishes the framework to the provision of services within the scope of intelligent electric energy distribution networks, namely with regard to network operators and suppliers. Specifically, the new rules include the following aspects of smart grids: i) requirements for the integration of electrical installations in smart grids; ii) communication from network operators on the availability of smart grid services; iii) activation of smart grid services, iv) ownership and access to consumption data; v) data to be used for invoicing; vi) services related to the electricity supply; vii) reading and making consumption and production data , and making available data to traders and third parties with a right of access; viii) remuneration for services provided in installations integrated in smart grids; and ix) evaluation of the performance and quality of service of network operators and suppliers in the new services of smart grids. That said, the description relates to interoperability and connectivity (EG1), as well as the resilience of the electricity infrastructure (EG2). Also, of most importance is the focus that EG4 has on the need of adapting the rules and guidelines to specific diversified local policy, regulatory, technical, socio-economic and cultural constraints and opportunities.
1.1 What are similarities between the principles of the different Expert Groups and the laws and regulations of your respective IANOS island?
The main principles of the several Expert Groups are related to the regulation (Regulation 610/2019, for Portugal in general including the Azores). Smart grid infrastructures include not only smart meters, but also data communications and energy systems handling technologies. Decree-Law no. 78/2011 of 20 June introduced the concept of smart metering systems as a way of reinforcing the consumers rights and their active participation in the electricity market. Only with all these elements operating together is advanced services possible. It is also mentioned that network operators that provide these services to consumers are entitled to a tariff incentive.
1.2 What are differences between the principles of the different Expert Groups and the laws and regulations of your respective IANOS island?
We find no substantial differences between the principles of the different EG and the laws and regulations of Terceira Island.

2. How are the principles of the ESGTF incorporated in the laws and regulations of your respective IANOS island?

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The Regulation covers matters addressed in the Commercial Relations Regulation, in the Quality-of-Service Regulation and in the Guide to Measurement, Reading and Data Availability. Network operators that provide these services to consumers are entitled to a tariff incentive, that ensures that the benefits resulting from smart grids are shared between consumers and operators, based on the effective provision of all defined services. It should be noted that the electricity market in the Azores is regulated, with only one entity with concession for the electricity distribution and commercialisation. In addition, the Ordinance no. 231/2013, of July 22, approves the technical and functional requirements of smart meters.
2.1 How could the laws and regulations of your respective IANOS island benefit from the ESGTF and its Expert Groups?
Regulation 610/2019 covers the national territory, including the Azores. The Azores could benefit from the conclusions and outcomes of the ESGTF and its Expert Groups, with particular emphasis to EG4, as it aims to ensure lasting and inclusive energy transition in insular context, and to the EG1, regarding the interoperability and the procedures for data access.

3. Are there findings and/or best practices in IANOS that the ESGTF could benefit from? If yes, what are these findings and/or best practices?
Since Terceira is a total energy island, the lessons learned from the deployment of the use cases on Terceira are replicable on all location without a connection to a main energy grid. Especially the regulatory implications of UC1 on Terceira might be of interest to EG3 (regulatory recommendations for smart grid deployment).

State aid

How is State aid regulated on your respective IANOS island?
The regulation on State aid that applies for Terceira Island comes from the Treaty on the Functioning of the European Union (TFEU), in particular article 107. In this regard, State aid regulation is transversal to the entire Portuguese territory, including the Azores. Besides that, under exceptional circumstances, higher aid intensities may be allowed for other types of aid (such as aid for research, development and innovation, employment, training, energy or environmental protection) whenever granted to companies established in assisted regions, in recognition of the specific difficulties they face – as is the case of the Azores. Therefore, regional bonuses applied to aid granted for these purposes are not considered regional aid. The exceptions to the principle of incompatibility of State aid are provided in Article 107(2) and (3) of the TFEU.

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2. Is State aid regulated differently on your respective IANOS island compared to the mainland? If yes, how?
The state aid regulation for the Azores (including Terceira Island) respects the regulation applied to Portugal mainland. However, under exceptional circumstances, higher aid intensities may be allowed for other types of aid (such as aid for research, development and innovation, employment, training, energy or environmental protection) whenever granted to companies established in assisted regions, in recognition of the specific difficulties they face – as is the case of the Azores. Therefore, regional bonuses applied to aid granted for these purposes are not considered regional aid.
2.1 Are there exceptions for islands, concerning the national State aid rules? If yes, what are these exceptions?
The exceptions to the principle of incompatibility of State aid are provided in Article 107(2) and (3) of the TFEU. The provisions of Article 107(3)(a) of the TFEU should be noted, which establishes that State aid may be compatible with the internal market *"(...) intended to promote the economic development of regions where the standard of living is unreasonably low or where there is serious underemployment, as well as the development of the regions referred to in article 349, taking account their structural, economic and social situation*". One of the (outermost) regions referred to in article 349 is the Autonomous Region of the Azores (consisting of nine islands, one of which is Terceira).

3. Are there differences with how State aid is regulated on your respective IANOS island and the European legislation? If yes, what are these differences?
No.

4. Do you see barriers for the implementation of the IANOS UC's because of State aid regulation? If yes, what are these barriers?
For the executing entities, there is no State Aid, considering that it is an investment support to entities with public capital, under the governance of Regional Government of the Azores' energy competent department, terms in which it is considered that the investment planned for our outermost region is unlikely to affect competition and trade between Member States, for the purposes of article 107 of the TFEU. This said, there are no barriers that prevent the IANOS UCs' implementation.

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Annex 3 – Interface Ameland

Locally Enforced Laws and Regulations

1. General Framework

Applicable laws and regulations on the Island

Formal Name of the law or regulation	Version No./Date	Object and purpose	Internet link to formal law or regulation
Elektriciteitswet 1998 (Electricity act)	01-07-2021	This act aims to gradually give individual consumers and suppliers in the electricity market more freedom of choice within a framework of rules aimed at reliable, sustainable and efficient functioning of the electricity supply.[1]	wetten.nl - Regeling - Elektriciteitswet 1998 - BWBR0009755 (overheid.nl)
Gaswet (Gas act)	01-07-2021	This act aims to make the gas market primarily demand-driven. Here is the freedom of consumers paramount. The competition between providers who associated with this can lead to greater efficiency, lower costs and thus a better international competitive position of gas companies.[2]	wetten.nl - Regeling - Gaswet - BWBR0011440 (overheid.nl)
Warmtewet (Heat act)	25-10-2021	The Heat act aims to protect the small-scale consumer. It is the duty of the (Dutch) government to make sure that small-scale consumers have access to heat at affordable prices.[3]	wetten.nl - Regeling - Warmtewet - BWBR0033729 (overheid.nl)

1.1 Relevant Authorities

1.1.1 Authorities responsible for: a) adopting and/or amending specific laws and regulations (see table above); b) enforcing specific laws and regulations

Formal Name of the law or regulation	Adopt(ed)	Amend	Enforcement
Elektriciteitswet 1998 (Electricity act 1998)	The Dutch Parliament is qualified to adopt new laws, after which the king and the relevant minister sign the law which makes it official.	A law in the Netherlands can be amended through another law, an amending law. This amending law has to go through the same procedure as a "normal" law. So, the Dutch Parliament is responsible for amending the laws.	Different articles have different parties that are responsible for enforcement of those articles. The Minister of Economic affairs and Climate and the Netherlands Authority for Consumers and Markets.
Gaswet (Gas act)	The answer given for the Electricity act also applies for the Gas act.	The answer given for the Electricity act also applies for the Gas act.	The Minister of Economic affairs and Climate and the Netherlands Authority for Consumers and Markets are responsible

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			for enforcing and supervision of the Gas act.
Warmtewet (Heat act)	The answer given for the Electricity act also applies for the Heat act.	The answer given for the Electricity act also applies for the Heat act.	Art. 12 of this act states that the Netherlands authority for Consumers and Markets is responsible for enforcing the Heat act.

1.2 Relation with mainland/national regulations

1.2.1 Are the laws and regulations governing energy markets the same as those applied on main land?

Yes, the laws and regulations governing energy markets are the same on Ameland as on the main land. The municipality of Ameland does have its own regulations, however these do not include rules regarding the energy markets. There are also rules which the province of Friesland has drafted, but these rules also do not include rules regarding the energy markets.

1.2.3 How are the system operators regulated under the applicable legal regime on the island?

1.2.3.1 Are they unbundled entities or are they exempt from the unbundling requirements?

The Netherlands is the only EU Member State that has imposed mandatory ownership unbundling for both TSO's (TenneT) and DSO's (e.g. Enexis, Liander). The Netherlands Authority for Consumers and Markets (ACM) is responsible for the regulation. The entities are not exempt from unbundling requirements. So, the TSO's and DSO's are in fact unbundled.[4] The law which elaborates on the unbundling provisions is the Electricity Act and the amending law concerning independent grid management (Wet Onafhankelijk Netbeheer).

1.2.3.2 Following the above question: are there differences between system operators for electricity, gas and (if relevant) heat network operators?

Yes, there are differences. The entities for the heat network are not unbundled, in contrast to the gas and electricity entities which are unbundled.

1.2.4 How is regulated third party access regulation on the island?

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1.2.4.1 What are legally defined reasons for refusing system access (transport capacity)?

The Electricity act and the Gas act explain the third-party access (TPA) regulation on Ameland. Art. 24(2) of the Electricity act gives an exemption to the obligation of operators to connect third parties to the electricity network. When a network system operator has no capacity, they can refuse access to the system by a third party. Art. 10(7) of the Gas act gives exemptions regarding TPA on the gas grid. These exemptions include: a connection for new construction buildings and buildings where a gas grid is already existing.

*1.2.4.2 What are the relevant categories of system users? (e.g. 'types' of users, such as households, SMEs, or industry; or based on connection size, for example 1*25A, etc.)*

The Gas act distinguishes based on a permeability till 40 m^3(n)/hr and higher than 40 m^3(n)/hr. The Electricity act distinguishes two types of system users, the free type and the protected type. Protected system users have no free choice of supplier. The Electricity act also, as mentioned in art. 95 of the Electricity act, distinguishes the users with a transmission value of above 3*80 A (Amperage) and below 3*80 A.

2. Electric mobility and e-charging

2.1 Are there any specific laws or regulations on electrical mobility infrastructure and charging?

Yes, Bouwbesluit 2021 (afdeling 5.4) gives rules regarding the building of charging poles and Besluit infrastructuur alternatieve brandstoffen (the Dutch implementation of Directive 2014/94/EU on the deployment of alternative fuels infrastructure) also gives rules regarding the building of (the infrastructure) of charging poles.

3. Utilization of waste streams and gas grid decarbonization

3.1 To what extent does the national legal framework require waste streams to be utilized for energy purposes?

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There are no national regulations found which require waste streams to be utilized for energy purposes.

3.3 Are there any requirements on the forms of energy that need to be produced using waste streams? If so, which?
No, current law does not give requirements regarding waste streams as an energy source.

3.4 Are there any requirements on the decarbonization of the gas grid, for example gas quality or composition requirements? If so, which?
No, there are no national provisions that I could find that give any of these requirements.

4. Decarbonization of heating network(s)
4.1 How are heating networks regulated, e.g. is there a heating (network) act?
Yes, the Netherlands (so Ameland as well) has a Heating act, de Warmtewet. The Heating act regulates the supply of heat to the consumers and elaborates more on the government's duty of care regarding the supply of heat.

4.2a If so, does this act or regulation also include requirements on the heat sources connected to the heating network? If so, which?
No, the Heating act does not include requirements on the heat source. It does however require a certificate and guarantee of origin when RES (for heat) are used. A certificate of origin is used when the energy source comes from fossil fuels, a guarantee of origin is used for renewable energy sources and combined heat and power (CHP).

4.2b If so, does this act or regulation also include requirements on access conditions for heating networks? If so, which?
Yes, the Heating act does give rules regarding the access conditions for the heating network. It does provide rules for system operators regarding access to the heating network. Art. 21 of the Heating act states that a system operator has to give an energy producer when asked, insight in the available transport capacity,

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the tariffs for transport, technical features of the network and the transport profile that provides insight into the required transport capacity at different times.

4.2c If so, does this act or regulation also include requirements on network tariffs for heating networks? If so, which?

Yes, the Heating act does include rules regarding network tariffs. These rules state that the ACM (Netherlands Authority for Consumers and Markets) establishes tariffs when a heat supplier closest a connection to the heating grid (art. 4a (1)) and establishes tariffs for heat delivery sets (art. 8(1)).

5. Active citizen and local energy community engagement

5.1 To what extent do national or local laws allow energy communities to be active on the energy market?

5.1a Is there a (legal) definition of energy communities in national or local laws? If so, which?

In the Netherlands most of the energy communities are cooperatives, which do not experience legal impediments, concerning provisions about the energy market. Current Dutch law does not give a definition of the term "energy community". However, a new Energy act is made, so this act is not yet in effect. The consultation version of this (new) Energy act states that an energy community is: "*a legal entity which is acting on behalf of its members or shareholders activities in the energy market. Its main purpose is not to make profit but to provide environmental benefits or economic or social benefits to its members or shareholders or to the local territories where she works.*" Regarding the activity of energy communities in the energy market, because current law does not mention energy communities there is no record of the (lack of) activity of energy communities in the energy market. However, energy communities will get a bigger role when the Energy act has gone into effect.

5.1b To what extent do national or local laws provide exemptions for energy communities on general market or system requirements? For example, requirements on system operation, authorization procedures, consumer protection?

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Current law provides a limited number of exemptions for energy communities (co-operations) in particular, regarding the energy market. The upcoming Energy act will most likely include exemptions (art. 2.2.27) for energy communities regarding complaint procedures, alternative dispute resolutions and additional requirements for energy balancing.

Grid Codes and legislation

1. General Framework

Applicable grid codes and legislation on the Island

Formal Name of the code	Version No./Date	Object and purpose	Internet link to formal code
Netcode Elektriciteit (netcode electricity)	21-04-2021	This code contains regulations for grid operators and grid users in three different areas: the functioning of the grids; connecting customers to the grids, and; the transmission of electricity over the grids.	wetten.nl - Regeling - Netcode elektriciteit - BWBR0037940 (overheid.nl)
Tarievencode Elektriciteit (tariffcode electricity)	21-04-2016	This code describes the elements and method of the calculation of the tariff for which connected parties will be connected to a network, of the tariff for which transmission of electricity, including the import, export and transit of electricity, will be carried out for the benefit of connected parties and for which the system services are provided, as well as the energy balance is maintained and the tariff for metering electricity at small consumers.	wetten.nl - Regeling - Tarievencode elektriciteit - BWBR0037951 (overheid.nl)
Begrippencode Elektriciteit (definitions code electricity)	21-04-2021	This code explains the different definitions/terms used in the Electricity act.	wetten.nl - Regeling - Begrippencode elektriciteit - BWBR0037938 (overheid.nl)
Meetcode Elektriciteit (metering code electricity)	21-04-2021	This code contains regulations for network operators and network users about measuring the amount of electricity that is transported and consumed.	wetten.nl - Regeling - Meetcode elektriciteit - BWBR0037946 (overheid.nl)

1.1 Relevant Authorities

1.1.1 Who is responsible for drafting the grid codes and legislation?

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The joint system operators.

1.1.2. Who is responsible for adopting the grid codes and legislation?

The Dutch Regulatory Authority, the 'Autoriteit Consument & Markt' (ACM).

1.1.3. What is the procedure for adopting new grid codes and legislation, or amend existing ones?

The joint system operators send a proposal for a new or amended grid code to the ACM. The ACM assesses in consultation with the relevant stakeholders whether the proposed changes are in line with national and EU legislation. If needed, the joint operators can be asked to make changes to their proposals. The ACM adopts the amended or new codes.

1.1.4. How are system users involved in the drafting procedures of the grid codes and legislation?

They can present their views during the drafting process to the joint system operators, or during the process of formal assessment of the ACM. Their views will be included in the assessment of the ACM, or are commonly included in the drafting process by the joint system operators.

1.1.5. How are system users involved in the formal review procedure of the grid codes and legislation?

They are invited to present their views to draft decisions for amending or adopting codes during a six week during consultation period. Everyone can send its views to the ACM during this period.

1.1.5.1 Do they have a right to submit their views/positions, to be included in the decision-making process by the relevant authorities?

Yes. See above.

1.2 Relation with mainland/national regulations

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1.2.1 Are the grid codes and legislation applied to the island different from the codes/legislation applied to the mainland?

No.

1.2.1.2 If not, are there any exemptions, or can they be made to better adapt to specific needs on the island which are not relevant for the mainland grid? Taking into consideration the UCs.

System users or operators can ask for exemptions of some of the requirements in the Network codes. These exemptions could for example be to organize a 'closed distribution system' (CDS), a 'direct line' (DL), or an experiment. All these exemptions however are restricted in their application. A CDS is restricted to primarily non-residential sites (not geographically), a DL can only be used for making a direct link between a producer and consumer (upon certain conditions), and an experiment offers a temporary (non-structural) setting. Experiments should be based on a government decree, which is currently lacking. As such, all the above mentioned settings do not foresee exemptions which are relevant for the implementation of the UCs (outside an experimental setting).

2. Virtual power plant

2.1 Are there any specific provisions with regard to Virtual Power Plants in any of the grid codes and legislation?

No.

3. Maximize self-consumption

3.1 Are there any specific provisions or requirements with regard to self-consumption in any of the grid codes and legislation?

No.

4. Optimal dispatch (intraday) balancing

4.1 How are balancing mechanisms structured into the grid codes and legislation? Is there a specific grid code or legislation dealing with balancing?

Yes, Netcode Elektriciteit (Electricity Netcode).

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4.2 How are the balancing mechanisms designed in relation to different system users? Do all system users have to take responsibility for their own balancing, or do the codes and legislation exclude some groups of system users from individual balancing responsibilities? If so, who has to balance on their behalf?

All system users are responsible for the imbalance they produce. A balance responsible party (BRP) should ensure their balance/imbalance is accounted for on the balancing market. Small (household) customers, which are being supplied by a licensed supplier do not need to account for their (individual) imbalance. The supplier has to do so on their behalf.

5. Storage, for fast responsive ancillary services

5.1 Are there any specific provisions regarding storage in the light of ancillary services in any of the grid codes and legislation? (Is storage considered differently from other resources used for providing ancillary services?)

No.

6. Power quality and congestion management services

6.1 Do the grid codes and legislation include a mechanism for congestion management?

Yes.

6.1.1 If so, please summarize the mechanism. Please also include which system users can make use of the mechanism.

System operators should monitor congestion. If congestion occurs, they need to assess whether they can perform congestion management. They assess the technical options and inform the market that congestion is expected. All system users can offer their bids for congestion management. If any feasible bids are available, they are selected and used. Currently, no specific mechanism is required for making use of potential flexibility for congestion management. Yet, the existing provisions on congestion management are being amended drastically in the Electricity Netcode. These amendments should encourage congestion management and the use of flexibility.

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6.2 Do the grid codes and legislation provide options for system users to provide power quality services for system optimization, which can be acquired/purchased/procured by the system operator? If so, which?

No, although such services are not prohibited by the grid codes. Also, system users are bound to the requirements for generators (RfG) and demand connections (DC).

6.2.1 Are these options available to all system users?

In theory yes. Although the RfG and DC apply differently for different system users. Also, any inclusion or exclusion of system users to provide system services should adhere to the principles of non-discrimination.

7. Electric mobility and e-charging

7.1 Are there any specific provisions with regard to charging infrastructure in any of the grid codes and legislation? (i.a. specific connection or system user category)

No.

8. Active citizen and local energy community engagement

8.1 Do the grid codes and legislation include any exemptions for active citizens and local energy communities from any of the requirements within the grid codes?

No.

ESGTF

How do the findings of the different Expert Groups of the ESGTF relate to your respective IANOS island?
Ameland is a testing ground for renewable energy projects, including the deployment of smart grids, in order to become energy independent. Next to that, regarding privacy and data protection the Netherlands has the general Implementation Act General Data Protection Regulation (Uitvoeringswet Algemene verordening Gegevensbescherming), based on EU Regulation 2016/679, to protect the data of users of the smart grids. Also the

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Electricity law (as well as the Gas law) include provisions on data processing, which relates to EG2.
1.1 What are similarities between the principles of the different Expert Groups and the laws and regulations of your respective IANOS island?
The laws and regulations applicable on Ameland are the same as those applicable on the mainland. The Netherlands does not have specific legislation/regulation focused on smart grids, which adds to the confusions concerning the legal framework thereof. Therefore, most of the Dutch legislation concerning smart grids can be found in the "Elektriciteitswet" (the Electricity law) and the "lower regulation" that stems from this law, including network codes. This Dutch electricity law finds it basis in the EU Electricity Directive, however, the most recent Electricity Directive 2019/72/EC has not yet been harmonized in the Netherlands. At this point in time, the Netherlands is in the process of implementing the new Energiewet (Energy law), which harmonizes the Electricity Directive. In 2009 the Dutch Minister of economic affairs established the Dutch taskforce for smart grids ("Taskforce Intelligente Netten"), which operated till 2011. This task force did not come to binding decisions, they did however give recommendations to the Dutch Government. These recommendations led to a budget of 16 million euros for the creation of testing grounds in order to get practical experience regarding smart grids. The Dutch Electricity law does not give a definition of smart grids (they do give a definition of a grid). As stated above, with Dutch laws and regulations and the principles of the ESGTF the focus is on data protection (EG2), which includes a Decree Code of conduct Smart Meters.
1.2 What are differences between the principles of the different Expert Groups and the laws and regulations of your respective IANOS island?
One of the differences is that the ESGTF does not focus on tariffs that could be applicable, concerning the use of Smart Grids. Dutch legislation does, and has a special code dedicated to it, the Tarievencode Electriciteit (Tariff code Electricity). The Dutch Electricity Law does mention the interoperability of the electricity networks, but not specifically related to smart grids. Therefore, one of the main differences between the ESGTF and Dutch legislation is that smart grids do not (yet) have a prominent role in Dutch legislation as it has in the ESGTF.

2. How are the principles of the ESGTF incorporated in the laws and regulations of your respective IANOS island?
As stated above in question 1.1, there is no specific type of legislation which focusses on smart grids in the Netherlands

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2.1 How could the laws and regulations of your respective IANOS island benefit from the ESGTF and its Expert Groups?
TNO, an independent Dutch research agency, has published a research paper[23] in 2021 concerning difficulties with Dutch laws and regulations concerning smart grids. The main difficulties found by TNO are: uncertainties in the redistribution of system costs, uncertainties about the role of regional network operators, low incentives to provide flexibility due to the connection values being based on peak values, current congestion management is not focused on the long term run and the framework for variable tariffs for transport is unclear. Next to that, the TNO rapport also mentions certain solutions to the current problems. The ESGTF could help in advising the Commission to take steps in creating flexible network tariffs, in order to make the framework more clear, which makes harmonization of Dutch law also more clear. Next to that, in the Netherlands there is currently a double tax on energy storage from your own connection, a change in EU legislation (the European Energy Tax Directive) could change this, e.g. a zero-rate.

3. Are there findings and/or best practices in IANOS that the ESGTF could benefit from? If yes, what are these findings and/or best practices?
Ameland is showcasing an integrated smart energy system that can become a blueprint for the different working groups of the ESGTF. The following aspects might be of interest: 1. The solar park that will be connected through a DC-connection is technologically superior but faces regulatory challenges. Lessons learned from this pilot can provide input to EG3 and EG4. 2. Cable pooling between a large (industrial) consumer and local RES can provide a cost effective solution to combining supply and demand. Overcoming regulatory issues and deployment challenges can be of value to EG3 and EG4.

State aid

How is State aid regulated on your respective IANOS island?
The laws and regulation on Ameland are the same as on the Netherlands' mainland. Dutch law refers directly to the Treaty of the Functioning of the European Union ("TFEU") through the "Wet Naleving Europese regelgeving publieke entiteiten" (European Public Entities Compliance Act). This Dutch act refers directly to EU treaties. Next to those rules, the Netherlands has

[23] Royal HaskoningDHV, '*Rapport Knelpunten Smart Energy*' [2021] <https://www.topsectorenergie.nl/sites/default/files/uploads/Urban%20energy/kennisdossier/Waarde%20van%20Flex/Rapportage%20Knelpunten%20Smart%20Energy%20TKI.pdf>

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implemented the “Wet terugvordering staatssteun” (State Aid recovery law). This law includes rules on the recovery of illegally granted State aid by governing bodies, including interest.[24]

2. Is State aid regulated differently on your respective IANOS island compared to the mainland? If yes, how?
No.
2.1 Are there exceptions for islands, concerning the national State aid rules? If yes, what are these exceptions?
No, there are no exceptions for Dutch islands. However, when looking at the islands part of the Kingdom of the Netherlands overseas (Curaçao, Sint Maarten, Aruba and the BES-islands), the EU rules on State aid do not apply as these islands are not part of the territory of the EU and have the OCT-status (Overseas Countries and Territories).

3. Are there differences with how State aid is regulated on your respective IANOS island and the European legislation? If yes, what are these differences?
No.

4. Do you see barriers for the implementation of the IANOS UC’s because of State aid regulation? If yes, what are these barriers?
Some proposed RES on Ameland are dependent on joint investments between government and private investors or government subsidies on development of the technology. Both constructs are susceptible to state aid challenges, as the investments have to fall under specific state aid exemptions mentioned in the “Guidelines on State aid for climate, environmental protection and energy “[25]. During and before the development of IANOS. However, these challenges have been mapped and were deemed not applicable to IANOS. Specifically, for the deployment of the SeaQurrent tidal kite (partially funded through the Wadden Fund) an extensive state aid analysis was required as part of the subsidy.

[24] https://uitspraken.rechtspraak.nl/inziendocument?id=ECLI:NL:RVS:2006:AU9416
[25] Guidelines on State aid for climate, environmental protection and energy 2022 (2022) C80/1

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Annex 4 – Legal framework Terceira

The laws and regulations on governing energy markets applied to the mainland and the Azores are not always the same. As a rule, laws and regulations consider the specificities of the Autonomous Regions or allow for adaptation. The differences lie in the regulated market and the liberalised market. The Network Access tariff is paid by consumers, which results from the sum of the tariffs: Global Use of the System; Use of the Transmission Network; Use of the Distribution Network; Logistics Operation of Change of Dealer. Energy and Commercialisation tariffs are paid by consumers who are still in the regulated market. In the liberalised market, the amount is defined by each supplier in a free and competitive way.

Regarding System Operators, the electricity system in the Azores is operated exclusively by the concessionaire of the electricity transmission and distribution network – EDA – Electricity of the Azores, SA. EDA is the sole supplier, applying the supply tariffs regulated by ERSE (Energy Services Regulatory Authority).
Likewise, the incentive systems both for energy efficiency equipment and electric mobility may be different for the mainland and for the Autonomous Region of the Azores.

Balancing, congestion management

Frequency balancing

The Quality of Service (QoS) legal regulation and the Portuguese standard for Voltage Characteristics of electricity supplied by Public Distribution Systems, the NP 50 160 standard (variation: 50 Hz (approx. 2% of 95% of a week's time and 50 Hz approx. 15% of 100% of a week's time), apply to frequency balancing.
Frequency balancing on the island Terceira is currently carried out through the thermal fuel generators in the Belo Jardim thermal power station, in Praia da Vitória. It should be noted that there is no market for power system services in the Azores. Decree-Order no. 596/2010, 30 July 2010, divulges the regulation establishing the technical conditions for connecting National Transmission Grid stations, as well as the conditions for its planning and operation.

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Among the many aspects these regulations advise caution with, for the imperative reasons of quality of service, reliability and grid security, worth highlighting are those resulting from a clean electricity production and the inherent difficulties from operating the grid, caused by a rise in reactive energy traffic and some disturbances that may affect grid stability.

Congestion management

Congestion is calculated annually, in accordance with the Access to Grid and Interconnection Regulation (ERSE/RARI). The following methods are applied:
Major congestions and grid capacity restrictions appear as available capacity in substations (power capacity per network-node) and as the maximum load per output (power capacity values per Medium Voltage (MV) line). These are then provided with corrective actions.

When calculating power capacity per network-node, maximum verified load per transport or thermal power station or substation distribution, installed transformation capacity and a 15% back-up of the installed power in transformation units for MV grid reconfigurations, in case of grid faults, are all considered. This calculation is viewed as a scenario with no contributions from renewable production. Transmission grid limitations are not considered.

Grid capacity restrictions are marked by power capacity values per MV line. They represent the maximum load that can be inserted into the most unfavourable location of each output (overhead power line or underground feeder) in the distribution substation or thermal central power plant, without exceeding output conductor thermal capacity and the minimum admissible voltage (0.95 pu) in the transformer substations being supplied.

The maximum load values presented are merely indicators. They were estimated through a load increase in the most unfavourable output locations, usually at the Transformer Station (TS) displaying the lowest voltage value, to obtain a

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maximum peak output scenario, considering a voltage value of 1.04 pu at the busbar of the substation or power station to which it is connected.

Local balancing

In the Azores, there is no local incentive for a supply and demand balance. Said balance is obtained through the electric public power supply service for consumers in quantity and quality, in accordance with the regulations in force: Portugal/Azores [ERSE/GRA (DREn)] and EU (NP 50160).

Energy communities

Active consumers

Traditionally, both the national Electricity System and the regional system are rooted in a centralised production. It is important to assure a decentralised-leaning model still within this framework that includes local production, self-consumption solutions, active smart grid management and the active participation of consumers in the markets.

Therefore, the intention is for consumers to start playing a fundamental role in the Electricity System, acting individually, collectively or through renewable energy communities, hopefully going from mere passive consumers to active agents that produce energy for self-consumption, selling excess power to the public grid. However, due to Terceira's particular characteristics, the organisation and operation of the Electricity System in the Autonomous Region of the Azores is based on the coexistence of a public electricity system service and an electricity production system reliant on authorisation and competitivity, which includes self-consumption and small-scale production.

As such, activities conducted in the public electricity system service are exclusive through public service concession contracts, aiming to ensure, across the entirety of the regional territory, the satisfaction of consumer electricity needs in proper service conditions. This concept comprises safety, normalcy and supply quality, as well as a universal service provision, among others.

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Without detriment to the special norms concerning consumer protection and essential public services, electricity consumers have the right to, among others: Have objective, transparent, timely and complete information regarding:

- Contract arrangements, applicable prices and tariffs;
- Access and appropriate use conditions for electricity supply, particularly users with special needs;
- Measures for energy efficiency and rational use of energy;
- The access to simple and transparent procedures for handling complaints related to electricity supply and grid services.

Citizen /renewable energy communities

Decree-Law no. 15/2022, 14 January 2022, establishes the organisation and operation of the National Electricity System, at a national level, transposing Directive (EU) no. 2019/944 and Directive (EU) no. 2018/2001. Self-consumption and participation in renewable energy communities (RECs) by end users are laid down in art. no. 187 through art. no. 191 of the same legislation.

According to this legislation, the end user has the right to become a self-consumer and the right to integration in RECs, including low-income families or ones in vulnerable situations, in order to fight energy poverty. RECs are established as legal persons through an open and voluntary affiliation of their members, partners or shareholders, who themselves can be natural or legal persons of public or private nature, including, in particular, small and medium-sized enterprises or local authorities. The main goal of RECs is to provide their members or local areas with environmental, economic and social benefits.

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Prosumption and self-consumption (in communities)

When it comes to self-consumption incentives, at a national level, the Support Programme for +Sustainable Buildings (Phase 2) is in force. This Programme is sponsored by the Environment Fund, which co-funds a wide array of projects, including those related to the implementation of systems for self-consumption based on renewable energy sources, among others.

The participation in this Programme was greatly impactful, so it was necessary to reinforce its allocation in order to ensure its continuity and stability of applications. This Programme intends, essentially, to fight energy poverty and to transform buildings into more energy efficient ones, improving thermal comfort levels, reducing energy dependence, the numbers on invoices and greenhouse gas emissions.

The Government of the Azores provides incentives for self-consumption in the regional framework, in accordance with Regional Legislative-Decree no. 14/2019/A, 12 June 2019.[26] This decree establishes the incentive system for renewable energy production in the Autonomous Region of the Azores – ProEnergia, including investments in support systems for self-consumption production of hydro, solar and wind sourced electricity.

[26] Second amendment to the Regional Decree-Law no. 5/2010/A.

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Peer-to-peer supply

Decree-Order no. 596/2010, 30 July 2010, divulges the regulation establishing the technical conditions for connecting National Transmission Grid stations, as well as the conditions for its planning and operation. This regulation states that, in exceptional situations regarding operation of the National Electricity System, such as congestion due to unavailable equipment or when the safety of production-consumption balance is at stake, the Grid Operator may control the output of production stations under a special regime to avoid exceeding the defined power value. The General-Director for Energy and Geology will issue an order in which the rules and procedures to carry out in these situations will be set.

Data, Requirements for grid monitoring

As already written out, Decree-Order no. 596/2010, 30 July 2010, divulges the regulation establishing the technical conditions for connecting National Transmission Grid stations, as well as the conditions for its planning and operation. According to this law, the forecast of loads (active and reactive power) to supply to the Transmission Grid is prepared for maximum and minimum load capacity conditions as well as intermediate load capacity situations, based on the historical records of these last few years. When relevant, season-typical months are addressed.

The starting point of this forecast is an estimate, for the ongoing year, of concurrent active loads at each supply terminal. The overall value of this resulting estimate reflects the simultaneous load situation at all supply terminals and the most probable scenario available in the document "Monitoring security of supply", which is under the responsibility of the General Directorate for Energy and Geology (DGEG).

The report on monitoring security of supply (RMSA - *Monitorização da Segurança de Abastecimento*) is an instrument that allows to assess system needs, from a supply safety perspective, particularly the electricity sector, in the medium and

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long term. It considers the government set guidelines on energy policy. DGEG is, at a national level, the entity responsible for drafting this report.

Electric vehicles

The national regulatory framework for electric vehicles is based on Decree-Law no. 39/2010, which establishes the legal framework for electric mobility. The Decree is applicable to management, access and exercise of activities related to electric mobility, and includes the rules for the creation of a pilot network of electric mobility, as well as the Roadmap for Carbon Neutrality 2050 (Roteiro para a Neutralidade Carbónica 2050, in Portuguese).[27]

At the regional level, Regional Decree-Law no. 21/2019/A[28] defines the strategy for the implementation of electric mobility in the Azores. With this in mind, the Strategy involves: a) Implementation of a public access charging network for electric vehicles; b) Incentives for the adoption of electric mobility (financial and non-financial).

The implementation of the electric mobility policy in the Azorean archipelago implies the existence of regional and municipal planning instruments, namely: a) Plan for Electric Mobility in the Azores (PMEA); b) Municipal Electric Mobility Plans (PMEM).

In addition to that, the Plan for Electric Mobility in the Azores (approved by Government Council Resolution 106/2019) was developed by the Government of the Azores for the period between 2018 and 2024. It is a guide for the implementation of electric mobility in the Region that integrates the diagnoses of several activity sectors. In addition to that, the PMEA is validated by diagnoses and simulations that support the proposed measures.

[27] www.portugal.gov.pt/download-ficheiros/ficheiro.aspx?v=%3d%3dBAAAAB%2bLCAAAAAAABACzMDexAAAut9emBAAAAA%3d%3d

[28] dre.pt/dre/detalhe/decreto-legislativo-regional/21-2019-123815991

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On the subject of subsidies for electric mobility promotion, the Environment Fund encourages the allocation of incentive units reliant on the typology of low-emission vehicles, considering distinct key-areas of intervention: the light passenger vehicle, urban logistics and active cycling and two-wheel mobility. This system has been in force since 2017 and is, as a rule, updated every year. The latest version was updated in 2021.[29]

The first financial incentive program for the purchase of electric vehicles and charging points in the Azores was established by the Regional Decree-Law 2/2020/A,[30] with applications being submitted between March 5 and December 31, 2020. As the incentives system for 2020 expired, a new regulation was published and is now in effect – Regional Decree-Law 4/2021/A[31] – determining the attribution of financial incentives for the introduction of new electric vehicles in the Azores, either through purchasing or through leasing for both natural and legal (artificial) persons. This new system also regulates the granting of financial incentives for the acquisition of charging stations for EV.

Industrial electrification

The industry, particularly facilities that fall into the category of intensive energy consumers (CIE) which, in the immediately preceding year, had registered an energy consumption equal to or greater than 500 tonnes of oil (500 tep/year), are covered by the Management System for Intensive Energy Consumption – SGCIE. These facilities are then required to register with the SGCIE portal as CIEs, as well as being recognised by qualified technicians, carrying out energy audits and preparing Energy Consumption Rationalisation Plans (PREn's), along with the respective Implementation and Progress Reports (REPs).

Therefore, within the scope of the National Strategy for Energy, Decree-Law no. 71/2008, 15 April 2008, was published. This Decree regulates the SGCIE – *Sistema*

[29] www.fundoambiental.pt/avisos-anteriores/apoios-20211/mitigacao-das-alteracoes-climaticas1/incentivo-pela-introducao-no-consumo-de-veiculos-de-baixas-emissoes-vbe2021.aspx
[30] dre.pt/dre/detalhe/decreto-regulamentar-regional/2-2020-128515585
[31] dre.pt/dre/detalhe/decreto-regulamentar-regional/4-2021-162067645

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de Gestão dos Consumos Intensivos de Energia. This law was amended by Statute no. 7/2013, 22 January 2013, and by Decree-Law no. 68-A/2015, 30 April 2015.

The SGCIE stipulates that CIEs conduct, periodically, energy audits that focus on energy use conditions and promote an increased energy efficiency, including the use of renewable energy sources. It also stipulates the preparation and execution of PREn's that comprise the minimum goals of energy efficiency. PREn's, when approved, become Energy Consumption Rationalisation Agreements (ARCEs), which, if fulfilled, lead to the operators of these facilities receiving incentives. The operator of the facilities covered by an ARCE will benefit from stimuli and incentives, as to promote energy efficiency in said facilities.

Heat networks

Neither mainland Portugal or the Azores have developed heat distribution networks or, specifically, the concept of thermal power distribution, as seen in other cities of the world, such as New York, Moscow and Paris; Heating networks were mainly built in places where the climate so demanded and where social or political conditions were favourable enough for such a system to emerge. In order to change that and bring forward new heating networks, it is essential that political decision-makers and public entities are made aware of the benefits – they take an active role in the promotion and defence of these projects. So, removing some political and fiscal barriers is vital.

Equally vital become spatial planning instruments for the development of cooling and heating networks, when conditions are economically favourable. In 1992, the city of Lisbon was chosen to host the last world expo of the 20th century, held in the eastern part of Lisbon. The EXPO 98 Urbanisation Plan envisaged the development of the first urban cooling and heating network of the country. Thus, in 1995, said first network sees the start of its construction in Parque das Nações, comprised of a trigeneration plant, distribution networks and their respective substations. In 1997, supply of energy to the first customers began.

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(re)Use of biomass/waste

In terms of legislation, the Resolution of the Council of Ministers no. 81/2010 establishes, within the scope of the National Strategy for Energy 2020, completion measures for plant projects dedicated to forest biomass, as well as the Republic Assembly Resolution no. 10/2009, which promotes the energy harnessing of agricultural biomass. Decree-Law no. 64/2017, as it is written now, approves the framework for new forest biomass plants, as well as the measures that promote the production and harnessing of biomass to ensure supply to these dedicated forest biomass plants.

At a national level, we once again emphasise the Support Programme for +Sustainable Buildings – Phase 2 (*2ª fase do Programa de Apoio a Edifícios +Sustentáveis*, in Portuguese). The programme foresees investments on high efficiency biomass boilers and fireplaces (heat recovery systems). It is promoted by the Environment Fund, which co-funds a wide array of projects, including those related to the implementation of systems for self-consumption based on renewable energy sources, among others.

At a regional level, the Incentive System for Business Competitiveness (*Competir+*), which includes a section for energy efficiency investments, may, eventually, encompass investments in equipment that uses biomass waste for energy purposes, such as boiler reconversion for domestic hot water heating using pallets or biomass.

Likewise, *ProEnergia* – an incentive system for the production and storage of renewable energy – encourages the production and storage of electric and heat energy meant for self-consumption by families, businesses, non-profit entities and IPSS (*Instituições Particulares de Solidariedade Social*). Notably, projects and investments involving heat energy production using biomass are eligible for incentives, especially the installation of heat recovery systems and the many different types of wood burning stoves.

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Annex 5 – Legal framework Ameland

The most relevant laws and regulations governing the energy markets in the Netherlands are the Electricity[32], Gas[33] and Heating Act[34]. For Ameland the same laws and regulations apply, as Ameland is integrated in the Netherlands energy market (interconnected). No specific exemptions apply to Ameland.

As such, the energy markets on Ameland are fully liberalized. The DSOs and TSO are ownership unbundled from producers and suppliers. DSOs are owned by local authorities, the TSO by the State. Producers and suppliers are privatized and usually (commercial) market players.

Because of their monopolistic position, the system operators are held to strict regulation, prescribing their operation, tariffs, etc. Suppliers are free to set their own tariffs, yet are required to hold a supply license when supplying small (household) customers. The main rationale behind such a license is to protect consumers by ensuring reliable supply. Production is a license free activity (apart from general license requirements, such as environmental licenses, etc.). Producers and consumers (system users) are also bound by the Netherlands Network code(s).

Balancing, congestion management

Frequency balancing

Frequency balancing (50Hz) is governed by the Network Code. Frequency balancing is performed by the TSO, TenneT. To ensure frequency balance, the TSO facilitates a balancing market, in which actors in the electricity system (e.g. suppliers, producers, consumers) are (either directly or indirectly) balance responsible. As balance responsible parties, such parties should ensure their production and consumption (generation/supply and load/demand) match. They should deliver a 'program', a portfolio, for each time-slot of 15 minutes, during the

[32] https://wetten.overheid.nl/BWBR0009755
[33] https://wetten.overheid.nl/BWBR0011440/
[34] https://wetten.overheid.nl/BWBR0033729/

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day, which is balanced. If they are unable to deliver their program in real-time, they have to compensate their imbalances. They can also be compensated for their positive contributions to the balance. The costs of 'balancing' are based on the costs of the system services the TSO has to purchase to compensate imbalances, in which the costs are distributed among the parties causing the imbalances. The TSO also makes sure it holds some reserve capacity (as minimal as possible) in case the market system fails.

Congestion management

Congestion Management in the Netherlands is also governed by the Network Code. Congestion management is 'activated' when the demand for network capacity exceeds the available network capacity. The 'demand for capacity' is based on the contractual (peak) values on a specific system level, which are aggregated to the peak network capacity demand. If the aggregated (peak) demand is higher than the defined allowed peak for such a system level, the network is 'congested'. If such a situation occurs, the system operator is unable to facilitate third party access to system users and should take appropriate measures to solve the lack of capacity and facilitate third party access again.

If congestion management is applied, the system operators, which can be both DSOs or the TSO, should inquire whether one or more system users are able and willing to reduce their demand for capacity. If this would be the case, the system manager could make use of market parties' abilities to lower the demand for capacity and solve the congestion. If such options cannot be used, the system operator takes 'technical measures', or refuses access. In the current setting, congestion management is only applied as a temporary solution.

Local balancing

In the Netherlands, balancing is not performed on a local level. Also, there are no incentives to do local balancing, as there is only a national market for (balancing) system services, which aims at balancing the national (and synchronized EU) electricity system.

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Energy communities

Active consumers

In the Netherlands, active consumers are not defined in the Electricity Act. Currently, a new (Energy) Act is being developed, which will most likely define active consumers as such. Nevertheless, despite their current lack of definition, active consumers do already exist in the Netherlands. Most commonly, active consumers are consumers that own and operate a PV installation within their own (household) installation. They are entitled to deliver self-produced electricity at their supplier. The delivered electricity is 'net-metered', which means that their produced electricity is subtracted from the electricity they have consumed on an annual basis. If they have produced more electricity than they have consumed, the surplus of produced electricity has to be purchased by their electricity supplier at a 'reasonable rate'.

Other forms of active consumerism are also possible, but are not (yet) actively incentivized in the Netherlands. One could think of demand side response, using e.g. battery storage solutions. In the Netherlands, no self-consumption requirements or subsidies exist, so active consumers fully rely on the value offer for flexibility for e.g. congestion management, or other (aggregated) system services, or dynamic electricity supply tariffs. At the moment, the value of flexibility for the large majority of (medium to small) consumers is too low or uncertain to invest in flexibility solutions, such as smart equipment, or storage solutions. A new mechanism for congestion management is being developed to increase the value of flexibility for congestion management.

Citizen /renewable energy communities

The current Electricity Act also does not provide any definition for citizen or renewable energy communities. Yet, also here, despite the absence of such definitions, energy communities already exist in the Netherland. These communities are private (legal) bodies, commonly referred to as 'energy

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cooperations'. In these cooperations, (local) citizens are the shareholders of the cooperation.

The vast majority of these communities are renewable energy communities, which jointly own and operate electricity production from either wind or solar energy. As there are no license requirements for the production of electricity, also local communities can produce and sell electricity. However, at the moment, local communities are generally not allowed to supply electricity to small (household) consumers without a supply license.

The Energy Act, which is currently still under development, will further define energy communities. Energy communities will also be entitled to an exemption to the requirement of having a supply license for the supply of (local) citizens. The exemption is still not fully developed, and the exact conditions for such an exemption need further definition.

Peer-to-peer supply

In the current regulatory setting in the Netherlands, peer-to-peer supply is not allowed (directly), and is not (yet) a right for consumers they can enforce with their current energy supplier. (small) consumers can perform direct (meaning without intervention of a supplier) peer-to-peer supply when holding a supply license, which poses a significant administrative burden. Although whilst currently there are no restrictions for peer-to-peer supply via energy suppliers with a supply license, there are also no incentives for such supply. In the Energy Act which is currently being developed, the options for peer-to-peer supply via existing suppliers should be facilitated.

Data, requirements for grid monitoring

In the Netherlands, system operators are required to monitor the safety of their systems, and the quality of service for electricity supply. At the moment, almost every customer in the Netherlands has been offered a smart meter, and many consumers have already installed a smart meter. Metering responsible parties

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collect the metering data and make sure the data is collected, validated and made available. Authorized market parties, or system operators, can make use of the available data to offer services, or improve their services. Despite the ability of smart meters to provide a significant contribution to more local grid monitoring (e.g. local voltage levels, based on smart meter readings), the current regulatory framework does not allow system operators (by law) to perform such monitoring. The processing of personal data is mostly restricted to the very minimum requirements, e.g. for billing (annually), or the technical maintenance of the smart meter. For most (other) purposes, explicit consent of (household) consumer is required.

Electric vehicles

Despite a national subsidy scheme for electric vehicles and local arrangements for installing (public) charging infrastructure at the request of EV owners or users, no specific regulation is in place for EVs, especially in relation to charging infrastructure. Charging points are considered as general (electric) installations, and make use of a regular electricity connection to the system. No specific requirements apply to such connections.

The incentive schemes for EVs in the Netherlands range from an exemption from paying road taxes to a fixed tariff for the purchase of an EV, or a lower rate (income) tax addition for business lease contracts.

Industrial electrification

In the Netherlands, it is expected that by 2050 around 60% of the total energy consumption of industry comes from electricity. This comes down to approximately 80-130 TWh/year. In order to ensure such amounts of (renewable) electricity, large scale investments in available and affordable electricity have to be stimulated and electricity network capacity has to be ensured. In the Netherlands, an SDE++[35] subsidy, which is a tariff premium, is deployed to

[35] https://wetten.overheid.nl/BWBR0022735/

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stimulate the availability of renewable energy sources. Next to that, efforts are being made to increase network capacity, although this is more a (significant) planning challenge; the costs of network expansion can be recouped by the regulated tariff-system as defined in the Netherlands Electricity Tariff Code.

Heat networks

The Heat Act regulates heat networks in the Netherlands. Currently, a 2014 version of this Act is in place, and a new version is being prepared, and expected to enter into force in 2022. The current Heat Act poses very limited requirements for heat networks in comparison with the Electricity and Gas Act. The most important provisions are on maximum tariffs for heat supply (currently linked to the price of natural gas, the main source for domestic heat supply in the Netherlands), disconnection conditions, the right on compensation when severe interruptions of heat supply occur, provisions on how heat supply should be measured.

(re)use of biomass/waste

The legal framework in the Netherlands does not pose specific requirements on the (re)use of biomass/waste. The Netherlands (local) government(s) are obliged to organize waste processing for households, commercial parties/business should organize their own waste disposal. Whilst there are no specific requirements for the (re)use of biomass/waste, many local governments seek to optimize their waste processing and the (re)use of biomass, also for energy purposes. Also, the Netherlands government tries to incentivise the (re)use of biomass by the SDE++ subsidy scheme,[36] which also includes e.g. the production of biogas from biomass.

[36] https://wetten.overheid.nl/BWBR0022735/

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Annex 6 – EU legal framework

This section elaborates on the relevant EU regulatory and legal framework for IANOS use case topics, and the extent to which this framework promotes decarbonization of geographical islands. Firstly, the general basis for all Directives and Regulations is explained (art. 194 TFEU). Secondly, a non-exhaustive overview of the most relevant Directives and Regulation is provided. Thirdly, the general derogations for small- and isolated islands are described, which can be used in the EU to be exempted from (some) EU law provisions. Fourthly, based on the relevant theme's (including a description and (EU) legal definition of the topic) in the IANOS project, a non-exhaustive overview of relevant EU law provisions is provided.

Article 194 TFEU

Art. 194 of the Treaty on the Functioning of the European Union (TFEU) is the basis of the Directives and Regulation that will be further discussed. This article states, in paragraph 1, that: '*In the context of the establishment and functioning of the international market and with regard for the need to preserve and improve the environment, Union policy on energy shall aim [...] to: (a) ensure the functioning of the energy market; (b) ensure security of energy supply in the Union; (c) promote energy efficiency and energy saving and the development of new and renewable forms of energy, and; (d) promote the interconnection of energy networks.*'

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Directives and Regulations

The following Directives and Regulation are included in the analysis:

A. Electricity Directive 2019/944[37]	The main goal of the Electricity Directive is to create a fully operational internal market for electricity. This goal is supported by articles about, among others, the generation, transmission, distribution, energy storage and supply of electricity. With these articles, the Electricity Directive also aims to ensure affordable, transparent energy prices and costs for consumers.
B. Electricity Regulation 2019/943[38]	The Electricity Regulation aims for further EU electricity market integration, e.g. by setting rules for cross-border exchanges in electricity and a well-functioning and transparent wholesale market.[39]
C. Gas Directive 2009/73/EC (consolidated version)[40]	The main goal of the Gas Directive is to create a fully operational and well-functioning internal market in natural gas. This goal is supported by articles concerning the transmission, distribution, supply and storage of natural gas in the EU and the organisation and functioning of the gas market, access conditions, distribution, supply, storage and the operation of natural gas systems.
D. Energy Efficiency Directive 2012/27/EC (consolidated version)[41]	The Energy Efficiency Directive pursues the overall objective of reaching the energy efficiency target of at least 32,5% in the EU by 2030.

[37] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32019L0944

[38] https://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX:32019R0943

[39] Electricity Regulation 2019/943, preamble paragraph 74.

[40] https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A32009L0073

[41] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02012L0027-20210101

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E. Renewable Energy Directive 2018/2001 (consolidated version)[42]	The Renewable Energy Directive promotes *'energy efficiency and energy saving and the development of new and renewable forms of energy.'* Next to that, one of the goals of this Directive is to *'achieve a share of at least 32% of energy from renewable sources in the Union's gross final consumption of energy by 2030.'*[43]
F. Buildings Directive 2010/31/EU (consolidated version)[44]	The Buildings Directive promotes *'the improvement of the energy performance of buildings within the Union'*. This goal is supported by provisions on minimum requirements to the energy performance of new buildings and national plans for increasing the number of nearly zero-energy buildings.[45]

These Directives and Regulation are, except for the Gas Directive, part of the '*Clean energy for all Europeans*' package of the European Commission.[46] This package '*presents an opportunity to speed [up] both the clean energy transition and growth and job creation.*'[47] On a more technical and detailed level, also relevant provisions can be found in the EU Network Codes.[48]

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[42] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32018L2001
[43] Renewable Energy Directive 2018/2001 (consolidated version), art. 3(1).

[44] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32010L0031
[45] Buildings Directive 2010/31/EU (consolidated version), art. 1(2)(b)(d).

[46] Energy policy: general principles | Fact Sheets on the European Union | European Parliament (europa.eu)

[47] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52016DC0860&from=EN

48 The EU Electricity Network Codes consists of eight Commission Regulations, which are divided into three code families: i) connections; ii) operation; and iii) market. For the first family, connections, a code holding requirements for generators, (Commission Regulation (EU) 2016/631) a demand connection code (Commission Regulation (EU) 2016/1388) and a code for high voltage direct current (HVDC) connections (Commission Regulation (EU) 2016/1447) is provided. For the second family, operation codes, a code on electricity emergency and restoration (Commission Regulation (EU) 2017/2196) and a code on electricity transmission system operation is provided

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Small and isolated island exemptions

EU law does not provide a specific status to small/isolated islands. As a general rule, all EU law applies to them. Only a closed list of European islands qualified as 'outermost regions', pursuant to article 349 TFEU. These islands benefit from an unconditional derogation from the obligations of unbundling, third party access and freedom of choice of the supplier granted by the European Commission.[49]

The exemptions provided by the secondary law are submitted to certain criteria. To be qualified, small/isolated islands would have to fit in one of the categories defined by the directives.

Small isolated system (SIS)	Defined as any system with a consumption of less than 3 000 GWh in the year 1996, where less than 5 % of annual consumption is obtained through interconnection with other systems	Electricity Directive, art. 2(42)
	Member states may decide to exempt SISs and networks serving less than 100 000 from DSO unbundling obligations without conditions.	Electricity Directive, art. 35(4).
Small connected system (SCS)	Defined as any system that had a consumption of less than 3 000 GWh in the year 1996, where more than 5 % of annual consumption is obtained	Electricity Directive, art. 2(43)

(Commission Regulation (EU) 2017/1485). For the third family, market, a code for electricity balancing is provided (Commission Regulation (EU) 2017/2195), forward capacity allocation (Commission Regulation (EU) 2016/1719) and capacity allocation and congestion management (Commission Regulation (EU) 1222/2015). Most of the provisions of the codes are targeted at transmission system level, but they also have implications for system operation at distribution level.

[49] Art. 66(2) Electricity Directive.

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	through interconnection with other systems.	

Member states can also apply to the Commission for the exemption of their SIS and SCS from article 8, on authorization procedures for new capacity and all relevant provisions contained in chapters related to free choice of supplier, market-based supply prices and third party access.[50] SIS can apply for these exemptions themselves, in which case the EC informs the relevant Member State before taking its decision. In case of "substantial problems for the operation of SISs and SCSs", Member States can apply for exemptions related to, among others, the principles regarding the operation of electricity markets, balancing market, day-ahead and intra-day market.[51] It must be underlined that these exemptions, contrary to those applicable to outermost regions, must be limited in time and subjected to conditions "aiming to increase competition and integration with the internal market for electricity."

Relevant themes IANOS UCs

For the IANOS UCs (see D2.4) a number of themes are of particular interest. These themes, and the most relevant EU law provisions, are briefly analysed in this section.

Balancing

Balancing is the matching of supply and demand (consumption) to ensure a voltage frequency of 50 Hz. In the EU interconnected system, frequency is balanced by the transmission system operators (TSOs). They do so by a) collecting the relevant data on consumption and production, ranging from long-term to real-time; b) defining the expected balance for any time of day; c) monitoring the real-time balance; d) ensuring sufficient balancing capacity (increase or decrease in consumption or production) to ensure balance can be found the initial predictions do not lead to a balanced situation. Balancing capacity can be acquired (long-term) through

[50] Art. 66, 8 Electricity Directive.
[51] Art. 64 Electricity Regulation.

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contracts with individual system users, or in a market setting, in which all system users can state their 'flexibility'. IANOS seeks to contribute to such balance in 5 UCs, in which a number of innovations are implemented which can be used for balancing purposes. In the UCs, balancing services can either be provided to the national TSO, if the island is (inter)connected to the main transmission system, or the local system operator/utility, in case the island is not (inter)connected to the main transmission system.

Relevant IANOS UCs

1 Optimal dispatch of local energy generators and intra-day balancing services (using a Virtual Power Plant).
2 Maximization of self-consumption in the community using demand-side management (using a Virtual Power Plant).
3 Island-wide, any-scale storage utilization for fast response ancillary services.
4 Demand-Side Management (DSM) and Smart Grid methods to support Power quality and congestion management services.
5 Decarbonization of transport and the role of electric mobility to stabilize the energy system.

Definition(s) in EU Law

Balancing: all actions and processes, in all timelines, through which transmission system operators ensure, in an ongoing manner, maintenance of the system frequency within a predefined stability range and compliance with the amount of reserves needed with respect to the required quality. — Electricity Regulation, art. 2(10)

Relevant EU Law Provisions

The Electricity Directive states that active customers, Citizen Energy Communities (CEC's) and market participants in aggregation are responsible for the imbalances they cause to the electricity system.[52] This entails that these parties are all balance responsible parties or have to delegate this responsibility. The Electricity Regulations holds a comparable

52 Art. 15(f), 16(3)(c), 17(3)(d) of the Electricity Directive

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provision, referring to '*all market participants*', and states that all balance responsible parties are financially responsible for their imbalances, and shall strive to be balanced or shall help the electricity system in being balanced.[53] This responsibility should create an incentive for all market parties to contribute to system balance (balancing).

The procurement of balancing capacity is performed by TSO's.[54] Concerning the price of balancing energy, the Electricity Regulation states that these prices shall not be pre-determined in contracts for balancing energy, and that imbalances have to be settled at a price that reflects the real-time value of energy.[55]

Further EU rules on balancing are provided by the **Electricity Balancing Regulation** (Regulation (EU) 2017/2195). The Electricity Balancing Regulation lays down provisions on '*procurement and the settlement of frequency containment reserves, frequency restoration reserves and replacement reserves and a common methodology for the activation of frequency restoration reserves and replacement reserves*'.[56] This regulation applies *'to all transmission systems and interconnections [...]* ***except the transmission systems on islands that are not connected with other transmission systems via interconnections'***.[57]

Congestion Management

'*Congestion*' is usually considered to exist when the demand for (electricity) network capacity exceeds the availability of (electricity) network capacity. If such a situation occurs, refusal of access to the system is imminent and has to be avoided as much as possible (based on the requirement on third party access to the electricity system). One of the options of avoiding refusal of access is to reallocate the available network capacity by applying *'congestion management'*. With congestion management, demand and supply can be

[53] Art. 5(1) of the Electricity Regulation

[54] Art. 6(8) of the Electricity Regulation

[55] Art. 6(2)(5) of the Electricity Regulation

[56] Art. 1(1) Regulation (EU) 2017/2195.

[57] Art. 1(3) Regulation (EU) 2017/2195.

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'redispatched', to ensure that the demand for network capacity can be lowered (and the congestion can be minimized or even solved), or to reallocate the available capacity according to one or more optimization standards.

Relevant IANOS UCs

1 Optimal dispatch of local energy generators and intra-day balancing services (using a Virtual Power Plant).
2 Maximization of self-consumption in the community using demand-side management (using a Virtual Power Plant).
3 Island-wide, any-scale storage utilization for fast response ancillary services.
4 Demand-Side Management (DSM) and Smart Grid methods to support Power quality and congestion management services.
5 Decarbonization of transport and the role of electric mobility to stabilize the energy system.

Definition(s) in EU Law

Congestion: a situation in which all requests from market participants to trade between network areas cannot be accommodated because they would significantly affect the physical flows on network elements which cannot accommodate those flows;	Electricity Regulation, art. 2(4)
Redispatching: a measure, including curtailment, that is activated by one or more transmission system operators or distribution system operators by altering the generation, load pattern, or both, in order to change physical flows in the electricity system and relieve a physical congestion or otherwise ensure system security;	Electricity Regulation, art. 2(26)

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Relevant EU Law Provisions

'Regulatory authorities shall monitor congestion management of national electricity systems including interconnectors, and the implementation of congestion management rules. TSOs and market operators shall submit their congestion management rules, including capacity allocation, to the regulatory authorities'.[58] The Electricity Regulation further requires that *'redispatch'* is applied based on market based mechanisms as much as possible.[59] As such, system users should be allowed the possibility to provide i.a. demand-side response, or other services that would allow market based redispatch, e.g. for congestion management. Only if such services would not be available, non-market based options for congestion management should be pursued.

Energy Communities

Energy Communities are communities that produce and consume energy, within a (local) community. Next to the production and consumption of energy, they can also be involved in the management of their own network infrastructure, or provide (other) energy services. The citizens within these communities are thus active in the energy system.

Relevant IANOS UCs

9 Active citizen and local energy community engagement into decarbonization transition.

Definition(s) in EU Law

Active customer: a final customer, or a group of jointly acting final customers, who consumes or stores electricity generated within its premises located within confined boundaries, or, where permitted by a Member State, within other premises, or who sells self-generated electricity or participates in flexibility	Electricity Directive, art. 2(8)

[58] Art. 59(10) of the Electricity Directive

[59] Art. 13 Electricity Regulation.

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or energy efficiency schemes, provided that those activities do not constitute its primary commercial or professional activity'.[60]	
Citizen energy communities: (i) a legal entity; (ii) based on open and voluntary participation and controlled by natural persons, including municipalities or small enterprises; (iii) has the primary purpose to provide environmental, economic or social community benefits to its members or shareholders or to local areas where it operates, and; (IV) may engage in generation (incl. renewable sources), and i.e. provide energy services to its members.	Electricity Directive art. 2(11)
Renewable energy community: a legal entity: (a) which, in accordance with the applicable national law, is based on open and voluntary participation, is autonomous, and is effectively controlled by shareholders or members that are located in the proximity of the renewable energy projects that are owned and developed by that legal entity; (b) the shareholders or members of which are natural persons, SMEs or local authorities, including municipalities; (c) the primary purpose of which is to provide environmental, economic or social community benefits for its shareholders or members or for the local areas where it operates, rather than financial profits;	Renewable Energy Directive art. 2(16)

Relevant EU Law Provisions

Art. 15 of the Electricity Directive provides a specific provision regarding the rights of active customers. This article states, among other things, that final customers are entitled to act as active customers and may not be subject to e.g. '*[…] disproportionate or discriminatory technical requirements, […], procedures and charges, […]*'. Also, Member States should ensure that active customers are entitled to operate directly or through aggregation, sell self-generated electricity, participate in flexibility schemes and are financially responsible for the imbalance they cause in the electricity system. The Directive also states that Member States are allowed to adopt different

[60] The Electricity Directive describes 'final customers' as customers who purchase electricity for own use (art. 2(3)).

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provisions with regards to individual and jointly-acting active customers, as long as the provisions apply to all active customers and are proportionate and justified. Lastly, art. 15 also gives different rights to active customers that own an energy storage facility, including; the right to a grid connection within a reasonable time after request and the fact that active customers with an energy storage facility may not be subject to disproportionate licensing requirements or fees.

Art. 16 of the Electricity directive lays down the rights Member States should ensure to citizen energy communities. It includes the requirement that participation should be open and voluntary and that members or shareholders do not lose their rights and obligations as household customers or active customers. Next to that, art. 16 also lays down that Member States should ensure that citizen energy communities are able to participate in cross-border participation, can access all electricity markets (directly or through aggregation), are financially responsible for imbalances they cause in the electricity system, are treated like active customers, and are entitled to arrange within the citizen energy community the sharing of electricity that is produced by its production units owned by the community.

Art. 21 Renewable Energy Directive states that Member States have to ensure that consumers are entitled to become renewables self-consumer. Next to that, Member States have to ensure that renewables self-consumers (individually or through aggregators) are entitled to generate, use and store renewable energy. The Renewable Energy Directive also allows self-consumers to sell excess production of renewable electricity through peer-to-peer agreements. NB. The other Directives and Regulation do not mention peer-to-peer supply. Art. 2(18) of the Renewable Energy Directive describes peer-to-peer trading of renewable energy as '*the sale of renewable energy between market participants by means of a contract with pre-determined conditions governing the automated execution and settlement of the transaction, either directly between market participants or indirectly through a certified third-party market participant, such as an aggregator […]*'. Next to that, the Renewable Energy Directive also states that renewables self-consumers are entitled to install and operate electricity storage systems,

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receive remunerations through support schemes, for the self-generated renewable electricity that they feed in the grid and that Member States shall put a framework in place that promotes and facilitates the development of renewables self-consumption This framework can consist of, among others, incentives to building owners to create opportunities for renewables self-consumption and granting renewable self-consumers, for the self-generated renewable electricity that they feed into the grid, non-discriminatory access to relevant existing support schemes. Art. 22 of the Renewables Directive requires renewable energy communities to be able to produce, consume, store and sell renewable energy, and to share energy within the community. The communities also should have (non-discriminatory) access to the energy market(s).

(Personal) Data Processing

Processing data is of the utmost importance for the integration of flexibility in the (future) energy system. Data on production and consumption of energy, data on the system state (e.g. balancing, available network capacity, etc.), are key for multiple IANOS UCs. The processing of (personal) data implies collecting, storing and translating data, to ensure e.g. (optimized) system operation. It is important to define which data can be processed, and under which conditions, to ensure the implementation of the IANOS UCs. All 'personal' data (data regarding natural persons, people) should be treated according to the requirements of the 'General Data Protection Regulation' (GDPR - Regulation (EU) 2016/679). As not all data is 'personal', the GDPR does not always apply when data is processed within the energy system. Yet, when personal data is involved, the GDPR always applies, in all EU Member States.

Relevant IANOS UCs

1 Optimal dispatch of local energy generators and intra-day balancing services (using a Virtual Power Plant).
2 Maximization of self-consumption in the community using demand-side management (using a Virtual Power Plant).

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3 Island-wide, any-scale storage utilization for fast response ancillary services.
4 Demand-Side Management (DSM) and Smart Grid methods to support Power quality and congestion management services.
5 Decarbonization of transport and the role of electric mobility to stabilize the energy system.
9 Active citizen and local energy community engagement into decarbonization transition.

Definition(s) in EU Law

Personal data: any information relating to an identified or identifiable natural person ('data subject'); an identifiable natural person is one who can be identified, directly or indirectly, in particular by reference to an identifier such as a name, an identification number, location data, an online identifier or to one or more factors specific to the physical, physiological, genetic, mental, economic, cultural or social identity of that natural person;	General Data Protection Regulation, 4(1)
Processing: any operation or set of operations which is performed on personal data or on sets of personal data, whether or not by automated means, such as collection, recording, organisation, structuring, storage, adaptation or alteration, retrieval, consultation, use, disclosure by transmission, dissemination or otherwise making available, alignment or combination, restriction, erasure or destruction	General Data Protection Regulation, art. 4(2)

Relevant EU Law Provisions

General principles for data processing. In the EU, personal data can only be processed if the processing complies to the general principles of the GDPR. These principles are, in short, that the data processing should be necessary and proportionate. It should have a clear purpose, and the processed data should correspond to that purpose. Data cannot simply be collected because it is interesting, it should be necessary to collect, based on a specific interest or need.	General Data Protection Regulation, art. 5
Grounds for data processing. The grounds for data processing define the need or interest to process personal data. Such grounds	General Data

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can be found in e.g. public law, contracts, a legitimate or vital interest, or the explicit consent of a (natural) person. For example, the tasks of system operators can be seen as a legal task requiring data processing. However, EU law does not explicitly define to what extent such data processing is justified. As such, national laws define the extent to which data processing can take place for implementing the IANOS UCs. Without a clear (legitimate or vital) interest, contractual duty (or right), or national legal requirement (in public law), explicit consent should be granted by the participants in the UCs. For example, for (active) citizen engagement and communities in providing system services (e.g. DSM, smart grids, or via virtual power plants). Again, it should be noted here that the GDPR only applies to natural persons; legal persons fall outside the scope of the GDPR. Next to the GDPR, the Electricity Directive also holds a number of requirements on data management. For example, it states that Member States have to organize data management within their territories, to ensure efficient and secure data access and exchange.[61] In addition, regardless of the data management model applied in each Member States, the parties responsible for data management must provide access to the data of consumers to any (eligible) party.	Protection Regulation, art. 6

Electric Vehicles

Electric vehicles (EVs) are stimulated across the globe to replace fossil fuel-based cars, using e.g. gasoline, diesel, or LPG. Despite their ability to consume green electricity, instead of fossil fuels, EVs also increase demand for (green) electricity and network infrastructure. This poses challenges. Most prominently it requires better allocation of existing electricity system infrastructure (avoiding too much peak demand). Yet, despite the challenges, EVs also offer opportunities to make the electricity system more

[61] Art. 23(2) Electricity Directive

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reliable, resilient, and efficient. The battery capacities of EVs offer significant (aggregated) flexibility, which could be utilized.

Relevant IANOS UCs

5 Decarbonization of transport and the role of electric mobility to stabilize the energy system.

Definition(s) in EU Law

Electric vehicle: a motor vehicle equipped with a powertrain containing at least one non-peripheral electric machine as energy converter with an electric rechargeable energy storage system, which can be recharged externally	Alternative Fuels Infrastructure Directive[62], art. 2 (2).
Recharging point: an interface that is capable of charging one electric vehicle at a time or exchanging a battery of one electric vehicle at a time	Alternative Fuels Infrastructure Directive, art. 2 (3).

Relevant EU Law Provisions

EU law poses limited specific requirements for EVs. Yet, Member States should facilitate the connection of publicly accessible and private recharging points to the distribution networks. It also requires DSOs to treat charging point developers and providers on a non-discriminatory basis.	Electricity Directive, art. 33.
EU law also tries to stimulate the deployment of recharging points to facilitate the use of EVs in the EU.	Alternative Fuels Infrastructure Directive, art. 4.

Heat Networks

Heat networks are one of the options to decarbonize current heat demand in the built environment. Heat networks require a reliable heat source, which could be a geothermal source, residual heat from industrial parties, or other

[62] Directive 2014/94/EU.

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collective heat systems. Heat networks also 'use' fossil fuel based sources, either directly (e.g. CHP unit) or indirectly (e.g. by using residual heat from coal-fired power plant, or industry using large amounts of fossil fuels). In order to complete the energy transition, these sources should also be replaced.

Relevant IANOS UCs

8 Decarbonization of heating network.

Definition(s) in EU Law

'district heating' or 'district cooling': the distribution of thermal energy in the form of steam, hot water or chilled liquids, from central or decentralised sources of production through a network to multiple buildings or sites, for the use of space or process heating or cooling	Renewable Energy Directive, art. 2(19)

Relevant EU Law Provisions

Apart from a number of general goals and ambitions[63] for the heating and cooling sector, EU law poses a lot less requirements for heating and cooling systems compared to electricity and gas systems. This is mostly due to the locality and lack of interconnectedness of these systems. Heating systems are commonly not interconnected and as such, also the need for EU harmonization of (large) cross-border systems is absent. Yet, the Renewables Directive does pose some requirements on the access/connection to heating and cooling systems for consumers and producers. More specifically, it requires that consumers have a 'right to disconnect' from the system to which they are connected, and are entitled on information on the renewable character of their heating- or cooling system.[64] For renewables producers, it offers a right to access to existing heating or cooling systems, but only if in such a system existing production capacity needs to be replaced or expanded, or when new customers are connected to the system (increasing the demand). Also, this right is not a given in all Member States, as they could also implement (other) *'measures that can be expected to*

[63] Art. 23(1) Renewable Energy Directive.
[64] Art. 24 (2), (1) Renewable Energy Directive.

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"trigger" an "annual Increase" in the share of renewable sources for heat and cold in their respective systems'.[65]

(re)Use of Biomass/Waste

Modern day society comes with a significant amount of waste. Most of this waste can be reused, recycled. Part of this waste is biomass. This can be reused for various purposes, including making fuels, gasses (biogas), or simply to be used directly as a fuel (e.g. woodchips). If done properly, the use of waste (biomass) can provide a solid sustainable fuel for e.g. heating purposes. For example, natural gas can be replaced with green (bio)gas.

Relevant IANOS UCs

7 Circular economy, utilization of waste streams and gas grid decarbonization.

Definition(s) in EU Law

Biomass: the biodegradable fraction of products, waste and residues from biological origin from agriculture, including vegetal and animal substances, from forestry and related industries, including fisheries and aquaculture, as well as the biodegradable fraction of waste, including industrial and municipal waste of biological origin.	Renewable Energy Directive, art. 2(24)

Relevant EU Law Provisions

Apart from general ambitions on the use and classification of biomass/fuels, the Renewable Energy Directive provides little requirements on the decarbonization of existing gas grids, using biogas. It primarily seeks to prevent the unsustainable production of biomass (fuels).

[65] Art. 24(4), (5) Renewable Energy Directive.

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