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THE INSIEME VISION

TOWARDS A COMMON EUROPEAN DATA SPACE FOR ENERGY

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INSIEME INTRO

Europe's transition to renewable and sustainable - yet volatile – energy sources has led to an increasingly participative and distributed landscape of actors placing challenges onto our energy infrastructure.
In comparison to a controllable number of larger generation units connected to the networks, today's electricity is increasingly generated by many smaller-scale prosumers, with most of the energy transition assets - such as renewables, EVs, heat pumps or batteries – connected at distribution level. Nowadays, innovative and participative tools are available to prosumers, helping to keep costs under control or increase revenues. Energy communities and energy sharing are on the rise, whilst markets for balancing and local services are being established, allowing new service providers to foster security of supply and stable infrastructures. At the same time, distribution system operators – in former days mainly responsible to connect and measure customers – are required to increase observability and respond to operational challenges in undertaking congestion management and voltage control. Pressure on electricity networks, among the world's most mission-critical infrastructures, are further aggravated by drastic increases in demand that is due to electrification of sectors such as transport and heating.

It is therefore of utmost importance that authorities and involved stakeholder groups improve their understanding and acknowledge that digitalization is a crucial prerequisite efficient decarbonization, through secure and seamless exchange of data that in return lead to optimized infrastructure operation and create value for customers and society. Europe is now positioned and strongly required to advance its data economy and the profound system transformation – yet today, the potential that is available to energy market and system actors remains largely untapped. In response, **INSIEME pilots the Common European Energy Data Space (CEEDS),** with the purpose of streamlining, securing and implementing the infrastructure elements that are required to build a Digital Single Energy Market across the European Union[1].

INSIEME, as a flagship initiative recently launched under the EU's Digital Europe Programme, pursues the main objective to pave the way for the Common European Energy Data Space, in line with the European Action Plan for the Digitalisation of the Energy Sector, with over 50 European partners[2] from across the energy and data value chain conducting use-cases and deployments over the course of 36 months.

Deploying a reliable and secure CEEDS fosters Europe's transition to net-zero and advances the transformation towards fully digitalized, decarbonized and distributed infrastructures as issued under strategic EU policy frameworks. In this context, **INSIEME** supports the real-life implementation of key legal and regulatory reform acts, such as the Network Codes on Demand Response and the Electricity Balancing Guideline, the Energy Market Redesign – all of which are geared to enable broader access to and exchange of data, empower consumers and foster the integration of renewables and the development of sustainable business models in energy, mobility, and the industry. **INSIEME** increases security of supply and resilience, fosters innovative energy services and advanced technologies, and supports electrification and the development of smart and flexible networks. Instead of building a data space for its own sake, **INSIEME** deploys a CEEDS architecture "by the sector, for the sector".

[1] as foreseen in the European Strategy for Data (2020)
[2] INSIEME project partners include leading European entities among energy data space operators and initiatives, EU and national sector associations, transmission as well as distribution system operators, hardware and IT providers, operators of local flexibility markets, energy community platforms, and energy management platforms, data infrastructures joint ventures, as well as research and academia.

IN A NUTSHELL - WHAT INSIEME DOES

1 GOVERNANCE & FRAMEWORK

INSIEME develops a consistent, holistic and clear governance framework for the final operationalisation of the Common European Energy Data Space.

2 INTEGRATION & INTEROPERABILITY

INSIEME brings together clean-tech solutions, energy savings applications, platforms for energy communities, as well as services for the utilisation of distributed flexibility and electromobility. **INSIEME's** wide range of expert partners team up to establish a CEEDS interoperability layer that allows operating solutions in all supported Member States, and across national borders – which is being done in **INSIEME's** use cases and deployments.

3 IMPLEMENTATION & STANDARDS

INSIEME is driven by EU implementation requirements which extend to national Flexibility Information Systems (FIS), Flexible Connection Agreements (FCAs), Energy Community platforms, or the increasing demand for smart system operation. To this purpose, common European reference models are developed by industrial actors. Compliant with the overall data space concept, EU-wide interoperable open-source systems and components are established, designed to foster involved stakeholders to directly act on implementation.

4 GRID MANAGEMENT & FLEXIBILITY

INSIEME responds to urgent implementation needs to provide for interoperable services that support the emergence of local balancing markets, as well as rules-based dynamic connection agreements. These functionalities enable system operators to efficiently and securely manage increasingly pressured networks, in light of rapidly increasing demand.

5 DATA INFRASTRUCTURE & CONNECTIVITY

INSIEME, in line with the int:net CEEDS blueprint[3], connects and leverages national data spaces and European-level sectoral data spaces into a common and uniform data infrastructure, without interfering with the (needed) diversity of national infrastructures. Regardless, CEEDS users are empowered to create and deploy solutions in all supported Member States, instantaneously.

6 COLLABORATION & EXISTING STRUCTURES

INSIEME focusses on implementing digital elements of our energy infrastructure building on existing and well-established structures and distributed competency (instead of creating new structures or organisations). Therefore, partners from the most relevant and related European energy data space and digitalization projects contribute with expertise, components and methodologies.

7 SECURITY & DATA EXCHANGE

INSIEME pursues a holistic approach, with an architecture that does not only enable cloud-to-cloud but also cloud-to-edge data exchange. Piloting an integrated use of the eIDAS regulation, electronic IDs and compliant electronic certificates ensure privacy, security and allow for cross-border service provision at minimum cost.

[3] https://doi.org/10.5281/zenodo.17116750

THE INSIEME VISION

EMPOWERING CITIZENS AND CONSUMERS

With the establishment of the Common European Energy Data Space, EU consumers - whether residential, commercial or industrial - have full control over their energy data. Through smart apps powered by open and secure data, citizens as well as businesses and industries effortlessly optimize their consumption, participate in energy communities, and get paid for providing flexibility when the grid is in need. Consumers become active participants in the energy market – which extends to industrial and commercial sites, who, although far fewer in numbers, represent much higher flexibility potentials at distribution level[4].

In parallel, **INSIEME** adds cross-MS interoperable price signals for energy and grid tariffs. Being seen as the most important triggers for implicit flexibility, making this data available to building automation and energy management systems allows for grid-friendly behavior and drastic cost reduction. Furthermore, this is a key prerequisite for smart (and bi-directional) charging.
INSIEME enables energy monitoring and efficient management of individual and collective self-consumption, making households and businesses benefit from demand-side flexibility and smart and bidirectional EV charging, and its substantial potential to save energy and reduce bills.

Through its workstream to standardize data exchange with Digital Customer Interfaces, **INSIEME** holistically includes these systems into the overall data space concept, and releases customers from lock-ins with incumbent market parties.

ENABLING A SMARTER, GREENER ENERGY INFRASTRUCTURE

Network operators across Europe will benefit from data exchange standardization, as do a wide range of market actors (e.g. active customers, operators of energy communities, suppliers, flexibility providers, project developers), alongside further valuable stakeholders such as administrative bodies who are producing and consuming data. Supporting the use of digital solutions for making EU energy systems more flexible increases efficient network utilization and helps avoid costly expansion measures.

The tools and infrastructure developed in **INSIEME** help reduce grid congestion and establish scalable means for systems operators and market actors to interact with residential, commercial and industrial customers and respective built environments. Secure data exchange between utilities lay the ground for new market actors and customers to be using digital technologies and for electricity systems to be integrating high renewable shares, and a large-scale roll-out of electric vehicles, with strong emphasis around major developments that require coherent sector coordination, such as vehicle-to-everything (V2X), and the needs of electric heavy duty transport vehicles (eHDVs).

One of **INSIEME's** major assets is the joint effort among Europe's most advanced DSOs, who cooperate to standardize the management of flexible connection agreements (FCA, as foreseen in the EU's reformed market design and EU Action Plan for Grids), and the implied communication with grid-edge components. **INSIEME** brings together the most relevant national initiatives and combines their forces in co-operation with Standards Defining Organisations, to establish European Data Exchange Standards for all aspects of a flexible energy system. **INSIEME** outlines a secure European framework, with streamlined roles and responsibilities, and clear rules with respect to customer sovereignty, when processing or storing data across borders.

[4] According to estimates, residential customers, although representing more than 90% of all connection points can provide roughly 10% of flexibility at DSO level. Any data exchange model must be beneficial to both, to residential as well as to industrial and commercial customers. ility markets, energy community platforms, and energy management platforms, data infrastructures joint ventures, as well as research and academia.

FUELING INNOVATION AND GROWTH

An efficiently operating CEEDS is a prerequisite for turning the energy sector into a hotbed for green digital jobs, driving competitiveness and economic growth across the EU. Data integration makes up a very large share of data-driven energy applications, and interoperability between Member States is currently poor. Yet startups, research institutions, and tech companies are being put into a position to take data integration for granted, and to focus on their area of innovation. **INSIEME** industrializes and improves digital energy solutions, creating a fertile ground for AI, machine learning, and clean tech innovation.

Piloting an holistic Data Space for Energy alongside the most relevant of 14 Common European Data Spaces[5], **INSIEME** makes a major contribution to the development of new data-driven products and services in the EU, shaping the core building blocks of an interconnected and competitive European data economy. In co-operation with DG CONNECT's SIMPL initiative, and in constant alignment with other key data space sectors such as in health, logistics, or mobility etc., **INSIEME** tests, develops and feeds back key architectural and solution building blocks that should be treated transversally across all sectors.

TRUST AND SECURITY

INSIEME is built on key principles formulated in the European Data Strategy and integrates security aspects by design.

Common and cross-border management of identification and authentication is understood as THE pillar of the EU Digital Single Market. As data spaces are a federated and distributed concept, it is of utmost importance that actors are reliably identified via common identifiers across platforms. The infrastructure is up and running and to a high functional degree available in most Member States.

Therefore, instead of creating new and dedicated Clearing Houses or Identity Service Providers, **INSIEME** pilots an architecture prone to existing and proven-in-use eIDAS, eID, Trust Services and the European Digital Identity Wallets.

[5] In addition to energy, the European Strategy for Data foresees Common Data Spaces for agriculture, cultural heritage, finance, the Green Deal, health, language, manufacturing, media, mobility, public administration, research & innovation, skills, and tourism.

TOGETHER – INSTEAD OF NATIONAL NUTSHELLS

The Common European Energy Data Space developed under **INSIEME** paves the way for the final steps in the operationalisaiton of the digital infrastructure for energy and data – it challenges Europe's ability to unite around shared challenges and be a global leader in the transition to net-zero and a digital future.

Yet, and in full respect of the European principle of subsidiarity, **INSIEME** drafts the CEEDS as a minimal invasive and slim federation service.

However, for the fully automated functioning of a data space, a careful distribution of responsibilities between the EU and Member State actions is needed to ensure dependability and accountability. To this end, **INSIEME** closely cooperates with the European Commission's Smart Energy Expert Group, and pilots foreseeable political developments and feeds back learnings to key regulatory and legislative initiatives.

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