

Grid Connection Paper - DSO Entity's Public Webinar 2

Connecting the surge of renewables to the distribution grid: How can digitalisation contribute to supporting DSOs?

15 November 2024 (9:30 – 11:00 CET)

DSO Entity, Regulatory Affairs & Strategy Team



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DSOs FOR EUROPE

Agenda

09:30-09:35	Opening	Claire Vandewalle DSO Entity, Strategy & Regulatory Affairs, Advisor
09:35-09:45	Welcoming remarks	Ricardo Renedo Williams European Commission, DG ENER, Team Leader C4 Infrastructure and Regional Cooperation
09:45-9:55	Setting the scene: Connecting the surge of renewables into the distribution grid	Claire Vandewalle DSO Entity, Regulatory Affairs & Strategy, Advisor
9:55-10:40	The role of smart solutions to connect renewables to the network: Sharing of best practices from distribution grids <ul style="list-style-type: none">• Austria's practice: Facilitated procedures for the assessment of feed-in requests• Italy's practice: Simplification and digitalisation of customer connection• Portugal's practice: Digitalisation of permitting procedures• Q&A session	<i>DSO Entity, Country Expert Group's representatives</i> Patrick Leithner , Austria, Netz Oberösterreich, Team Lead for Decentralised Generation Davide Riccio , Italy, E-Distribuzione, Junior Operation Infrastructure & Network Susete Albuquerque , Portugal, E-Redes, Business Development and Support Management
10:40-10:55	Smart and digital solutions: What's next?	Flore Patrat-Delon DSO Entity, Vice-Chair, TF Digitalisation of the Energy System
10:55-11:00	Closing remarks	Claire Vandewalle DSO Entity, Regulatory Affairs & Strategy, Advisor

To ask questions:

Please use the Q&A function of the platform.



1. Opening



2. Welcoming remarks by Ricardo Renedo Williams

European Commission, DG ENER

Teamlead

C4 Infrastructure & Regional Cooperation



European Commission

#TeamJunckerEU



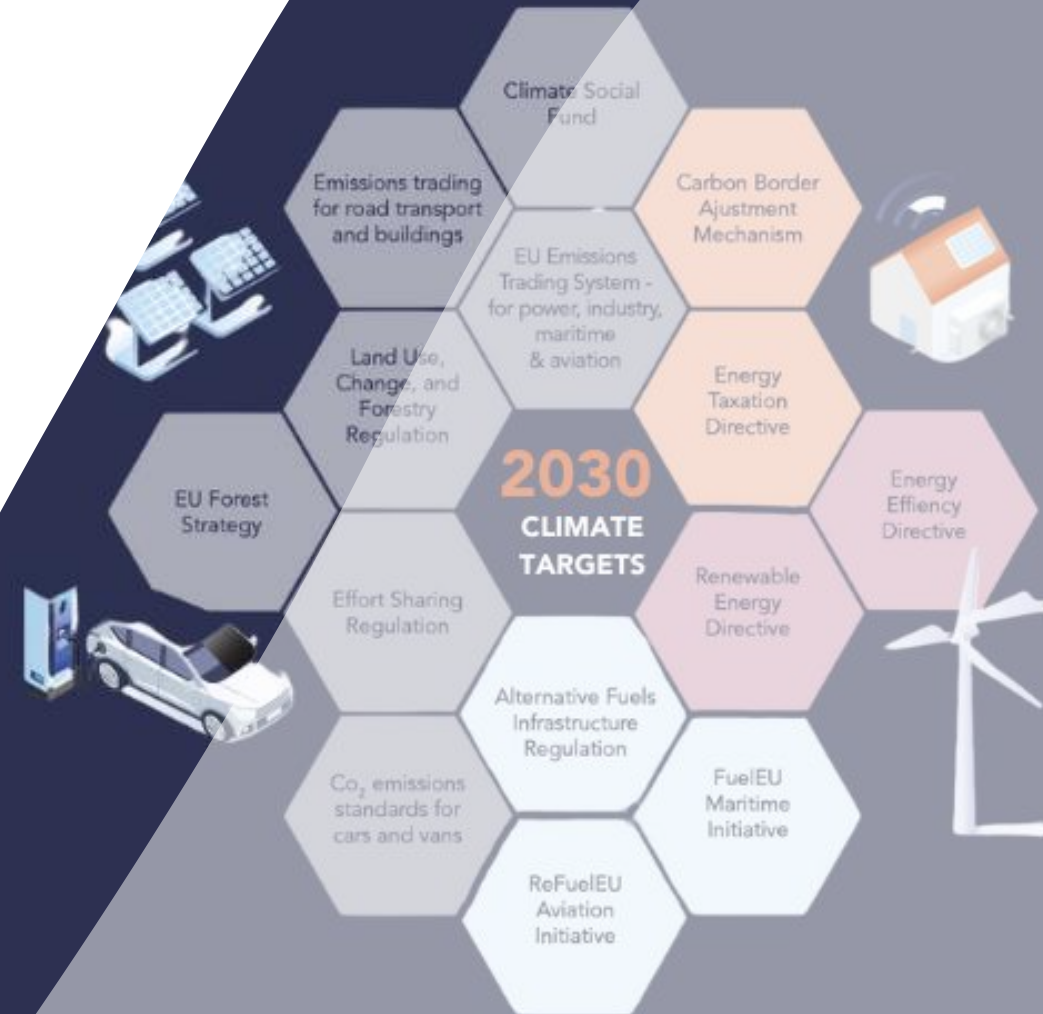
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3. Setting the scene

Connecting the surge of renewables into the distribution grid



DSOs role as technical enablers of the EU political targets

EU Objectives

 +42,5% RES by 2030 & 600 GW Solar installed by 2030	 -55% CO2 by 2030	 +30M electric vehicles by 2030	 60M heat pumps by 2030	 Active customers energy sharing
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70% of RES connected to the distribution grid	Management of more decentralised, bi- directional production, RES integration, flexibility	Most private and public charging stations (incl. motorways) are connected to DSOs, smart grids, smart charging, flexibility	Facilitating electrification of heating, active system management	Technical realisation (IT- and data- infrastructure), customer contacts, active system management
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DSO Reality

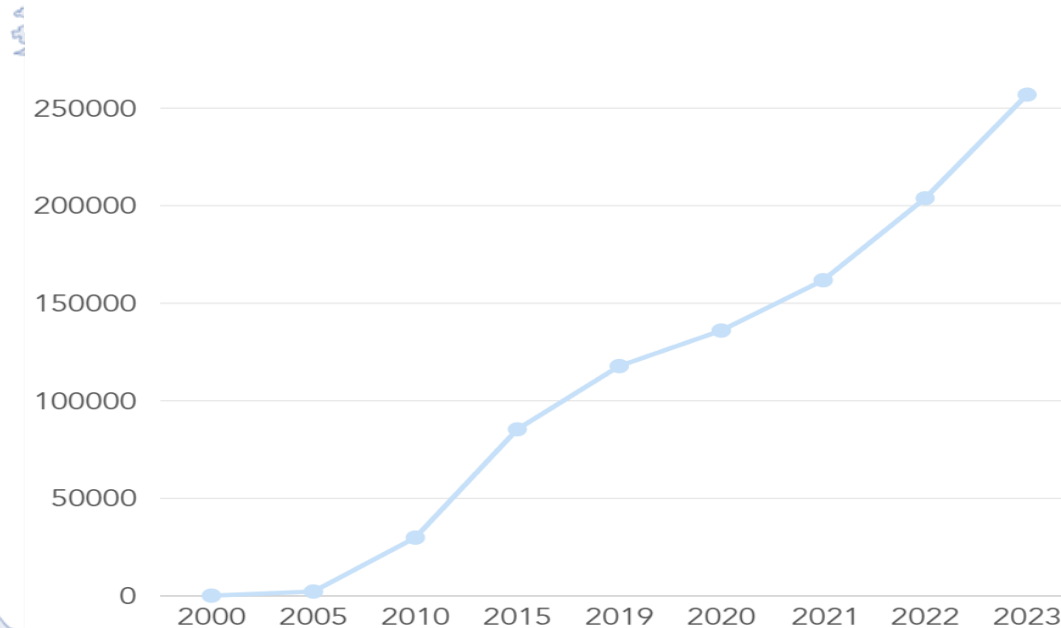
DSOs fit for 55

DSOs are under growing pressure as they face a significant increase in requests to connect RES

Increased EU's and national solar targets require grids to manage grid connection requests, adapt the network capacity and increase flexibility

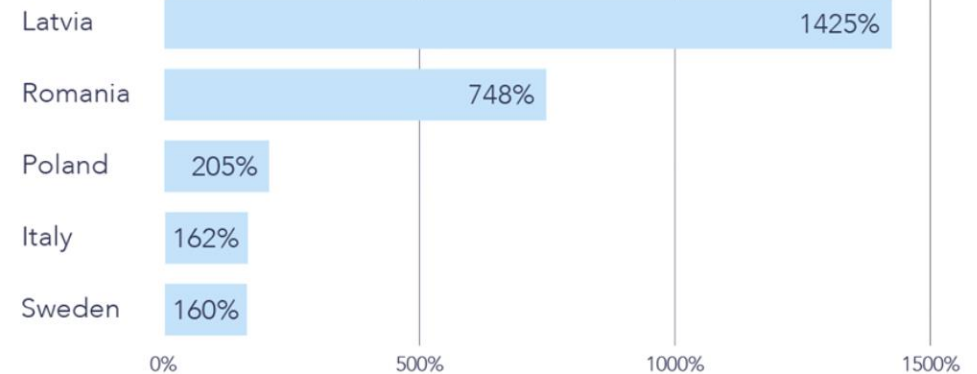


70% new RES installed capacity to be connected to DSO grid by 2030



Source: EurObserver, 2024

Evolution of connection requests 2021-2022

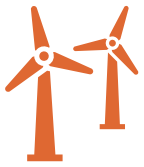


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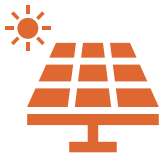
Significant increase of grid connection requests in all MS

When managing the massive number of connection requests, DSOs face unprecedented challenges

Acceleration of the deployment of renewables in the EU



In the first half of 2024 around 50% electricity generation came from renewables



Record year in the EU with **56 GW** of new solar energy capacity installed in 2023

Challenges for DSOs

Investment needs to expand, upgrade and smarten the energy infrastructure

Grid connection queues

Permitting procedures

Facing the challenges: The measures identified by the Grid Action Plan on the digitalization of the grid

Zoom-in on Action Points

Action Point 6a



Issue recommendations to **digitalise and streamline procedures** for grid connection requests

Action Point 7



(with ENTSO-E)

Promote smart grid uptake, network efficiency and innovative technologies



DSO Entity identified in 7 out of the 14 Action Points and key actor to support and deliver the tailored-made measures

Grid investment & financing

Grid capacity & planning

Grid smartening

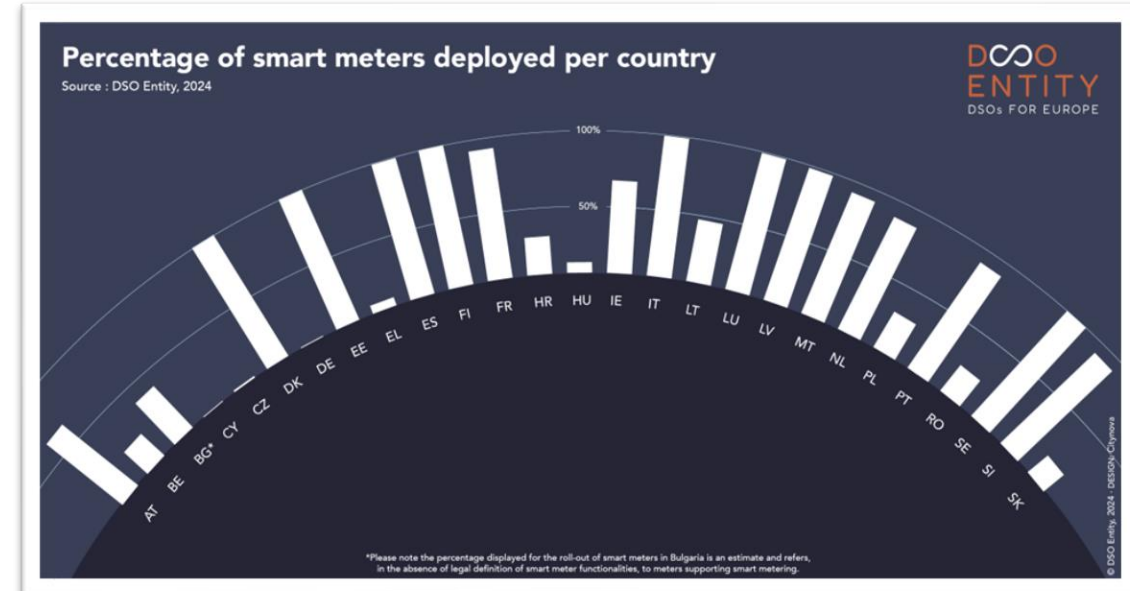
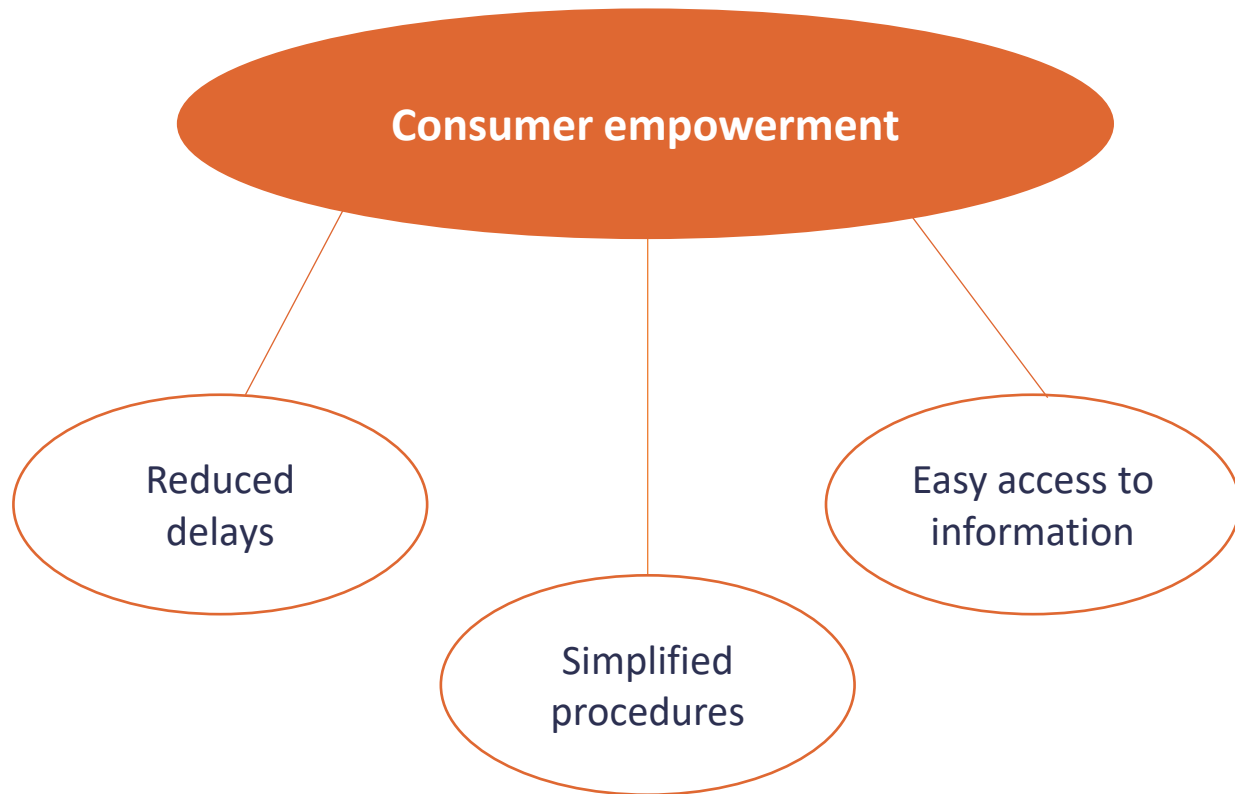
Permitting

Supply chains



How can digitalisation help: The proactive initiatives led by the DSOs to digitalise their processes and grid

Digitalising grid connection & permitting procedures

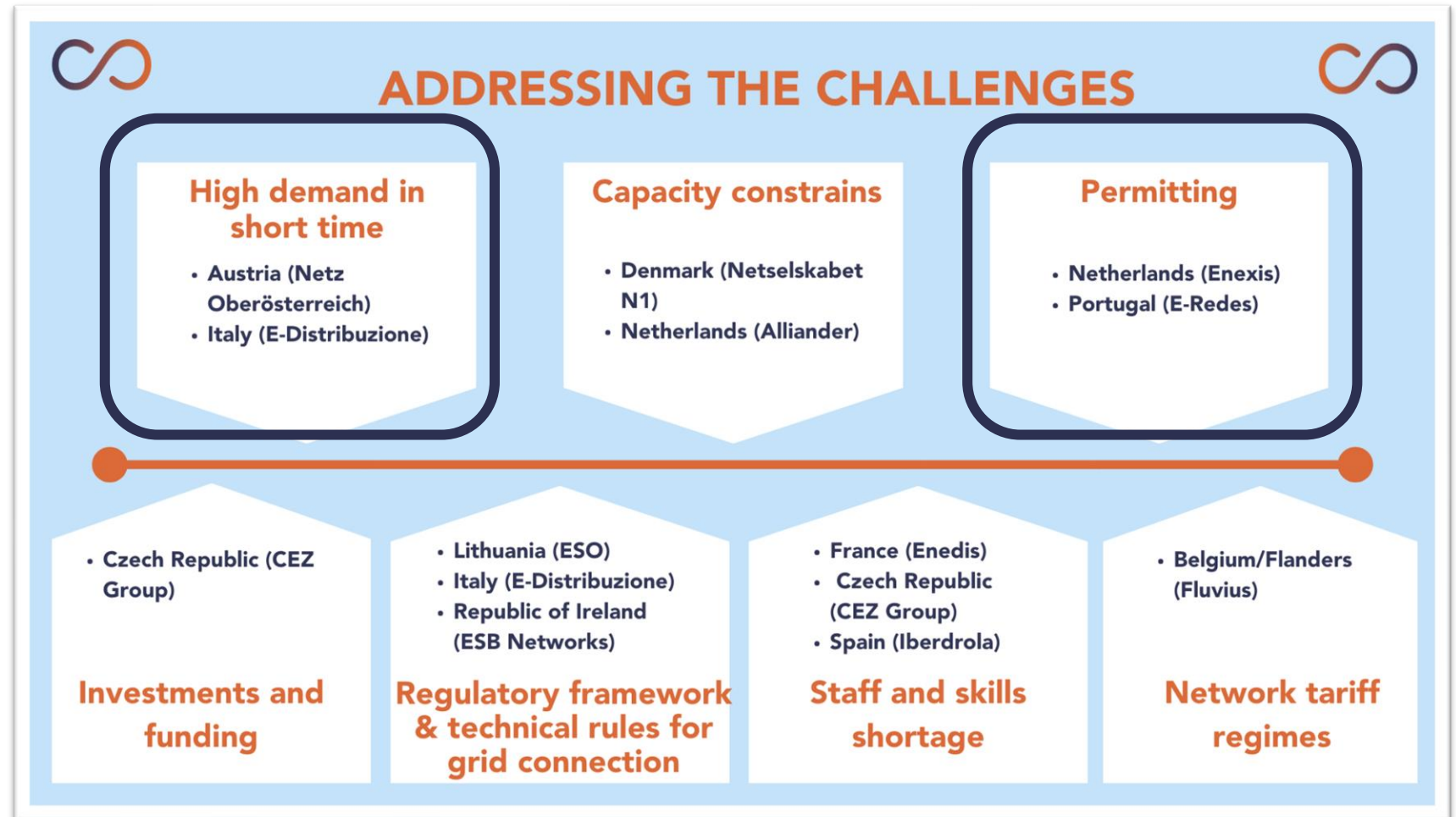


Smartening the distribution grid

Main findings from DSO Entity's Grid Connection Paper



Good practices from DSO



4. Role of smart solutions in connecting renewable to the network:

Sharing of best practices
from distribution grids



Role of smart solutions in connecting renewables: Sharing of best practices from distribution grids



Austria' s practice: Facilitated procedures for the assessment of feed-in requests

Patrick Leithner, Austria, Netz Oberösterreich, Team Lead for Decentralised Generation



Italy' s practice: Simplification and digitalisation of customer connection

Davide Riccio, Italy, E-Distribuzione, Junior Operation Infrastructure & Network



Portugal' s practice: Digitalisation of permitting procedures

Susete Albuquerque, Portugal, E-Redes, Business Development and Support Management

Role of smart solutions in connecting renewables: Sharing of best practices from distribution grids



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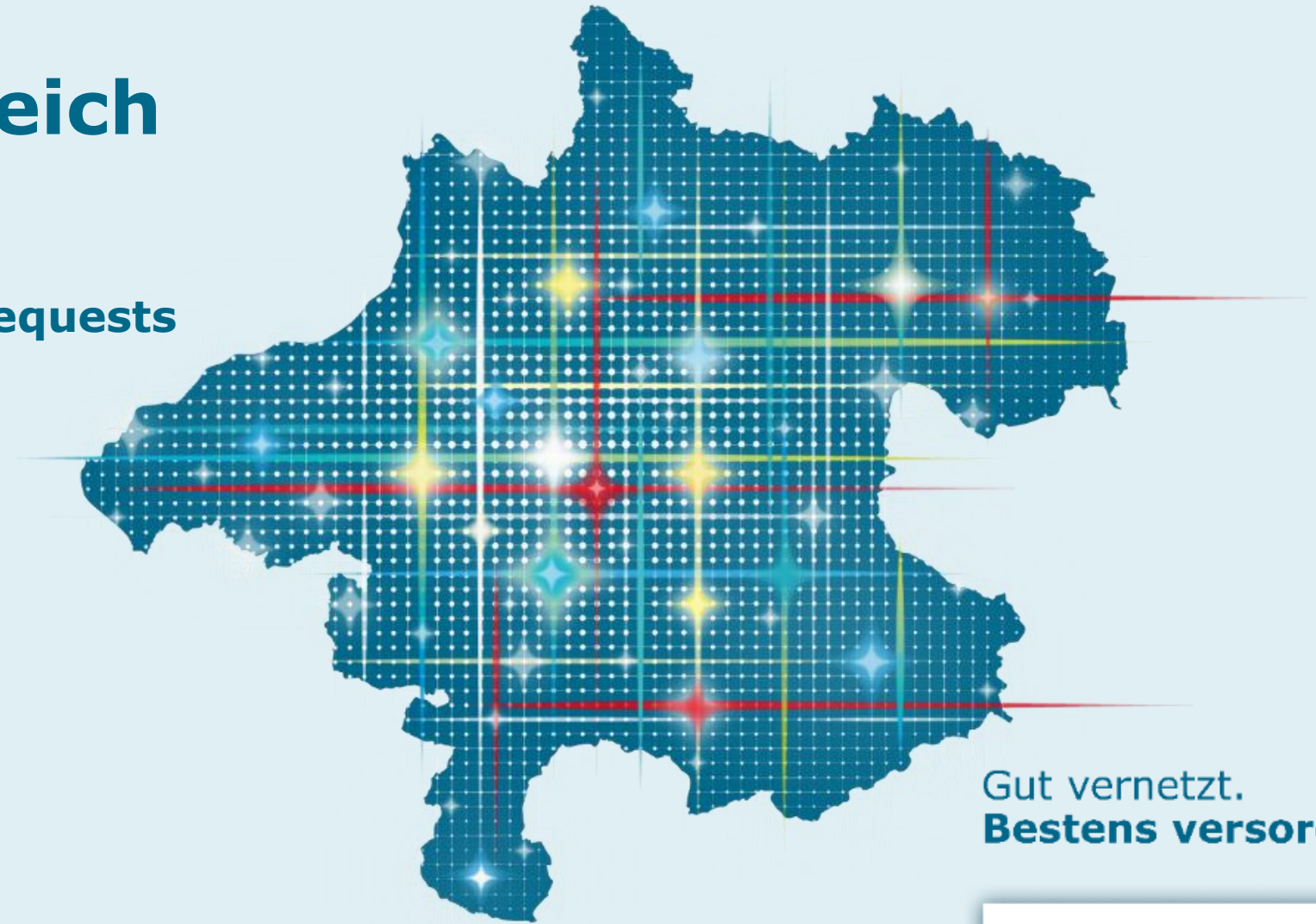
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Portugal's practice: Digitalisation of permitting procedures
Susete Albuquerque, Portugal, E-Redes, Business Development and Support Management

Netz Oberösterreich

Facilitated procedures for
the assessment of feed-in requests



Gut vernetzt.
Bestens versorgt.

Patrick Leithner

15.11.2024

NETZÖÖ
Ein Unternehmen der Energie AG

Points of interest

- 1 Requirements
- 2 Anette - Automated grid connection tool for producers
- 3 Low-voltage grid connection assessment
- 4 Grid expansion options



1. Requirements

Overview of the power grid in one system (GIS)



Smart meters and their power quality data



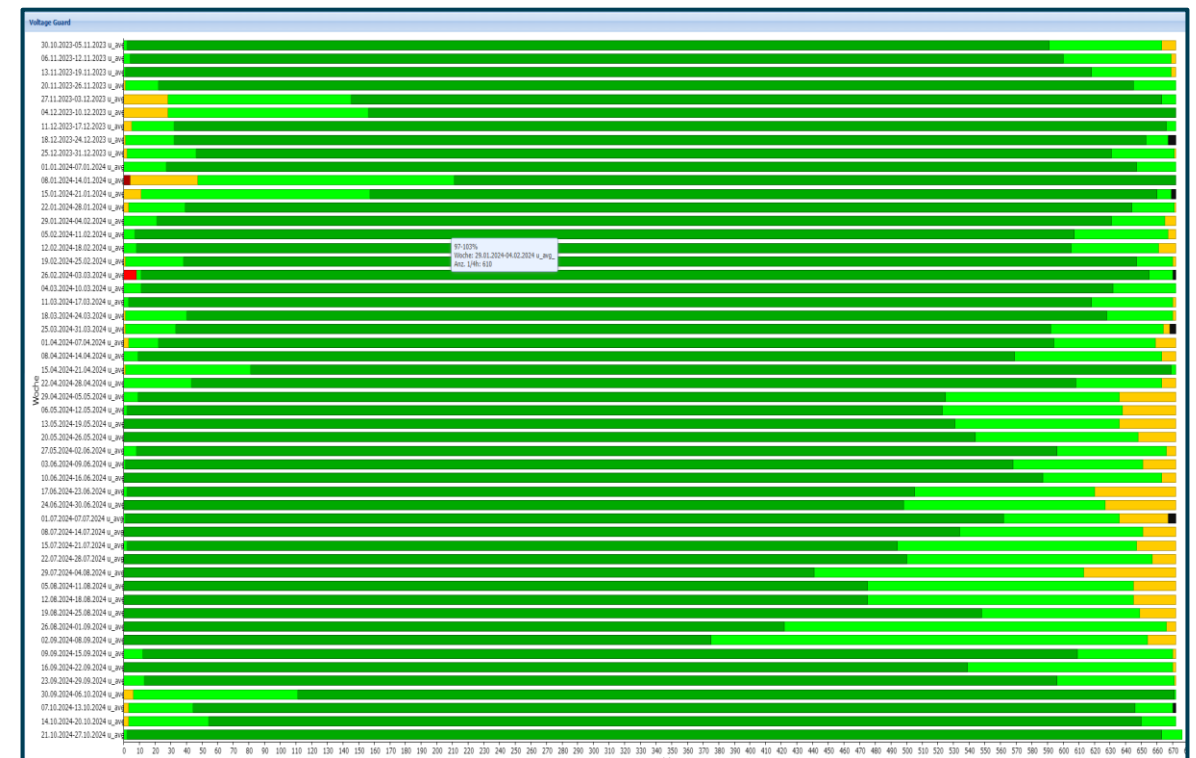
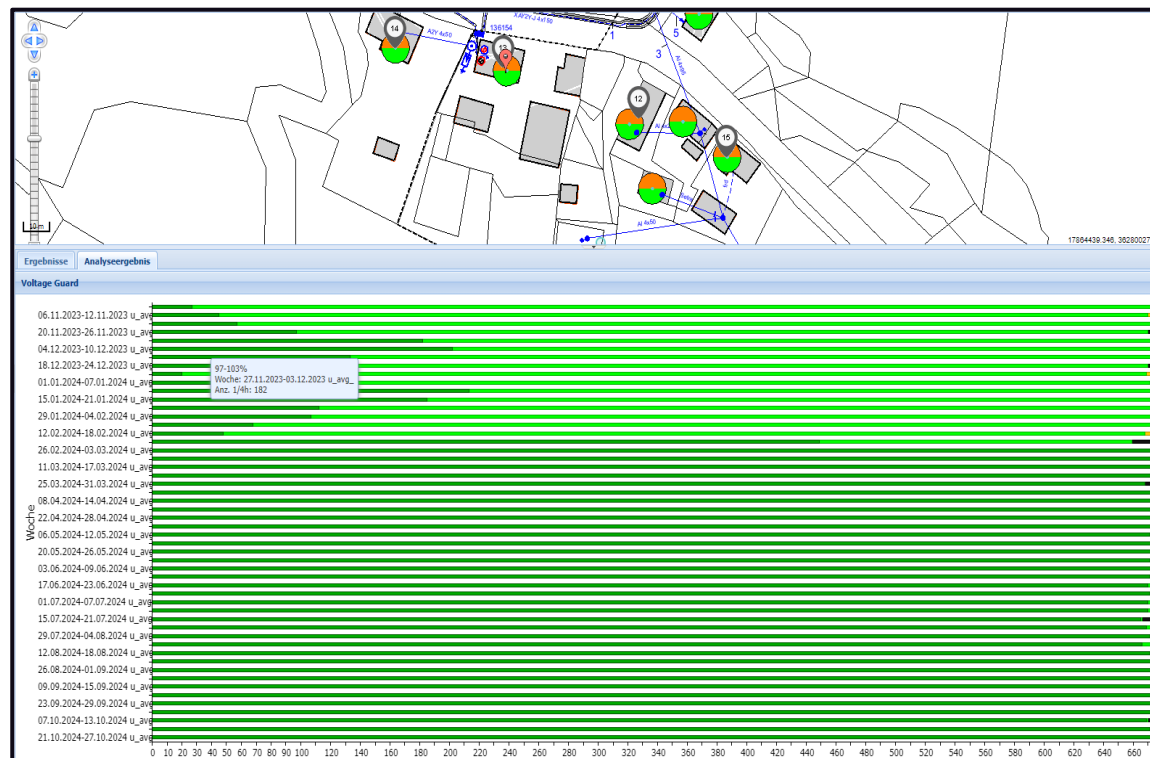
2. Anette - Automated grid connection tool for producers

- Calculation without the power quality data
- Feed-in systems up to 30 kVA maximum capacity (kVA adjustable)
- Maximum voltage increase 3 % (TOR)

	ST	NS-HA-Kasten		HA/Schauerbach		Bergwerksiedlung	1	411 V	2.8 %	4 kVA	4.0 kW	1.3 kVar	Ja	0.0 kW	0.37	1xH0	1992	0	in Planung	Photovoltaik		
Nein	ST NS-Freileitungsverbind...	349..	NS/D5T/78535-NS..			Bergwerksiedlung	1	411 V	2.8 %	0 kVA	0.0 kW	0.0 kVar	Ja	0.0 kW					---	---		
Nein	ST NS-HA-Kasten	438..	HA/Schauerbach		61110068	Bergwerksiedlung	1	411 V	2.8 %	4 kVA	4.0 kW	1.3 kVar	Ja	0.0 kW	0.38	1xH0	5592	0	in Planung	Photovoltaik		
Nein	ST NS-Freileitungsverbind...	349..	NS/D5T/78534-NS..			Bergwerksiedlung	1	411 V	2.8 %	0 kVA	0.0 kW	0.0 kVar	Ja	0.0 kW					---	---		
Nein	ST NS-Freileitungsverbind...	349..	NS/D5T/78533-NS..			Bergwerksiedlung	1	411 V	2.7 %	0 kVA	0.0 kW	0.0 kVar	Nein	0.0 kW					---	---		
Nein	ST NS-HA-Kasten	349..	HA/Schauerbach		61010201	Bergwerksiedlung	1	411 V	2.7 %	0 kVA	0.0 kW	0.0 kVar	Ja	0.0 kW	0.36	1xL1, 1x...	24436	4686	in Betrieb	Photovoltaik		
Nein	ST NS-Freileitungsverbind...	349..	NS/D5T/78536-NS..			Bergwerksiedlung	1	411 V	2.7 %	0 kVA	0.0 kW	0.0 kVar	Ja	0.0 kW					---	---		
Nein	ST NS-HA-Kasten	356..	HA/Bergwerkweg/28		61304658	Bergwerksiedlung	1	411 V	2.7 %	4 kVA	4.0 kW	1.3 kVar	Ja	0.0 kW	0.36	1xH0	3407	0	---	---		
Nein	ST NS-Freileitungsverbind...	350..	NS/D5T/313137-NS..			Bergwerksiedlung	1	411 V	2.7 %	0 kVA	0.0 kW	0.0 kVar	Ja	0.0 kW					---	---		
Nein	ST NS-Freileitungsverbind...	349..	NS/D5T/78552-NS..			Bergwerksiedlung	1	411 V	2.6 %	0 kVA	0.0 kW	0.0 kVar	Ja	0.0 kW					---	---		
Nein	ST NS-HA-Kasten	349..	HA/Bergwerkweg/26		61152653	Bergwerksiedlung	1	411 V	2.6 %	0 kVA	0.0 kW	0.0 kVar	Ja	0.0 kW	0.38	1xH0, 1x...	1439	7573	in Betrieb	Photovoltaik		
Nein	ST NS-Freileitungsverbind...	349..	NS/D5T/78549-NS..			Bergwerksiedlung	1	410 V	2.6 %	0 kVA	0.0 kW	0.0 kVar	Ja	0.0 kW					---	---		
Nein	ST NS-Freileitungsverbind...	349..	NS/D5T/78550-NS..			Bergwerksiedlung	1	410 V	2.6 %	0 kVA	0.0 kW	0.0 kVar	Ja	0.0 kW					---	---		
Nein	ST NS-HA-Kasten	349..	HA/Bergwerkweg/25		61152541	Bergwerksiedlung	1	410 V	2.6 %	0 kVA	0.0 kW	0.0 kVar	Ja	0.0 kW	0.40	1xH0, 1x...	2839	0	---	---		
Nein	ST NS-HA-Kasten	349..	HA/Bergwerkweg/30		61239198	Bergwerksiedlung	1	410 V	2.6 %	0 kVA	0.0 kW	0.0 kVar	Ja	0.0 kW	0.36	1xH0, 1x...	3137	4553	in Betrieb	Photovoltaik		
Nein	ST NS-Freileitungsverbind...	349..	NS/D5T/78551-NS..			Bergwerksiedlung	1	410 V	2.6 %	0 kVA	0.0 kW	0.0 kVar	Ja	0.0 kW					---	---		
Nein	ST NS-HA-Kasten	349..	HA/Bergwerkweg/29		61152601	Bergwerksiedlung	1	410 V	2.6 %	0 kVA	0.0 kW	0.0 kVar	Ja	0.0 kW	0.38	1xH0	3196	0	---	---		
Nein	ST NS-Freileitungsverbind...	550..	NS/D5T/78548-NS..			Bergwerksiedlung	1	410 V	2.6 %	0 kVA	0.0 kW	0.0 kVar	Ja	0.0 kW					---	---		
Nein	ST NS-HA-Kasten	581..	HA/Bergwerkweg/24		61200131	Bergwerksiedlung	1	410 V	2.6 %	0 kVA	0.0 kW	0.0 kVar	Ja	0.0 kW	0.41	1xH0, 1x...	2913	811	in Betrieb	Photovoltaik		
Nein	ST NS-HA-Kasten	349..	HA/Schauerbach		61110098	Bergwerksiedlung	1	410 V	2.6 %	0 kVA	0.0 kW	0.0 kVar	Ja	0.0 kW	0.44	1xL1, 1x...	33742	12825	in Betrieb	Photovoltaik		
Nein	ST NS-Freileitungsverbind...	349..	NS/D5T/78530-NS..			Bergwerksiedlung	1	410 V	2.6 %	0 kVA	0.0 kW	0.0 kVar	Ja	0.0 kW					---	---		
Nein	ST NS-Freileitungsverbind...	349..	NS/D5T/78547-NS..			Bergwerksiedlung	1	410 V	2.5 %	0 kVA	0.0 kW	0.0 kVar	Ja	0.0 kW					---	---		
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Nein	ST NS-HA-Kasten	349..	HA/Bergwerkweg/22		61152365	Bergwerksiedlung	1	410 V	2.5 %	0 kVA	0.0 kW	0.0 kVar	Ja	0.0 kW	0.45	1xH0	3518	0	---	---		
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Nein	ST NS-HA-Kasten	349..	HA/Bergwerkweg/15		61281131	Bergwerksiedlung	1	410 V	2.5 %	11 kVA	10.0 kW	3.3 kVar	Ja	10.0 kW	0.51	2xH0	6245	0	---	---		
Nein	ST NS-Freileitungsverbind...	349..	NS/D5T/78545-NS..			Bergwerksiedlung	1	410 V	2.5 %	0 kVA	0.0 kW	0.0 kVar	Ja	0.0 kW					---	---		
Nein	ST NS-HA-Kasten	349..	HA/Bergwerkweg/21		61152311	Bergwerksiedlung	1	410 V	2.5 %	0 kVA	0.0 kW	0.0 kVar	Ja	0.0 kW	0.46	1xH0, 1x...	4875	9251	in Betrieb	Photovoltaik		
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Nein	ST NS-HA-Kasten	349..	HA/Bergwerkweg/18		61110210	Bergwerksiedlung	1	410 V	2.5 %	0 kVA	0.0 kW	0.0 kVar	Ja	0.0 kW	0.51	1xH0	1999	0	---	---		
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Nein	ST NS-Freileitungsverbind...	349..	78541-NS/FLV1			Bergwerksiedlung	1	410 V	2.4 %	0 kVA	0.0 kW	0.0 kVar	Nein	0.0 kW					---	---		
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Nein	ST NS-Freileitungsverbind...	349..	NS/D5T/78539-NS..			Bergwerksiedlung	1	409 V	2.3 %	0 kVA	0.0 kW	0.0 kVar	Ja	0.0 kW					---	---		
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Nein	ST NS-Freileitungsverbind...	349..	78537-NS/FLV1			Bergwerksiedlung	1	409 V	2.2 %	0 kVA	0.0 kW	0.0 kVar	Nein	0.0 kW					---	---		

3. Low-voltage grid connection assessment (GIS)

- Assessment using the power quality data
- No simulation -> real data of the grid network -> 3% not reached yet
- More feed-in systems can be connected
- Assessment by specialist



5. Grid expansion options

Low-voltage expansions (400 V)

- changeover of the transformer stage
- automatic voltage regulator
- adjustable local transformer
- cable reinforcement
- reconstruction / renewal transformer station

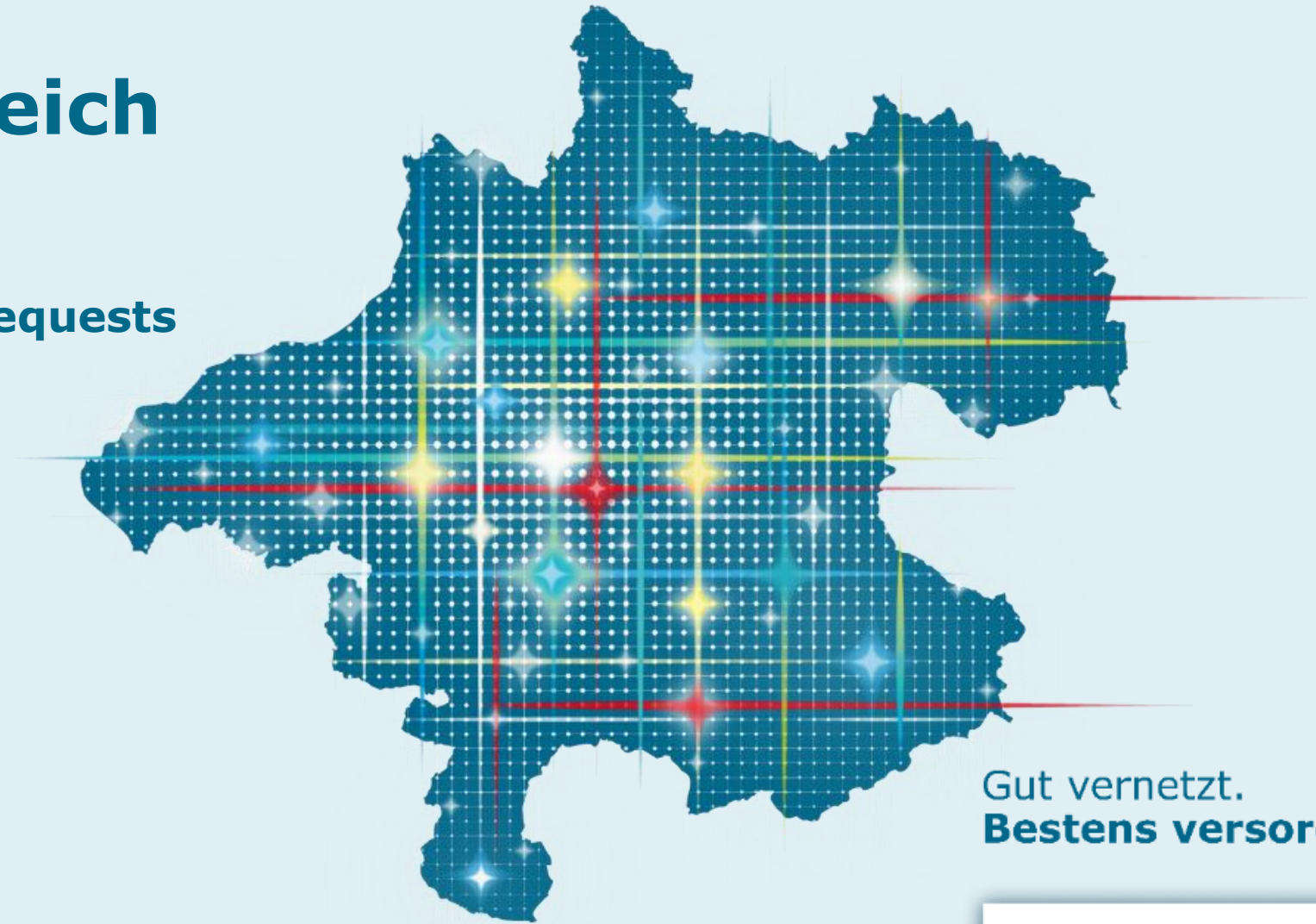
High-voltage expansions (10 / 30 kV)

- compounding / voltage regulation
- adjustment of control characteristic
- longitudinal controller / voltage regulator
- cable reinforcement
- reconstruction / renewal substation



Netz Oberösterreich

Facilitated procedures for
the assessment of feed-in requests



Gut vernetzt.
Bestens versorgt.

Patrick Leithner

15.11.2024

NETZÖÖ
Ein Unternehmen der Energie AG

Role of smart solutions in connecting renewables: Sharing of best practices from distribution grids



Austria's practice: Facilitated procedures for the assessment of feed-in requests

Patrick Leithner, Austria, Netz Oberösterreich, Team Lead for Decentralised Generation



Italy's practice: Simplification and digitalisation of customer connection

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Portugal's practice: Digitalisation of permitting procedures

Susete Albuquerque, Portugal, E-Redes, Business Development and Support Management



PRODUCER CONNECTION PROCESS SIMPLIFICATION - ITALY

Davide Riccio

Commercial Operation Management

Customer Engagement

E-distribuzione - Italy

Environment and Innovation Context

e-distribuzione

Team objectives



The team was set up to develop our new business application to replace the outdated IT system, which had been in use for more than a decade, and to provide new technologies to the technical and commercial back office.



We have designed and implemented different innovation to increase the efficiency of the connection process of a production plant, in order to make it faster and improve the experience for our customers.



Our application focuses on these innovations, which have changed the process of connecting production facilities. Many of these ideas could be replicable in other countries.

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Team objectives

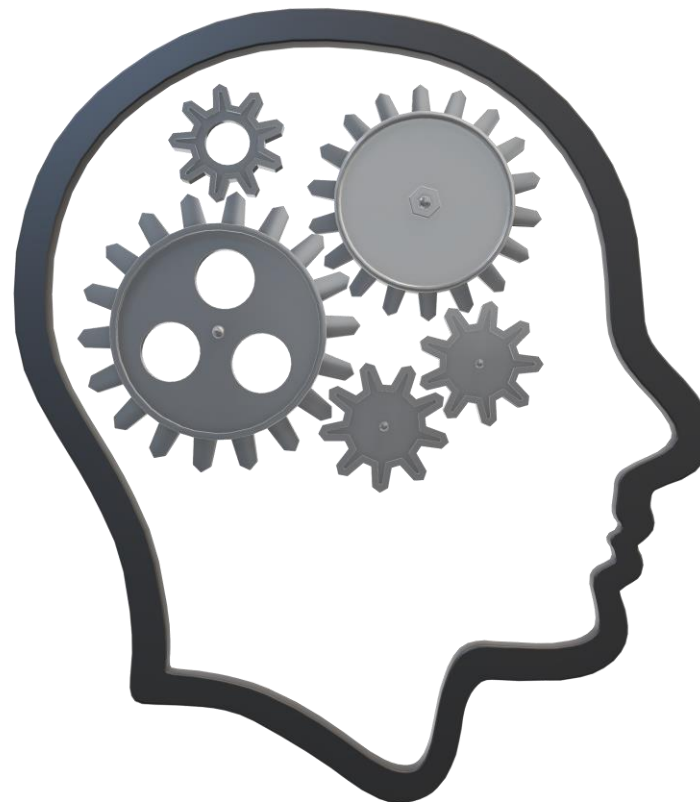
e-distribuzione

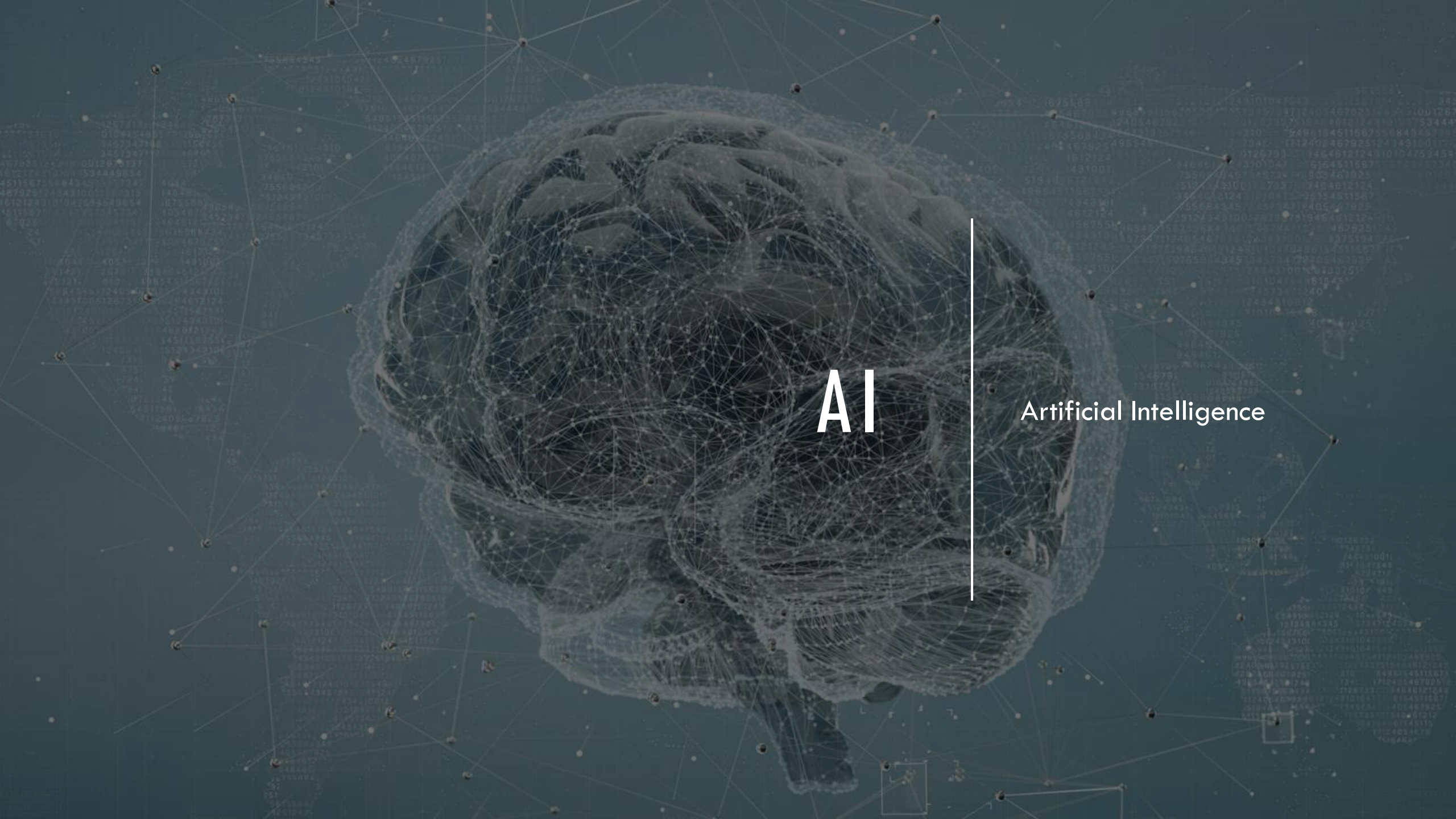
01 AI – ARTIFICIAL INTELLIGENCE

02 SMART QUOTATION

03 DELIBERATION 361

04 SIMULATOR



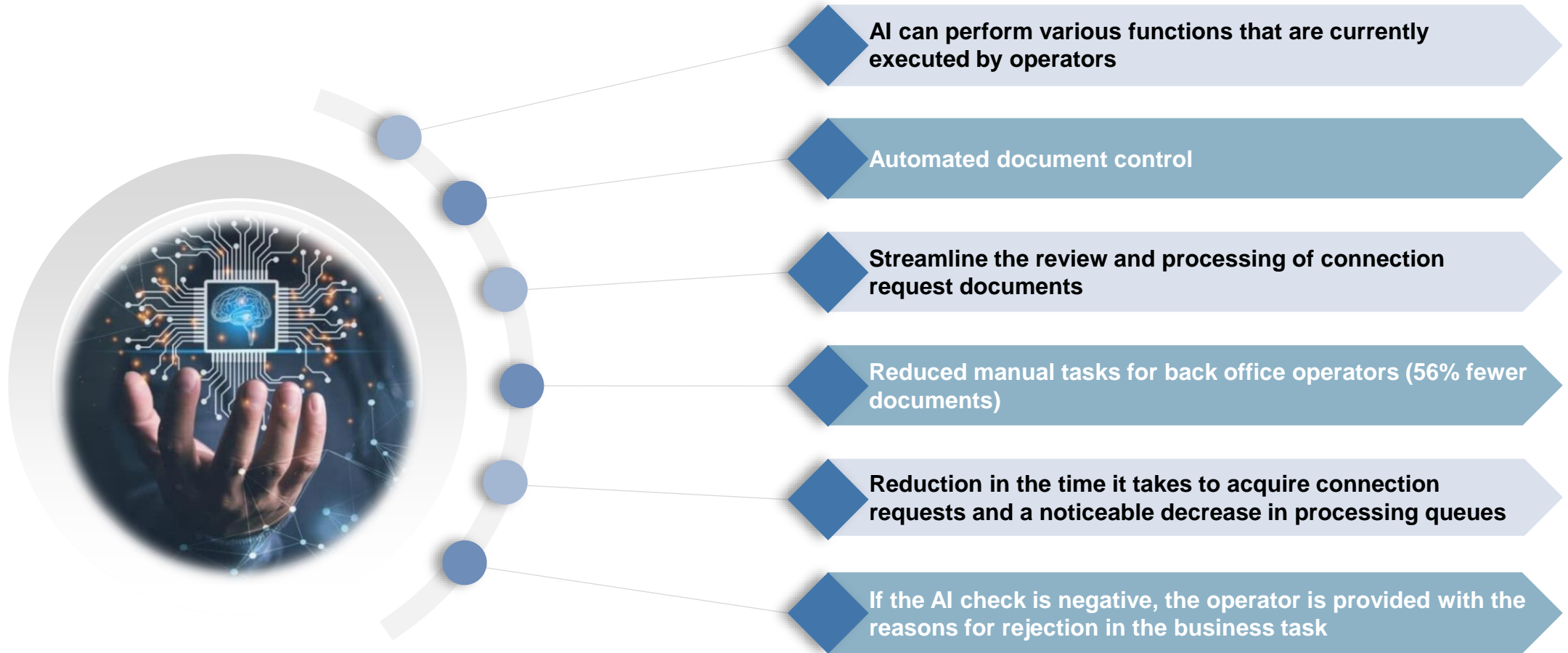



AI

Artificial Intelligence

AI

Artificial Intelligence





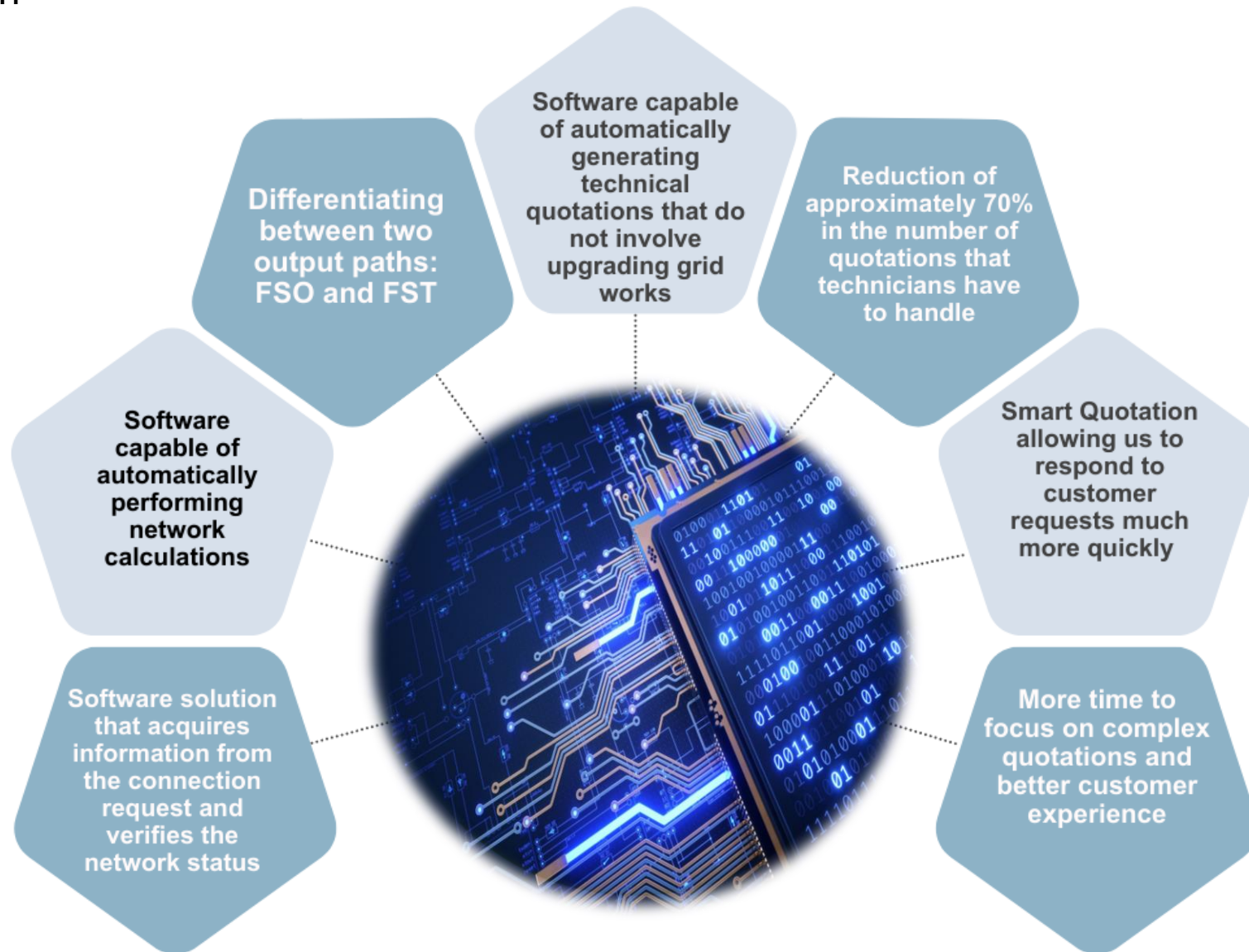
SMART QUOTATION

Software solution

SMART QUOTATION

Software Solution

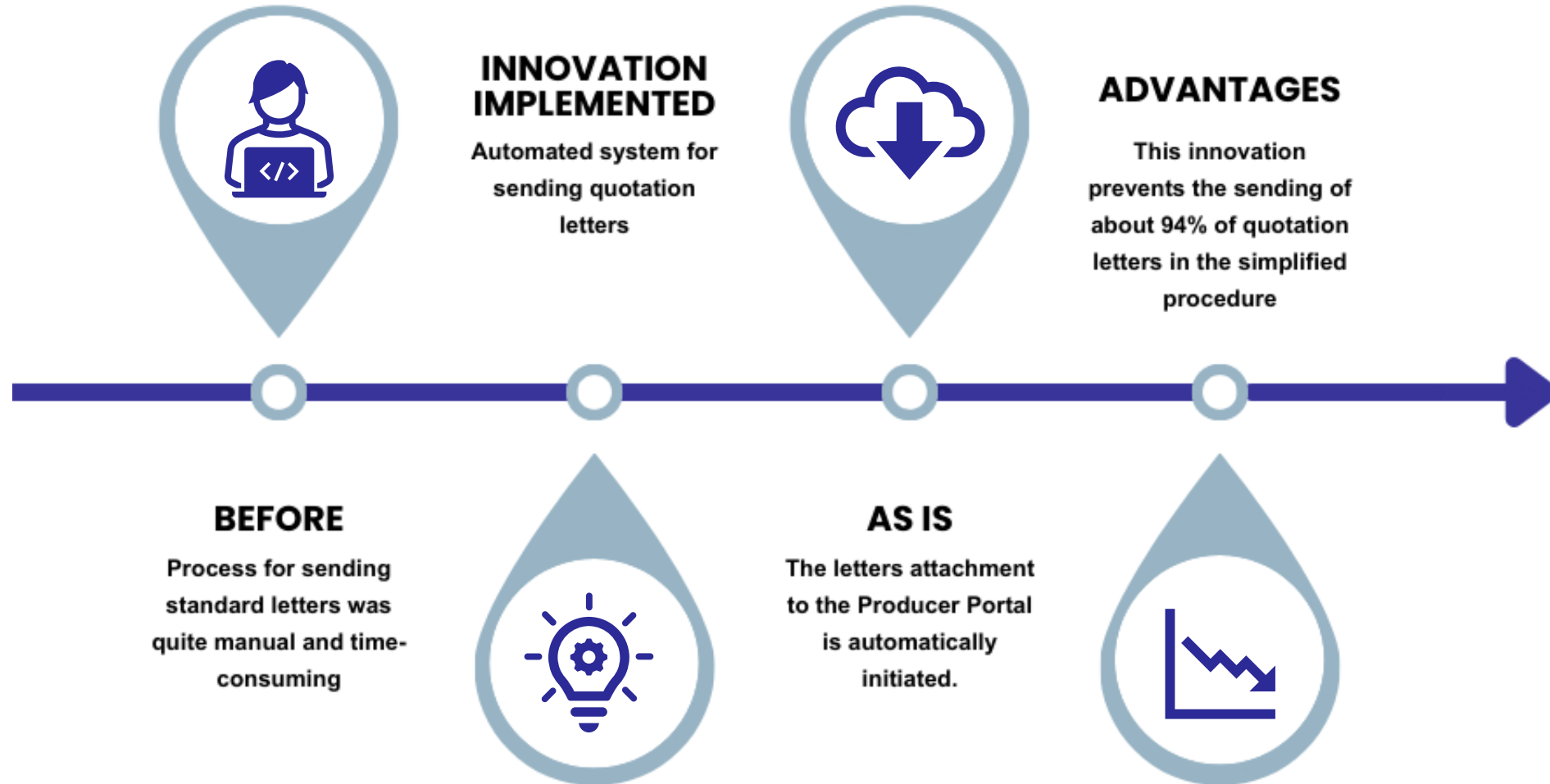
e-distribuzione



AUTOMATIC LETTERS SENDING

Software Solution

e-distribuzione





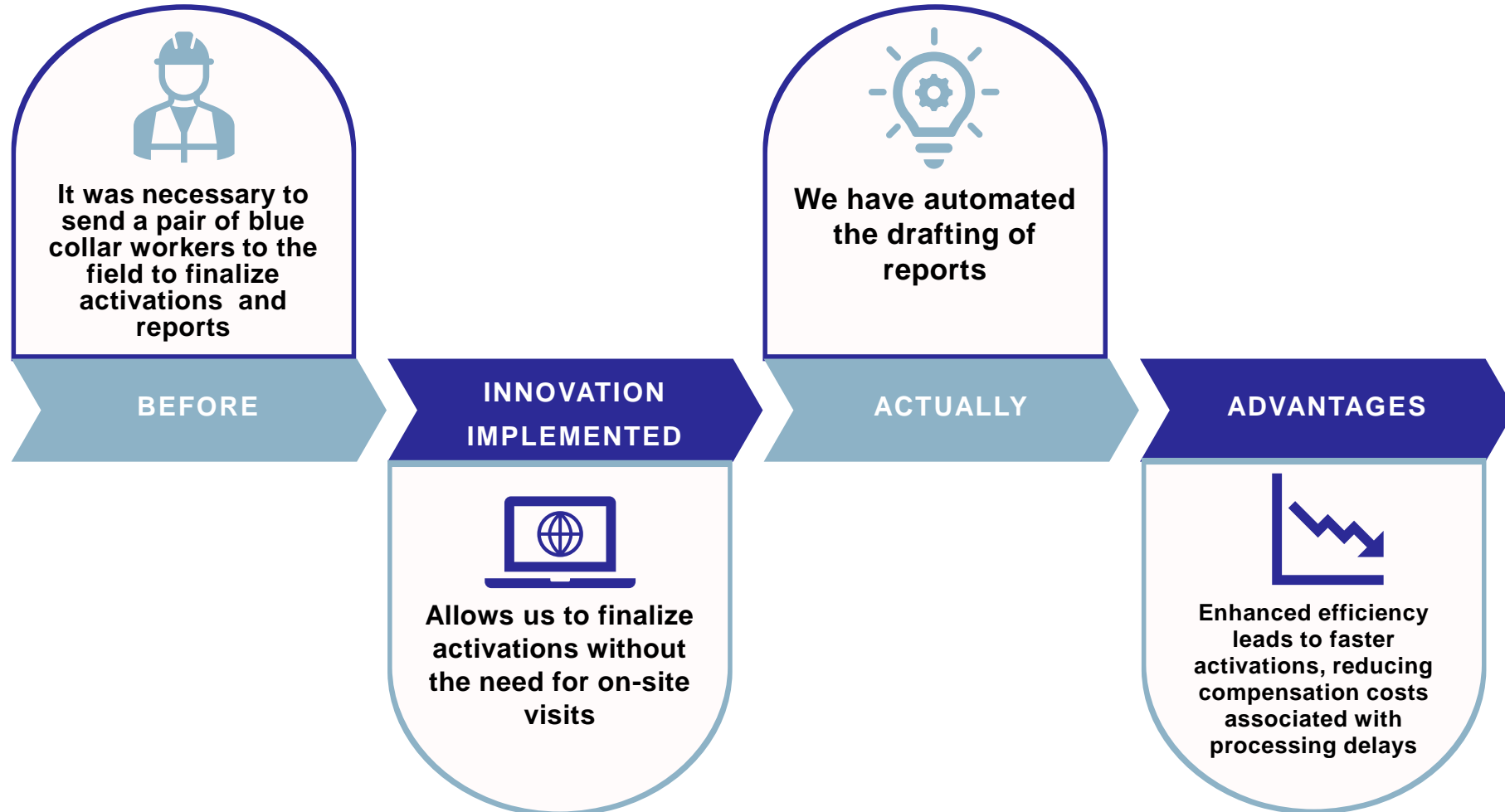
DELIBERATION 361

Simplification by Authority

DELIBERATION 361

Simplification by Authority

e-distribuzione





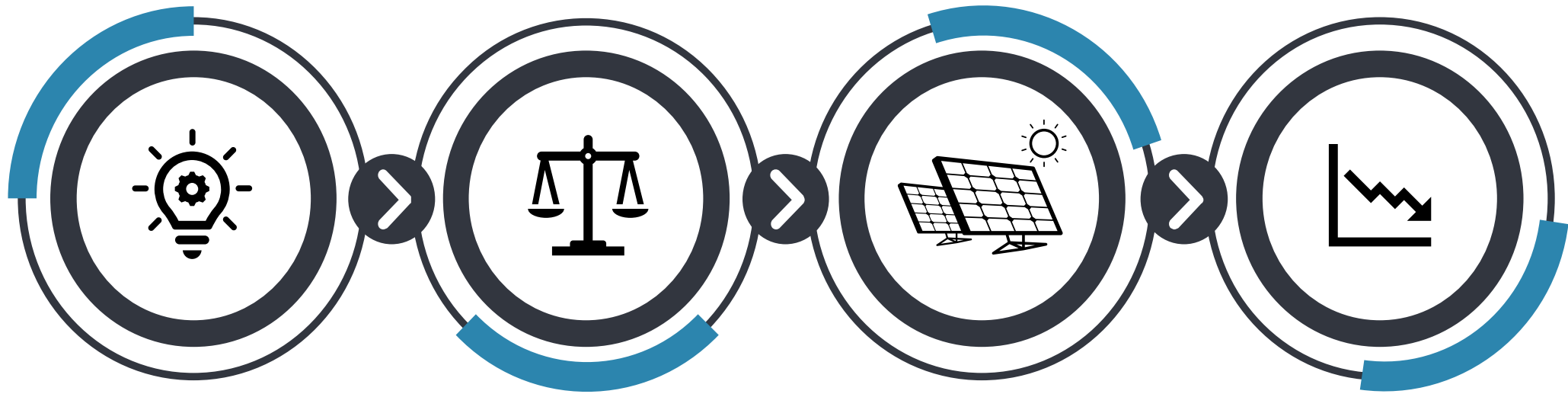
SIMULATOR

Customer's tool

SIMULATOR

Customer's tool

e-distribuzione



Innovative customer's tool available on our portal

The software simulates the connection of a production plant and quickly provides an estimate of costs and time

The producer can use it without being required to submit a grid connection request

Reduction in the cancellation rate of connection requests



**THANK YOU FOR YOUR
ATTENTION**

Role of smart solutions in connecting renewables: Sharing of best practices from distribution grids



Austria's practice: Facilitated procedures for the assessment of feed-in requests

Patrick Leithner, Austria, Netz Oberösterreich, Team Lead for Decentralised Generation



Italy's practice: Simplification and digitalisation of customer connection

Davide Riccio, Italy, E-Distribuzione, Junior Operation Infrastructure & Network



Portugal's practice: Digitalisation of permitting procedures

Susete Albuquerque, Portugal, E-Redes, Business Development and Support Management



Portugal's good practice: Digitalisation permitting procedures

Susete Albuquerque

E-REDES

Digitalisation in general in Portugal

Experiences and Services mainly address to Customers and Citizens:

Promoting

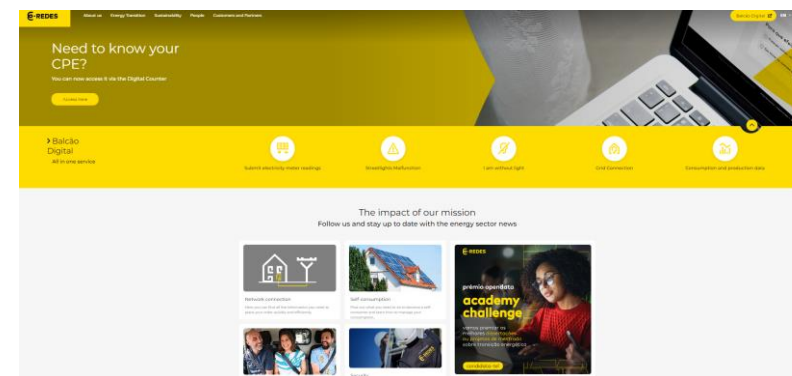
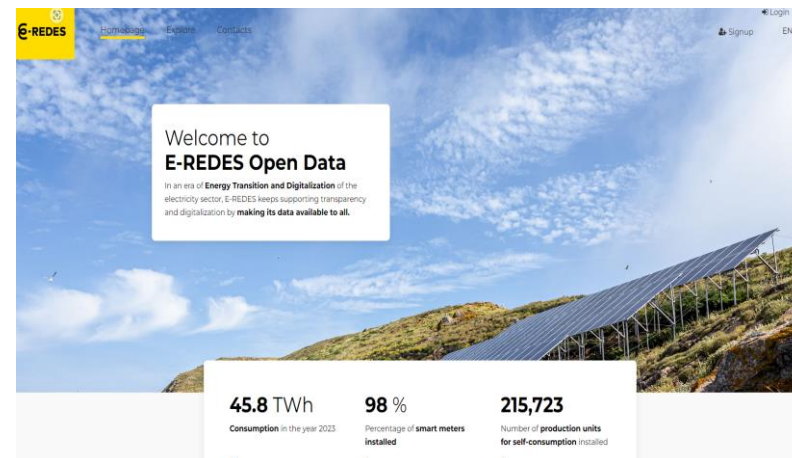
Inclusion

Trusted and secure experiences to empower customers and citizens:

- Knowledge sharing
- Data sharing

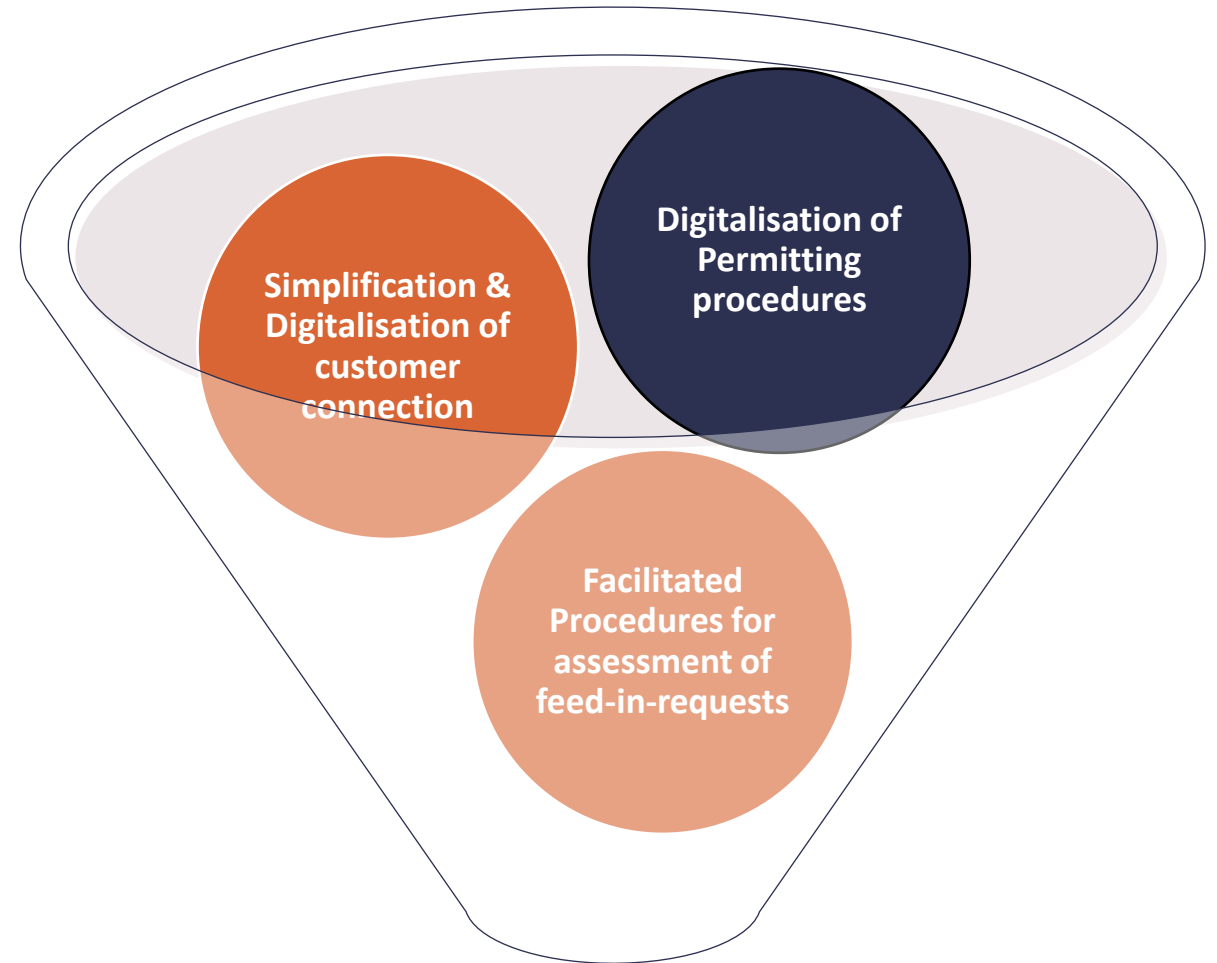
Knowledge

Data sharing



Smart solutions to connect renewables to the grid

Best Practices from Distribution Grids



Digitalisation of permitting procedures (PT): Objective and permitting types



Grant permission to operate the facilities and transfer the energy produced to the grid



Licensing of energy production facilities
Licensing of connection infrastructures to the public service network



Historical challenges in Portugal

- **Complex procedures**
- **Long procedures**
- **Many entities involved**
 - Promoter of the production unit
 - DSO or TSO
 - Licensor
 - Municipalities
 - Environment Agency
 - Railroad and Road domain authorities
 - owners of the land used

And in certain cases...

- **Sequential process of approvals from different entities;**
- **Lack of warnings**
- **Lack of penalties**

1st Smart solution to address the challenge in Portugal



Licensing guide for onshore renewable energy projects

- Launched in July 2023
 - ✓ Portuguese Renewable Energy Association;
 - ✓ Portuguese Environmental Agency;
 - ✓ Directorate General Energy and Geology
- Result of a collaborative work (promotors, DSOs, TSOs,...

[guia-de-licenciamento-versao-final.pdf \(apren.pt\)](#)



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Figura 1 – Licenças e Títulos necessários no decurso do processo de licenciamento de projetos de energia renovável onshore.

2nd Smart solution to address the challenge in Portugal

The screenshot shows a web application interface for the Directorate General Energy and Geology. The top navigation bar includes 'Energia' and 'Sustentabilidade'. The main menu is divided into 'Serviço Público', 'Serviço Elevação', and 'Registo de frações residenciais'. Under 'Serviço Público', there are sub-menus for 'SRIESP', 'Autoconsumo', and 'UPP'. The 'Serviço Elevação' section includes 'Entidade Manutenção El...'. The 'Registo de frações residenciais' section is partially visible. The main content area shows a form titled 'Serviço público' with various input fields for process information.

Digital platform for licensing connection infrastructure to the public service network

- Directorate General Energy and Geology
- Result of a collaborative work (Public responsible entities, DSOs, TSOs,...)
- Single digital platform (ready date foreseen 2024)
 - ✓ Total dematerialisation of the complex permitting process
 - ✓ “Zero paper needed”
 - ✓ Guarantee interaction & Control of responses
 - ✓ Possibility from the responsible authority to:
 - ✓ Impose response deadlines
 - ✓ Tacit approval
 - ✓ Only authorised involved users will be able to connect

5. Q&A session



! Please use the Q&A function of the platform to ask your question.

The chat will be disabled for the time being.

6. Smart and digital solution: What's next?

Flore Patrat-Delon

DSO Entity

Vice-Chair, TF Digitalisation of
the Energy System



Grid momentum | Focus on connection



As the backbone of our energy system, **electricity grids are critical for the clean energy transition**. Europe has **the most interconnected and resilient electricity grid in the world** bringing electricity to consumers every minute, hour and day of the year. However, for the EU to bring renewable electricity to its consumers and empower them to produce it, **electricity grids need to develop further and faster. In the next seven years, we should double our cross-border transmission infrastructure.**

An accelerated energy transition requires a shift towards a **decentralised, digitalised, integrated and flexible system**, with the expansion and upgrade of both the transmission and distribution grids. Investing in grids today will help to reduce greenhouse gas emissions and energy costs for consumers: **cross-border energy infrastructure projects can decrease generation costs by €9 billion annually until 2040.**



	Grid Action Plan – Tasks assigned to DSO Entity (mostly in cooperation with ENTSO-E)	Action	Lead
Grid Planning and Grid Capacity	<ul style="list-style-type: none"> Support DSO grid planning by mapping DSO development plans; by improving best practices and recommendations* Develop mechanisms for providing increased visibility to manufacturers into their upcoming procurement plans* 	Action 3a Action 13b	TF TYNDP EG ExNC
	<ul style="list-style-type: none"> Provide harmonized definitions for available grid hosting capacity for system operators and to set a pan-EU overview 	Action 6a	EG DF TF TYNDP
	<ul style="list-style-type: none"> Issue recommendations to digitalise and streamline procedures for grid connection requests 	Action 6b	TF DESAP
	<ul style="list-style-type: none"> Promote smart grid uptake, network efficiency and innovative technologies, e.g. technopedia 	Action 7	TF DESAP
Grid Investment and Financing	<ul style="list-style-type: none"> Raise awareness on the available options to increase funding applications for DSOs (PCIs)* 	Action 3b,10a	TF FIN
	<ul style="list-style-type: none"> Support the EC in proposing guidance for conditions to approve anticipatory investments* 	Action 4	TF FIN
Grid Permitting and the Public	<ul style="list-style-type: none"> Facilitation of the Pact for Engagement to reinforce stakeholder engagement and permitting 	Action 12	CEG
Grid supply chains and Standardization	<ul style="list-style-type: none"> Collaborate with technology providers to develop standard technology specifications [TSO-focus] 	Action 13a	EG ExNC
	<ul style="list-style-type: none"> Develop mechanisms for providing increased visibility to manufacturers into their upcoming procurement plans (see also grid planning) 	Action 13b	TF TYNDP CEG
	<ul style="list-style-type: none"> Promotion of technical requirements for generation & demand connection (revision NC RfG/DC) 	Action 14	EG ExNC

Connection Requests Project | Definition Phase

Initial Ideas:

- Target key building blocks
- Complement existing work
- Set clear boundaries

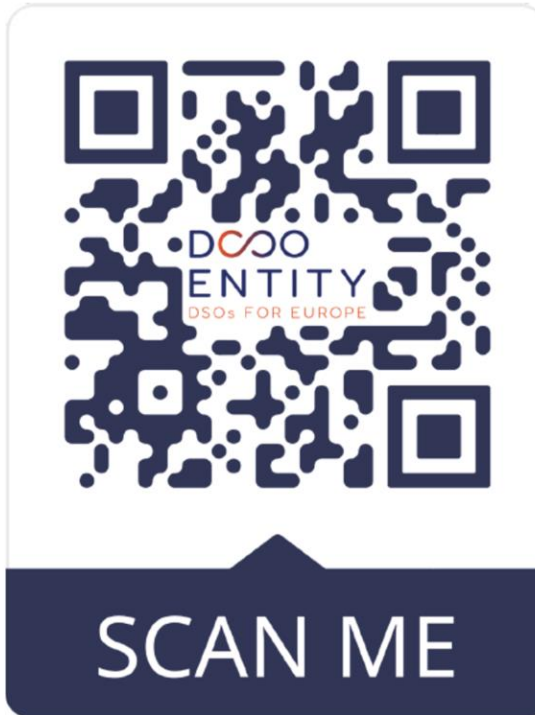


Proposed Goal: deliver **guidance** on a digital view in relation with connection to **maximize consumer value by solving specific pain points**

Deadline: S2 2025

7. Closing remarks

Find out more in our Grid Connection Paper!



DSO Entity's Annual Event

5

DECEMBER

Thank you!

Contact: Claire Vandewalle
DSO Entity, Advisor – Regulatory Affairs & Strategy
Claire.Vandewalle@eudsoentity.eu

The background of the slide is a composite image. On the left, a dark blue diagonal shape contains the text. The right side features a photograph of a renewable energy farm at sunset, with solar panels in the foreground and wind turbines in the distance. A network of white nodes and lines is overlaid on the sky. In the bottom right corner, the logo for DSO Entity is displayed, consisting of the text 'DSO ENTITY' in a bold, sans-serif font, with 'DSOs FOR EUROPE' in a smaller font below it.

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