


CEER webinar on DSO development plans and network planning

**Friday 23 October
10:00 – 12:15**



- Welcome address
- Current practices Distribution Network Development Plans (D-NDPs)
 - ERSE case study
 - Elenia case study
- Development plans according to the Clean Energy Package (CEP)
- Panel discussion on challenges and advantages of D-NDPs according to the CEP
- Q&A session
- Closing remarks

Distribution Network Planning Approval Process in Portugal

 **CEER**
Council of European
Energy Regulators

CEER webinar on DSO development plans and network planning

Friday 23 October 2020, 10:00 – 12:15 CET
GoToWebinar event

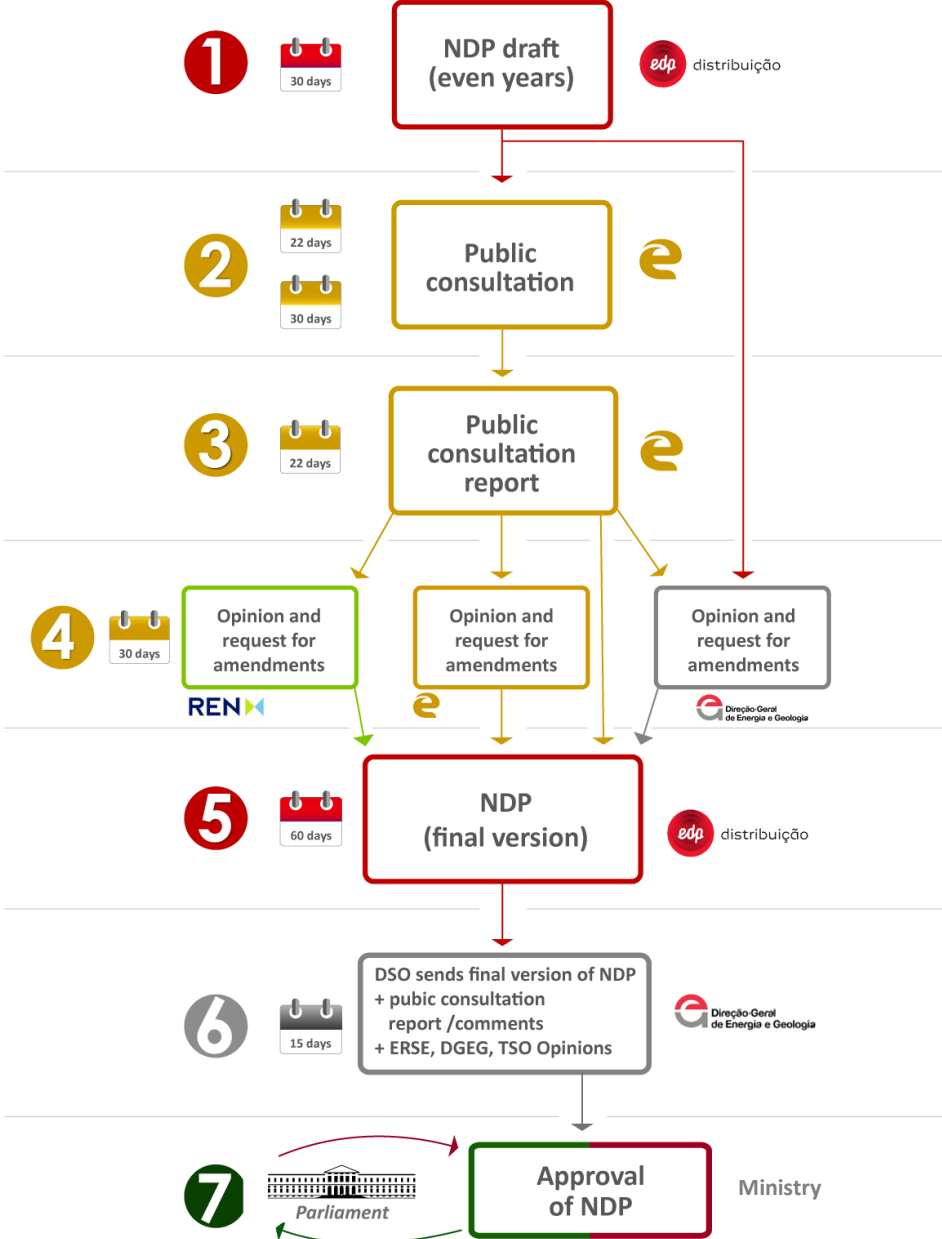
23 October 2020

Article 40.º-A of DL (Law-Decree) 76/2019, 3 June 2019, recast of the DL 172/2006

- The **electricity HV and MV distribution networks** operator must prepare, every two years, in even years, a **five-year development and investment plan** for its networks, based on the technical characterization of the current and planned network and supply and demand,
- Since 2014, **this approval process has been applied for 4 times** for the **electricity HV and MV distribution networks** (one network operator)¹
- Similar process is done, during even years, for the **natural gas distribution networks** (11 network operators plans) and, during odd years, for the **electricity transmission network** and the **natural gas transmission network, storage facility and LNG terminal** planning.

¹ Information available at the Public Consultation folder at www.erse.pt
("Consulta Pública n.º 91", "Consulta Pública n.º 74", "Consulta Pública n.º 56" and "Consulta Pública n.º 49")

The HV and MV DSO Planning Approval Process



The HV and MV DSO Planning Approval Process

(DSO, TSO, NRA, stakeholders, Government)



Explanation of slide 3

1. Under the terms of Article 40.º-A of Decree-Law no. 76/2019, of 3 June, HV and MV DSO shall submit to ERSE a draft National Distribution Plan (NDPlan), until April 30. The DSO shall submit it also to Transmission System Operator (TSO) and to Directorate-General for Geology and Energy (DGEG) (Ministry), in order for these parties to prepare their own Opinion.
2. Upon receiving the draft NDPlan, ERSE prepare in 22 working days the launch of the public consultation, to be held during a period of 30 working days.
3. Following the public consultation end, in the next 22 working days, ERSE elaborates a report summarizing all comments received during public consultation, attaching contributions received from each stakeholders. ERSE send this report to the DSO, the TSO and DGEG.
4. During the subsequent 30 working days, ERSE elaborates and issues its considered Opinion having attention to the stakeholders contributions during the Public Consultation. ERSE may determine necessary changes to draft NDPlan, in order to meet network needs, as well as to meet any requests mentioned during public consultation.
5. Upon receiving the considered Opinions from ERSE, TSO and DGEG, the DSO has 60 working days to amend draft NDPlan and submit the final draft NDPlan to DGEG
6. DGEG submits the final NDPlan, together with the 3 Opinions and the Public Consultation Report and comments received to the Ministry
7. Final approval from the Ministry (after receiving Opinion from the Portuguese Parliament).

ERSE has a central role in this approval process:

1. Organises the public consultation
2. Publishes the stakeholders received contributions and a Public Consultation Report with a summary of the received contributions
3. Issues a considered Opinion to the draft NDPlan

Public Consultation

- **Stakeholders opinions are of paramount importance** in this planning approval process.
- National legislation (DL 76/2019) reinforce this importance by setting a **30 working day Public Consultation** allowing stakeholders to analyse the draft NDPlan, identify any network need not covered in draft NDPlan, and submit comments and recommendations
- When issuing its Opinion, **ERSE takes into consideration all the received comments during the Public Consultation**, in order to improve the draft NDPlan recommending amendments to initial draft.
- ERSE has recently concluded its [91st Public Consultation](#) to draft **NDPlan 2021-2025**. We are now finishing our Opinion to be published.

ERSE Tariffs Council and Advisory Council

- The **Opinions from ERSE Advisory Council and ERSE Tariffs Council** to the Public Consultation are also important pieces during the preparation of the ERSE Opinion. These councils are composed by representatives of the different society sectors (government, generators and consumer associations, suppliers, network operators (transmission and distribution network operators).
- This interaction with both Councils has been crucial in the last decade, allowing a **more balanced ERSE Opinion** with regard to consumers'/networks users' and network operators' interests, resulting in a more robust Opinion and a better approved NDPlan.

The 2020 draft National Distribution Plan as an example



Anexo C - Caracterização e justificação dos principais projetos

Ficha n.º 26 - Projeto Nova SE 60/15kV Guimarães (Guimarães B)

Tipo de Investimento: Específico
 Programa de Investimento: Desenvolvimento de Rede
 Subprograma: Cenário de Evolução de Consumos: Central

Concelhos: Guimarães, Póvoa de Lanhoso, Fafe

Investimento (M€)	Total	2021-2025	PDIRD-E	2016	2018	2020
Costos Primários	2 245	2 245	Incluído	Não	Não	Ficha N.º 26
Costos Totais	3 747	3 747				

Notificação: Redução do comprimento de circuitos MT com melhoria de perdas e de qualidade de serviço.

Alternativas:

- Nova SE 60/15kV 3L3MVA a nordeste de Guimarães alimentada em anel na LN60 S. João de Ponte-Fafe.
- Estabelecimento de uma nova linha 15kV vinda da S. João de Ponte para alimentar cargas da SE Guimarães.

Alternativa Subselecionada: A alternativa 1 apresenta indicadores económicos mais interessantes, resolvendo os riscos de potência não garantida em Regime N-1.

Benefícios Esperados:

Benefício	Valor
Redução anual de END (kWh) (*)	25 621
Redução anual de Energia de Perdas (kWh) (*)	3 678 716
Eliminação de Sobrecarga (kWh) (*)	-

(*) Valor médio anual no período de vida útil do projeto (30 anos)

Calendarização do Investimento e Custos Totais:

Investimento (M€)	Atualizado até 2020	2021	2022	2023-25	Após 2025
Rede AT	93	-	-	-	91
Instalações AT/MT	2 927	-	-	-	2 884
Rede MT	784	-	-	-	772
TOTAL	3 804	-	-	-	3 747

Benefícios:

Benefício (kWh)	2022	2023	2024	2025	2026	2027	2028
Perdas	4 355	-	-	-	-	-	10 811
END	980	-	-	-	-	-	2 306
Elim. Sobrecarga	-	-	-	-	-	-	-
TOTAL	5 335	-	-	-	-	-	13 117

Risco de Potência não garantida:

Potência não garantida	2022	2023	2024	2025	2026	2027	2028
Regime N (kW)	0	0	0	0	0	0	0
Regime N-1 (kW)	9 550	9 943	10 565	11 382	12 135	12 913	13 721

Figura 1: Ligação em PI da SE Guimarães B na LN60 1056 S. João de Ponte-Fafe (Rede AT)

Figura 2: Zonas de intervenção previstas no projeto da nova SE Guimarães B (Rede MT)

Relevant content

- Planning security standards and criteria
- Evolution of electricity consumption + network characterisation + capacity for new generation connection
- Objectives and planning strategy (Energy transition and network expansion; Network active control and new services; Network resilience)
- Main strategic vectors (Security of supply; Quality of supply; Network efficiency; Operational efficiency; Access to new services)
- Renewal / refurbishments of existing network assets
- Network resilience (Moving existing overhead lines to underground cables; Vegetation management; ICT & Cybersecurity)
- Smart grids
- Risk analysis
- Investment costs and network tariffs impact assessment (a little more than 1000 M€ on investments during 5 five years)
- 11 Annexes

Investment project characterisation (new HV/MV substation)



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Subprograma:

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Investimento (k€)

	Total	2021-2025
Custos Primários	2 245	2 245
Custos Totais	3 747	3 747

PDIRD-E

	2016	2018	2020
Incluído	Não	Não	Ficha n.º 26

Motivação
 Redução do comprimento de circuitos MT com melhoria de perdas e de qualidade de serviço.

Alternativas

- Nova SE 60/15kV 31,5MVA a nordeste de Guimarães alimentada em anel na LN60 S. João de Ponte-Fafe.
- Estabelecimento de uma nova linha 15kV vinda da S. João de Ponte para alimentar cargas da SE Guimarães.

Alternativa Seleccionada

- A alternativa 1 apresenta indicadores económicos mais interessantes, resolvendo os riscos de potência não garantida em Regime N-1.

Benefícios esperados

	Benefício
Redução anual de END (kWh) (*)	25 621
Redução anual de Energia de Perdas (kWh) (*)	3 678 716
Eliminação de Sobrecarga (kWh) (*)	-

(*) valor médio anual no período de vida útil do projeto (30 anos)

Calendarização do Investimento a Custos Totais

	Atualizado ano 0	Até 2020	2021	2022	2023-25	Após 2025
Rede AT	93	-	-	-	91	-
Instalações AT/MT	2 927	-	-	-	2 884	-
Rede MT	784	-	-	-	772	-
TOTAL	3 804	-	-	-	3 747	-
Perdas	4 355	-	-	-	-	10 811
END	980	-	-	-	-	2 306
Elim. Sobrecarga	-	-	-	-	-	-
TOTAL	5 335	-	-	-	-	13 117

Risco de Potência não garantida

	2022	2023	2024	2025	2026	2027	2028
Potência não garantida	0	0	0	0	0	0	0
Regime N (kW)	0	0	0	0	0	0	0
Regime N-1 (kW)	9 550	9 943	10 565	11 382	12 135	12 913	13 721

Resumo de Investimentos e Benefícios Esperados

	Investimento (k€)	Benefícios (k€)
Rede AT	93	-
Instalações AT/MT	2 927	-
Rede MT	784	-
TOTAL	3 804	-
Perdas	-	10 811
END	-	2 306
Elim. Sobrecarga	-	-
TOTAL	-	13 117

Análise de Risco, Resumo de Investimentos e Benefícios Esperados

Ano 0: 2025

Expected technical benefits:

- Reduction in Energy Not Supplied (ENS)
- Reduction in losses

Expected economic benefits (current + NPV)

Investment cost (current + NPV)

Specific investment program: "Network expansion"

Project Cost (including financial & overheads)

Project description: "Reduction MV circuit length, to lower electric losses"

Studied alternative solutions for achieving the same goal (a new line vs a new MV/MV substation)

Selected alternative (presenting better economic indicators)

Project was included in previous NDP?

Risk of power not guaranteed (N & N-1 regimes)



- The **HV and MV distribution network** in Portugal mainland is a national concession operated by one network operator that presents the referred **NDPlan**
 - The **LV distribution network** is divided into **278 municipal concessions** with their specific investments **not being considered** at the current **NDPlan** approval process
 - However, as the supply points of MV distribution network are the **interconnection points between MV and LV networks**, we can assume that a major aspect of the LV planning is **already included** during the preparation of the MV network development **at the NDPlan**
 - In addition, as the HV and MV network operator is responsible for **data collection and treatment** from all the “smart” and “traditional” meters in HV, MV and LV networks, this facilitates the inclusion in the NDPlan of the strategic investment topic of **smart grids, optimised distribution grid dispatch and local flexible markets**
-
- A first challenge for Portugal resulting from the Directive (EU) 2019/944 is to assure a **better integration of the HV and MV network with the LV network development planning** allowing to assume that the **NDPlan** represents **an integrated distribution networks development and investment plan**, recasting the national law in line with these recent European legislative developments.
 - **Coordination between the HV and MV network operator and the other LV only networks** must be emphasized and the existing specific aspects must be also considered.

Article 32 (3) of Directive (EU) 2019/944, 14 June 2019 states that:

- *The development of a distribution system shall be based on a transparent network development plan that the distribution system operator shall publish at least every two years and shall submit to the regulatory authority.*
- *The network development plan shall provide transparency on the medium and long-term flexibility services needed, and shall set out the planned investments for the next five-to-ten years, with particular emphasis on the main distribution infrastructure which is required in order to connect new generation capacity and new loads, including recharging points for electric vehicles.*
- *The network development plan shall also include the use of demand response, energy efficiency, energy storage facilities or other resources that the distribution system operator is to use as an alternative to system expansion*

- Major consequences to the distribution network are expected from the challenges resulting from the impact that **technological developments**, related to **decarbonisation, digitalisation and decentralisation**, will impose on available **electrical distributed resources** (e.g.: PV and other RES generation, self-generation, storage, electric vehicles, ...).
- Being deeply innovative, only a real open-minded approach will allow to **convert these new challenges into new opportunities** for distribution networks planning.
- This is one of the reasons justifying this **CEER webinar on DSO development plans and network planning**





Thank you!

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ELENIA

Current practice of D-NDPs: Elenia Case Study

CEER webinar on DSO development plans and
network planning
23 October 2020

Jorma Myllymäki
Senior Vice President



Elenia's Networks Business and Service Business



REVENUE 2019

291.5 M€ / 4.0 M€

EMPLOYEES

119 / 189

MARKET SHARE

12%

CUSTOMERS

430,000

ELECTRICITY NETWORK

74,000 KM

NETWORK PER CUSTOMER

172 M

SUSTAINABILITY AND QUALITY

- Asset Management Systems ISO 55001 and PAS 55
- Occupational Health and Safety Management System ISO 45001: 2018
- Environmental Management System ISO 14001: 2015
- Information security management ISO/IEC 27001: 2013

MISSION

Electrifying life

VISION

Most responsible reformer of energy services and markets

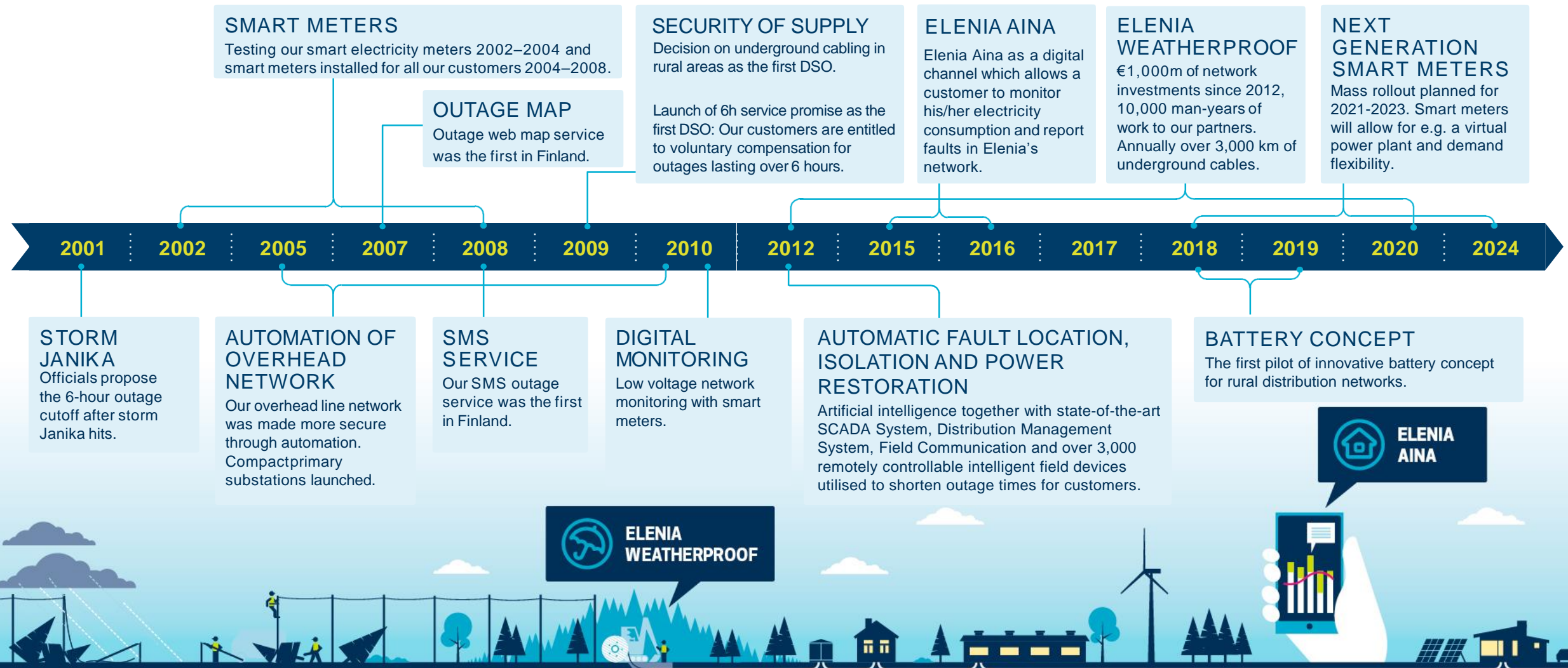
VALUES

Close to the customer
Accountable partner
Achieving together
Courage to renew



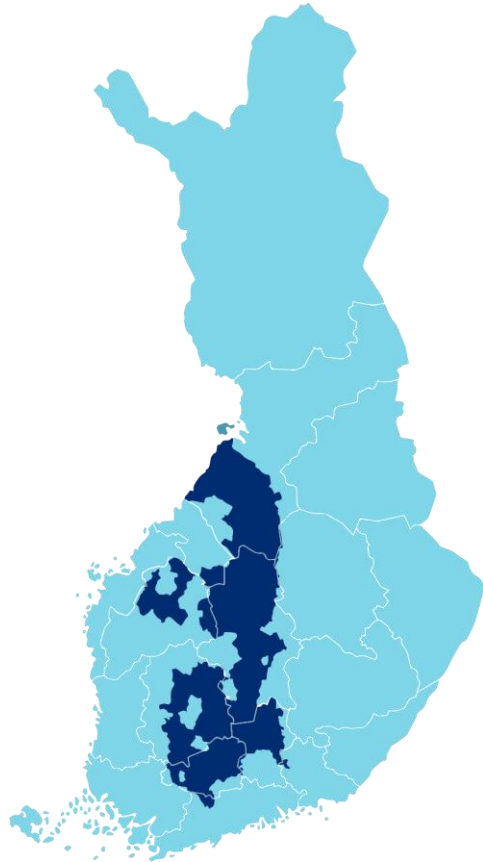
- Elenia's areas of operation
- Elenia's headquarters

Elenia at the forefront of innovation

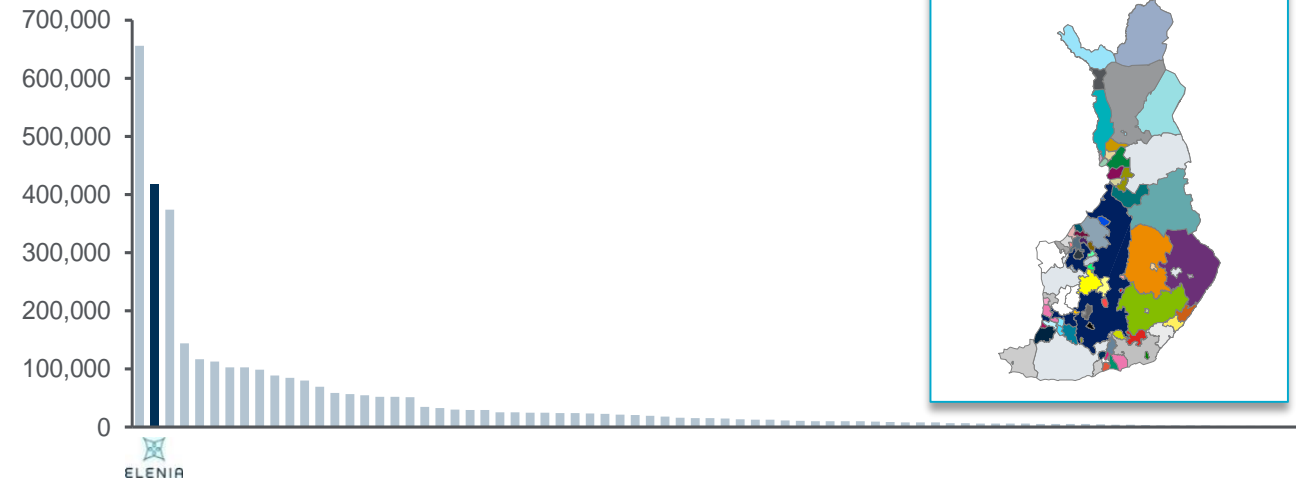


Fragmented DSO market in Finland

Elenia's Geographic Network Area



Number of Customers in Finland by DSO

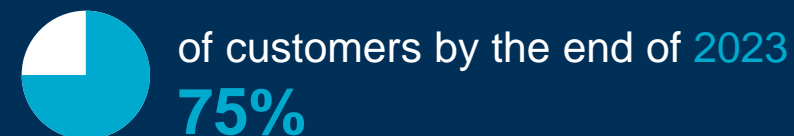
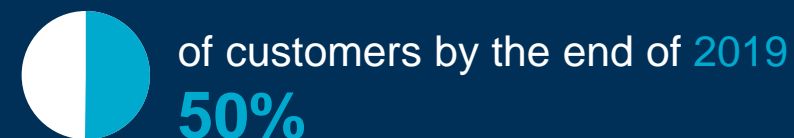


- Sparsely populated country: 5.5 million inhabitants and over 338,000 km²
- 77 Distribution System Operators (DSOs) in total in Finland
- The same regulatory methods applied for all the DSOs
- Largest five DSOs have a combined market share of approximately 50%
- Elenia is the 2nd largest DSO in Finland
- The Electricity Market Act (EMA) established in 1995
- The Energy Authority is an entirely independent regulator

Network Development Plans focus on the security of supply measures

Requirements defined by the Electricity Market Act in 2013:

Power outages caused by storms or snow loads shall not exceed **6 hours** in zoned areas and **36 hours** in other areas, as follows

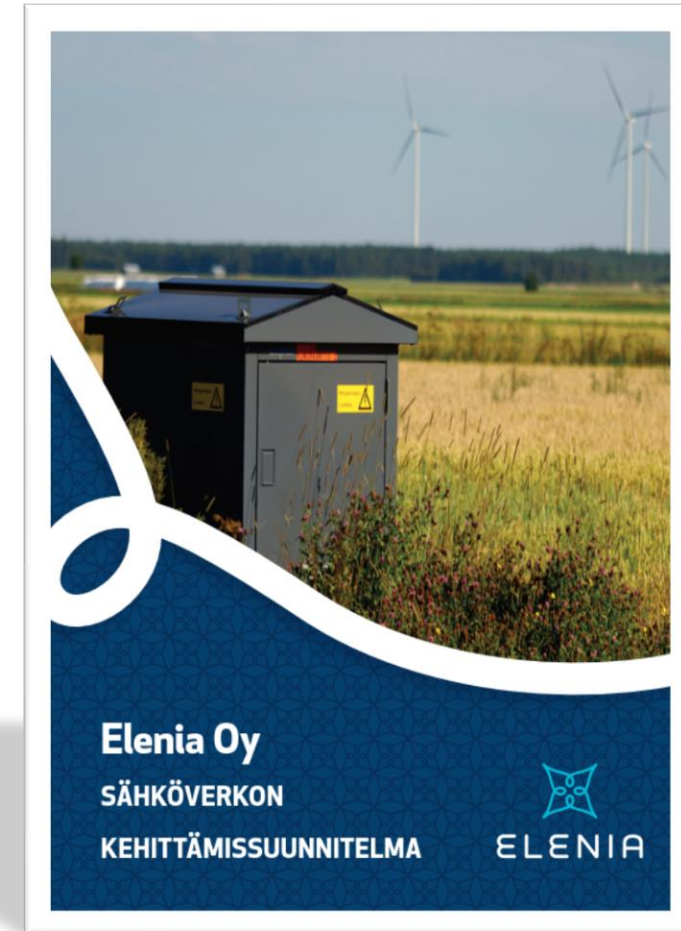


DSOs need to define the measures on how to achieve the security of supply requirements in the NDP which needs to be updated and delivered to the Energy Authority every 2nd year

Elenia's NDP – Content

- The Energy Authority defines the requirements for the NDP content
- Elenia's NDP can be summarized as follows:
 1. Strategic approach in network development
 - a) Network design criteria and measures to fulfill the security of supply requirements
 - b) Capabilities for the execution of network development
 - c) Co-operation with other infrastructure operators
 - d) Operational model and capabilities for outage management and major power disruptions
 - e) Specific measures regarding critical customer premises for the society
 - f) Exceptions to security of supply targets due to local circumstances
 2. Long-term plan
 3. Current situation and achieved performance
 4. Detailed plan for the current and following year
 5. Measures taken in the last two years

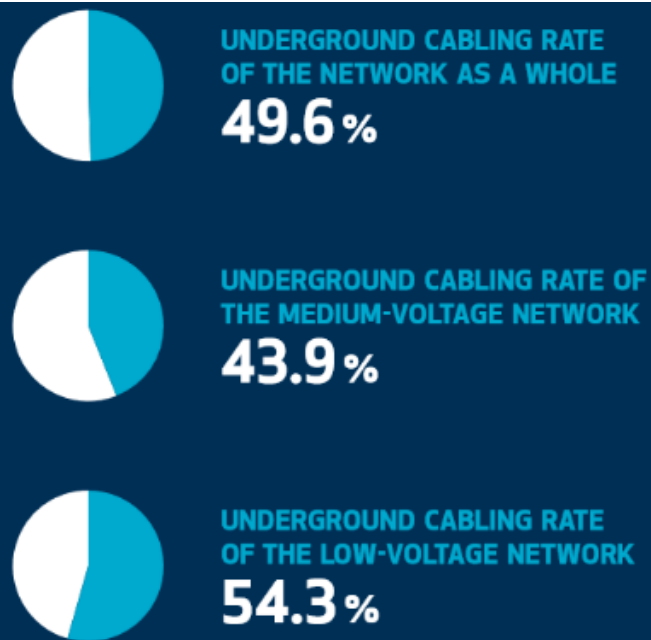
Appendices – 24 pcs of Elenia's operational documents



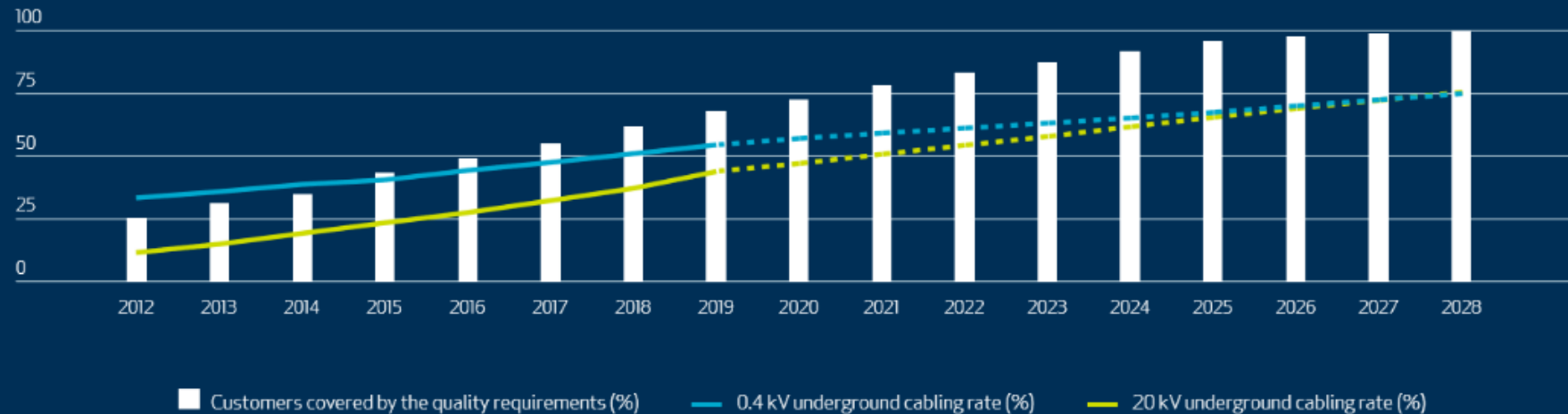
Elenia's NDP – Strategic approach



- DSOs can freely choose the network development strategy to meet the EMA's requirements
- In Elenia's long-term NDP 75% cabling rate by 2028 is the backbone for the security of supply
- Network automation together with sophisticated ICT systems is the additional enabler to improve operational performance and outage time reduction
- Operational processes and preparedness capabilities for major power disruptions are continuously improved together with external contractor partners



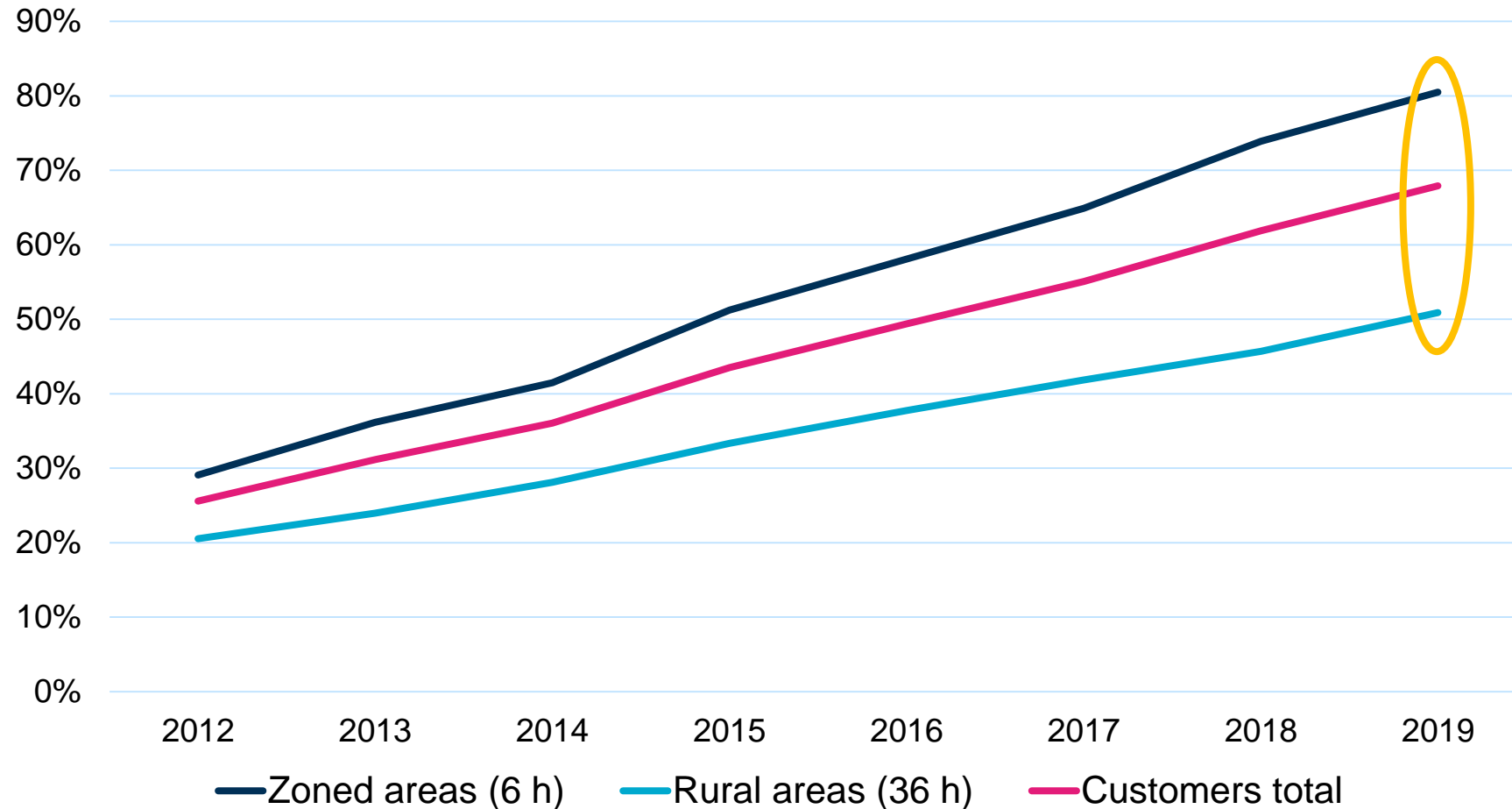
DEVELOPMENT PLAN 2012-2028 (%)



Elenia's NDP – Performance vs. EMA's requirements



Fulfilment of the EMA's security of supply requirements



- DSOs report the performance vs. targets in the NDP
- In **zoned areas** **80.5%** of Elenia's customers fulfilled the 6 hour quality demands in 2019
- In **rural areas** **50.9%** of Elenia's customers fulfilled the 36 hour quality demands in 2019

Elenia's NDP – Experiences and benefits



- Security of supply is the primary focus of the NDPs today
- NDP drives for professional and transparent asset management and long-term network development
 - Systematic approach covering e.g. investments, maintenance, outage management and resource capabilities
 - Strategic choices for network development and actual measures
 - Analysis of performance and actions taken to ensure progress
 - Justification and transparency for customers and stakeholders
 - Identification of critical customer premises in network development to ensure well-functioning society
- The level of granularity is correct and not too detailed
 - Holistic approach instead of project/area specific approach
 - Achieved vs. targeted KPIs to ensure performance



Future expectations – Finnish & European perspective

- Requirement for cost-efficient network development and evaluation of alternative solutions for the security of supply
- Stakeholder engagement and consultation of all relevant system users and the relevant TSO (Fingrid Oyj)
 - Details of the network development and the consultation procedure should be kept as lean as possible
- Connection of new generation capacity and new loads, including charging points for electric vehicles
- Transparency on the flexibility services needed
- Use of demand response, energy efficiency, energy storages or other resources as an alternative to system expansion

Recommendations on the use of flexibility in distribution networks,
Eurelectric recommendations on Article 32 of the Electricity Directive – April 2020:

https://www.eurelectric.org/media/4410/recommendations-on-the-use-of-flexibility-in-distribution-networks_proof-h-86B1B173.pdf



Elenia's innovative battery concept with Fortum:

- In normal situation (99% of time), Fortum offers the battery to the FCR-N market
- In an unexpected failure of supplying network, the battery charge is available for the island operation of Elenia's 20 kV distribution network branch line
- Automatic transition to island operation and automatic synchronization when the supplying network is restored

**Close to the
Customer**

**Courage
to Renew**



**Accountable
Partner**

**Achieving
Together**

Elenia – Electrifying Life

Development plans according to the Clean Energy Package

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23 October 2020

Marion Malafosse

Policy Officer

Unit for retail markets, consumers and local initiatives

European Commission - DG Energy, Directorate for Internal Energy Markets

An updated framework for DSOs

- ❖ **DSOs to use Flexibility** – integrating renewables and new loads requires innovative solutions and an appropriate regulatory framework.
 - ❖ **Neutral role of DSO** – specific rules for DSO involvement in storage, EV infrastructure, data management and other activities.
 - ❖ **Systematic and wider distribution network development plan** – specific rules on the process, content, cooperation with TSOs, role of NRAs
-
- ❖ **EU DSO entity and cooperation with TSOs** – establish a EU DSO entity with specific tasks and cooperation with TSOs in network operation and development.



DSO network development plan (art. 32(3) – 32(4) Directive 2019/944)

What?

- ✓ To provide **transparency on the medium and long-term flexibility services needed**
- ✓ Set out the **planned investments for the next five-to-ten years**
- ✓ Emphasize on the main distribution infrastructure which is required in order to **connect new generation capacity and new loads, including recharging points for electric vehicles.**
- ✓ Include the **use of demand response, energy efficiency, energy storage facilities** or other resources that the distribution system operator is to use as an **alternative to system expansion.**
- **possibility to exempt** DSOs serving less than 100,000 connected customers or small isolated systems

DSO network development plan (art. 32(3) – 32(4) Directive 2019/944)

Process

- ✓ **At least every two years**
- ✓ **Transparent** – consultation of relevant system users and TSOs. Results of the publication to be published along with the network development plan
- ✓ Submission to **the NRA**

Role of the NRA

- ✓ To **receive and assess** the results of the consultation and the network development plan.
- ✓ Can **request amendments** to the plan

DSO/TSO cooperation in network operation and development

- ✓ **TSOs to be consulted** by DSO on the distribution network development plan (art 32(4))
- ✓ **DSOs and TSOs to cooperate** with each other in planning and operating their networks (art 57 Reg 2019/943).
 - this includes **exchange of all necessary information and data** on the performance of generation assets and demand side response, the daily operation of their networks and **the long-term planning of network investments**

DSO/TSO Cooperation needed to:

- ✓ ensure the **cost-efficient, secure and reliable development and operation of their networks**
- ✓ **achieve coordinated access to resources** such as distributed generation, energy storage or demand response that may support particular needs of both the DSO and the TSO

EU DSO Entity – Completion of the institutional framework of the IEM

The EU DSO Entity is set in the Electricity Regulation (art. 52 to 55)

- ✓ Clarifies the **structure of the EU DSO entity** (membership, governance, Board, Strategic Advisory Group)
- ✓ Sets the **objectives**
 - Promote the completion and functioning of the internal market in electricity.
 - Promote an optimal management and a coordinated operation of distribution and transmission systems.
- ✓ Defines the **tasks** which will be further specified in the statutes and constituting general assembly, in particular for network development:
 - promoting operation and planning of distribution networks in coordination with the operation and planning of transmission networks;
 - EU DSO to cooperate with the ENTSO-E and adopt best practices on the coordinated operation and planning of transmission and distribution systems

Thank you



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Challenges and advantages of D-NDPs according to the Clean Energy Package

Moderator: Athir Nouicer, *FSR*

Panellists: Kenneth Hänninen, *GEODE*

Mark McGranaghan, *EPRI*

Patrick Clerens, *EASE*

Elina Hautakangas, *Finnish Ministry*

Luca Lo Schiavo, *ARERA*



European Association
for Storage of Energy

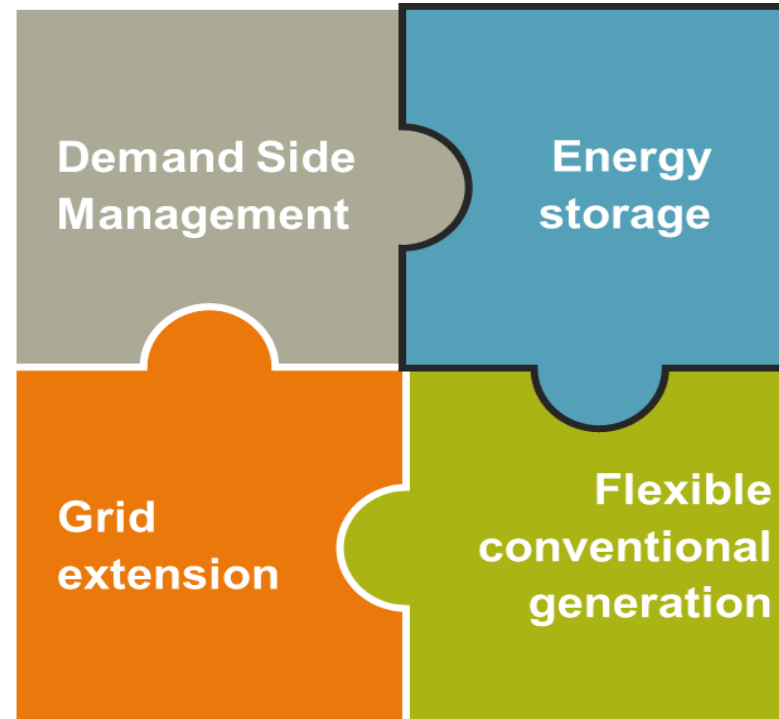
Introduction to EASE



Challenges of operating the power system

Planning the future distribution network

Big potential
Need to assure all comes to
the market



Many available technologies,
value for host of different
applications and locations.

Social acceptance
becoming increasingly
limited; significant
investments needed

Concerns about the
environmental impacts
and sustainability

Planning the future distribution network

Multi-Service Business Cases



Maximising Social Welfare of Energy Storage
Facilities through Multi-Service Business Cases

Brussels, April 2019



Source: [Maximising Social Welfare of Energy Storage Facilities through Multi-Service Business Cases](#), 2019

- ❖ Multiple stakeholders, non-regulated and regulated entity develop, own, operate and maintain the storage asset
- ❖ The regulated entity dispatches the storage asset for infrastructure services – its primary goal is ensuring a **safe and reliable** electricity system. The device is not to be used for market services by the entity
- ❖ A market player will be responsible for providing and monetising market-based value streams, e.g. arbitrage, frequency regulation, etc.
- ❖ *Agreements in place – clearly identified when, how, and by whom storage services will be provided.*



- ❖ *This maximises the facility's social welfare by fully deploying all services storage can deliver*



European Association
for Storage of Energy

EASE – European Association for Storage of Energy

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Challenges and advantages of D-NDPs according to the Clean Energy Package

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Luca Lo Schiavo, *ARERA*

Q&A session

Moderator: Athir Nouicer, *FSR*

Closing remarks

Veli-Pekka Saajo, CEER Distribution Systems Working Group Chair

Thank you for your attention!



www.ceer.eu