

Netzintegration von Windenergie und Photovoltaik: Netzplanung, Herausforderungen und Synergien

Entwicklung lokaler Flexibilitätsmärkte: Rechtsrahmen, Chancen und Perspektiven

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OFATE/DFBEW

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AGENDA

- Introduction to Nord Pool
- What are the flexibility basics?
- Two use cases for the creation of one platform



INTRODUCTION TO NORD POOL

At a glance

- Nord Pool offers day-ahead and intraday trading, clearing and settlement services
- ~ 400 customers from 20 countries trade on Nord Pool's markets
- Operates in 16 European countries under our license and in 4 European countries as a service provider
- Nord Pool Consulting / Nord Pool Academy
- ~150 employees, 36 nationalities, offices in Oslo, Stockholm, Helsinki, London, Berlin, Brussels and Tallinn



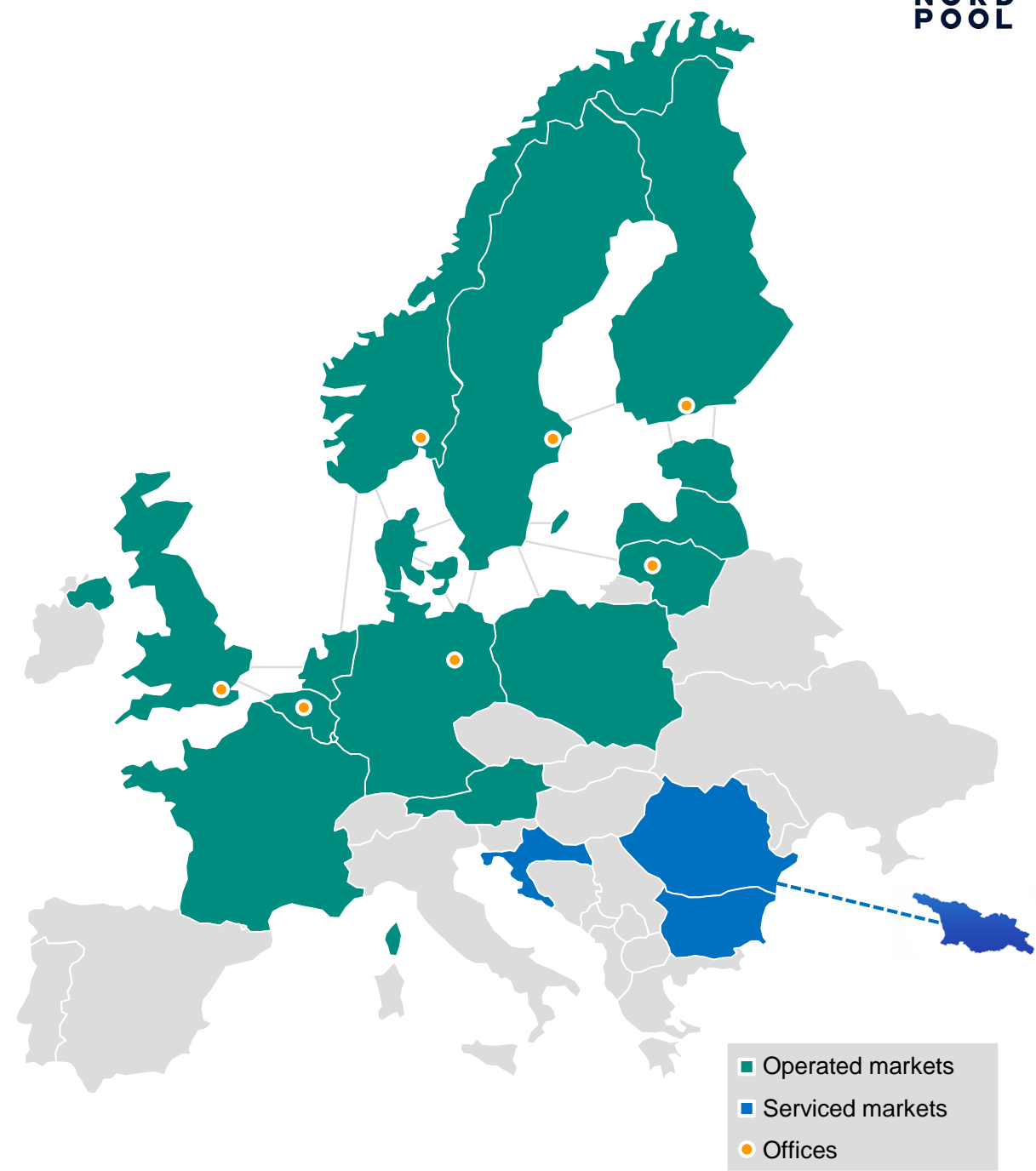
1030 TWh
day-ahead



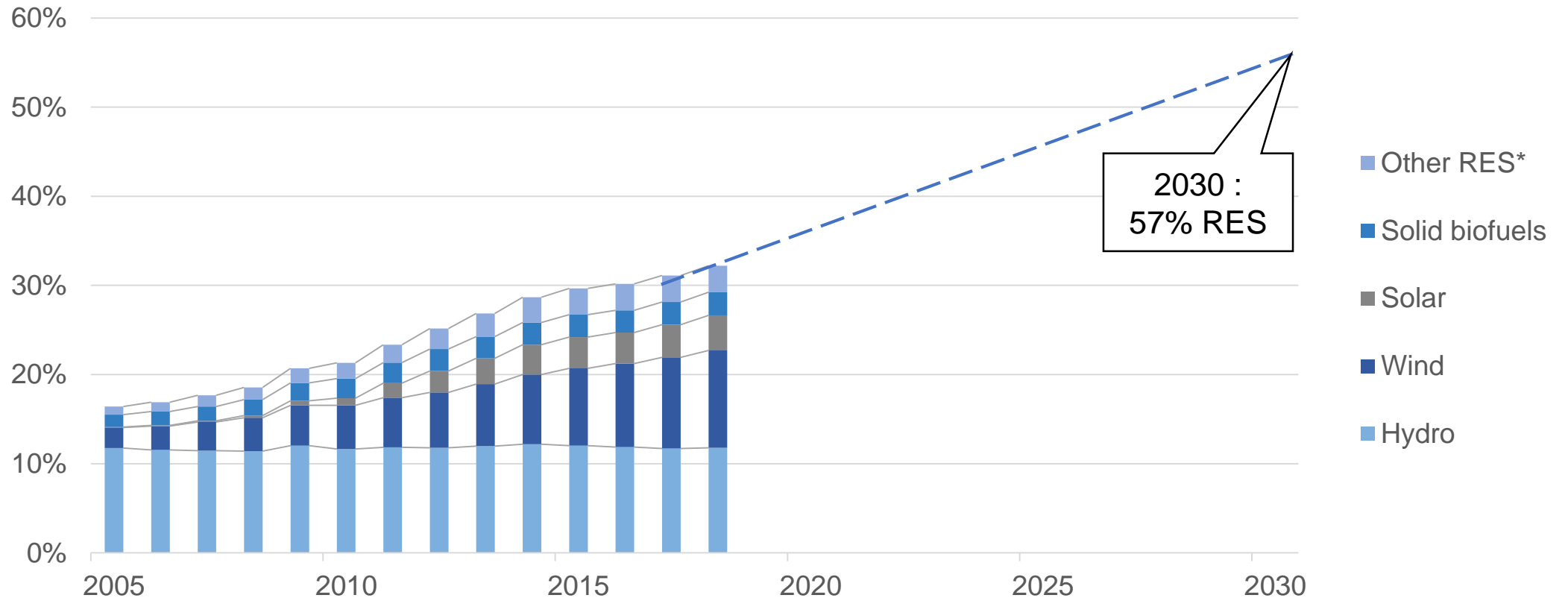
74 TWh
intraday



~400
customers



Share of RES in the electricity production in the EU

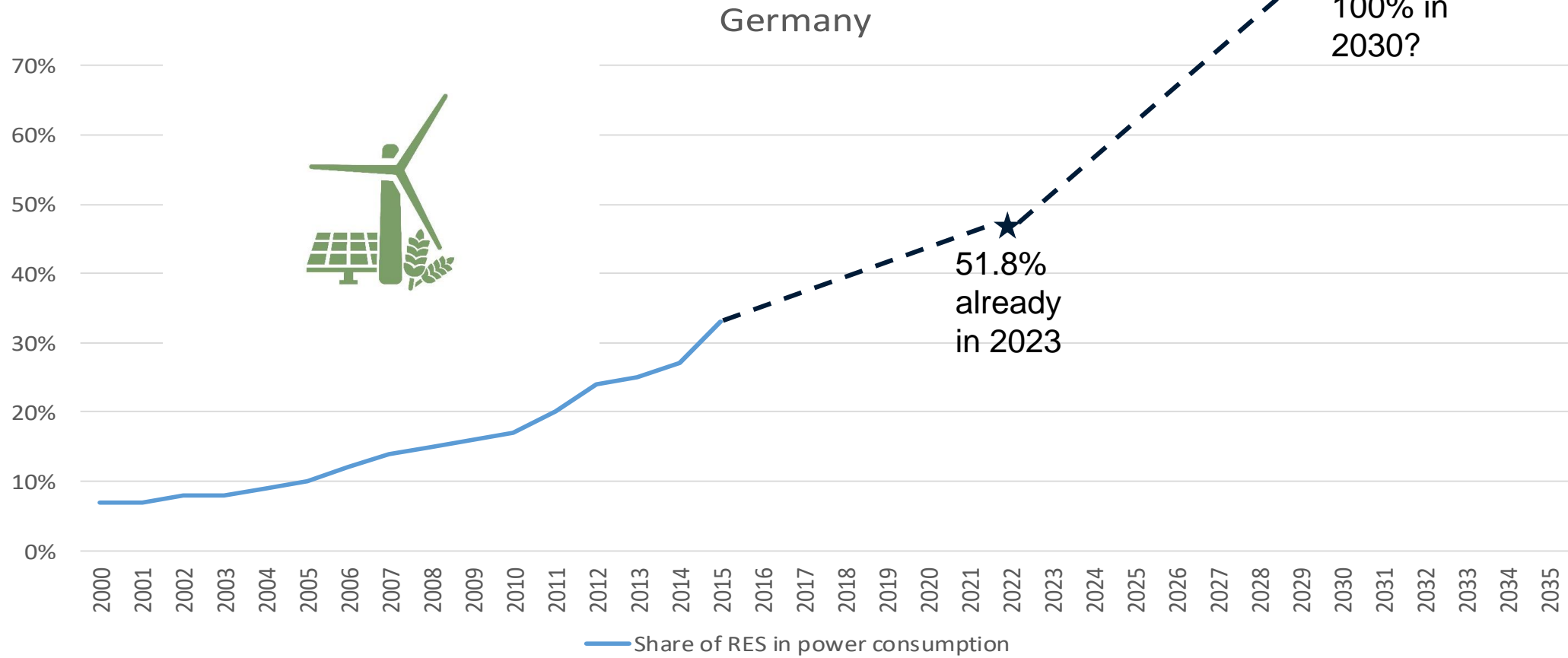


RES (especially iRES) have been and will be increasing their share across Europe (EU-28)...

EU targets by 2030 : 57% RES, ~ 30% iRES

*Electricity generation from gaseous and liquid biofuels, renewable municipal waste, geothermal, and tide, wave & ocean

Source : <https://ec.europa.eu/eurostat/web/energy/data/shares>

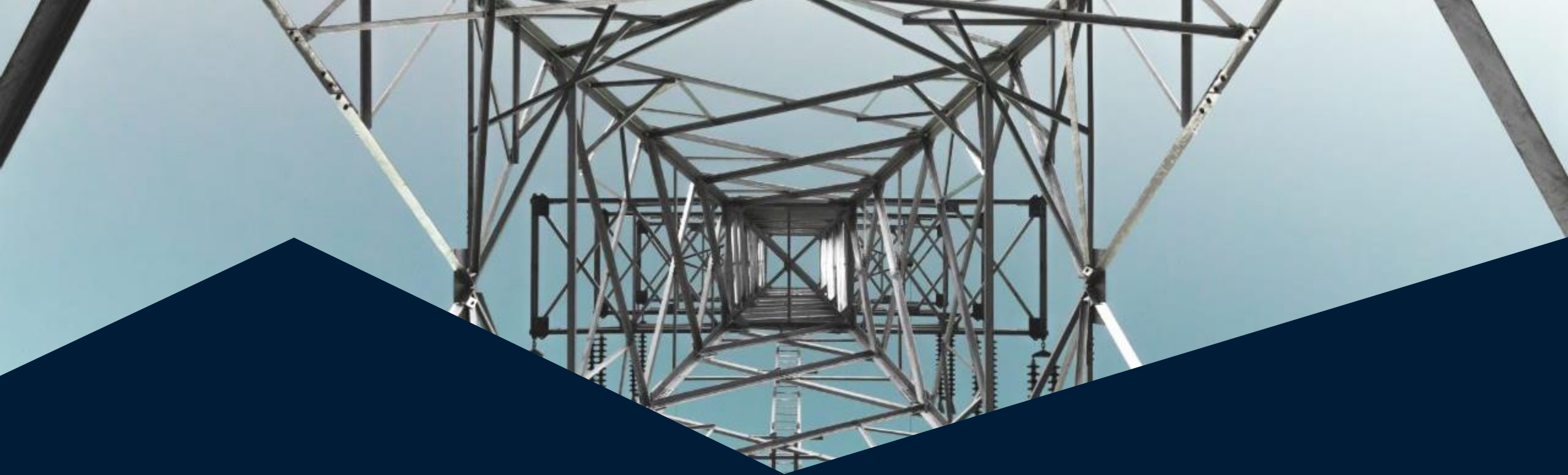


...and a similar pattern applies to Germany—one main driver

Source : Agora Energiewende (2021)

The 5 current trends in European power market

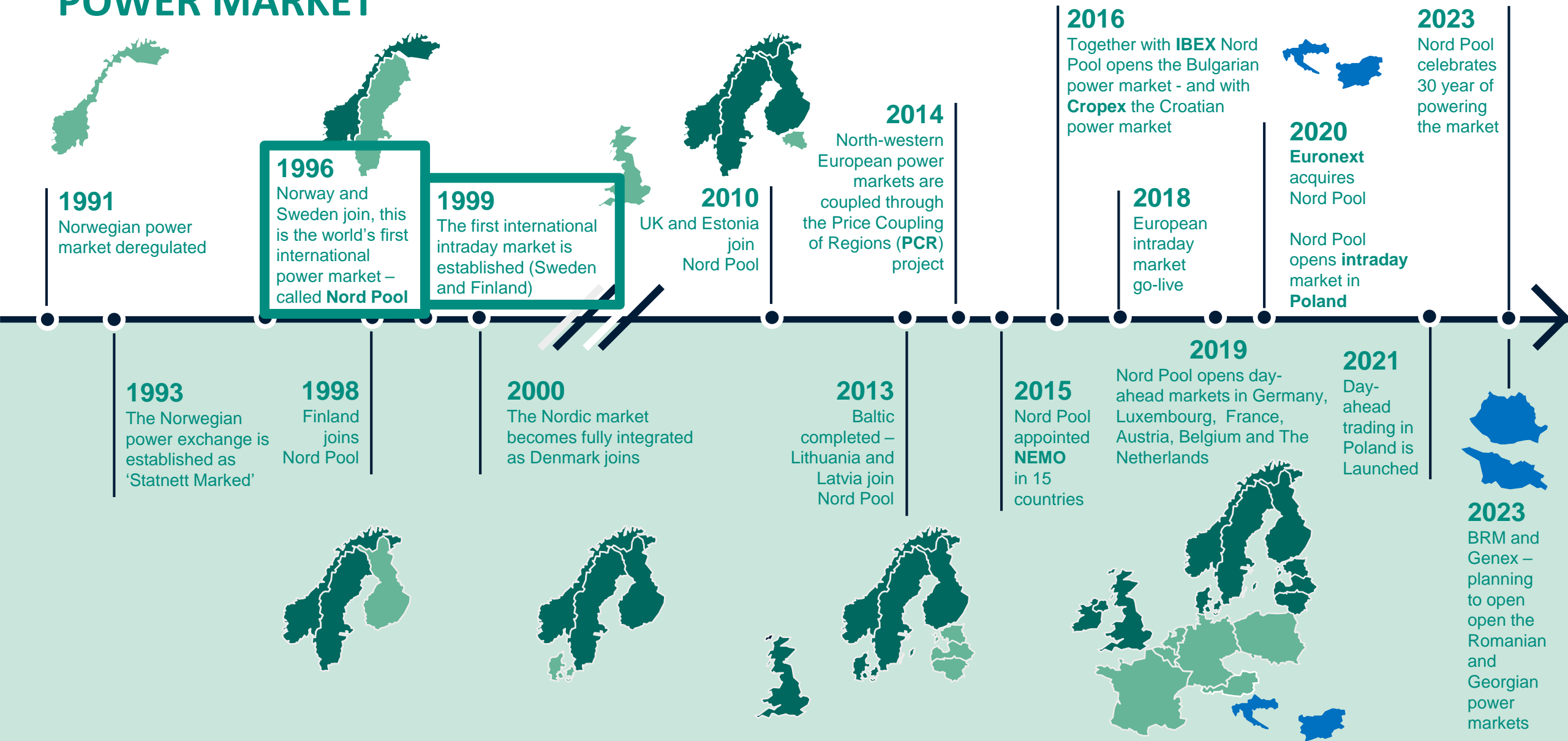
- More trading close to delivery
- More APIs (algorithmic trading)
- Cost cutting
- **Decentralized flexibility markets**
- Changing and new business models



3. A more integrated European power market benefits our customers and the end consumer

- XBID (continuous trading)
- IDAs
- New cables
- Decentralized markets
- MRC/PCR (Day-Ahead auction)

NORD POOL WAS THE BEGINNING OF AN INTEGRATED EUROPEAN POWER MARKET



WHAT ARE FLEXIBILITY BASICS?

Current European market and the need for flexibility

The need for more flexibility in Europe was already high, it is now exacerbated with the energy crisis

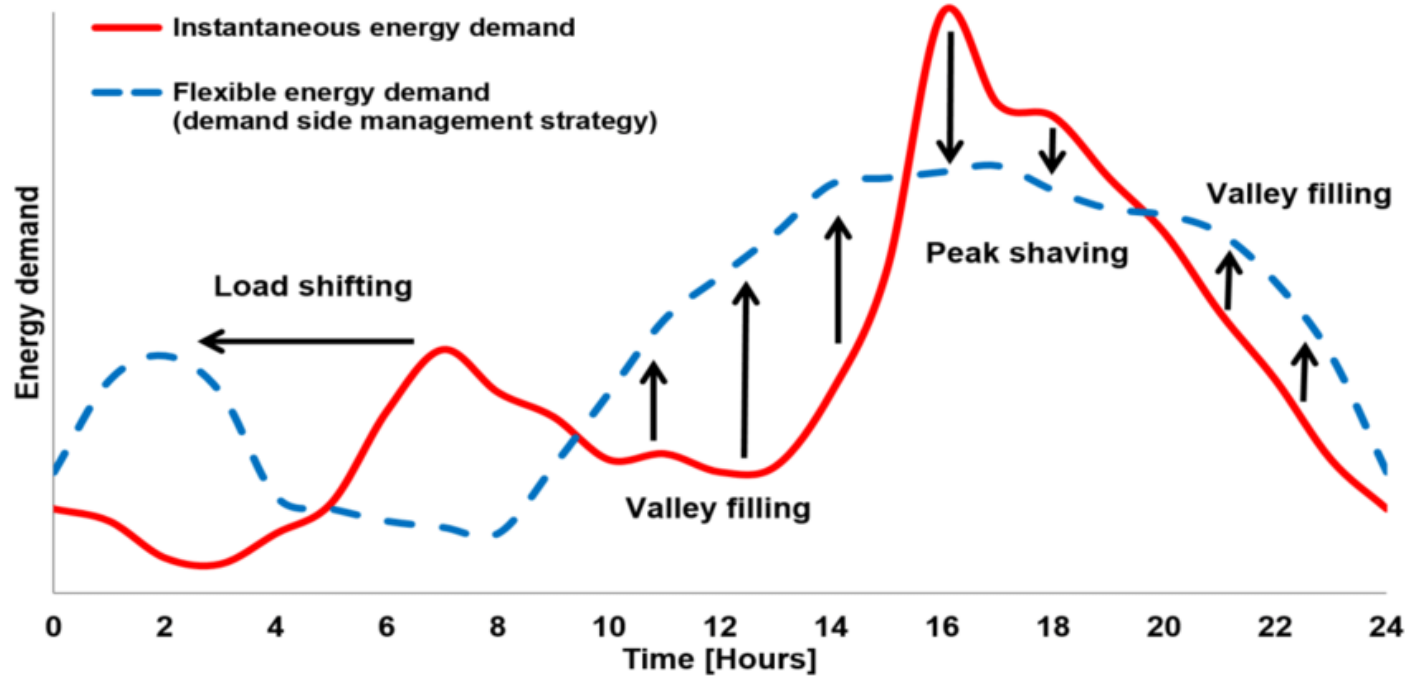
- Electricity markets are moving from centralised to **distributed generation**, from conventional to weather-dependant renewable sources, and from fixed to variable supply and demand.
- In addition, **electrification** is starting to reach neighbouring sectors—from transportation to industrial processes.
- Finally, an outdated **bidding zone configuration** and **insufficient market integration** hinder the transformation of the electricity sector
- As a consequence, today **European grids are congested** and markets are becoming more volatile.



Flexibility fundamentals

Flexibility is the ability of network-connected assets to deviate from their planned electricity consumption or production profile in response to the needs of system operators

Examples of demand-side flexibility actions



Key benefits

System operators

- Avoid curtailment of renewables
- Improve congestion management
- Defer grid reinforcement

Market participants

- Portfolio optimisation
- Self-balancing

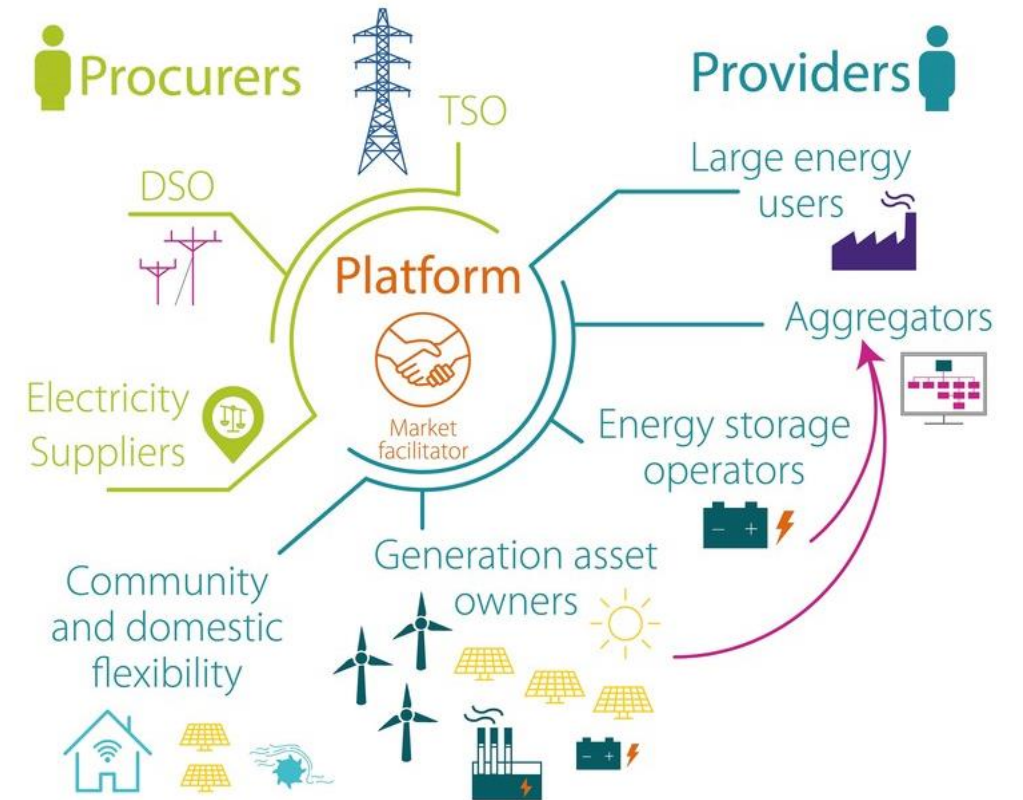
Microgrids, energy communities, prosumers

- Demand/supply optimisation

Flexibility fundamentals

Diverse types of decentralized assets should find a way to value their flexibility

SCALE	Residential	Commercial	Large-scale/industrial	
FLEXIBILITY SOURCES	Generation	Solar PV Micro-CHP	Medium-size CHP On-site generators Building-integrated PV	Centralized power plants (gas CCGT, pumped hydro) Industrial CHP Renewables curtailment
	Storage	Electric vehicles Home batteries	Batteries	Pumped hydropower Grid-based battery storage Large-scale mechanical storage
	Demand-response	Electric vehicles Electric heating/cooling (warm water boilers)	Smart buildings Heating/cooling installations	Manufacturing installations Steam/heat generators



regen, 2018. [Local flexibility markets guide](#).

Flexibility fundamentals

Market-based procurement is one way to incentivize a more flexible EU energy market

Network tariffs

Cost-reflective network charges that factor in time, location, direction and capacity could better expose users to prices and untap implicit DSF.

Regulated approach

Network codes and regulations that impose detailed flexibility requirements.

Connection agreements

Variable network access (SOs save on grid expansion) in exchange for lower connection charges (users save on tariffs).

Market-based procurement

System operators acquire flexibility in the market

Flexibility providers value their assets on the market

What do we know in a nutshell?



We know that..

Market drivers and flexibility fundamentals

1. Market drivers

- Decarbonisation, decentralisation, new demand/supply patterns, and sector coupling are transforming the EU electricity system.
- In addition, current market design and poor market integration slow down the development of the sector.
- Flexibility at all levels is needed to avoid increasing congestion costs and volatile prices.

2. Flexibility fundamentals

- **Definition:** the adaptability of grid-connected assets to change plans at system operator's request.
- **Sources:** supply, demand and storage. Currently, supply delivers most flexibility. Demand-side flexibility offers large potential but it is difficult to access.
- **Use cases:** congestion management, investment deferral for DSOs, self-balancing and portfolio management.
- **Flexibility markets** are promising mechanisms to untap demand-side flexibility.

We know that..

Stakeholders and market design

3. Roles in flexibility markets

- NRAs, DSOs and aggregators play key roles in a complex setup.
- **NRAs** must lay out the legal basis for the market-based procurement of flexibility.
- As single buyers, **DSOs** drive the design of flexibility markets.
- **Aggregators** group demand-side flexibility into tradeable volumes.

4. Market design

- Flexibility markets are being designed by **trial and error**.
- In absence of defined configurations, **pilot projects** and **operating platforms** are making design choices—regarding operation, participation, product definition, trading schemes, price setting, settlement, market integration, and TSO-DSO coordination.

We know that..

5. Market barriers

- Emerging flexibility markets face **regulatory, economical, technological** and **competition** issues. The **lack of clear legal frameworks** is easily the biggest obstacle for market development.
 - This is now being addressed by the ACER's effort to bring in new Network codes on Demand Side Response
 - UK's DESNZ is currently working on a newer market design to standardize demand side flexibility legally
- DSOs need the right economic incentives
 - With a right mix of CAPEX and OPEX ratios, driving innovation and at the same time securing the SoS
 - Digitalisation is lagging behind.
- Local flexibility markets are limited in size and competition.
 - No standard product available which doesn't help in scaling up

We know that..

6. EU flexibility projects

- Dozens of initiatives across Europe, including 100+ pilots, are testing how to unlock flexibility for TSOs and DSOs. **Many projects overlap.**
- Most implementations focus on **storage** as flexibility source (*over generation or demand*).
- **Market platforms** are the preferred market-based tool (*over bilateral agreements or tenders*).

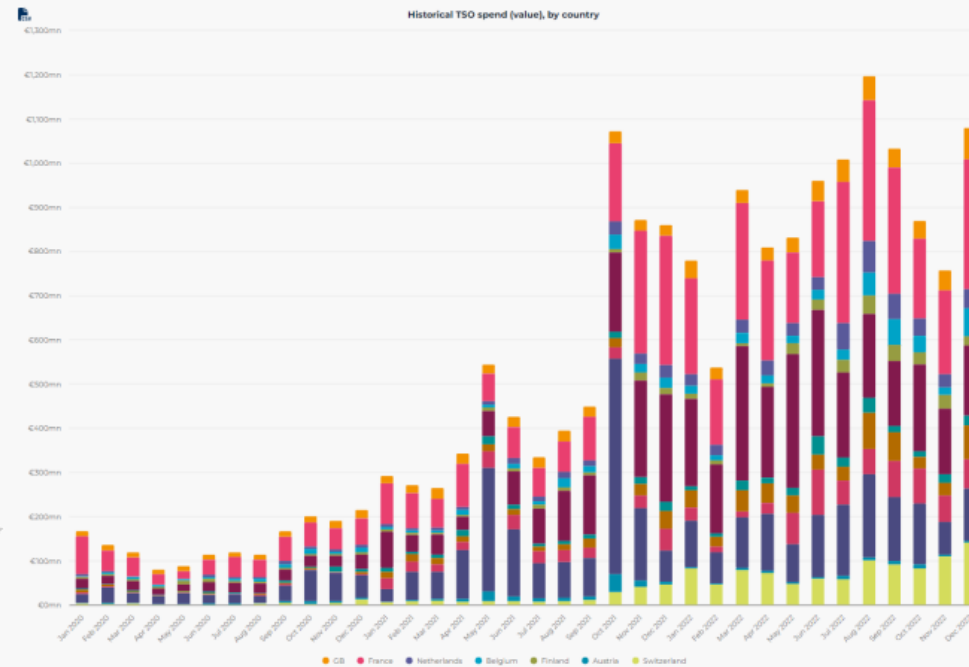
We see that..

How big is the market for flexibility?

LCPDelta



From 2022 Market Monitor for Demand Side Flexibility



From LCP Delta FLEXtrack

But...

Volatility is the Biggest Necessary EVIL!!!!

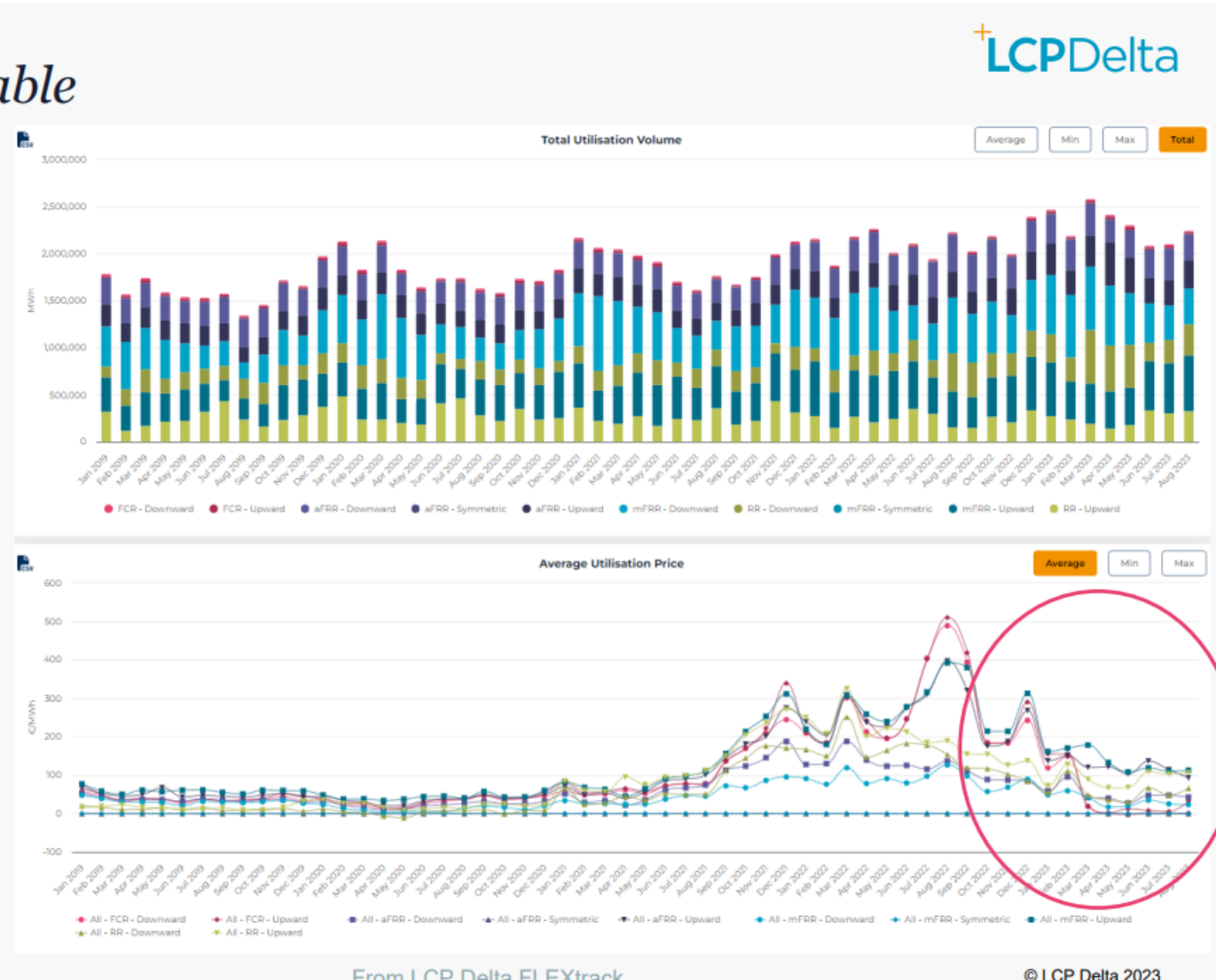
€16bn is not sustainable

2022
€5.3bn



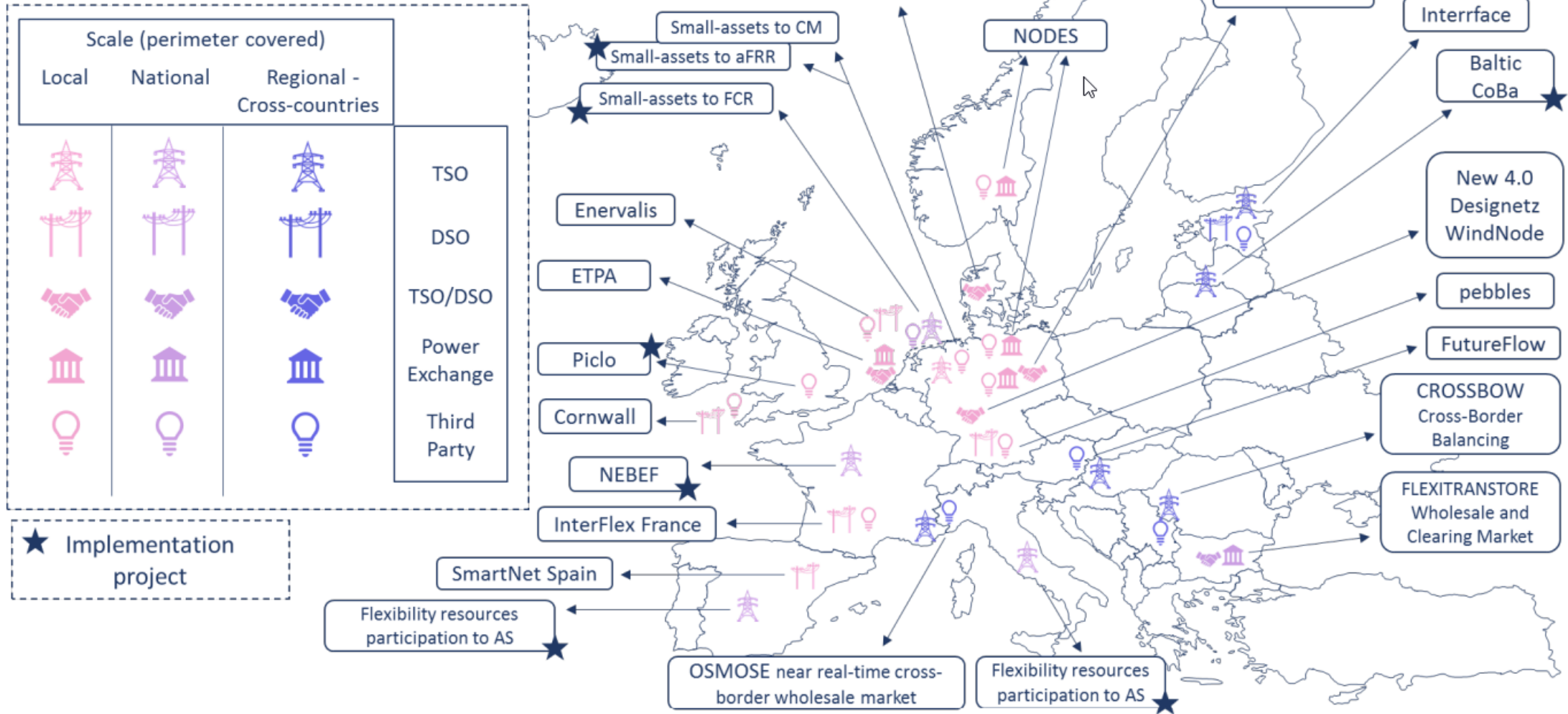
2023
€3.3bn

For comparison 11 markets Jan - July



We know that..

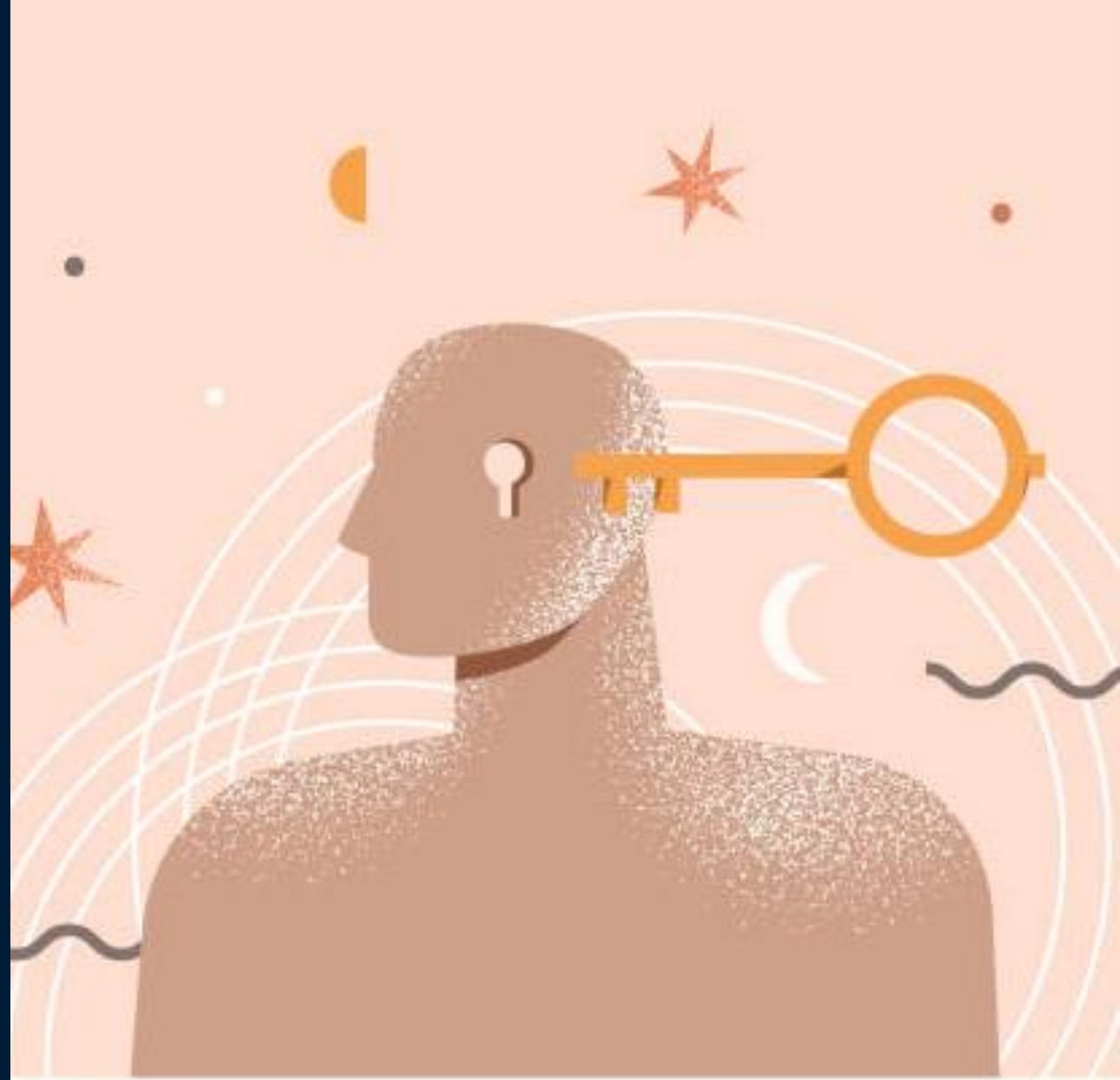
6. EU flexibility projects



Nord Pool Philosophy

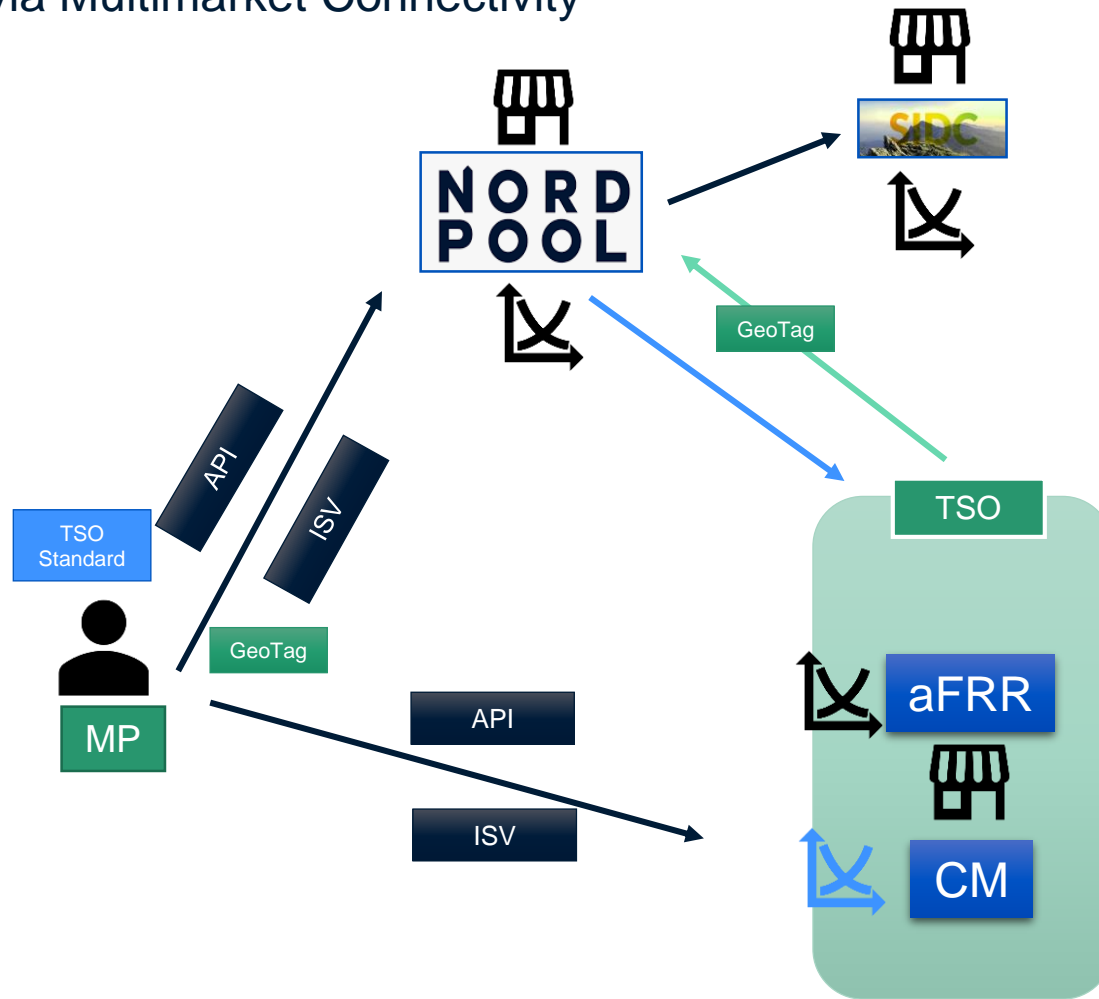
Nord Pool understands that the key is to harmonize and to further integrate markets together to harness flexibility

- Nord Pool to keep working on a solution where spot markets are leveraged to solve many problems
 - procuring flexibility
 - managing lower TSO markets liquidity
 - Lowering the entry barriers
 - Bringing the TSOs closer to spot markets
- Nord Pool believes in one platform philosophy to provide all market stakeholder with higher efficiency and effectiveness to procure/deliver commodities in all time frames



Vision for Nord Pool

Leveraging Flexibility via Multimarket Connectivity



- Status Quo
- Vision 1
- Vision 2



TWO USE CASES FOR THE CREATION OF ONE PLATFORM

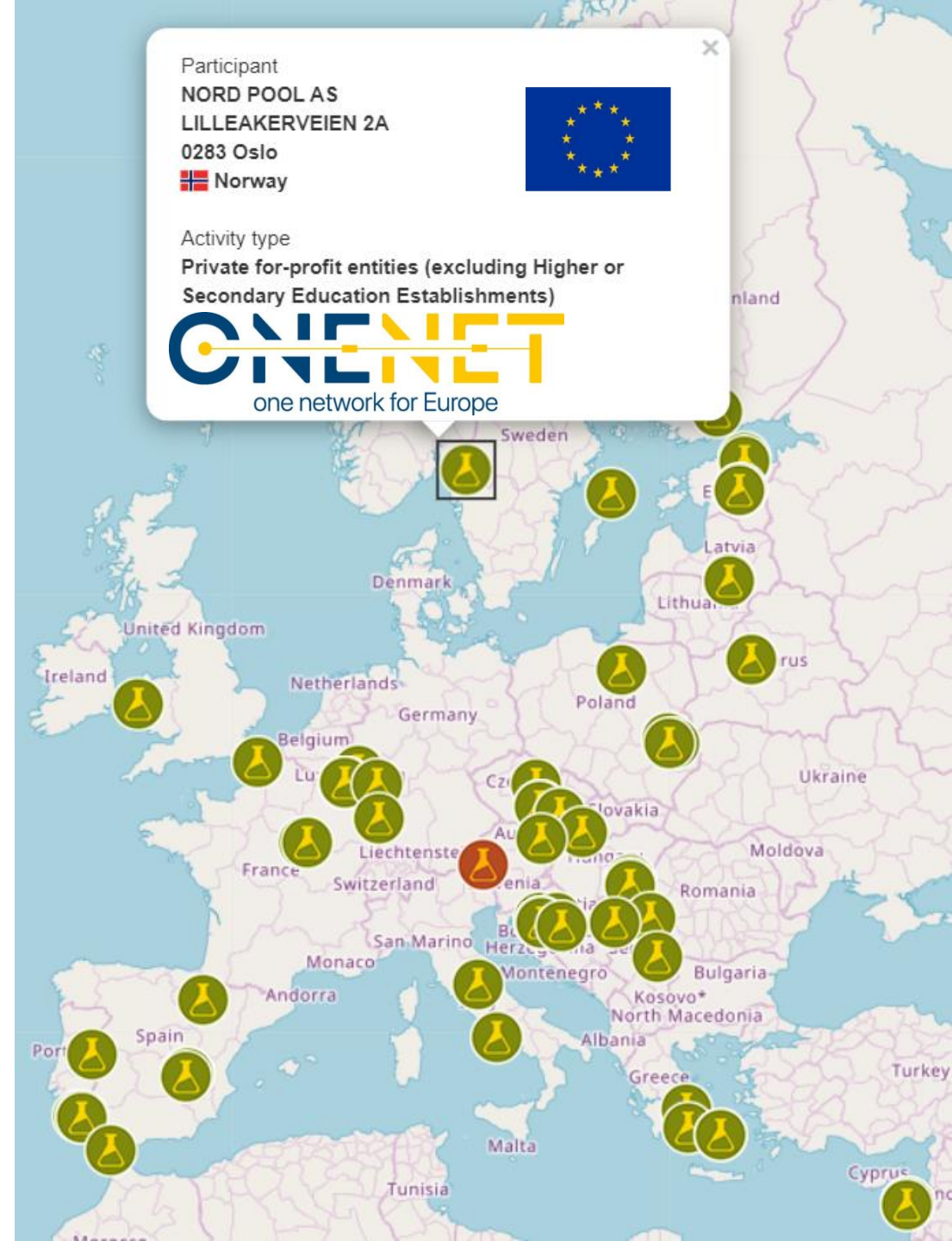
ONEnet project

Nord Pool enables TSOs and DSOs to purchase their flexibility needs on the wholesale intraday market

Nord Pool is part of the **Northern Cluster Demonstrator***.

- **Key goal:** to allow customers **access to TSO balancing markets** through Nord Pool's user interface in addition to the intraday markets.
- Implementation must be "balancing-market compliant" (frequency and congestion management)
- Part of EC's Horizon 2020 program: consortium of over 70 participants lead by the Fraunhofer Institute

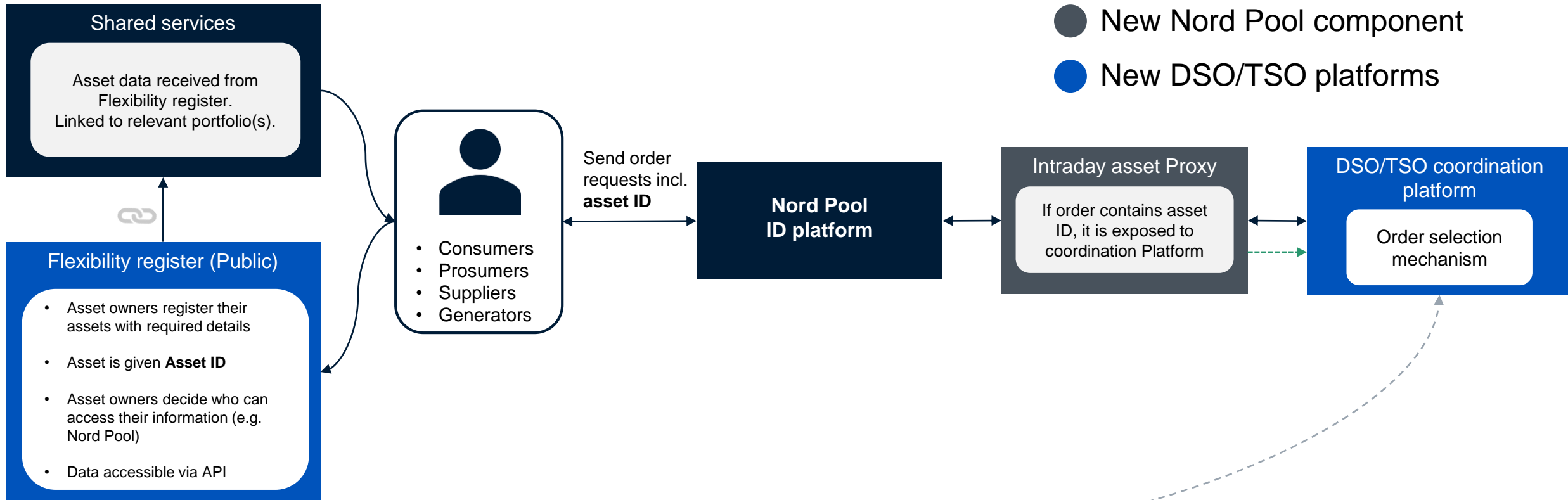
*Ireland, Norway, Sweden, Finland, Estonia, Latvia, Lithuania.



ONEnet project

Development of a solution with which TSOs can access to orders on the intraday platform with balancing attributes (geographical tags)

- Existing Nord Pool components
- New Nord Pool component
- New DSO/TSO platforms

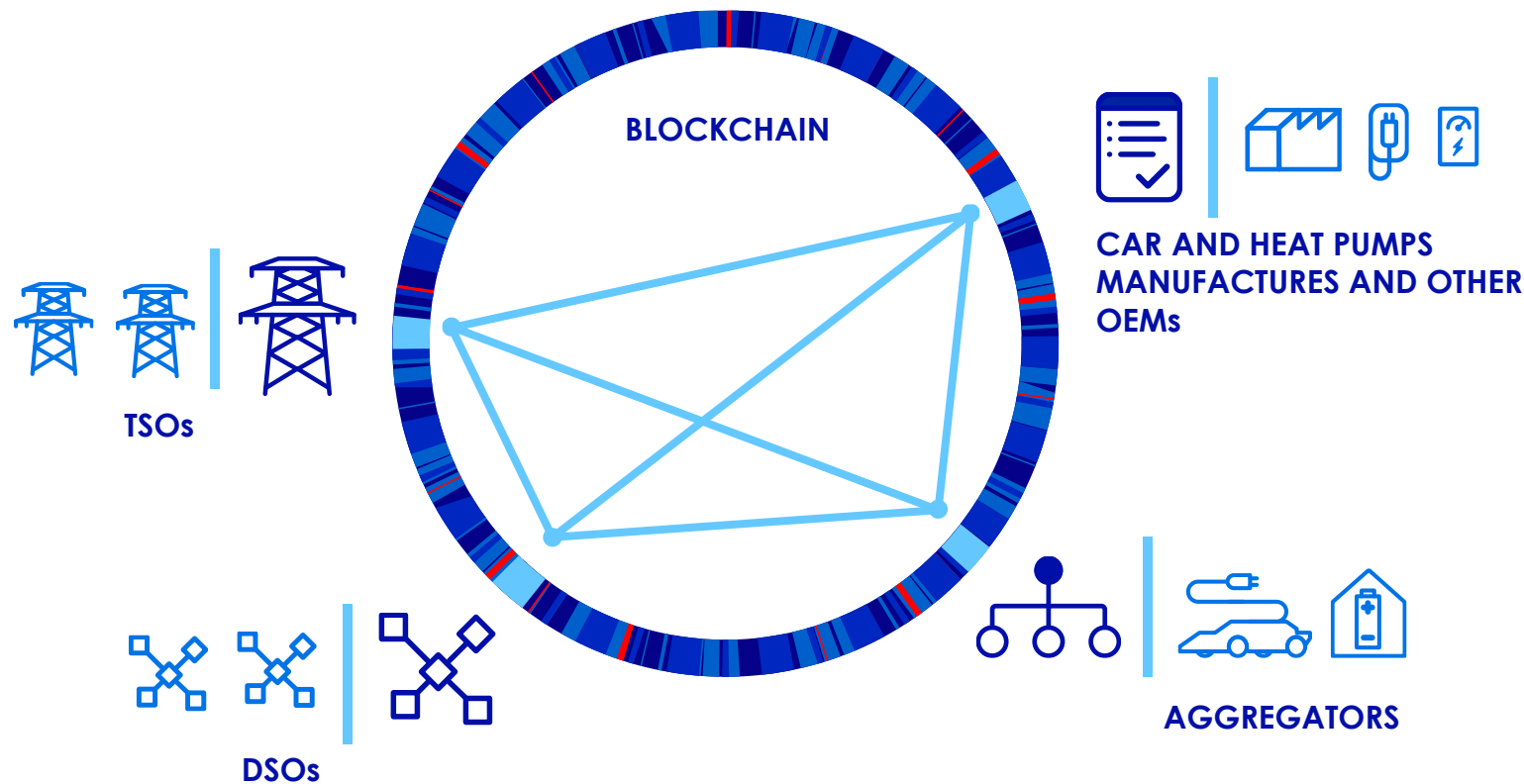


Equigy flexibility platform and crowd balancing

EQUIGY

crowd
balancing
platform

Equigy is a technology provider enabling small scale flexibility sources to participate to the electricity markets



- Provide the required transparency and allow TSO and DSO to add system constraints
- Facilitate interaction between aggregators & OEMs
- Facilitate an increasingly decentralised energy market
- Improve validation methods for the TSO and DSO
- Scaling possibilities over country borders for Aggregators and BSPs

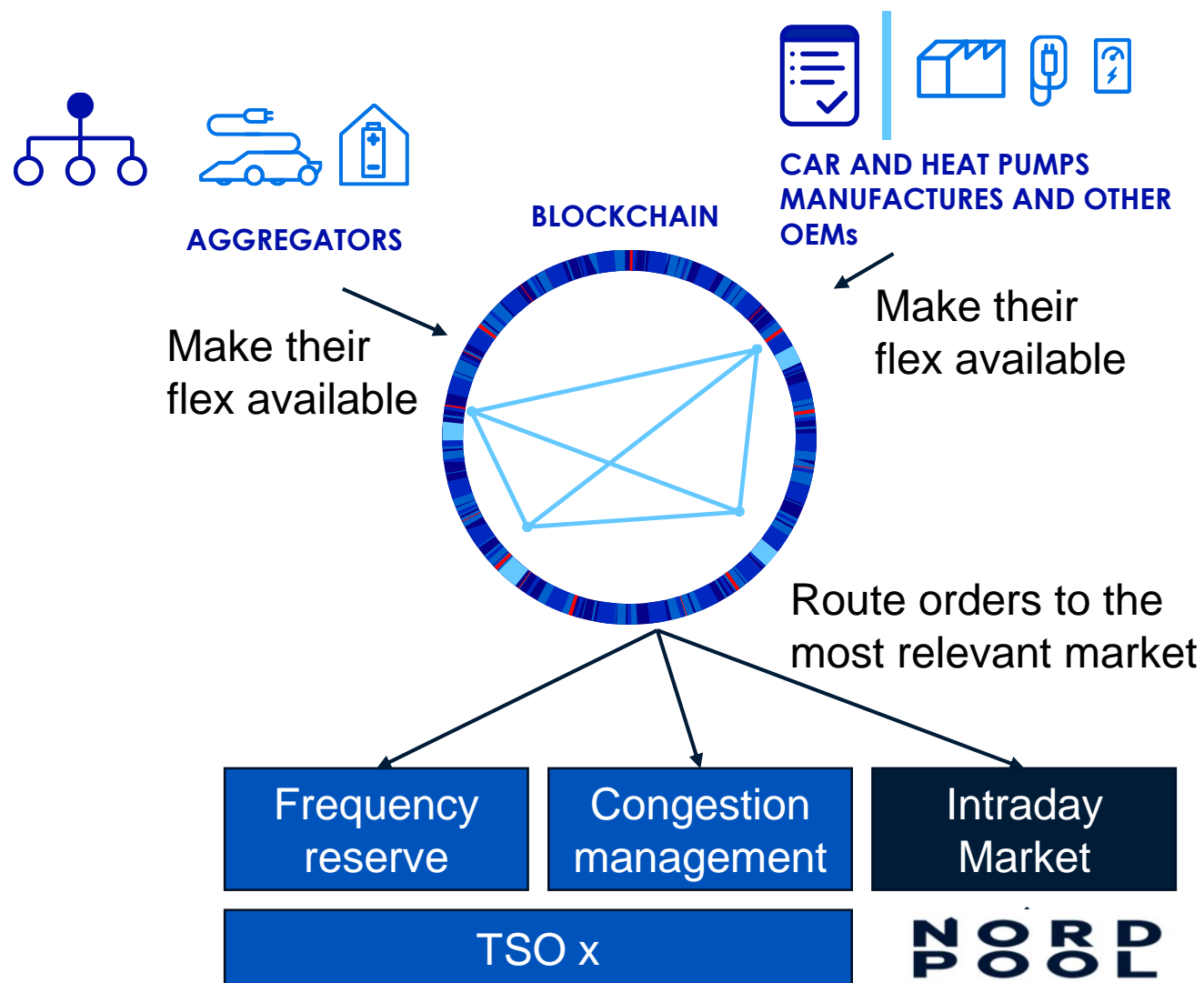
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Equigy flexibility platform, crowd balancing and intraday

Nord Pool and Equigy are partnering to help flexibility providers to find the best possible value to their assets

Nord Pool and Equigy are offering together a better optionality to flexibility providers so they can offer their flexibility where it is the most valued:

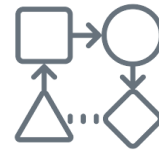
- **Key goal:** to allow **small flexibility providers** using Equigy technology not only to **access to TSO balancing markets** but also to access **Nord Pool's intraday markets**, through an automated API
- Implementation in line with balance responsibility as defined in Europe as step 1, step 2 is to introduce handling of multiple balance responsible parties



Major relevant components and success factors



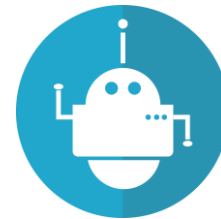
One open platform for all to trade flexibility services in a transparent and cost-effective way



Dynamic market model exposing flexibility to all DSOs & TSOs in a coordinated way



Unlock the value of local flexible power resources by **lowering barriers of entry**



Customer centric approach, supporting existing **automation** abilities

Challenges with market-based flexibility procurement

Ideally designed markets should incentivise more flexibility

- **Competitive** – many available sellers
 - **Liquid** – sufficient volumes and capacity
 - **Transparent** – full information and clearly defined products and services
 - **Non-discriminatory** – supply, demand and storage participate on equal footing, including small participants
 - **Low entry or exit barriers** – thanks to technology and business models
- Existing market design (with some tweaks) and technology are 2 key enablers of revealing the potential of flexibility***

BUT lack of clear legal framework

- EU vs National regulation and harmonisation
- Clarified roles and responsibilities between platforms, market operators, TSOs/DSOs and flexibility providers
- Flexibility in network regulation and incentives (buy vs build) Relevance to wholesale market regulation (balance responsibility, role of aggregators)



Questions and suggestions?

DANKE!
GRAZIE!
THANK YOU!
MERCI!
BEDANKT!
TAKK!
Dziękuję!

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Pietro is Executive Vice President Europe at Nord Pool and, acting as General Manager for this region, he is responsible for overseeing and expanding Nord Pool's presence across Europe and creating greater value for its customers and other stakeholders.

Pietro has a professional background in international business, and the public and academic sectors, particularly relevant to the energy and power sector and to his role at Nord Pool.

He has studied engineering at Politecnico di Milano and Alta Scuola Politecnica in Italy and at Ecole Polytechnique in France, economics at Milan University and pursued postgraduate business and government studies at Harvard University in the USA.

Born into an Italian-Greek family and grown up in Italy close to Austria and Slovenia, Pietro has lived in 10 countries so far. You may address him in English, German, French, Italian or Greek (you can try some Spanish, Dutch and Russian, too).

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