

Local Flexibility Platforms and US Nodal Markets

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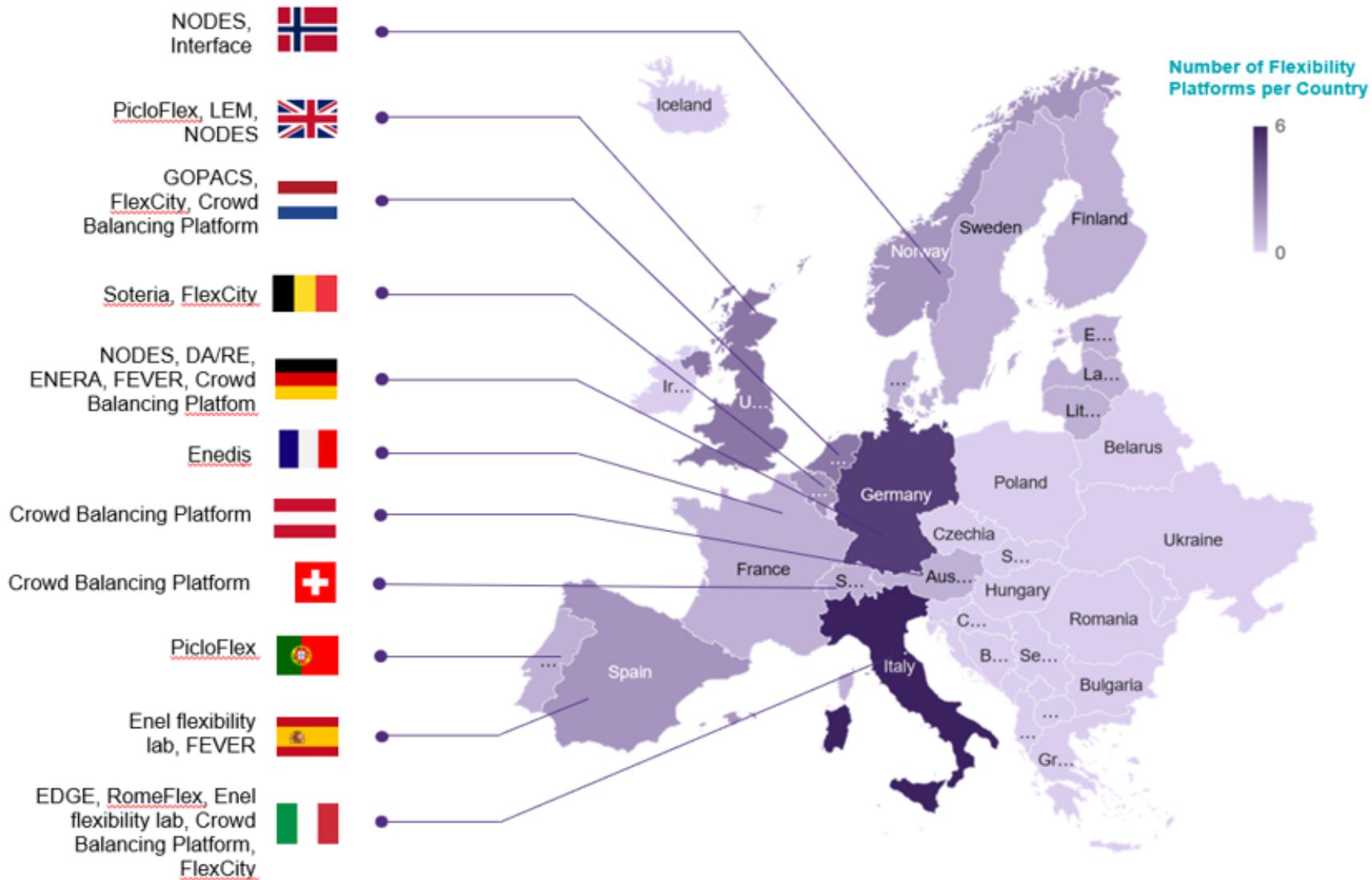
Future Market Power platform workshop on
“Local Market Places: market design options”

Brussels, Belgium

July 2, 2025

Local Flexibility Platforms

<p>Pilot Platforms</p>	<ul style="list-style-type: none"> • FlexRome • Enera • EDGE • Soteria • Enel flexibility lab • Crowd Balancing Platform • FEVER
<p>Commercial Platforms</p>	<ul style="list-style-type: none"> • PicloFlex • NODES • GOPACS • FlexCity • DA/RE • Interrface • Local Energy Market (LEM)



Platform	Ownership	Topology of operation	Products	Commercial readiness	Liquidity	Participation in other markets
ENERA	EPEX SPOT (power exchange)	Germany, counties Aurich, Frisia and Wittmund	Like intraday products definition	Terminated after pilot phase	---	Yes, intra-day market
NODES	<ul style="list-style-type: none"> Formerly owned by Nord Pool (power exchange) Now owned by NODES (independent entity) 	Norway, Sweden and Canada	<ul style="list-style-type: none"> Two products: short-term & long-term Wide range of parameters 	Commercial	<ul style="list-style-type: none"> 8000 MWh of traded volumes 	Unclear
PicloFlex	Owned by Piclo (independent entity)	UK, USA, Australia, Portugal and Italy	<ul style="list-style-type: none"> Definition adapted to country UK: 4 products Italy: 3 products 	Commercial	<ul style="list-style-type: none"> Over 300 000 flexibility assets 2.6 GWh of procured flexibility € 86 million awarded in contracts 	No
EDGE	<ul style="list-style-type: none"> Pilot owned by E-Distribuzione (Italian DSO) E-Distribuzione contracted PicloFlex 	Italy, provinces of Cuneo, Benevento, Foggia and Venice	3 products: regulation of active power, regulation of reactive power, emergency	Pilot	<ul style="list-style-type: none"> First tenders conducted in 2024 	No
RomeFlex	<ul style="list-style-type: none"> Areti (Italian DSO) GME (Italian power exchange) 	Italy, Rome	Forward market and spot market products	Early commercial	<ul style="list-style-type: none"> First tenders conducted in November 2023 	Fully integrated to the wholesale market
GOPACS	<ul style="list-style-type: none"> System operators: Dutch TSO TenneT and Dutch DSOs Enexis, Liander, Rendo, Stedin, Westland Infra 	Netherlands	Procurement is a combination of two orders <ul style="list-style-type: none"> a buy order a sell order 	Commercial	<ul style="list-style-type: none"> Over 90 GWh of flexibility has been procured via GOPACS by TenneT Over 110 MWh procured by DSO Liander 	Integrated in the intraday market
Enedis	<ul style="list-style-type: none"> DSO Enedis 	France	3 services: congestion management, enhance work planning, investment deferral	Commercial	<ul style="list-style-type: none"> In 2023 Enedis awarded 4 flexibility contracts, significantly more activity in 2024 	No
EPEX LEM	<ul style="list-style-type: none"> EPEX 	UK	Upward/downward energy activations	Commercial	During the trial phase: 201 MWh reservation contracts, 90 MWh of volume delivered/activated	No

Sources

Bibliographic sources

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- [2] Mezghani, I., Stevens, N., Papavasiliou, A., & Chatzigiannis, D. I. (2022). Hierarchical coordination of transmission and distribution system operations in European balancing markets. *IEEE Transactions on Power Systems*, 38(5), 3990-4002.
- [3] Frontier Economics (for ENTSO-E), “Review of Flexibility Platforms,” 2021
- [4] Chondrogiannis, S., Vasiljevska, J., Marinopoulos, A., Papaioannou, I., & Flego, G. (2022). Local electricity flexibility markets in Europe. Joint Research Centre (JRC), Tech. Rep. EUR 31194 EN.
- [5] CEER Report on Regulatory Frameworks for European Energy Networks 2022, Annex 6, General case study
- [6] E-Distribuzioni, Impiego dei servizi ancillari forniti da risorse di energia distribuite per l’esercizio della rete di distribuzione
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- [8] BeFlexible, “DEMO 1 Methodological report”, 2023
- [9] Areti, “Presentazione RomeFlex ai Service Providers”, 2023
- [10] GME, "Progetto Pilota Romeflex e Mercato della Flessibilità", 2023
- [11] Enedis, “Règlement de consultation V1.4”, 2024
- [12] Desegaulx, A., Kuhn, T., Dupin, H., & Chevalier, S. (2020, September). Enedis two-step market approach to local flexibilities. In *CIREC 2020 Berlin Workshop (CIREC 2020)* (Vol. 2020, pp. 803-806). IET.
- [13] Dronne, Theo, Fabien Roques, and Marcelo Saguan. "Local flexibility market: Which design for which needs?." In *CIREC 2020 Berlin Workshop (CIREC 2020)*, vol. 2020, pp. 721-723. IET, 2020.

Sources (2)

Interviews conducted

- Yves Langer (Smart Vision, ENERA Platform)
- Philippe Vassilopoulos (EPEX SPOT, involved in the development of ENERA and EPEX LEM)
- Gesa Melzer (NODES, senior project manager at NODES)
- Evyatar Littwitz (Es-geht, German DSO)
- Lukas Albert and Beatrix Schmitt (Stadtwerk Hassfurt, German DSO)
- Ercole De Luca and Altomonte Daniele (Areti, Italian DSO)
- Stefano Alaimo and Fabrizio Carboni (GME, Italian power exchange)
- Matthew Billson and Ayan Kanhai Aman (Piclo, PicloFlex platform)
- Alex Howard (UKPN, UK DSO)
- Nathan Billion (Enedis, French DSO)

Important Takeaways from Study

- Commercial maturity
 - Our subjective impression is that Piclo appears to be the most commercially advanced platform among the ones studied
 - Although UKPN (one of the major UK DSOs) decided to move from Piclo to EPEX (Local Energy Market)
 - Other commercially mature platforms involve power exchanges (e.g. Areti in Italy, where GME is active)
- Diversity of platform ownership
 - It seems that most commercial platforms are not owned/operated by DSOs
 - But some platforms are an exception to this rule, e.g. GOPACS and Enedis: unclear whether there may be conflicts of interest in such cases
- DSO regulatory framework is key driver for platform adoption
 - Countries with advanced DSO regulation have the most advanced solutions (e.g. Italy, UK)
 - And countries with weak DSO regulation are well behind (e.g. France, Germany)

Important Takeaways from Study (II)

- Diversity of integration to wholesale markets
 - Some platforms are mindful of interaction of flexibility products with existing wholesale markets (e.g. GOPACS, RomeFlex)
 - Other platforms are quite disconnected from existing wholesale markets (e.g. Enedis, PicloFlex)
- Diversity of selection criteria
 - Some platforms are based on pure price competition (e.g. GOPACS)
 - While others are a mix of technical qualifications and economic criteria (e.g. Enedis)
 - Awarded prices are often as-bid

Important Takeaways from Study (III)

- Congestion management is the dominant service offered by these platforms
 - Other encountered needs: investment deferral, restoration, voltage control
 - This also translates to a diversity of time scales: long-term procurement (e.g. ENEDIS) as well as day-ahead or close-to-real-time operation (e.g. GOPACS)
- Closed gate versus continuous matching
 - Certain platforms favor closed-gate auctions, e.g. EPEX LEM
 - Others are based on continuous matching, e.g. GOPACS, and exploit existing infrastructure of operating markets

North American Power Systems

FPM Webinar

- Interesting webinar organized last week (June 25, 2025) on “First-hand Insights from the North American Implementation of Nodal Pricing”
- Jointly organized by:
 - Future Power Market Platforms (Karsten Neuhoff)
 - Future Power Markets Forum (Ben Hobbs)
- Link is available here:
<https://www.youtube.com/watch?v=YYBoG0vAMRA>
- Presentations from:
 - Susan Pope (FTI) on implementation of nodal pricing in Ontario, Canada
 - Mark Rothleder (CAISO) on implementation of nodal pricing in California
 - Rana Mukerji (Loudon Energy Analytics) on implementation of nodal pricing in NYISO
 - Scott Harvey (FTI) on implementation of nodal pricing in North America

Some interesting takeaways

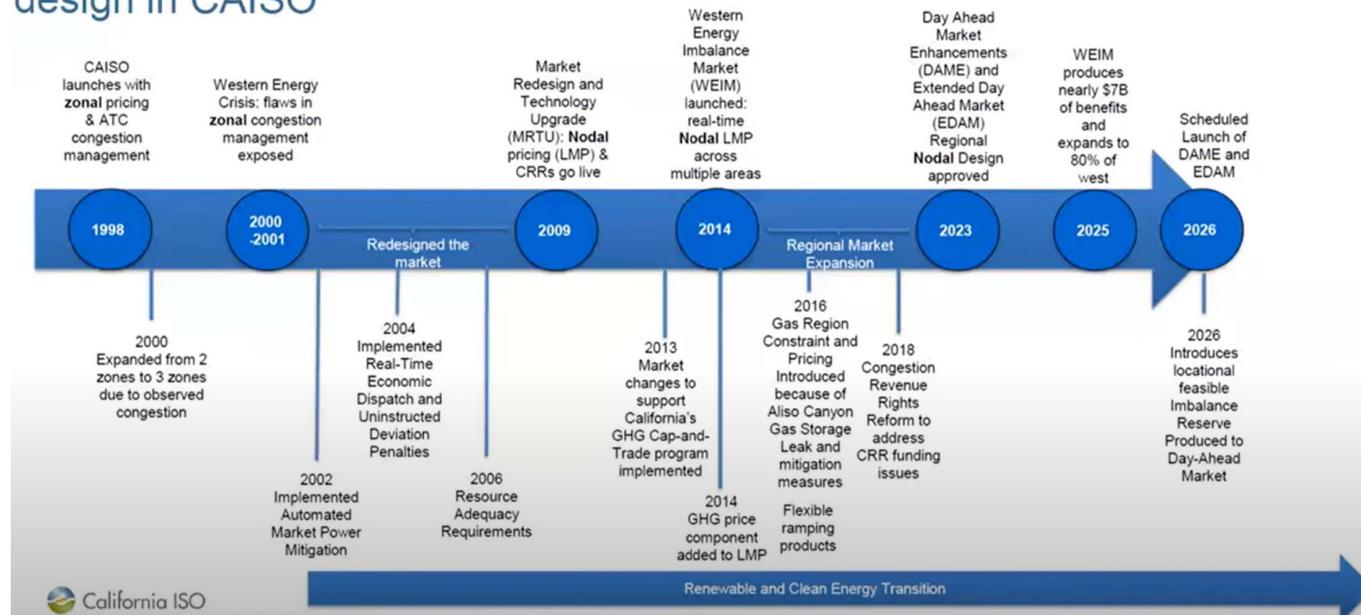
- All presenters made a point about implementing nodal pricing in the **security constrained economic dispatch** (SCED), i.e. the real-time market
- The point was then validated in the breakout session, where two key points were made:
 - Real time comes first
 - And day-ahead (forward market) institutions arrange around that
 - Worth reflecting on how this relates to MARI/PICASSO, and how they interact with SDAC
- What's so special about real time? Secure real-time dispatch is inevitable, if it is not priced then many side effects come up (gaming, investment incentives, ...)
- Portfolios can exist, but at the level of resolution that SCED operates in: if that resolution is nodal, then the location of resources needs to follow a nodal resolution
 - This should not be confused with coordinating power plants with toasters, small resources should still be aggregated

Some interesting takeaways (II)

- According to some speakers, a “big bang” approach can be preferable, but not necessary
 - Ontario: direct implementation of nodal two-settlement system (2025)
 - CAISO: real-time first (2004) and then day-ahead (2009), **not** the other way around
 - NYISO: direct implementation of nodal two-settlement system (1999)
- Loads can follow a zonal resolution in clearing
- One speaker made it clear that it is important for regions to be able to attempt the implementation of nodal pricing and function as frontrunners
 - But is this possible in the case of the EU (see example of Poland)?

US ISOs continue to innovate

Evolution of Congestion Management, Locational Marginal Pricing market design in CAISO



Ontario Electricity System – Introduction

- May 1, 2025 start-up of LMP two-settlement market
- Operated as a single settlement price electricity market beginning May 1, 2002
- Process to implement LMP started in 2017 and delayed by COVID; previously considered several times

IESO Load Zones
(2024 peak load ~ 23.1 GW)



Change to LMP motivated by large constrained off payments and need for locational price incentive for fast ramping supply and decentralized supply