



The future of the Belgian electricity system

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Overview

- ❑ About myself
- ❑ Yuso: a new look at energy management
- ❑ Renewables and aggregation: a practical guide
- ❑ Battery storage: the missing link
- ❑ Barriers to renewable integration
- ❑ Policy advocacy and main takeaways



About Myself: Bart Pycke

- Master Electrical Engineering, University of Ghent, Belgium 1994
- MBA Vlerick Management School, Ghent, 1995
- Research Associate, INSEAD, Fontainebleau, France, 1995-1997
- Head of Trading, GDF SUEZ Electrabel (now Engie), Brussels, Belgium, 1997-2007
- Board member Powernext (now Epex Spot), 2001-2007
- Managing Director, Mercuria Energy Trading, Geneva, Switzerland, 2007-2011
- **1998-Now: Board member EFET**
- **2012-Now: Co-founder and MD Yuso, renewable power & flexibility aggregator**



The start of Yuso

Industry trends



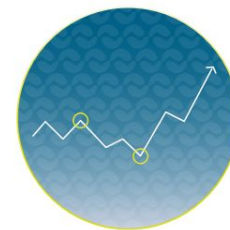
UNBUNDLING AND SPOT MARKETS

The current trends of unbundling and spot markets are reshaping the value chain, allowing Yuso to act as a full actor in the energy business system.



ENERGY TRANSFORMATION

The rise of renewables and batteries is radically changing the industry.



DATA IS THE NEW GOLD

Data is becoming one of the most valuable assets in the energy value chain of tomorrow.



700+

connections

200 MWp

Installed capacity

70+

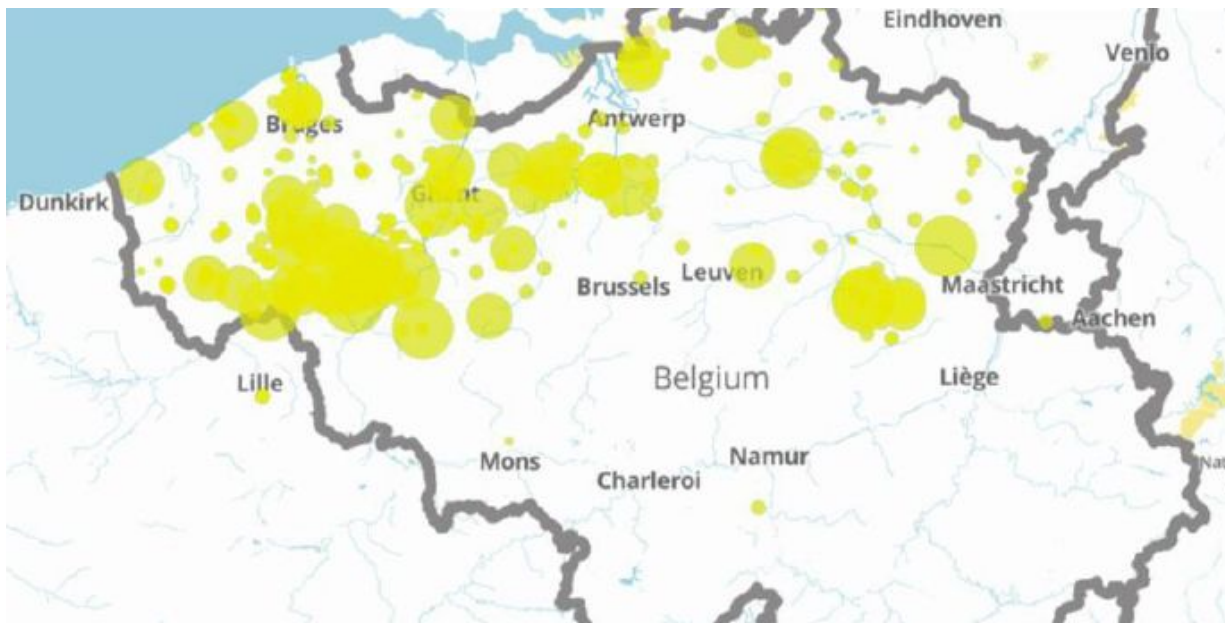
GWh

300+

B2B
Customers

8+ MEUR

Turnover





Disruption of the utility business model

An innovative digital platform offering tailored at B2B “prosumers”

THREE BUSINESS LINES

Covering all aspects of the future of energy players



Injection contracts:

Join our community and deliver your energy **to** the Yuso network!



Supply contracts:

Serve your business with energy **from** the Yuso network!



Storage solutions:

Store and **recycle** your precious energy!



Each hour the market price

Why negotiate a price when there is an open market that determines the fair price?!
With Yuso, you pay the market price every hour!



No contract Just signing up

No more fixed contract durations or tacit renewal: The Yuso Delivery Contract only has a start date: You step in and out whenever you want; No surprises!



Transparent digital reporting

Clear insight into your pricing, consumption and production via Yuso's dashboard platform!



Demand response incentive

Hourly Belpex prices varying between 0 and 300 euro/MWh give a clear demand response incentive immediately reflected on your invoice!



Linking wholesale and retail prices

Components of the Yuso energy platform price

MARKET PRICES,
EVERY HOUR



+ PLATFORM FEE +



GRID COSTS
AND TAXES



yuso Day-ahead prijzen

Beste,
Hieronder kunt u jouw energieprijzen voor morgen vinden.

Gemiddelde prijs voor morgen is: **55.05 EUR/MWh**

Gemiddelde prijs voor deze maand is: **53.77 EUR/MWh**

Lid te zijn naar My Yuso
Log in online om meer informatie te bekijken.
[Log in](#)

Uur	Uurprijs EUR/MWh	Uur	Uurprijs EUR/MWh
00:00 - 01:00	48.11	12:00 - 13:00	58.29
01:00 - 02:00	42.91	13:00 - 14:00	56.46
02:00 - 03:00	41.80	14:00 - 15:00	55.68
03:00 - 04:00	39.21	15:00 - 16:00	55.30
04:00 - 05:00	38.55	16:00 - 17:00	57.84
05:00 - 06:00	40.80	17:00 - 18:00	61.32
06:00 - 07:00	49.61	18:00 - 19:00	66.15
07:00 - 08:00	63.91	19:00 - 20:00	64.90
08:00 - 09:00	58.57	20:00 - 21:00	62.99
09:00 - 10:00	65.38	21:00 - 22:00	52.59
10:00 - 11:00	65.88	22:00 - 23:00	57.97
11:00 - 12:00	61.97	23:00 - 00:00	55.00

in EUR/MWh

[Wijzig mijn meldingsinstellingen.](#)

Bedankt om voor Yuso te kiezen.

Met Yuso team

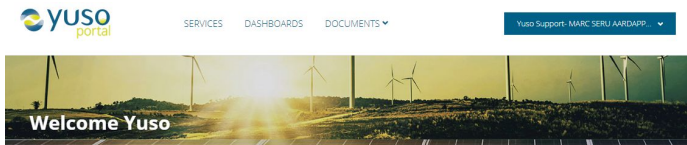
Als je geen dagelijkse prijsmeldingen wilt ontvangen, kun je je afmelden.

Making new energy flow
one platform for your energy

INJECTION SUPPLY STORAGE



A scalable self-service platform for B2B prosumers



to the My Yuso Portal, choose one of the sections below to continue.



Services !

An overview of all your service points with the accompanying technical data and contractual parameters.



Dashboards

Displays your energy consumption or injection for every hour, as well as the wholesale price. These amounts determine the energy component of your invoice or self-bill.



Documents

A list of all invoicing documents concerning your company, divided into overview documents, self-bill documents, invoice documents and a detail document.

We only need a few details from you !

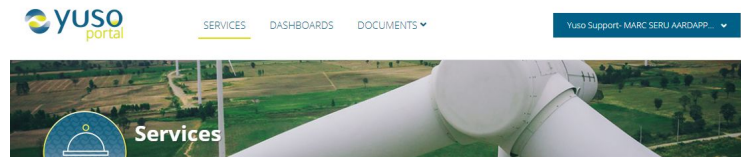
To finalise your supply agreement, we only need a few details from you. This concerns the EAN code and the capacity of your installation, and also the expected use. Click further to complete this information.

[Activate your offtake today](#)

Do you want to use your green energy as optimally as possible?

Yuso provides the best battery solutions for your company. Discover the benefits of our approach.

[Request your battery analysis](#)



An SDP (Service Delivery Point) refers to a measurement point and a Yuso service. An SDP has both technical and contractual parameters listed below. This data determines the various fees and costs (network costs, surcharges and taxes) that Yuso will charge you as a customer supplier.

Supply	Injection	Batteries
EAN54144881000088793 - Vaartstraat 52, 8630 Veurne ↕		
Technical data of the supply point		
EAN	EAN54144881000088793	
Distribution operator	GASELWEST	
Connection rate	T03	
Address	Vaartstraat 52, 8630 Veurne	
Contract parameters for the supply point		
Formula	Belpeex hourly	
Platform fee	€ 4.00 / MWh	

Technical data of the supply point

To make a proposal for the supply of electricity by Yuso or make an analysis, we need a few details from you: the EAN number of your supply/injection meter, the capacity of your connection and the expected annual offtake from the grid. The EAN number can be found on the invoice of your current supplier.

[Add Supply Point](#)

Do you want to use your



Bringing transparency to B2B prosumers

Nederlands Français



SERVICES

DASHBOARDS

DOCUMENTS ▾

ADMIN ▾

ECO QUEST BVBA ▾

YUSO SUPPORT ▾



Total energy **delivered**

631.02 kWh

Total **amount**

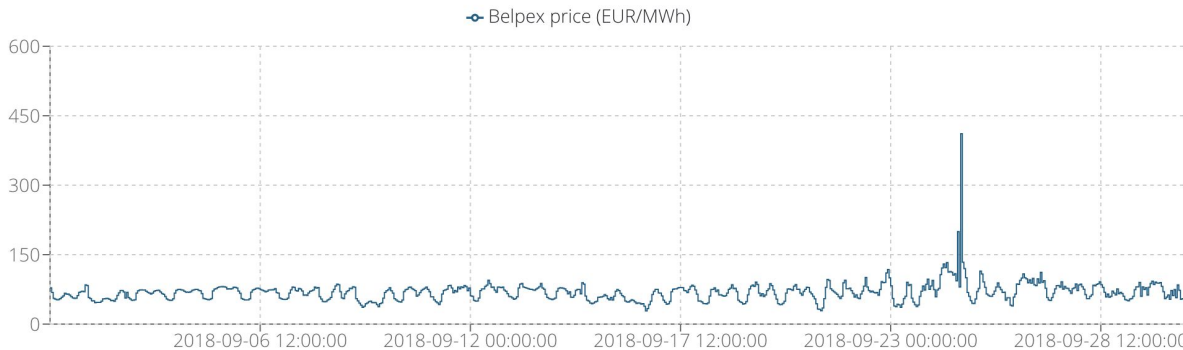
41.01 EUR

Average **price**

64.99 EUR/MWh

Export CSV

Download





Renewables and aggregation: a practical guide

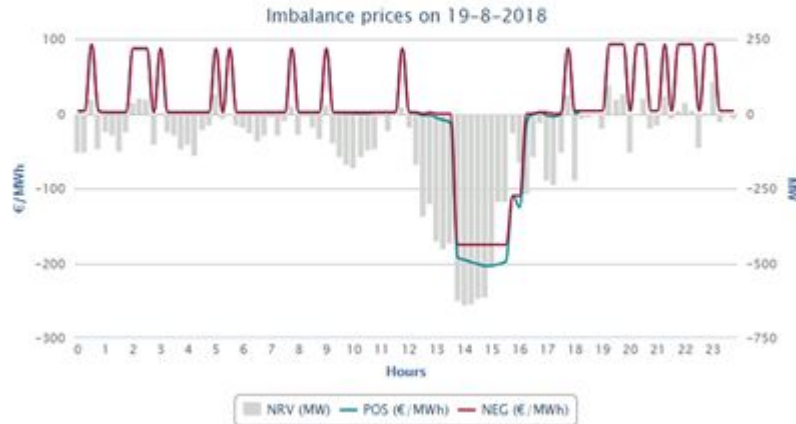




Power price volatility driven by intermittent renewable infeed into the Belgian system

19/08/2018
Data validated on 17/09/2018

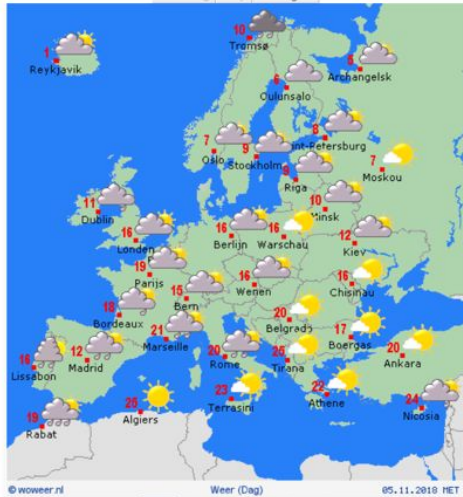
[Export to Excel](#)
[Export to CSV](#)



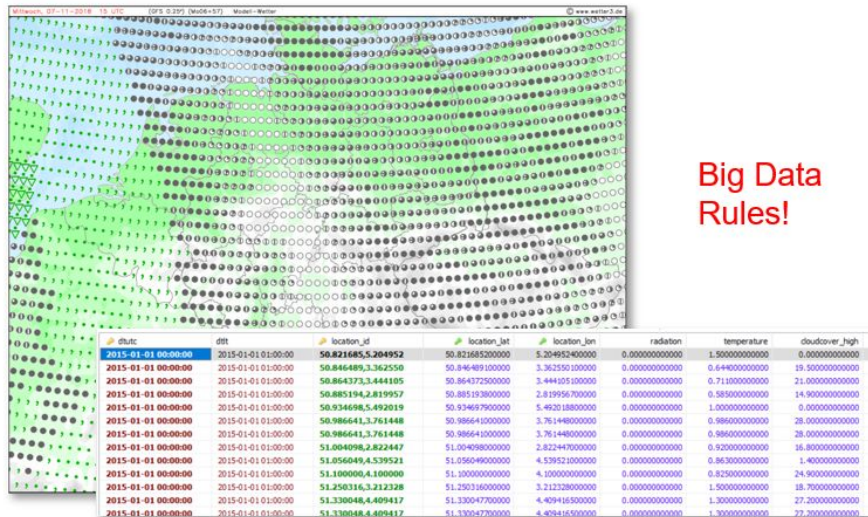
- 'Live Market' organized by TSO Elia
- TSO's 'market' task relates to keeping demand and supply in balance
- Post unbundling, TSO's can not operate assets themselves (Transport vs. Generation)
- The 'imbalance price' reflects the active optimization of excess/shortage of power in the Elia zone versus offtake/supply bids obtained on 15-minute basis



Renewables and aggregation: a practical guide



This is a good start...

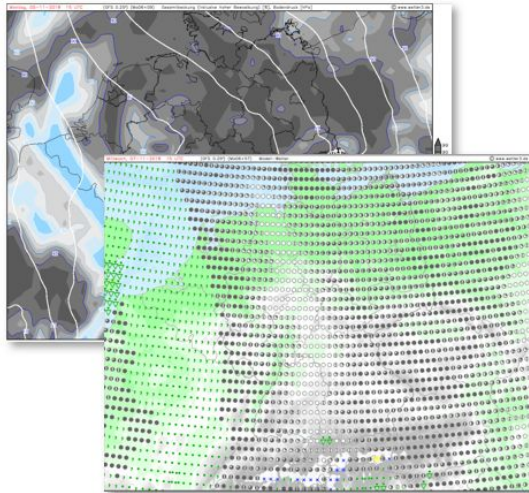


Big Data Rules!

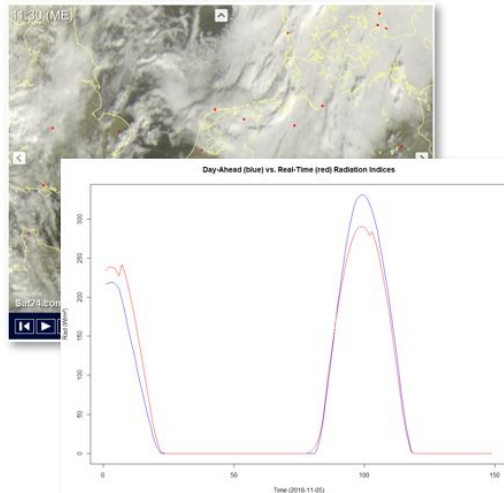
This is way better in terms of spatio-temporal resolution...



Renewables and aggregation: a practical guide



Day-Ahead: Models, models

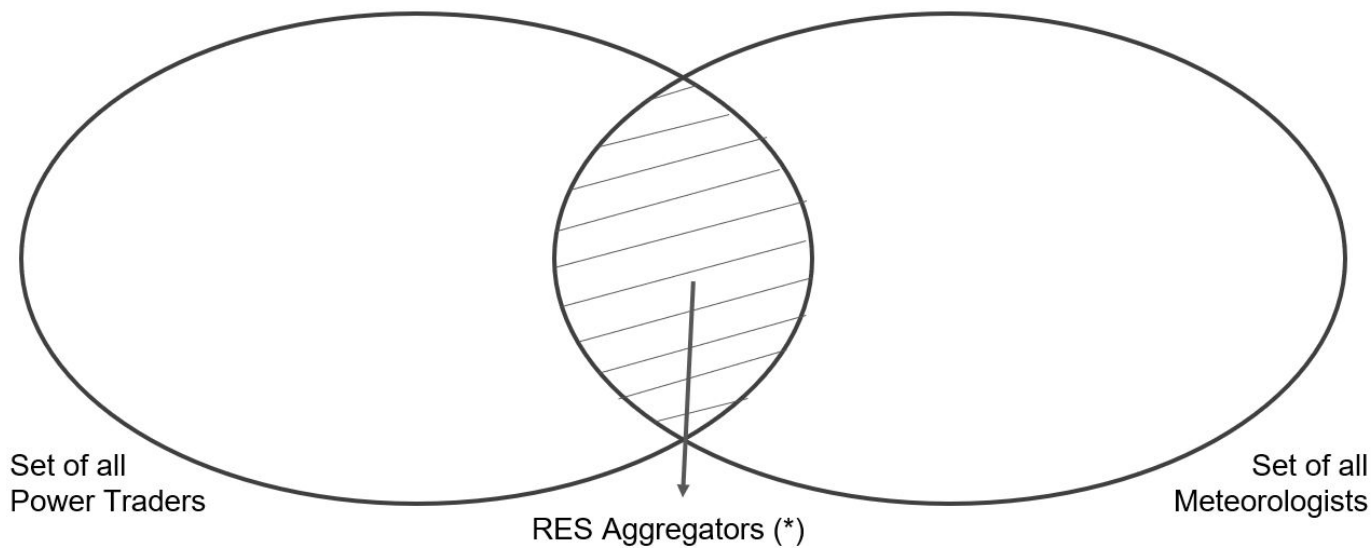


Intraday: Models, actuals and flexibility (batteries)





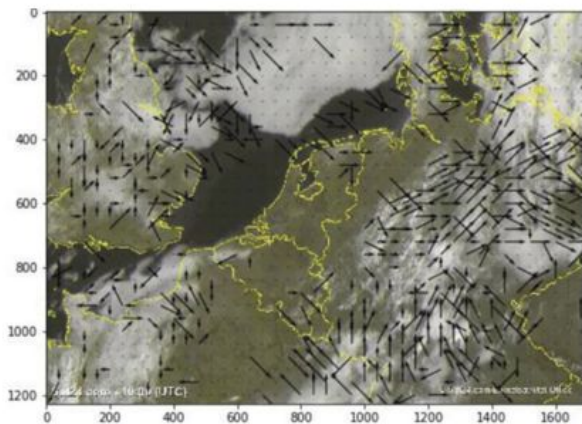
Renewables and aggregation: a practical guide





Renewables and aggregation: a practical guide

Cloud Image Recognition

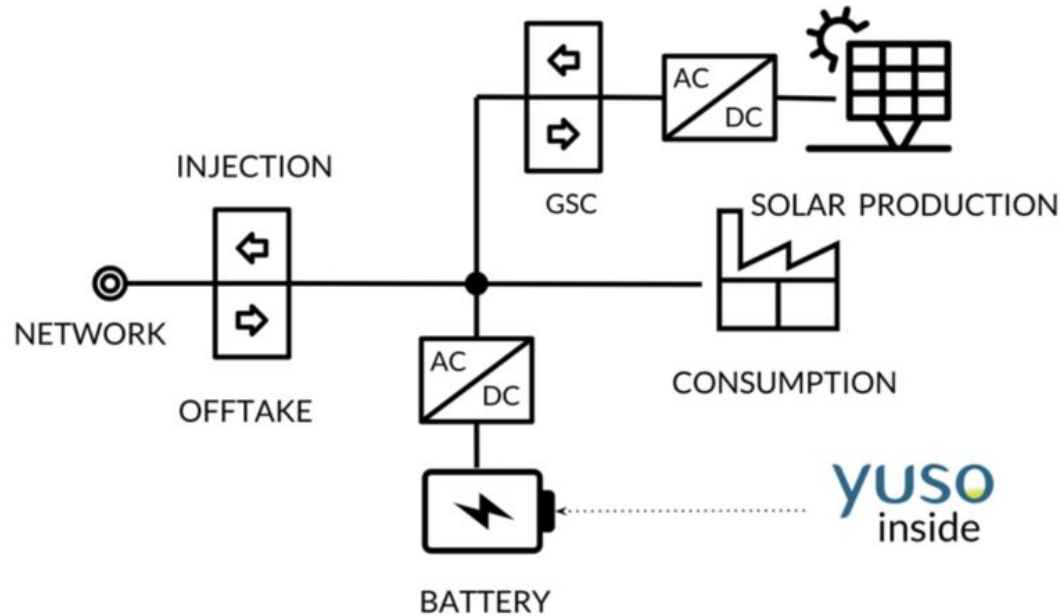


Robotized Portfolio Management

- tradeCapture Intraday** APP: 2:47 AM
 - Yuso (API in BOT,Pavlov) offers 1 MW 03-04 at 32.4 EUR/MWh
 - Yuso (API in BOT,Pavlov) sold 1 MW 03-04 at 38 EUR/MWh (<http://dante.yuso.be/trading/trades/detail/16546>)
- tradeCapture Intraday** APP: 4:47 AM
 - Yuso (API in BOT,Pavlov) bids 1 MW 05-06 at 40 EUR/MWh
- tradeCapture Intraday** APP: 5:17 AM
 - Yuso (API in BOT,EarlyBird) bids 1 MW 07-08 at 62 EUR/MWh
 - Yuso (API in BOT,EarlyBird) bids 1 MW 10-11 at 60 EUR/MWh
 - Yuso (API in BOT,EarlyBird) bids 1 MW 09-10 at 60 EUR/MWh
 - Yuso (API in BOT,EarlyBird) bids 1 MW 08-09 at 58 EUR/MWh
 - Yuso (API in BOT,EarlyBird) bought 1 MW 07-08 at 62 EUR/MWh (<http://dante.yuso.be/trading/trades/detail/16547>)
- tradeCapture Intraday** APP: 5:56 AM
 - Yuso (Michel in Proprietary) bought 5 MW 09-10 at 85 EUR/MWh (<http://dante.yuso.be/trading/trades/detail/16548>)
 - Yuso (Michel in Proprietary) bids 5 MW 09-10 at 85 EUR/MWh

The basic battery concept

How Yuso operates batteries



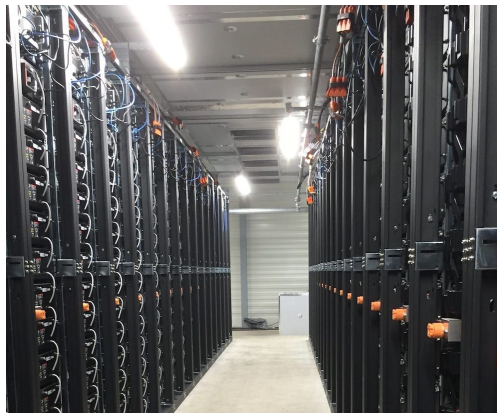
Realised battery projects

Batteries as a service, growing expertise on different dimensions and types



Redox-Flow at Filclair Serren

This large battery allows Filclair Serren to use more solar energy itself, saving thousands of euros on grid costs.



Grid battery in Zeeland

Yuso currently manages the largest battery in Europe in Zeeland (NL). With 10 MW of flexibility. It contributes to the equilibrium of the net via Yuso.



Lithium-ion at Verplancke Haarden

This unit is about four times smaller than the one at Filclair Serren, but it has a higher power capacity making it a valuable asset to act on flexibility markets. Yuso dispatches this highly flexible battery to contribute to network equilibrium.

Grid batteries in practice

ENERGY MANAGEMENT of 10 MW / 10 MWh BATTERIJ ZEELAND



Energy storage is booming worldwide...



Ruien Energy Storage



Ruilen Energy Storage

Development of a 25 MW BESS in Belgium in partnership with Nippon Koei (Japan)



DE TIJD
26
dinsdag 26 juni 2018
www.tijd.be

West-Vlaamse start-up bouwt megabatterij
Energieopslag op voormalige steenkoolcentrale Ruilen

ds De Standaard
ONDERNEMEN ELECTRABEL-PIONIERS VERLEGGEN GRENZEN

Een batterij batterijen

West-Vlaamse start-up bouwt megabatterij
Energieopslag op voormalige steenkoolcentrale Ruilen

Een batterij batterijen

de persgroep van Lincen met een demonstratie van de nieuwe technologie

Ruien Energy Storage Project planning

- JANUARI 2018 Yuso secured plot in Ruien
- APRIL 2018 Yuso partners with Nippon Koei
- JUNE 2018 Incorporation of RES: Ruien Energy Storage NV
- JULI 2018 Grid study requested
- SEPTEMBER 2018 Launch of battery supply tender (BESS)
- NOVEMBER 2018 Grid study of Elia completed
- DECEMBER 2018 Filing of building permit
- JANUARI 2019 Selection of BESS suppliers

- MARCH 2019 Complete site permitting**
- APRIL 2019 Financial Close**
- JUNE 2019 Construction on site**
- Q2 2020 Go live commissioning and commercial operation**



Barriers to renewable integration

- Inadequate (metering) data management
 - ◆ No real time metering data
 - ◆ No information if 15-min meter reading (AMR) are available before switching
 - ◆ Lack of standardization
 - ◆ Disparate systems, lacking API
 - ◆ Smart meters without smart metering (15-min data not used in settlement process !)
- Market design prevents batteries delivering on their full potential
 - ◆ DSO grid fee 'friction' prevents participation in balancing market
 - ◆ Awaiting the implementation EU grid codes to opening of all ancillaries markets to batteries
 - ◆ Battery investment by market rather than DSO/TSO who should remain neutral, non-discriminatory actors



Policy advocacy and main takeaways

- Evolution rather than revolution: build regulation on top 20+ years of market opening
 - ◆ Ensure all generation assets (including renewables) and all demand (including flexibility) have balancing obligation
 - ◆ Use of price signals to balance the system (including a single real time balancing price)
- Put the customer at the center
 - ◆ link retail prices to wholesale prices
 - ◆ give customer ownership of his data and the associated data flows
- Cost- and incentive-based regulation towards DSOs and TSOs
 - ◆ complement cost-based regulation with incentives for effective data management
 - ◆ incentives to promote the integration of renewables and storage in the system
- Smart regulation to stimulate storage
 - ◆ Exempt storage from grid fees
 - ◆ Provide for regulatory models to embed storage assets without friction in energy communities



Making new energy flow

Eén platform voor jouw energie



www.yuso.com



info@yuso.be



[@yusobe](https://twitter.com/yusobe)



Facebook/yusobe