



# **Integration of Flexibility: Managing Risks Successfully**

## **Implement Your Storage Project With Vattenfall**

Webinar | Thursday, December 5, 2024 | Honey Duan & Daniel Schwarz

# Who are your speakers today?



**Honey Duan**

- *Director of Commodity Origination at Vattenfall Energy Trading GmbH*
- *15+ years' professional experience in energy and other markets*
- *Responsible for all origination activities that relate to traded markets, molecules, and flexibility*



**Daniel Schwarz**

- *Head of Business Development at Vattenfall Energy Trading GmbH*
- *10+ years' professional experience in energy, metals, and carbon markets*
- *Responsible for new business onboarding, commercial business development, and strategic development*

# Agenda

- |           |  |           |
|-----------|--|-----------|
| <b>01</b> | <b>FLEXIBILITY IS THE TOPIC OF THE HOUR</b>  | <b>4</b>  |
|           | <ul style="list-style-type: none"><li>➤ Increasing volatility challenges the successful progress of the energy transition.</li><li>➤ Renewables per se are not the business case, profitable integration of them is.</li></ul> |           |
| <b>02</b> | <b><i>FLEXIBILITY UNDER MANAGEMENT IS ESSENTIAL - FOR THE MARKET AS WELL AS FOR VATTENFALL</i></b>   | <b>11</b> |
|           | <ul style="list-style-type: none"><li>➤ Vattenfall's strategy is "All-in Renewables" - Flexibility as a Key Lever.</li><li>➤ Where is Vattenfall already investing, and how does Vattenfall operate in the market?</li></ul>   |           |
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# Flexibility Is Everywhere: But Why?

## Vattenfall steigt in das Geschäft mit großen Batteriespeichern ein

Der Energiekonzern kündigte angesichts des wachsenden Bedarfs an Flexibilitäten an, umfassend in das Geschäft mit Großbatterien investieren zu wollen. Neben der Entwicklung von großen Batteriespeichern will sich Vattenfall auch in der Vermarktung des Stroms engagieren und dies auch für Großspeicher der Wettbewerber.

BATTERIES/STORAGE | ELECTRICITY | TRANSMISSION

1 min read

### German surge in TSO battery capacity requests amid green growth

(Montel) Germany's four power TSOs have seen a surge in connection requests for battery capacity in the last two years, they told Montel, with requests currently standing at 161 GW compared with the 1.4 GW installed.

Neuer Plan der Bundesnetzagentur

## Bau von Großbatterien und Wasserstoffherzeugern soll günstiger werden

Deutschland braucht mehr Möglichkeiten, erneuerbar erzeugten Strom zu speichern. Doch bislang sind die Anschlüsse ans Stromnetz teuer. Das will die Bundesnetzagentur nun ändern, vor allem im windreichen Norden.

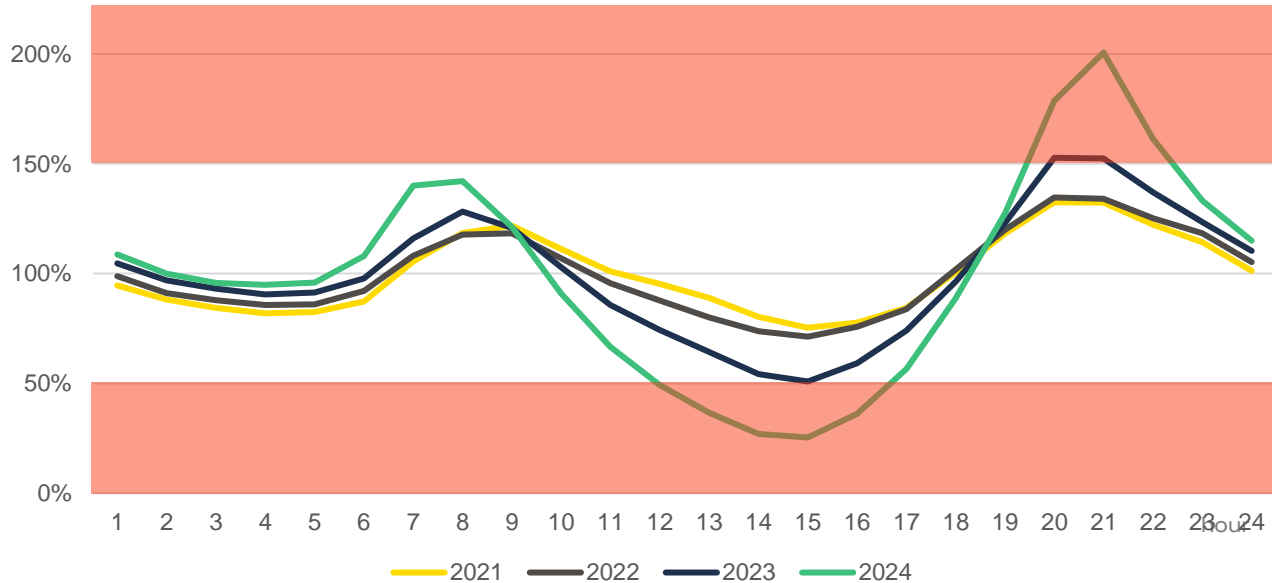
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## Managing risk in renewable-energy portfolios: The role of flexible assets

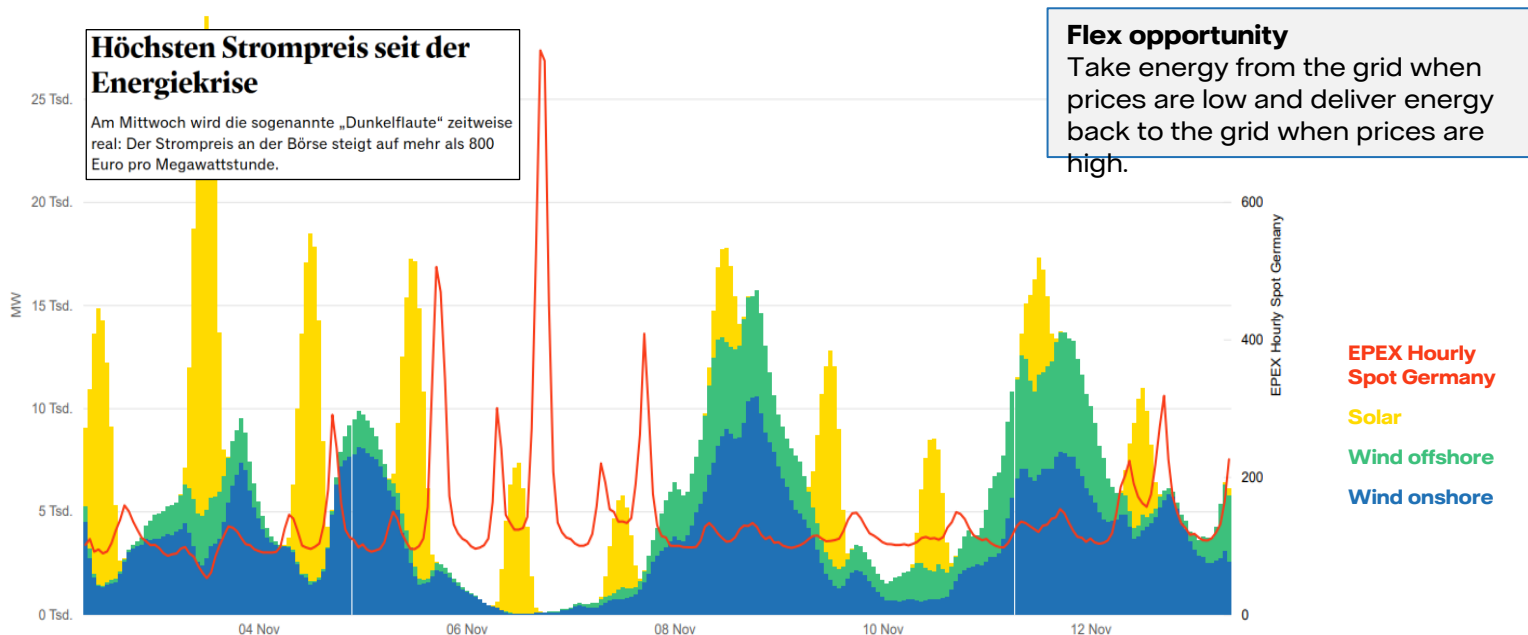
November 5, 2024 | Article

# The Best Predictable Unpredictability or The Daily Duck

Normalized day-ahead spot prices in Germany during the sunny season (April to September)

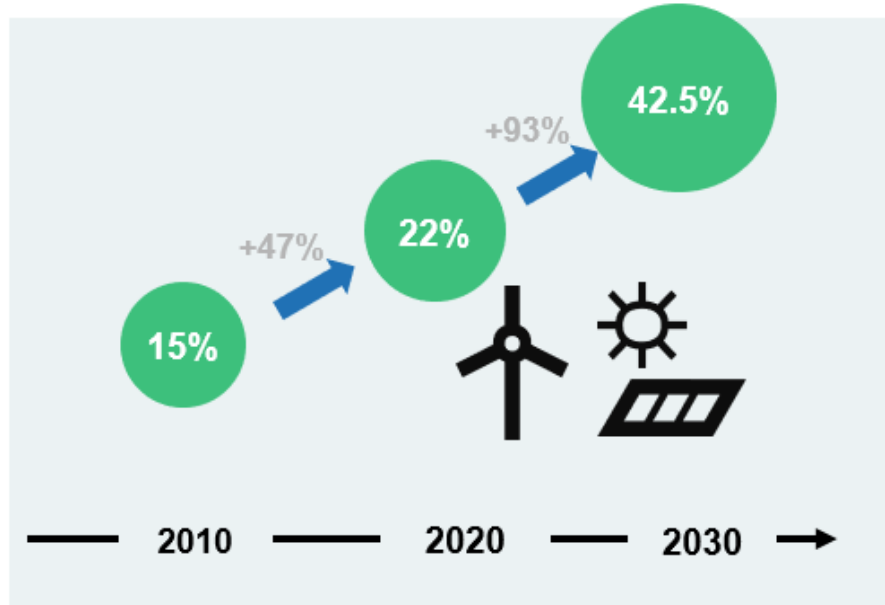


# Volatilities In The Wholesale Market Are Increasing



Sources: handelsblatt.de, ENTSO-E / EPEX Spot, Vattenfall Newsletter

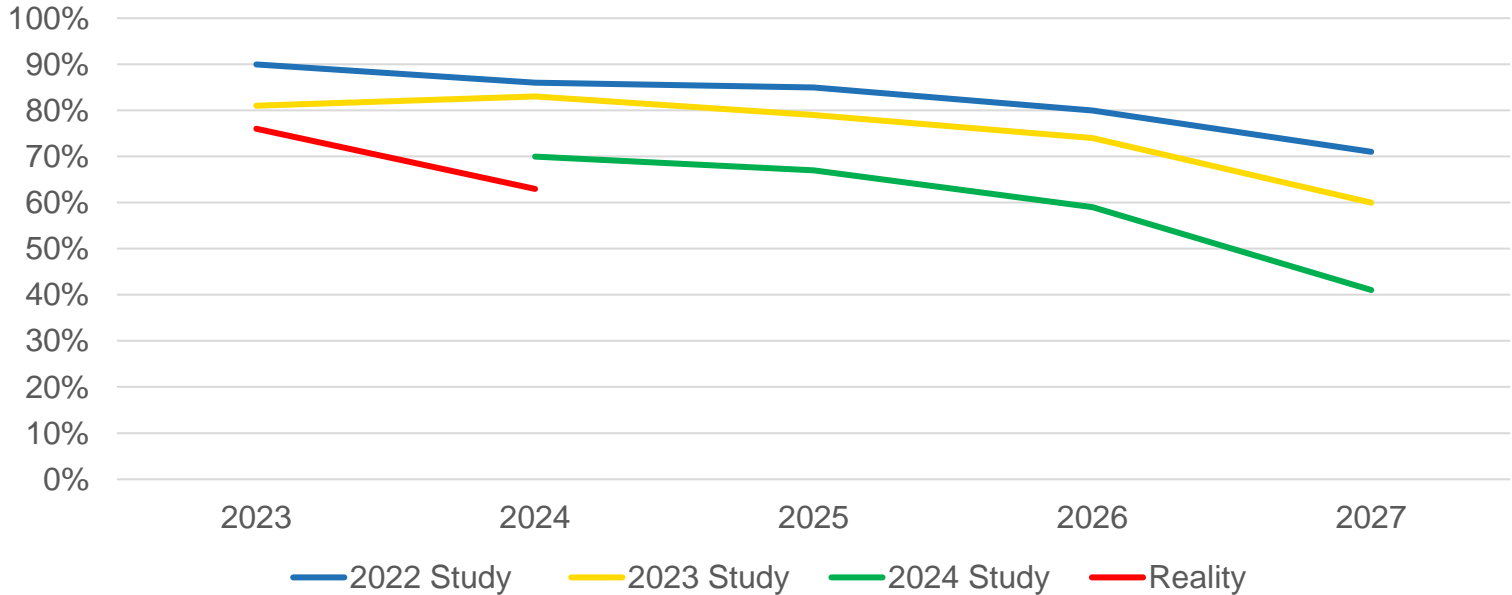
# Where Do We Stand Today, And Where Do We Want To Go?



**Renewable Energy Directive sets a binding target of 42.5% Renewable Energy by 2030**

# Both Existing And New Projects Are Facing Difficulties

Estimation of the solar capture rate in Germany





# Flexibility = Profitability of Renewables = Energy Transition

- 1** **Increasing volatility in the electricity markets presents challenges to the industry:** Both existing and new projects are struggling to maintain profitability and ensure successful implementation.
- 2** **We are far from the goal:** The further expansion of renewables goes hand in hand with the integration of flexible storage solutions such as batteries.
- 3** **It's about more than just marketing:** Smart load distribution along current (and future) price curves relieves system pressure, reduces volatility, and paves the way for the next major step in the energy transition.

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## So, Why Vattenfall?

“

Fossil-free living is not our sustainability strategy, it's our business strategy. And it is sustainable!

Anna Borg ”



# We're All-in!



## Offshore

5.4 GW 2024  8 GW 2030

- Hollandse Kust Zuid (1,509 MW)
- Kriegers Flak (604 MW)
- Nordlicht 1 & 2 (1,610 MW)



## Hydro

8.5 GW 2024  9.2 GW 2030

- Harsprånget (871 MW)
- Stornorrfors (599 MW)



## Onshore

2 GW 2024  3 GW 2030

- Blakliden Fäbodberget (353 MW)



## Solar

2.5 GW 2024  3 GW 2030

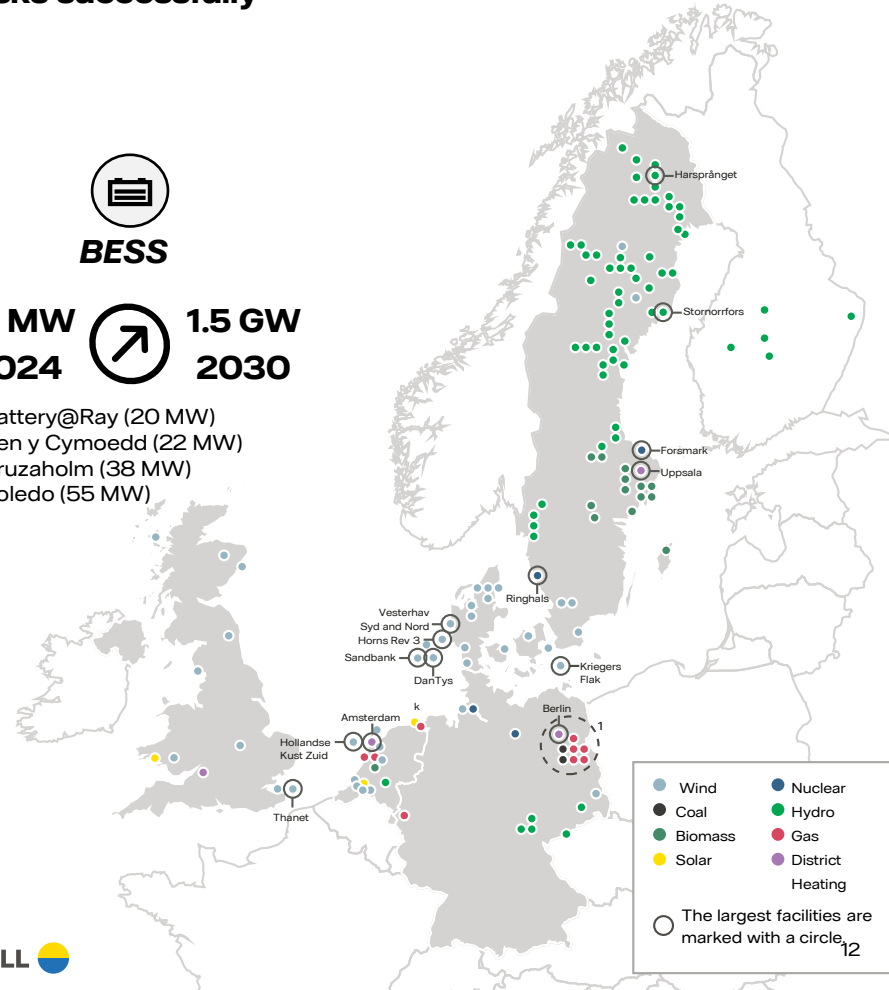
- Tützpatz (79.3 MW)
- Haringvliet Zuid (38 MW)



## BESS

77 MW 2024  1.5 GW 2030

- Battery@Ray (20 MW)
- Pen y Cymoedd (22 MW)
- Bruzaholm (38 MW)
- Toledo (55 MW)



	Wind		Nuclear
	Coal		Hydro
	Biomass		Gas
	Solar		District Heating
	BESS		The largest facilities are marked with a circle

# Where Has Vattenfall Already Made Investments?



Vattenfall Webinar | Integration of Flexibility: Managing risks successfully

# Vattenfall Manages Flexibility for More Than 100 Years...

- **Planning and Optimization** of flexible hydro assets (Germany & Nordics in particular) and batteries
- **Dispatch** of flexible assets (re-optimization, continuous trading, balance management and delivery of grid services 24x7)
- **Flexibility monetization:** Pumping water to the upper reservoir in times of low power prices and releasing water to the lower reservoir in times of high prices
- **Experience in 3<sup>rd</sup> party optimization:** We have contracted 26 TWh RES supply, of which 17 TWh from 3<sup>rd</sup> parties



## Our Portfolio Includes...

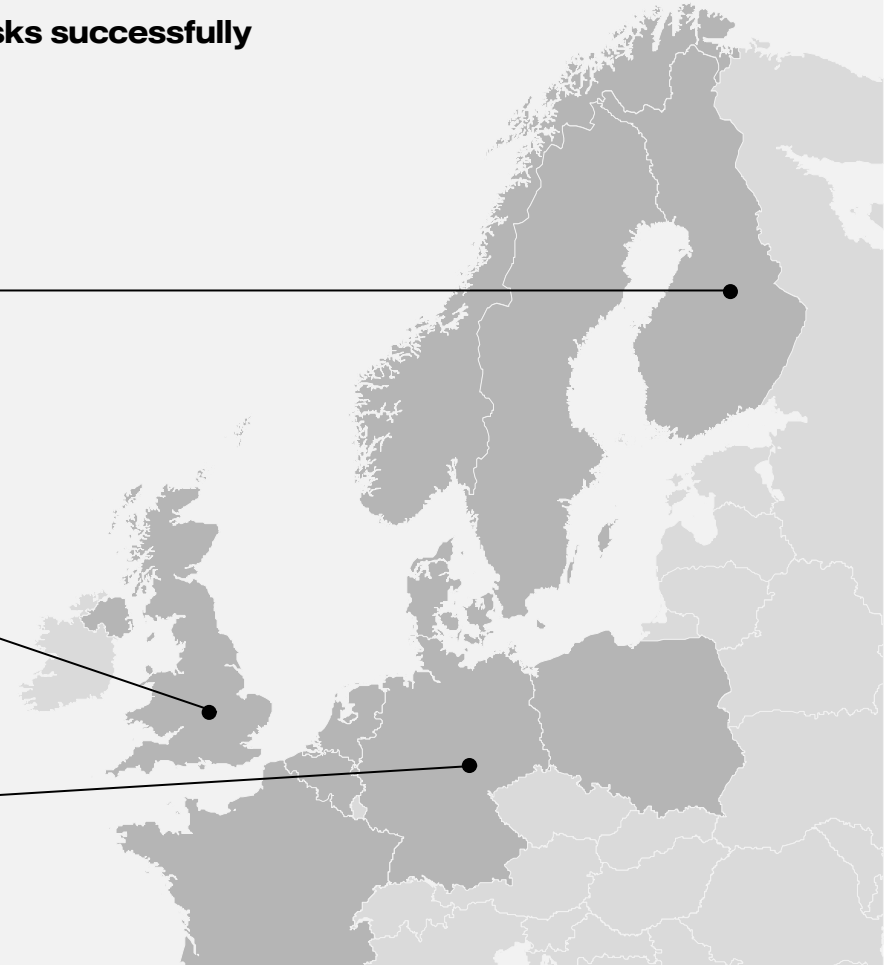
***Hydropower plants, such as those in Finland (with more than 10 GW installed)***



***Co-located and standalone BESS, for example in the UK (+100 MW).***



***Pumped storage plants, such as those in Germany (with over 2.5 GW installed).***



# And We Optimize It...

*Fully automated*



*With the help of machine learning, continuously evolving algorithms*



*Monitored around the clock by our skilled traders (24/7, 365 days a year)*

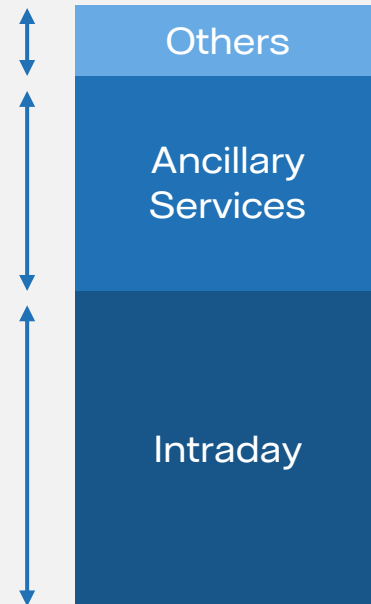




# Cross-Market Optimization - What Does It Actually Entail?

Value pool	What they are
<b>Intraday</b>	15 minute-blocks on the intraday market allow batteries to profit from arbitrage opportunities and charge/discharge according to prices levels and volatility.
<b>Day-Ahead</b>	Back-up market for hedging in case of a lack of intraday liquidity. Moderate opportunities in comparison with intraday.
<b>FCR</b>	Primary response to frequency disturbances, The FCR market is well suited for batteries, given their symmetrical design and the ability for batteries to respond fast to TSO/frequency signals.
<b>aFRR</b>	aFRR capacity & aFRR energy markets: Decrease in product length in the balancing energy market (now 15 min) is expected to boost battery participation in the future.
<b>Others</b>	Depending on location and regulation: <ul style="list-style-type: none"><li>- Imbalance market</li><li>- Capacity market</li><li>- Local congestion management</li></ul>

Vattenfall can adjust to each market's revenue stacking to maximize revenues



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# The Technical Characteristics Of The Storage Drive Its Value

## Degradation

How much does the asset degrade over its lifetime?

## System Efficiency

(Round-trip Efficiency)  
How much energy is lost between charge and discharge?



## C-Rate

How does power relate to the storage capacity?

## Cycles

How many full cycles can the storage undergo annually and daily?

## Availability

Guaranteed availability, maximum downtime?

# Vattenfall as a Marketer: Why partner with us?

①

## **Experience**

We have extensive expertise in the design and operational management of (flexible) assets – consult with us in the design phase to tailor your storage solution to current and future flexibility needs.

②

## **Stability & Reliability**

Even in uncertain times, we stand by a clear vision and mission. Our stable ownership structure and consistently leading market rating offer you a robust and reliable partnership for the financing and implementation of your project.

③

## **Nordic Clear & Fair**

We stand for a clear and fair allocation of risks – based on the principle that those who can influence a risk should also bear it. Our experienced colleagues in the origination department are experts in structuring these contracts, enabling all parties to focus on their core competencies.

# Vattenfall as a Marketer: What Do We Offer? And Why?

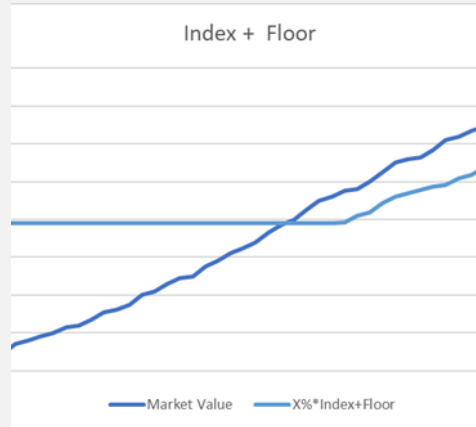
## Fixed Price

Vattenfall contracts the installed flexibility at a fixed price (premium) over a predetermined period (tenor).



## Index + Floor

Vattenfall contracts the installed capacity at a fixed premium, plus an indexed adjustment.



## Index / Benchmark

Vattenfall contracts the installed capacity according to an index (tbd), indicative of the flexibility's value.



Risk Protection

Opportunity

# Vattenfall as a Marketer: Clear, Fair, And Reliable.

## Operator

- > Acquisition, Design, Construction
- > Grid connection and operation
- > Metering
- > Facilitation of physical control (notifications, etc.)

## Vattenfall

- > Optimization based on the defined parameters
- > REMIT and redispatch operations
- > Balance group allocation, prequalification, collateral management, and marketing
- > Full supply

# Vattenfall as a Marketer: Clear, Fair, And Reliable.

## Operator

- > Acquisition, Design, Construction
- > Grid connection, operation
- > Financing
- > Facilitation of physical control (notifications, etc.)

The operator's risk: The costs

## Vattenfall

- > Optimization based on the defined parameters
- > REMIT and market operation
- > Balancing, fuel allocation, communication, collateral management, and marketing
- > Full supply

The marketer's risk: The revenues

# Vattenfall as a Marketer: Clear, Fair, And Reliable.

Operator

You design, commission, and implement your storage project, bringing it to commercial operation.



Vattenfall

We take the marketing worries off your hands, offer you a premium for the installed flexibility, and handle the marketing side for you!



# Vattenfall as a Marketer: Clear, Fair, And Reliable.

Operator

Vattenfall

You design, commission  
and implement your  
storage project  
it to cover  
oper

Our proposal is focused on mutual  
security: You gain planning stability,  
while we obtain flexibility to expand  
renewables.

We take the marketing  
worries off your hands,  
offer you a premium for  
the installed flexibility,  
and handle the marketing  
side for you!