

“From Grid Congestion to Grid Resilience: The Role of Flexibility Enablers”

Webinar

11 June 2026

15:00 – 16:00 CEST



FROM GRID CONGESTION TO GRID RESILIENCE: THE ROLE OF FLEXIBILITY ENABLERS

Buse Yildiz

**Project Manager & EU PVSEC Executive
Committee Member**

WIP Renewable Energies



AGENDA

15:30	Opening Buse Yildiz <i>Project Manager & EU PVSEC Executive Committee Member, WIP Renewable Energies</i>
	Introduction of EU PVSEC Dr Robert Kenny <i>Directorate for Energy, Mobility and Climate, European Commission - Joint Research Centre</i>
	Introduction of Energy Storage Europe Daniel Vig <i>Senior Policy Officer, Energy Storage Europe</i>
15:40	The Green Reliable Future of the Grid with Emerging Technologies and PV/RES Venizelos Efthymiou, Senior Researcher, PHAETHON Centre of Excellence
15:50	Presentation from Energy Dome Jessie Ciulla Shea, Director of Regulatory and Policy, Energy Dome
16:00	Outlook into PV Growth Beyond Grid Flexibility via Integration with Storage and Fuels Dr Tsvetelina Merdzhanova, Team Leader, Forschungszentrum Jülich
16:10	Presentation from BSTOR Kevin Milis, Regulatory Affairs Manager, BSTOR
16:20	Q&A from the Audience
16:30	Closing



WEBINAR “From Grid Congestion to Grid Resilience: The Role of Flexibility Enablers”



WHO WE ARE

EU PVSEC: The European Photovoltaic Solar Energy Conference and Exhibition is the world's leading forum for PV Research and Development and the biggest Conference on PV Solar Energy. EU PVSEC is the longest running, renowned PV conference in the World and the annual meeting point for PV experts from research, development, and industry.

ESE: Energy Storage Europe (formerly The European Association for Storage of Energy – EASE), is the leading member-supported organisation representing more than 70 entities across the entire energy storage value chain. The Association promotes energy storage deployment to enable a secure, competitive, climate-neutral energy system.



WHY COLLABORATE?

Together, we bridge the solar and storage sectors

- Foster innovation, integration, and impact
- Create stronger links between PV and energy storage stakeholders
- Continue a series of joint sessions addressing common challenges and opportunities

A RESILIENT GRID NEEDS FLEXIBILITY

The Challenge

- Europe's electricity grids were largely designed for a centralized generation system and have not evolved at the same pace as the rapid deployment of renewable energy sources.
- Rapid PV deployment is increasing pressure on electricity grids across Europe, with grid congestion becoming a major barrier to further renewable integration.
- Limited grid capacity and insufficient storage solutions are making it harder to connect new renewable energy projects.

The Opportunity

- Energy storage and other flexibility solutions can help relieve congestion, improve grid resilience, and optimise existing infrastructure.
- By shifting renewable electricity to when it is needed most, additional PV capacity without immediate grid expansion can be unlocked.

THANK YOU

Contact: buse.yildiz@wip-munich.de

The **EU PVSEC 2026** will take place from 13 - 18 September in WTC, Rotterdam, The Netherlands.

Register here:
www.eupvsec.org

WIP Renewable Energies

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Dr Robert Kenny

Directorate for Energy, Mobility and Climate

European Commission - Joint Research Centre





EUPVSEC

EU PVSEC 2026

43rd European
Photovoltaic Solar Energy
Conference and Exhibition

14 — 18
September

WTC —

World Trade Center

Rotterdam —

The Netherlands



JOIN US AT THE
EU PVSEC
TO DRIVE THE ENERGY
TRANSITION THROUGH
INNOVATION IN
PHOTOVOLTAICS, GRID
MANAGEMENT, AND
FLEXIBILITY
SOLUTIONS.

Daniel Vig

Senior Policy Officer

Energy Storage Europe



www.energystorageeurope.eu





energy storage europe conference

6-8 October 2026
Brussels

#ESEC2026

Day 1 - Policy

Day 2 - Market

Day 3 - Benelux



The 3-Day Conference is a key meeting point for **industry, researchers, and policymakers**, with discussions centred on Europe's energy storage priorities.

The conference is deliberately **content-focused**, with a strong **emphasis on the quality, depth, and relevance of discussions**. [Visit the website here!](#)

Venizelos Efthymiou

Senior Researcher

PHAETHON Centre of Excellence



From Grid Congestion to Grid Resilience: The Role of Flexibility Enablers

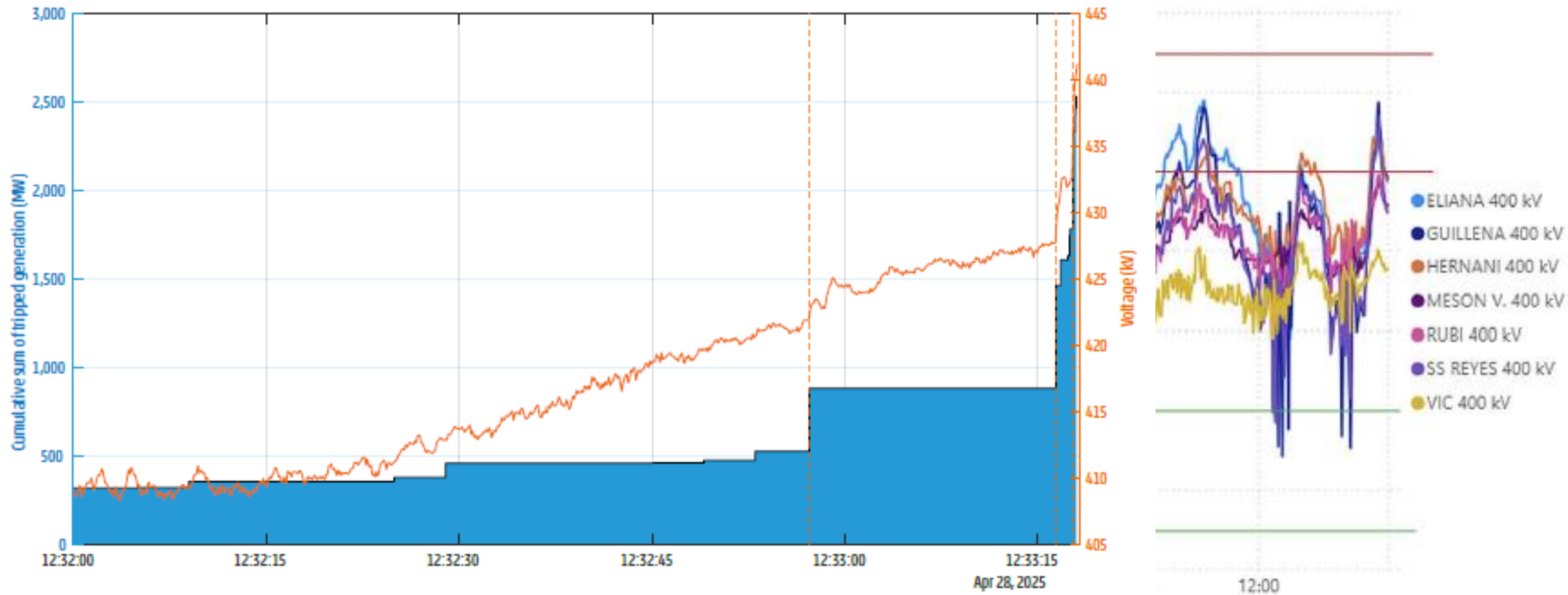
The green reliable future of the grid with emerging technologies and PV/RES

Dr Venizelos Efthymiou^{1,2}

¹ PHAETHON CoE for Intelligent, Efficient and Sustainable Energy Solutions, University of Cyprus

² PV Technology, Department of Electrical and Computer Engineering, University of Cyprus

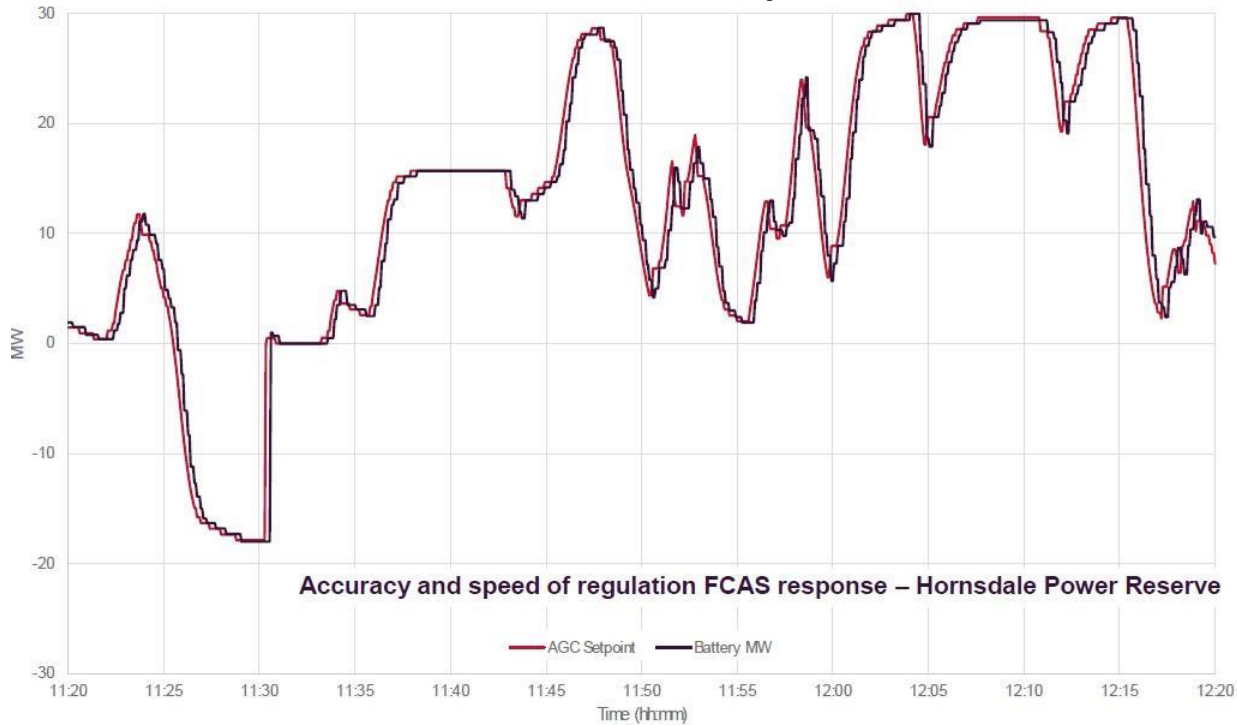
The extend of the problems faced in Spain / Portugal and the obvious inability of the grid to recover / respond



The transition to power electronics control systems brings a lot of benefits

How do you think batteries are performing? Due to the low inertia of storage systems, their response is much faster than fossil fuel generators hence improved operation regimes can be achieved

Hornsedale Battery

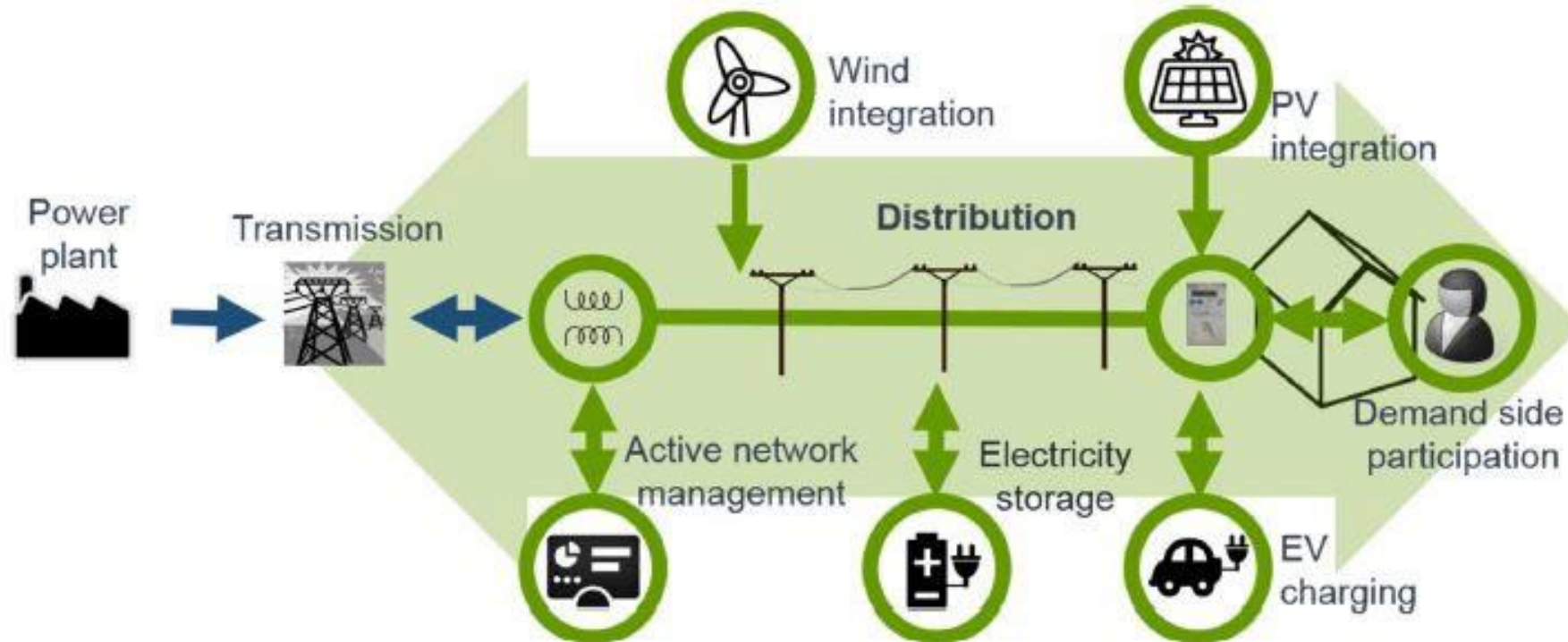


Conventional generator



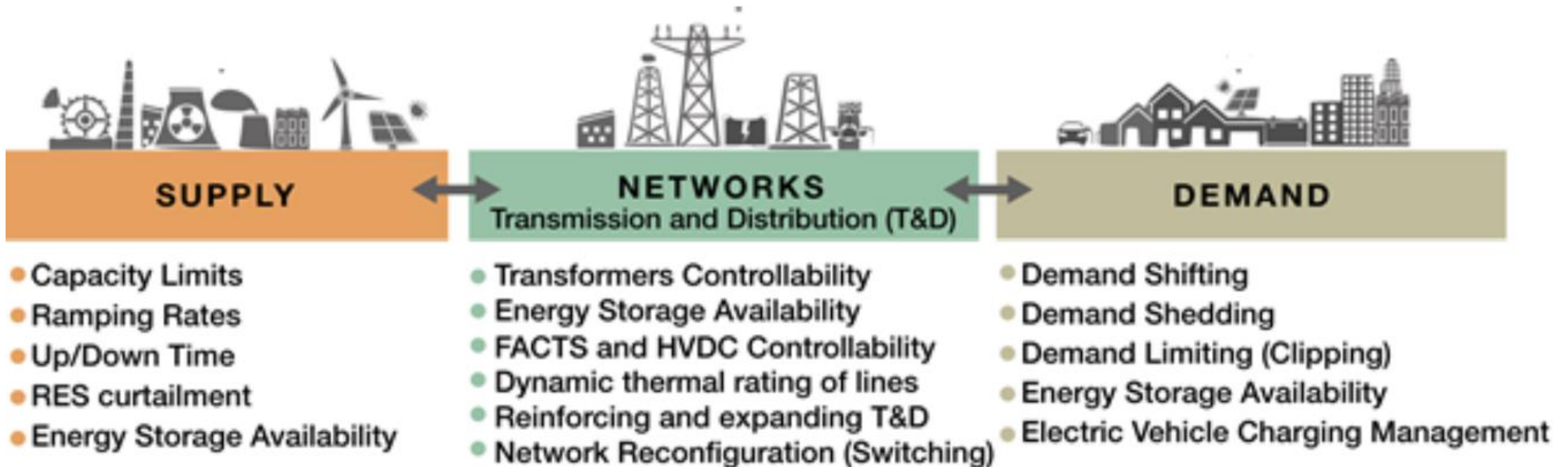
The system is being transformed but the grid still the backbone

The ability of energy storage systems (ESSs) to respond quickly to shifts in the supply and demand for power maintains grid stability. By storing extra RE, storage devices ensure a higher rate of utilization of generated RE. Thanks to ESSs, Peaker plants which are usually based on fossil fuels and used during periods of high demand can be used less frequently. ESSs act as a buffer against supply interruptions and power outages, enhancing grid reliability.



Embedded flexibility on grid: We must optimize both energy usage and grid capacity simultaneously

- Energy optimization shifts consumption, production, and storage to align with low-cost periods, ensuring efficient energy use.
- Grid capacity optimization schedules flexible loads to reduce congestion, minimizing the need for costly infrastructure expansion and enhancing system efficiency.



Segmentation of services to support different parts of the system

Services to Support Behind the Meter Customer Energy Management

- End-User Peak Shaving
- Time-of-Use Energy Cost Management
- Requirements in Power Quality and Continuity of Energy Supply
- Maximizing Self-Production of Electricity
- EV Integration
- Limitation of Upstream Disturbances
- Compensation of Reactive Power

Services to Support Distribution Infrastructure

- Distribution Grid Upgrade Deferral
- Dynamic Local Voltage Control
- Reactive Power Compensation
- Contingency Grid Support
- International Islanding
- Cross Sectoral Storage

Ancillary services

- Frequency Containment Reserve (FCR)
- Automatic Frequency Restoration Reserve (aFRR)
- Manual Frequency Restoration Reserve (mFRR)
- Replacement Reserve (RR)
- Load Following
- Frequency Stability of Weak Grid, Voltage Support
- Black Start

Solutions have evolved that render the new generation of controllers more responsive and adaptive to system needs

BESS use specialized inverter controllers to deliver FFR, reacting in **ms** to stabilize power grids. By shifting from standard Grid-Following to advanced Grid-Forming control, these controllers enable much faster and smoother active power injections without grid disturbances. Hence, to optimize a battery controller for a much faster and smoother FFR, the following key control strategies and features are currently practised:

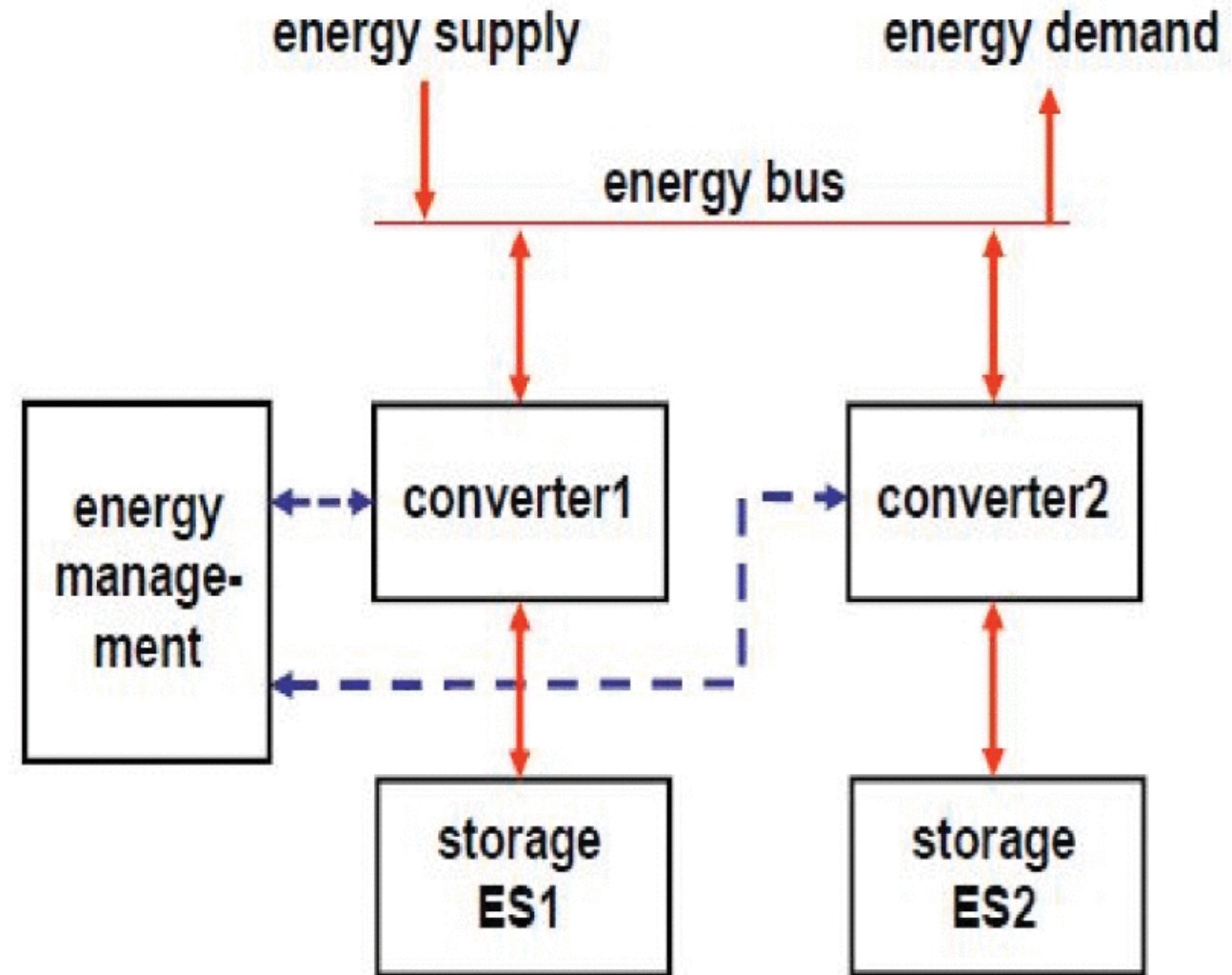
- **GFM vs. GFL:** Upgrading to GFM algorithms allows the inverter to act as a "virtual synchronous machine," providing **synthetic inertia** that responds instantly to RoCoF (Rate of Change of Frequency) without relying on a phase-locked loop (PLL).
- **Virtual Inertia Tuning:** Adjusting the controller to measure $df \div dt$ allows for immediate power injection, arresting deep frequency drops before UFLS (Under-Frequency Load Shedding) gets triggered.
- **Deadband Minimization:** Tightening the frequency deadband (e.g., ± 15 mHz) allows the system to engage and inject active power continuously during the earliest, minor frequency shifts.
- **Droop Control Optimization:** Steeper, dynamic droop characteristics enable more aggressive yet stable responses to severe grid events.
- **Voltage Coupling Effect (VCE) Mitigation:** Adjusting the virtual impedance in the GFM controller limits the sudden voltage drops that can weaken FFR in remote or weak grids.

Real systems use a combination of systems for achieve optimal operational needs

A hybrid energy storage system (HESS) method, combines storage technologies with additional operating features. In a HESS typically one storage (ES1) is dedicated to cover “high power” demand, transients and fast load fluctuations and therefore is characterized by a fast response time, high efficiency and high cycle lifetime.

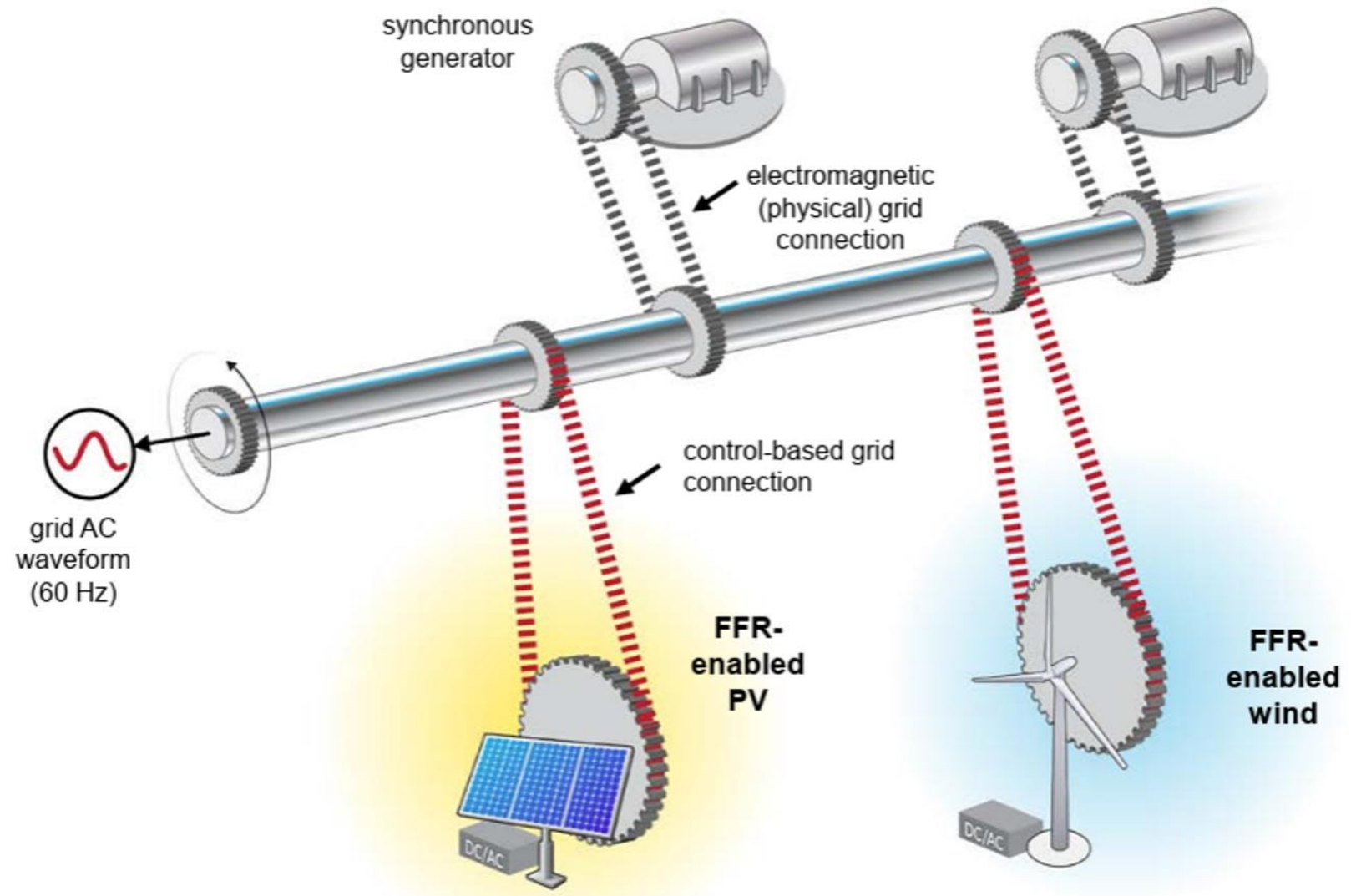
A second storage (ES2) system can be the “high energy” storage with a low self-discharge rate and lower energy specific installation costs.

A common energy management system will optimize use and deliver optimal benefits to the interconnected system.



Fast frequency response from RES in combination with RES

Resources that rely on inverters such as PV and Wind, can offer Fast Frequency Response using Grid Forming Inverters in combination with BESS (Battery Energy Storage Systems)



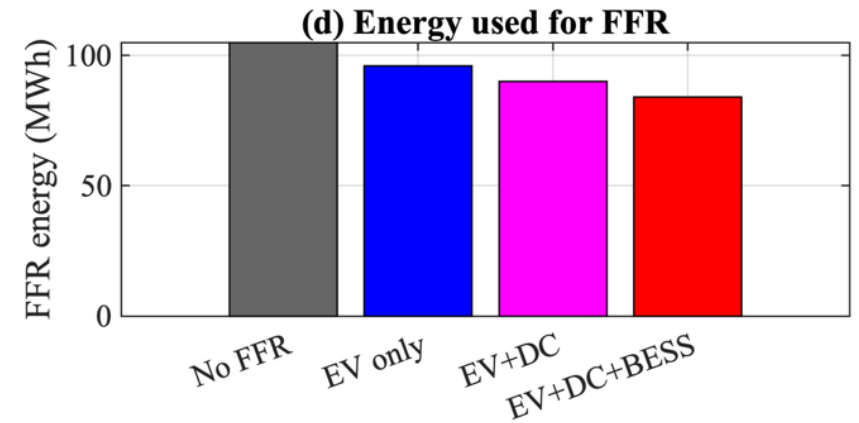
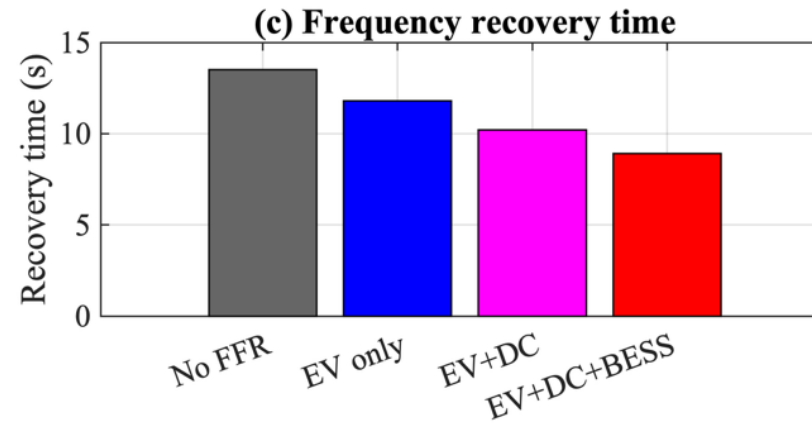
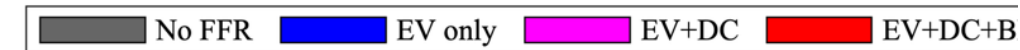
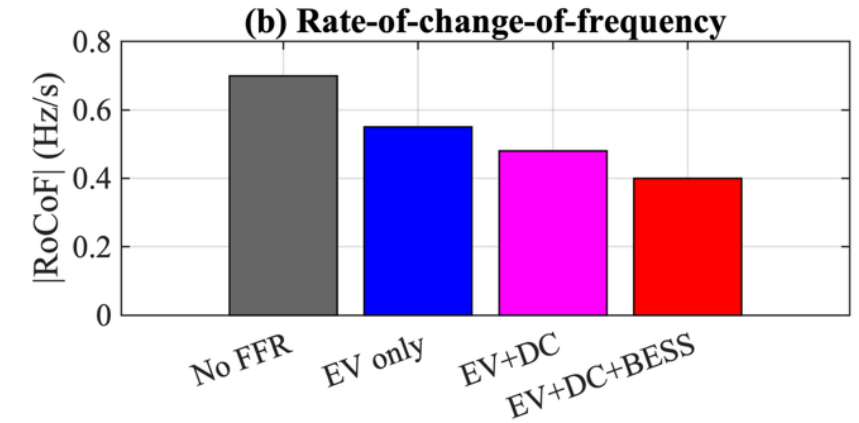
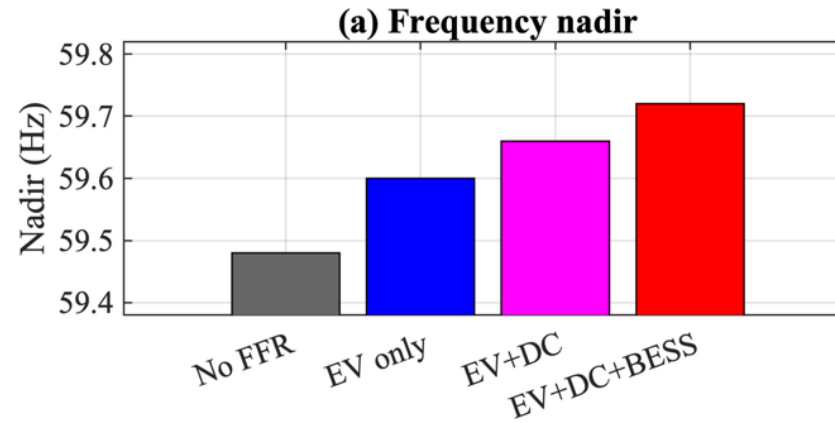
Combination of flexibilities offers a wealth of useful improved solutions that are possible with the controllers of today

Quantitative comparison of frequency performance across four scenarios:

no FFR, EV only FFR, EV+DC FFR, and coordinated EV–DC–BESS FFR.

Subplots show (a) frequency nadir, (b) absolute RoCoF, (c) recovery time, and (d) FFR energy usage.

The carefully designed coordinated strategy yields the highest nadir, the lowest RoCoF, the shortest recovery time, and comparable or lower energy usage compared with other cases.

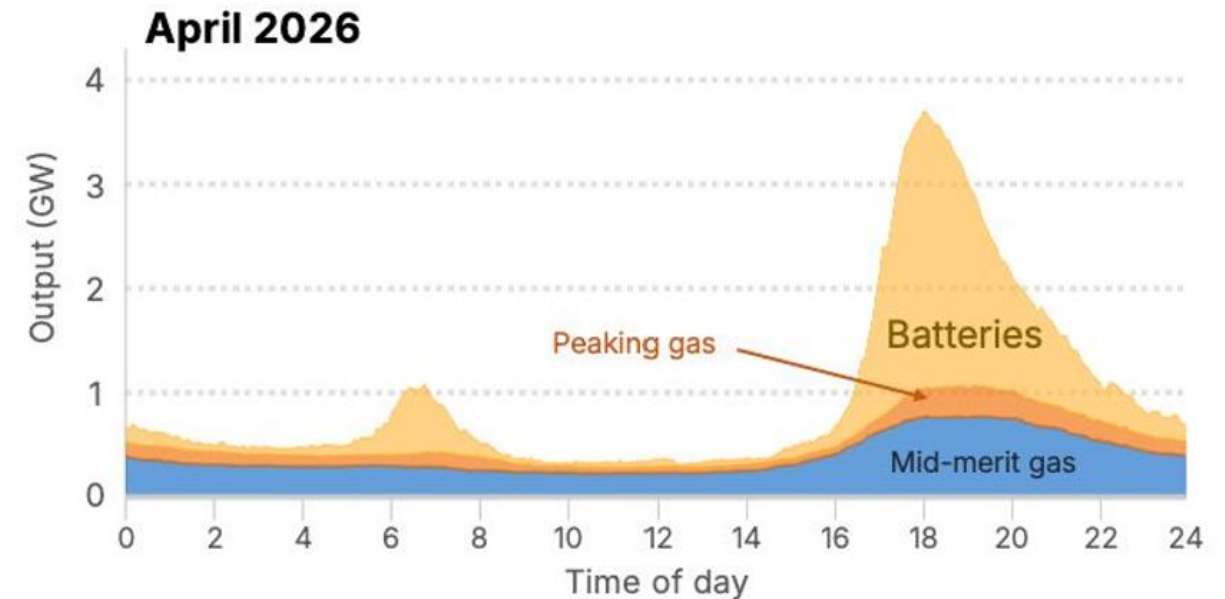
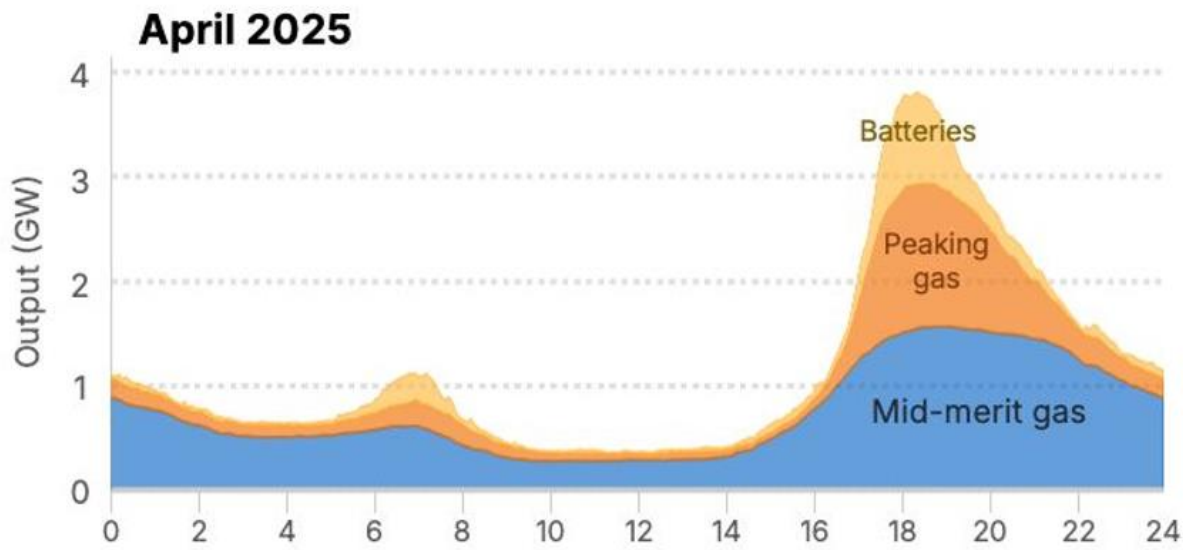


Batteries are taking over Australia's evening peak

This isn't just about more batteries being installed. It's also about batteries performing one of the grid's most valuable jobs: supplying electricity during the high-demand evening period when solar output falls away. A few things stand out:

- ✓ Battery discharge in Q1 2026 was around 3x higher than a year earlier
- ✓ Batteries now set wholesale electricity prices roughly one-third of the time
- ✓ Wholesale electricity prices were 12% lower in Q1 - largely due to the influx of batteries

Peaking gas fell sharply as battery discharge surged



Source: Open Electricity, via AFR
NEM 28-day average ending 30th April each year

@gavinmooney

Thank You



Dr Venizelos Efthymiou^{1,2}

¹ PHAETHON CoE for Intelligent, Efficient and Sustainable Energy Solutions, University of Cyprus

² PV Technology, Department of Electrical and Computer Engineering, University of Cyprus

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Jessie Ciulla Shea

Director of Regulatory and Policy
Energy Dome



The logo consists of a stylized arch above the text. The arch is composed of two curved lines, one dark blue and one teal. Below the arch, the word 'ENERGYDOME' is written in a bold, sans-serif font. 'ENERGY' is in dark blue and 'DOME' is in teal. Underneath, the phrase 'Our WORLD can't wait.' is written in a smaller, sans-serif font. 'Our' is in dark blue, 'WORLD' is in teal, and 'can't wait.' is in dark blue.

ENERGYDOME
Our **WORLD** can't wait.

EU PVSEC | From Grid Congestion to Grid Resilience: The Role of Flexibility Enablers

Jessie Ciulla Shea, Director of Policy and Market Strategy | 11 June 2026

Energy Dome's CO2 Battery is at commercial scale today

Robust Commercial Pipeline

- ✓ Demo plant **online and operational** since June 2022 (Sardinia, Italy)
- ✓ First-of-a-kind **20 MW commercial plant online and operational** since August 2025 (Sardinia, Italy)
- ✓ **Signed commercial contract** with Alliant Energy (Wisconsin, U.S.)
- ✓ **Signed commercial contract** with NTPC Utility (Kudgi, India)
- ✓ **10+ GWh global commercial pipeline**

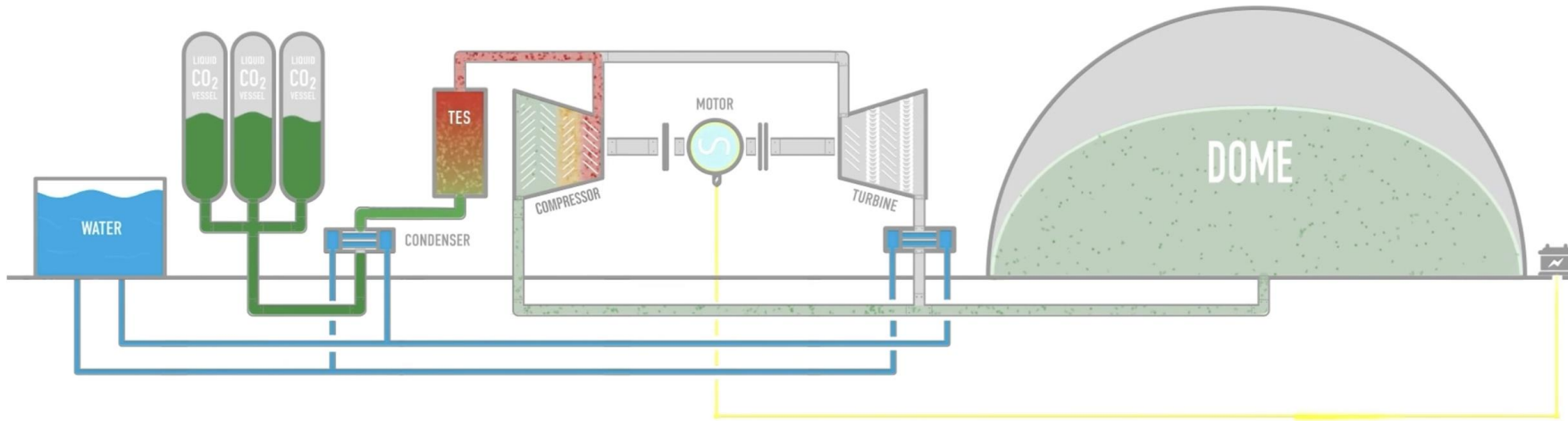
Clean, Reliable Power

- ✓ **Baseload energy capacity** to more reliably integrate renewable generation, eliminating reliance on fossil generation
- ✓ Ancillary services like **voltage regulation, frequency response, and inertia** enable higher penetrations of renewable energy
- ✓ **Reduces curtailment** of clean energy generation
- ✓ **Lowers overall system costs** and stabilizes energy prices

Low-Risk & Proven

- ✓ The **only commercially deployed (>10 MW)** long-duration energy storage technology ready for scale
- ✓ **Highly efficient**, comprised of **off-the-shelf components** with **no critical materials**
- ✓ **18- to 24-month** development timeline
- ✓ Identical engineering and construction between first of a kind and subsequent plants enables **transfer of lessons learned**

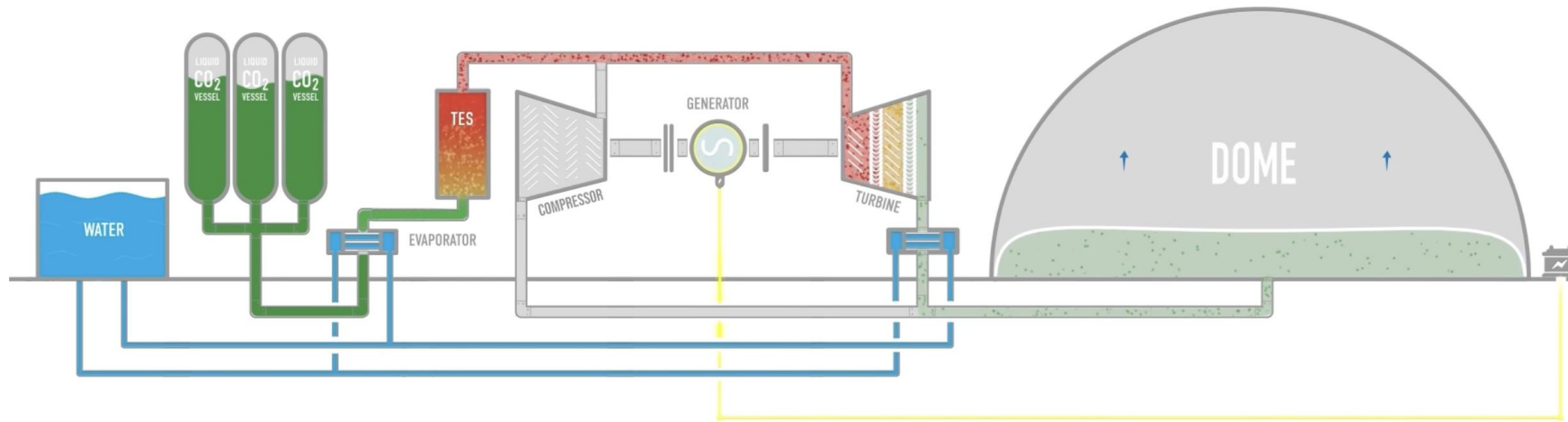
How it works: Charge



The CO₂ is withdrawn from an atmospheric gasholder, the dome, and compressed into an inter-refrigerated compressor driven by a motor. The heat generated from the compression is stored in a thermal energy storage system, whereas the CO₂ is liquefied and stored in vessels under pressure at ambient temperature with zero atmospheric emissions.

- 8+ hour charge duration
- 73% net RTE; no degradation over time
- Charges directly from the transmission system
- Can be co-located with clean energy resource; not required
- Fully closed loop system; no need for ongoing access to water or other resources

How it works: Discharge

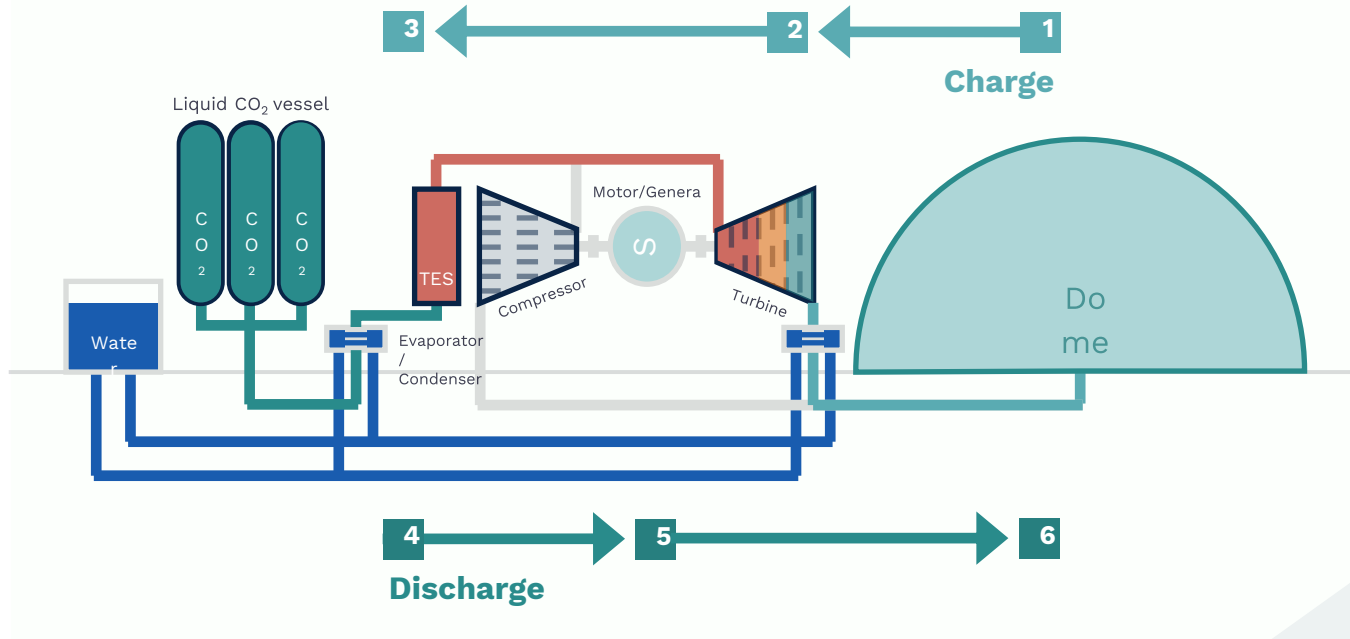


- 8+ hour discharge duration
- Discharges directly to bulk transmission system
- Can be co-located with a large load; not required

In discharge mode, the CO₂ is heated, evaporated and sent into an expander before flowing back into the dome. In doing so, the expander drives the generator to feed carbon-neutral electricity to the grid.

Our technology is thermo-mechanical long-duration energy storage asset

CO2 Battery process overview



CO₂ is used as a working fluid in a closed cycle and is not consumed or emitted

Charge

- 1 CO₂ is withdrawn from the atmospheric gasholder (Dome) and compressed adiabatically
 - Energy Dome relies on industrial-grade CO₂ purchased from industrial gases suppliers, which only needs to be charged once since the system is closed-loop and does not have leakages
- 2 Sensible heat generated from compression is captured and stored in Thermal Energy Storage (TES) vessels
- 3 CO₂ is condensed into liquid state and stored

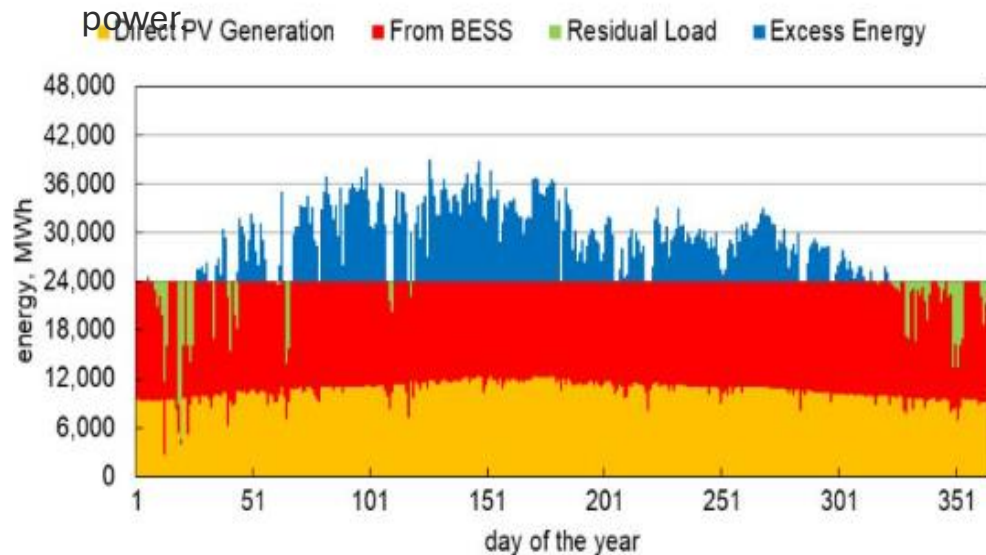
Discharge

- 4 Liquid CO₂ is evaporated and heated by recovering heat from TES
- 5 Hot CO₂ stream is expanded into turbine, returning power to the grid
- 6 Gaseous CO₂ is returned to the Dome at ambient temperature and pressure without leakage to atmosphere

Case Study: CO2 Battery + PV for 24/7 clean energy

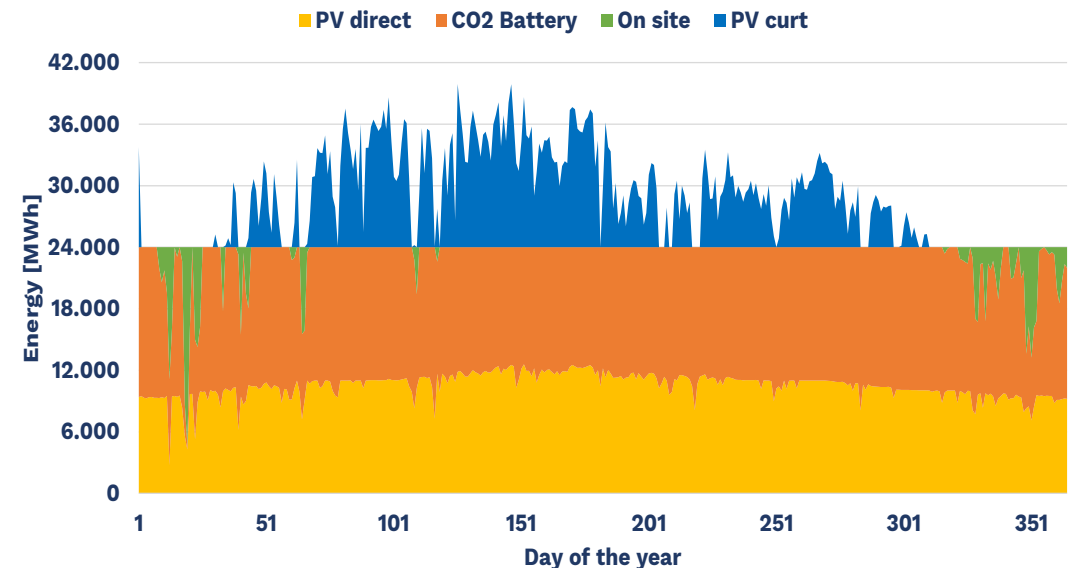
Original Study by Bernhard Seubert

- **Situation:** Renewables developer Masdar and Emirates Water and Electricity Company (EWEC) are partnering on the worlds “first gigascale 24/7 renewable energy project”
- **Resource mix:** The project will be comprised of 5.2 GW PV plus a 19 GWh BESS to have 1 GW availability 24/7
- **Study:** Using PVWatts, researcher Bernhard Seubert modeled the system using publicly available assumptions.
- **Results:** 1. The proposed system reaches ~97% 24/7 outcomes. 2. LCOE is approximately \$66.6 USD/MWh based on a reference 8760 GWh production and 20 year lifetime. 3. BESS provides 54% of



Energy Dome replication with CO2 Battery

- **Replication:** Energy Dome set out to determine how the CO2 Battery would perform under the same conditions
- **Resource mix:** We modeled the same solar baseload target (1 GW), and optimized to 5.9 GW PV plus 14.04 GWh CO2 Battery
- **Study:** Used original study model and assumptions to replicate the modeling with the CO2 Battery.
- **Results:** 1. The modeled results reach ~97% 24/7 outcomes. 2. LCOE is approximately \$55.4 USD/MWh based on a reference 8760 GWh production and 30 year lifetime. 3. CO2 Battery provides 52% of power.





ENERGYDOME

Our WORLD can't wait.



Dr Tsvetelina Merdzhanova

Team Leader

Forschungszentrum Jülich

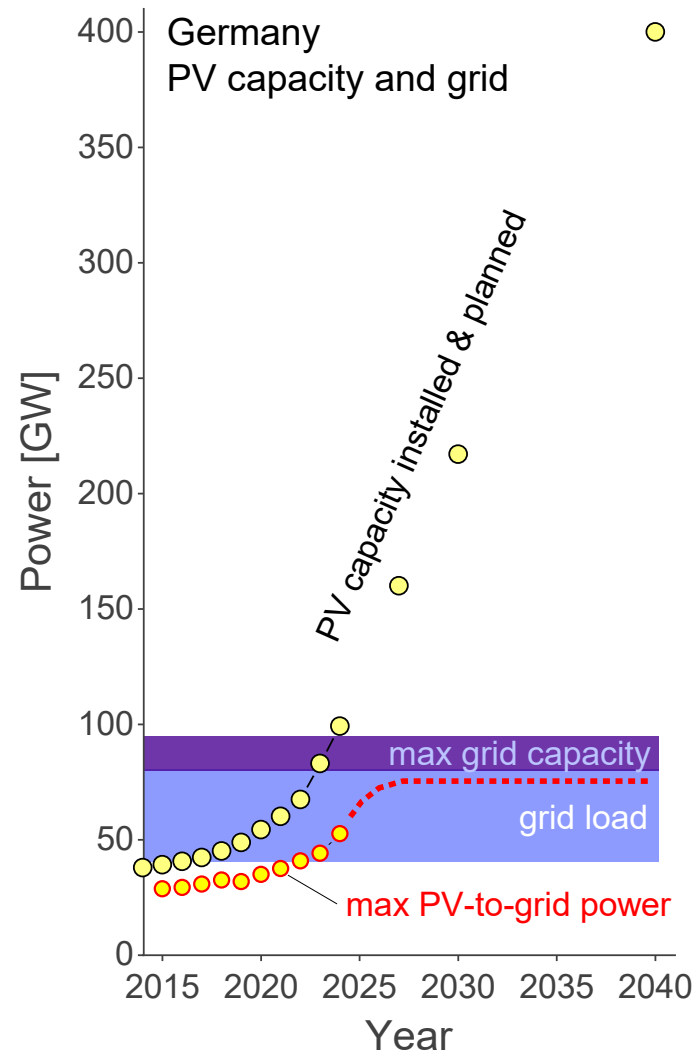




OUTLOOK INTO PV GROWTH BEYOND GRID FLEXIBILITY VIA INTEGRATION WITH STORAGE AND FUELS

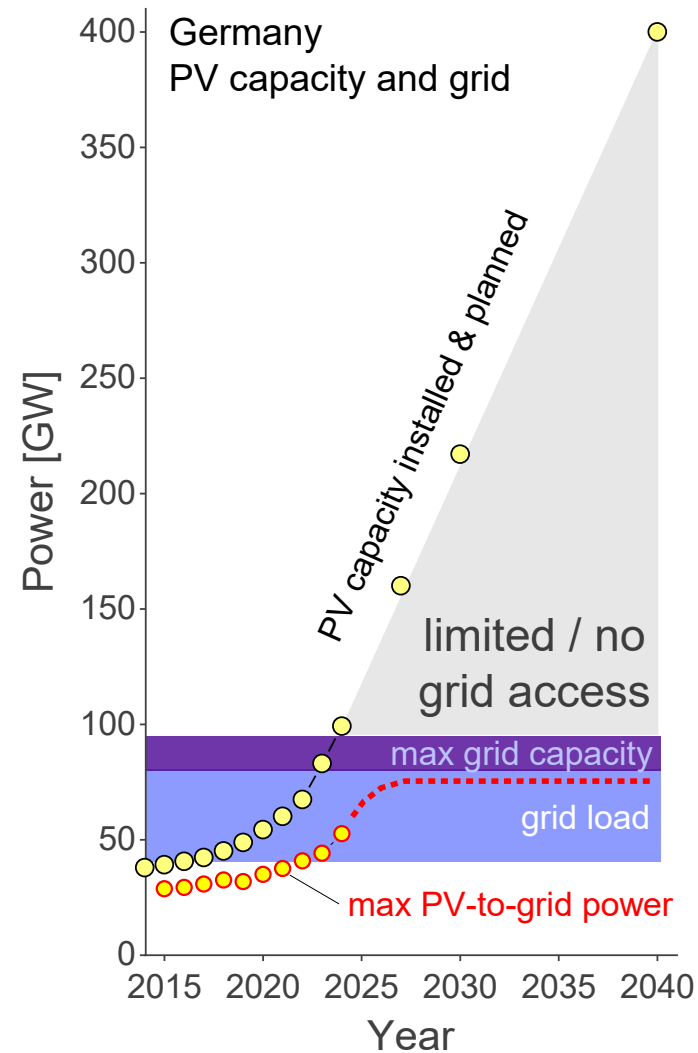
T. Merdzhanova, O. Astakhov, T. Cibaka, S. Shcherbachenko, U. Chibuko, U. Rau, C. Brabec

PV success and challenge – high power low energy



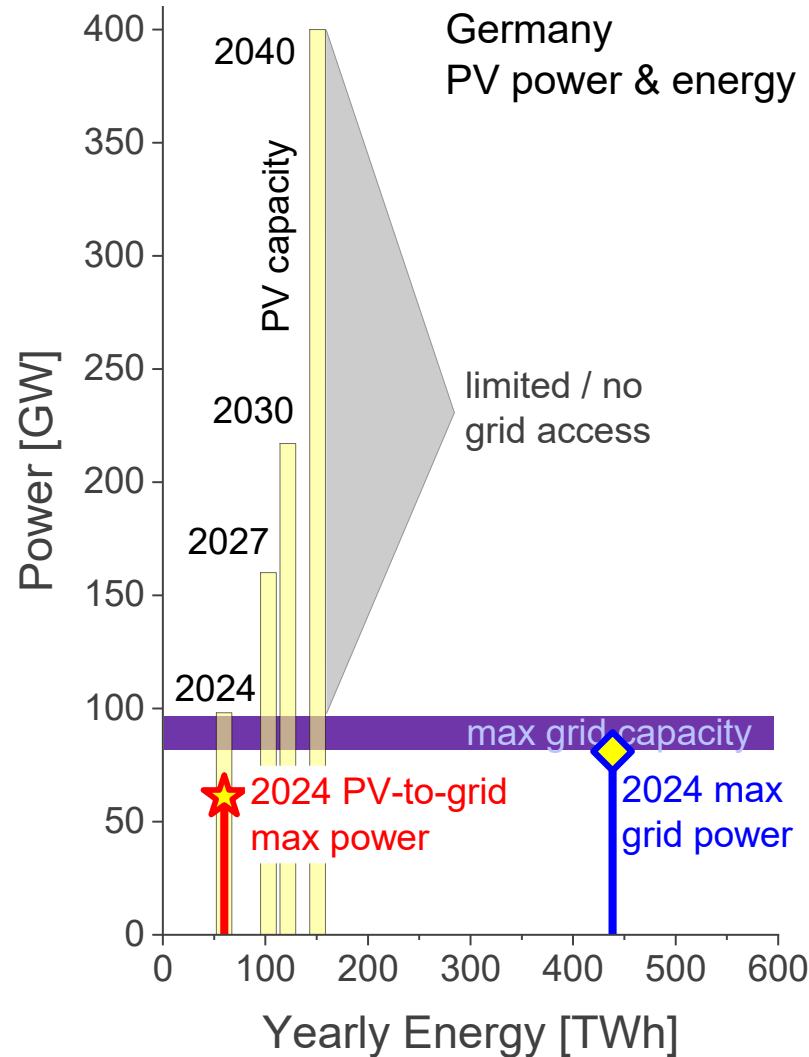
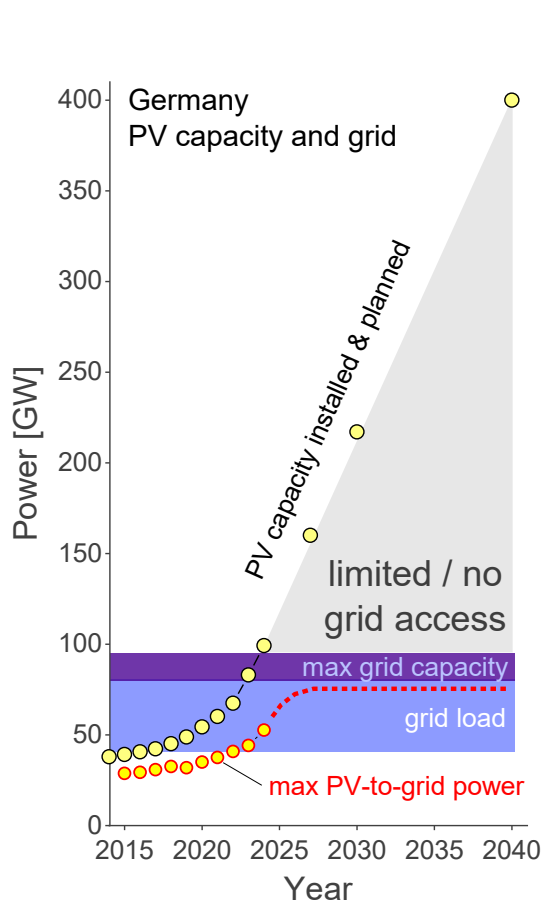
- Installed PV capacity grows persistently faster than forecasted
- In 2024 in Germany: nominal PV capacity exceeded max. grid power capacity
- Zero or negative electricity prices at peak PV generation
- Every additional GW of PV capacity has lower chance for utilization

PV success and challenge – high power low energy



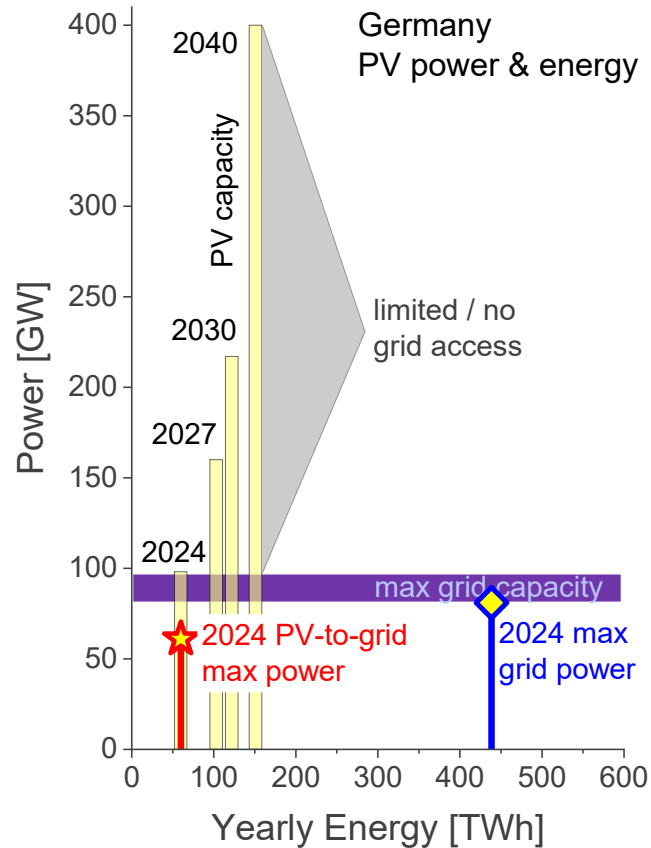
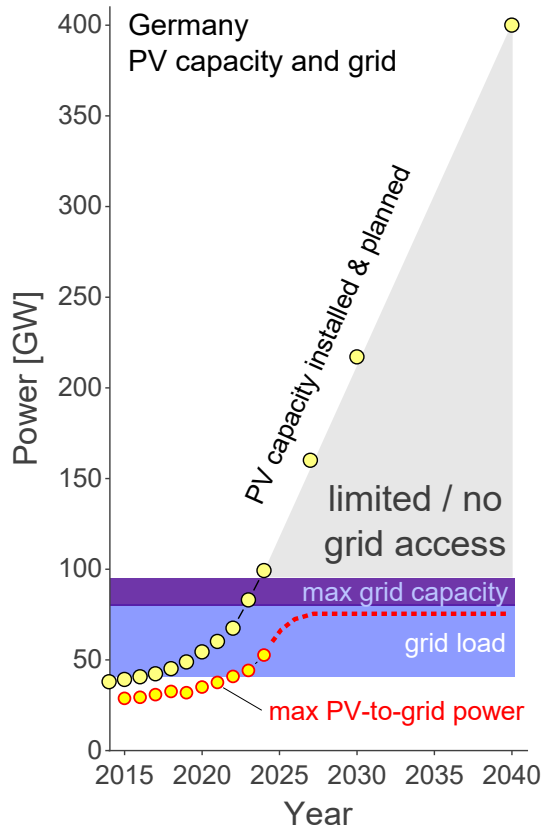
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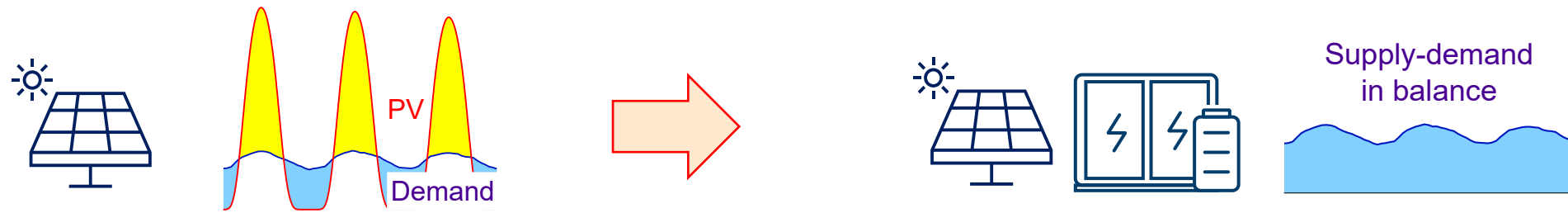
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Technical and economic curtailments
societal acceptance issues

PV must be integrated with storage to become stable reliable power source

What is ideal storage for PV?

Ideal PV storage turns PV into stable power source meeting the demand 24/7/365

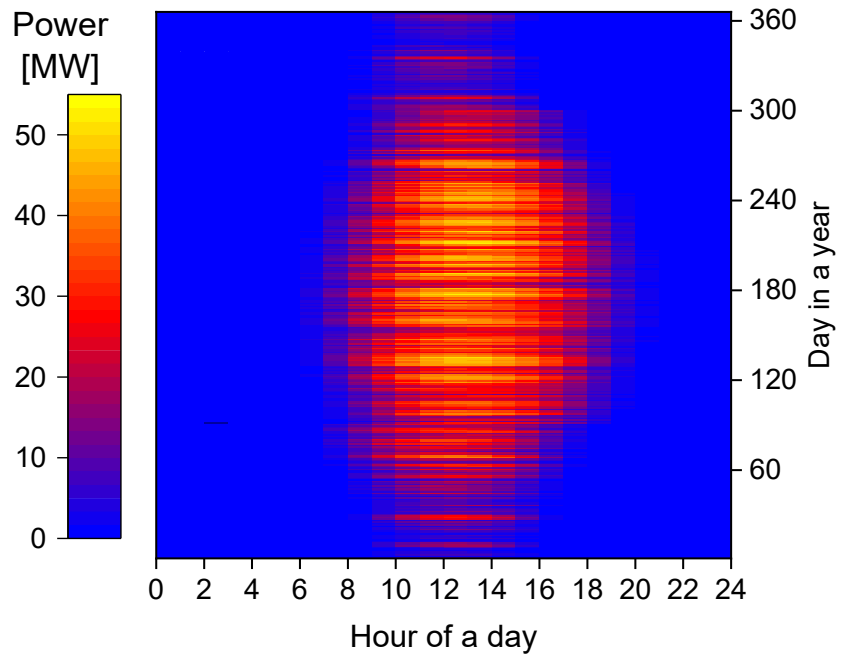


More specifically the requirements fall into three categories:

- **Time** - timescale for energy storage and delivery
- **Scale** - scalability of the storage capacity to match the scale of PV power and energy
- **Place** - where the storage must be installed to **minimize impact on the grid**

PV-Storage: Time

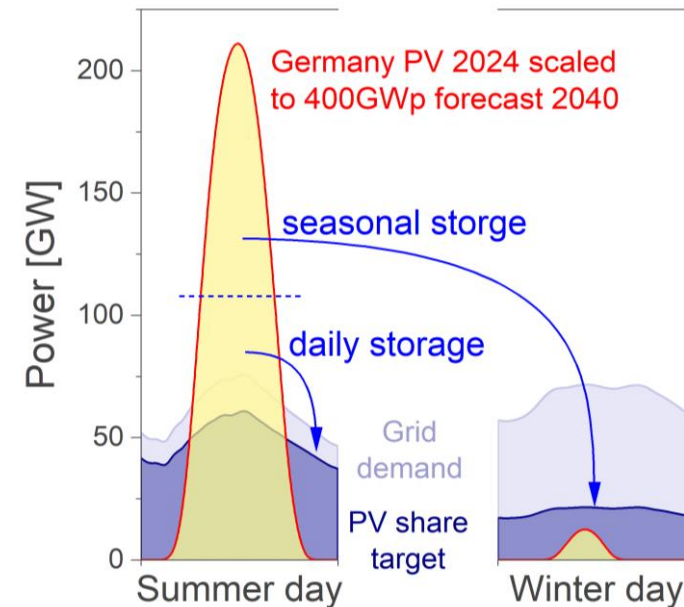
Germany PV to grid power 2024



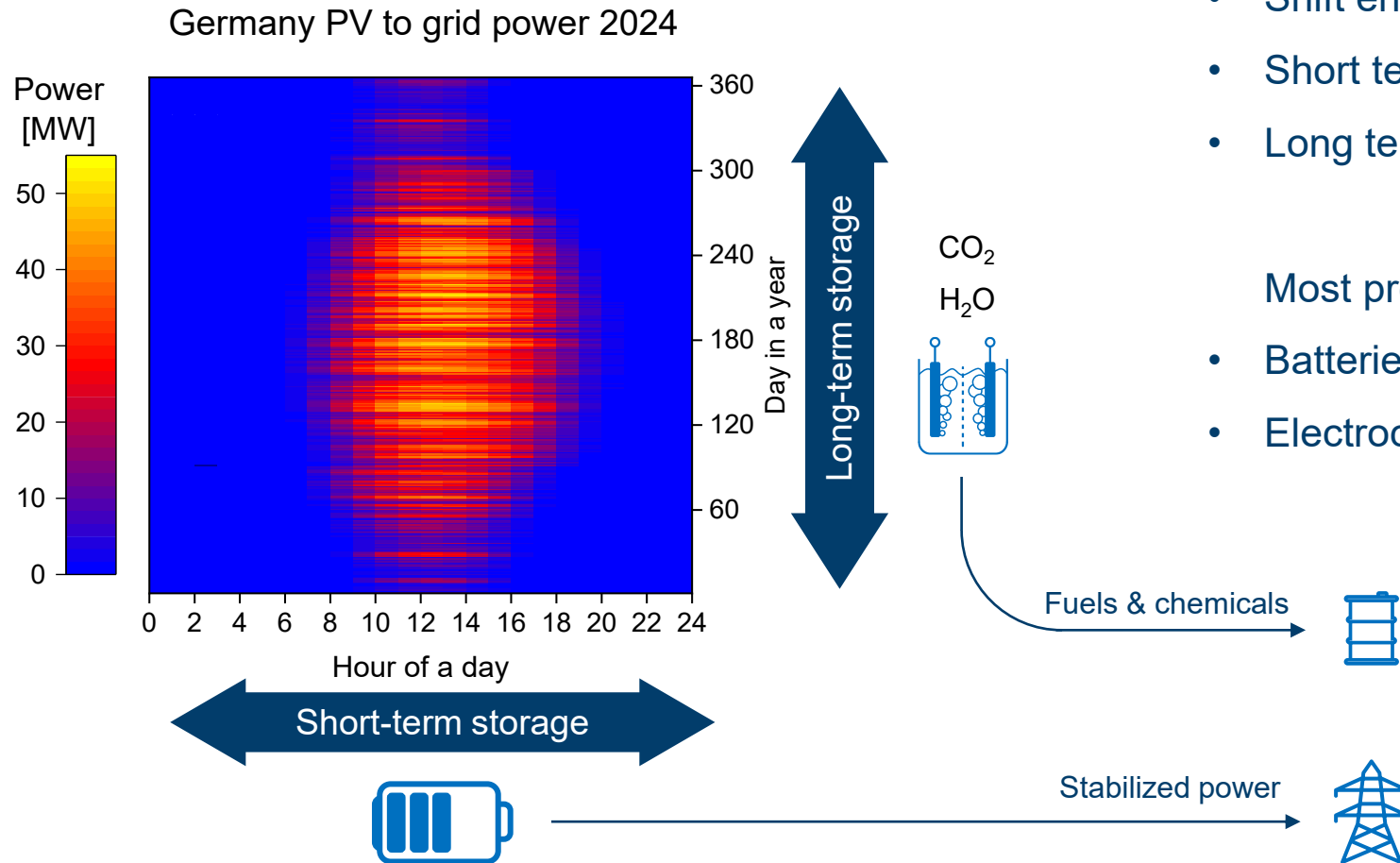
Carpet plot of PV power delivered to the German grid in 2024

Data: <https://www.agora-energiewende.org>

- Shift energy on timescale from seconds to years
- Short term (daily) storage seconds – days
- Long term (seasonal) storage days – years



PV-Storage: Time



- Shift energy on timescale from seconds to years
- Short term storage seconds – days
- Long term storage days – years

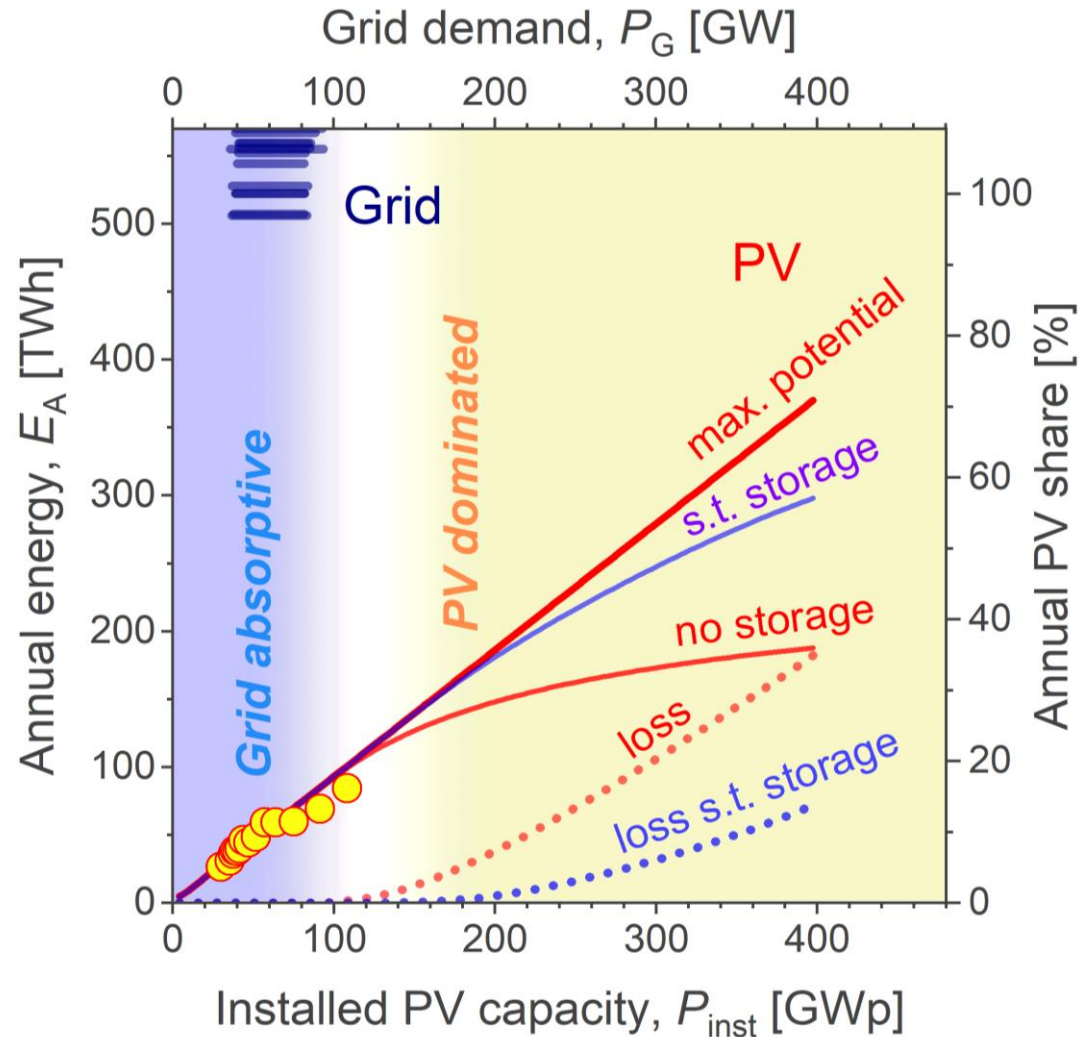
Most promising solutions:

- Batteries for short term
- Electrochemical (EC) conversion for long term

Data: <https://www.agora-energiewende.org>

PV-Storage: Scale

PV energy potential, delivered PV energy, and losses vs installed PV capacity with and without storage



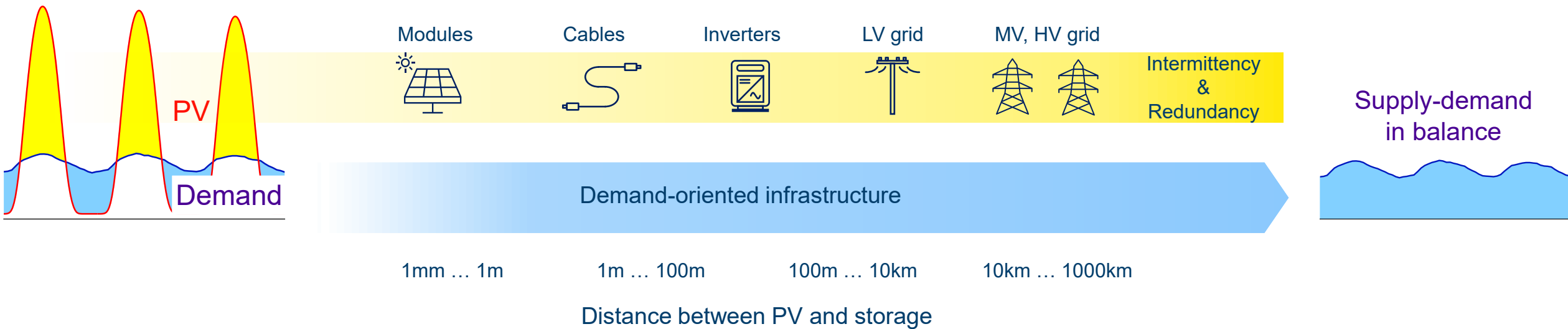
- PV potential increases linearly with installed capacity
- Without storage, PV utilization declines beyond ~120 GWp ($\approx 20\%$ PV share) due to growing curtailment
- Short-term storage (~ 2 h) significantly reduces losses and enables PV shares up to $\sim 30\%$.
- At 400 GWp installed PV capacity
 - short-term storage needs to shift up to ~ 0.5 TWh energy and ~ 100 GW power capacities
 - long-term storage needs to shift up to ~ 80 TWh energy and ~ 100 GW power capacities

O. Astakhov et. al. Joule 2026 submitted.

PV-Storage: Place

Storage can be placed at different distance and power delivery stage. From PV module to transmission grid

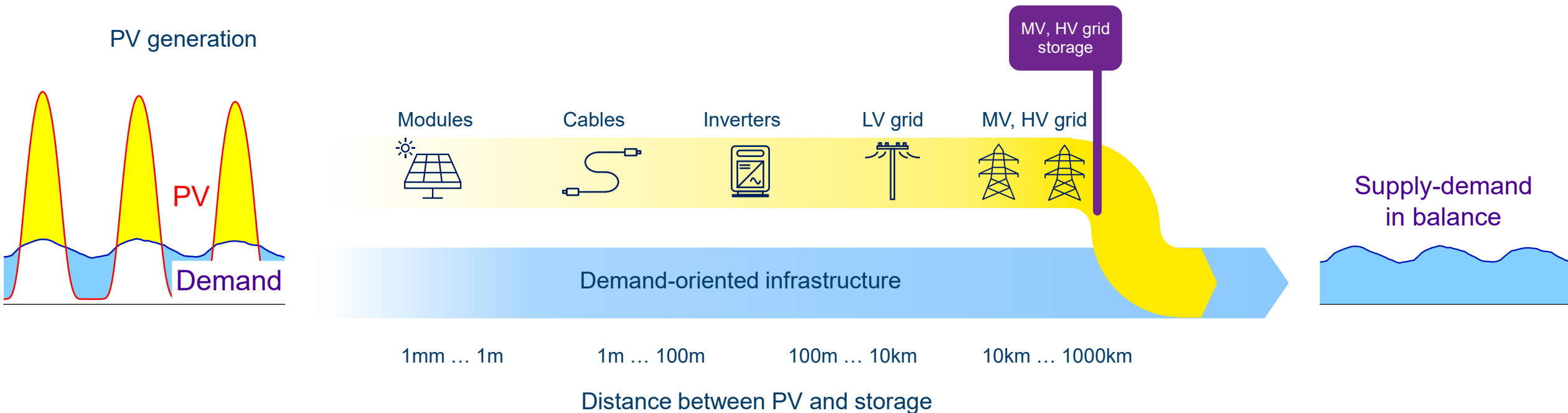
PV generation



PV-Storage: Place

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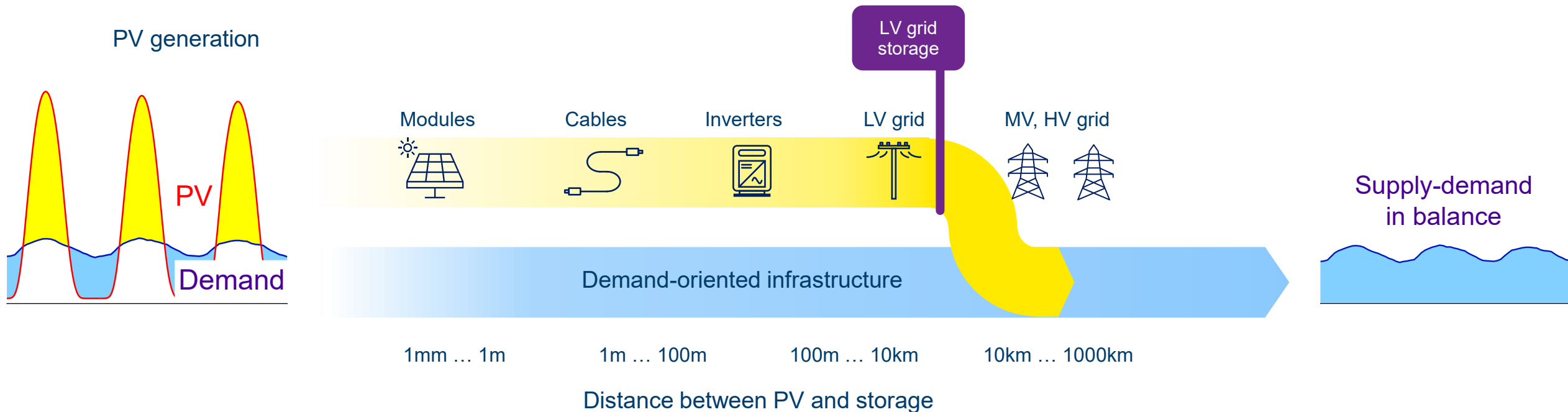
- farther from PV – farther propagation of excess generation requires more grid development and redundancy



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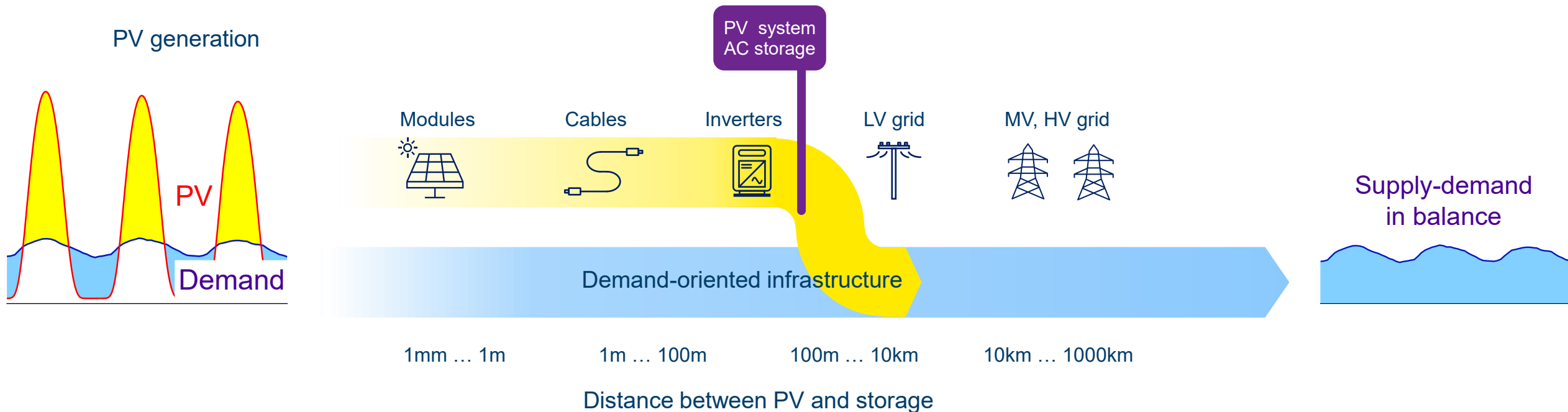
- farther from PV – farther propagation of excess generation requires more grid development and redundancy
- closer to PV – relaxed requirements for grid development, flexibility, and redundancy, more resilient and stable energy system



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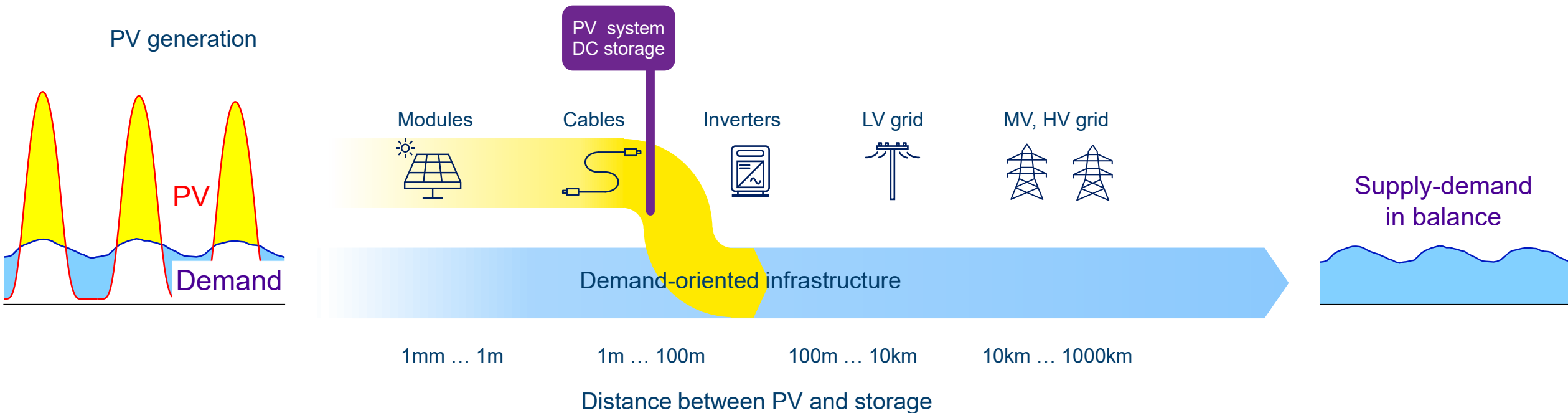
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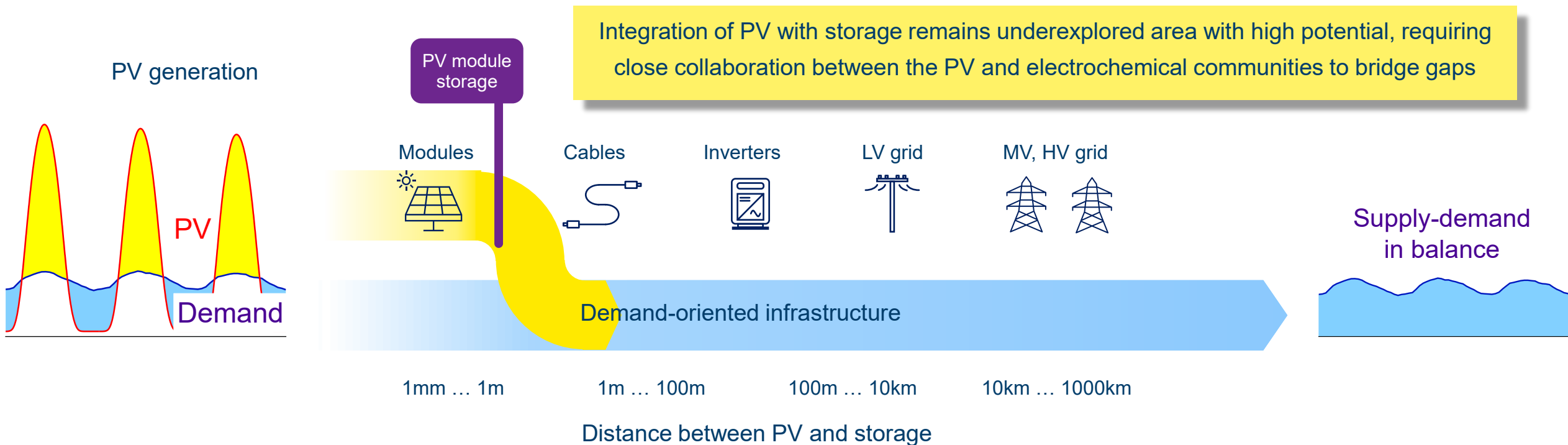


PV-Storage: Place

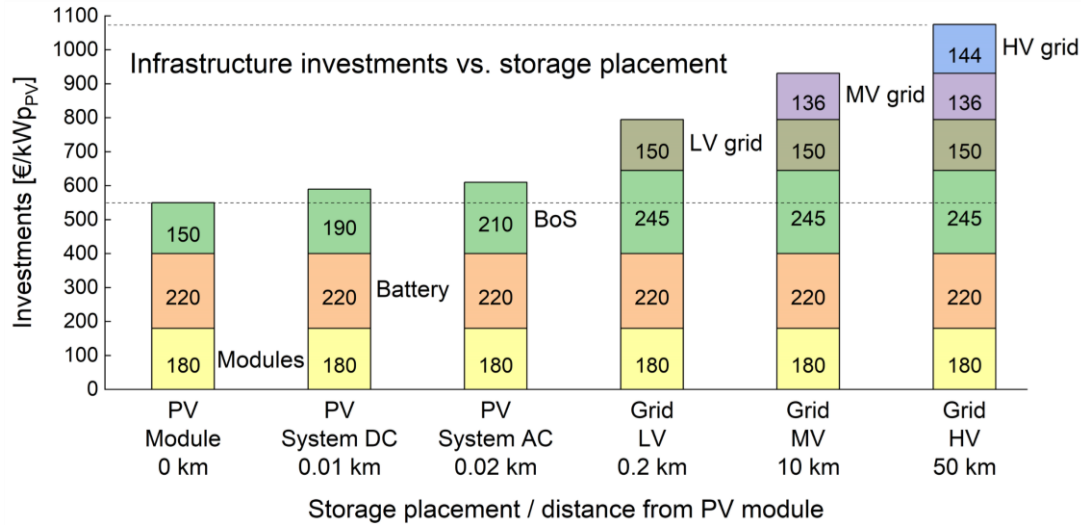
Storage can be placed at different distance and power delivery stage. From PV module to transmission grid

- farther from PV – farther propagation of excess generation requires more grid development and redundancy
- closer to PV – relaxed requirements for grid development, flexibility, and redundancy, more resilient and stable energy system
- both batteries and EC devices allow integration with PV at cell/module/string level – the most attractive and most challenging solution

Integration of PV with storage remains underexplored area with high potential, requiring close collaboration between the PV and electrochemical communities to bridge gaps



PV-Storage: Place – Investments vs storage placement



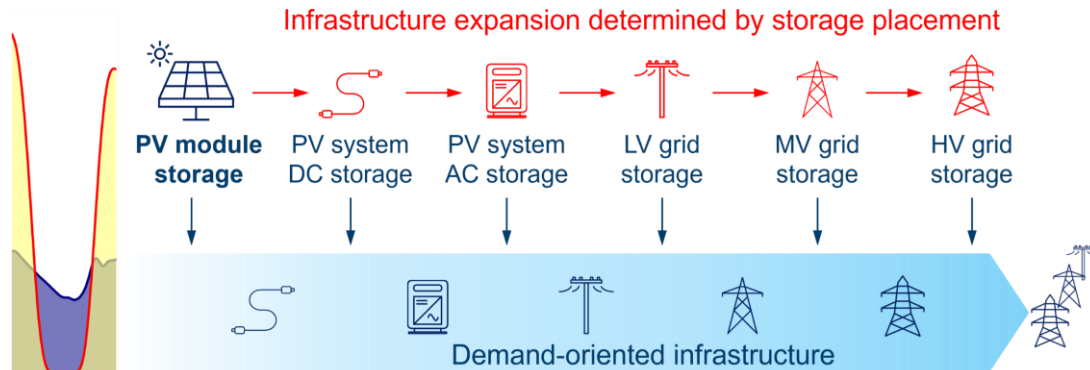
New PV installation investments

- ~ 550 €/kWp – storage at PV module
- ~ 1100 €/kWp – storage at HV grid

For Germany, this implies

>€40 billion in grid investments at ~30% PV share
(100 GWp added)

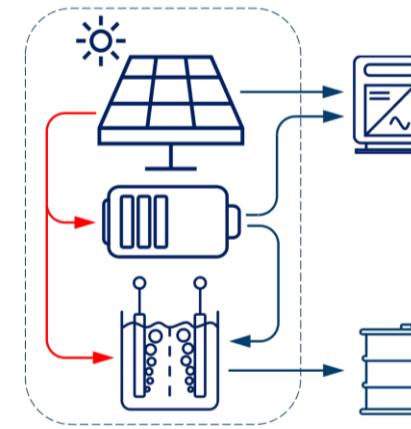
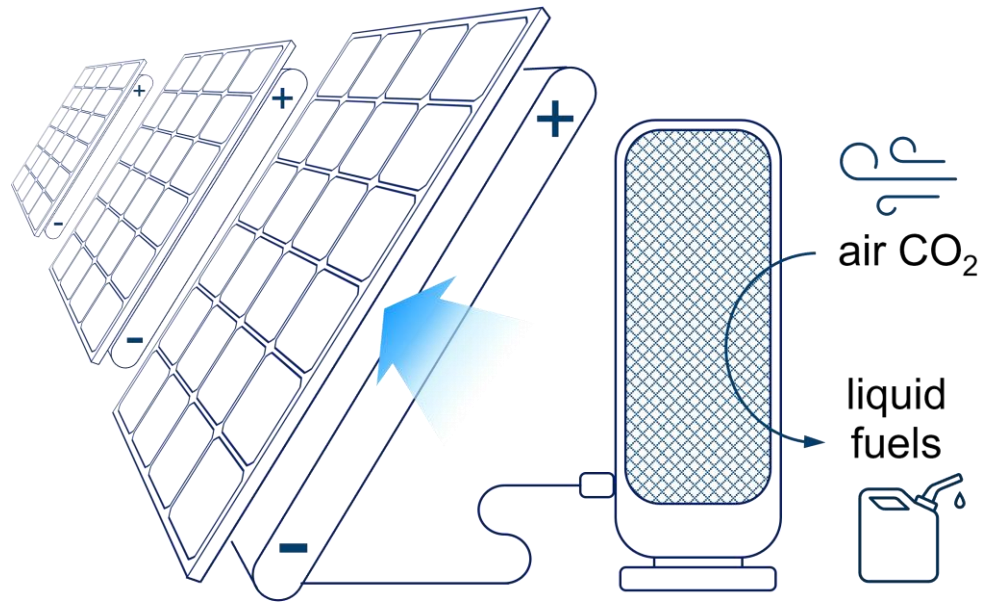
>€100 billion at 400 GWp for **grid-coupled storage**



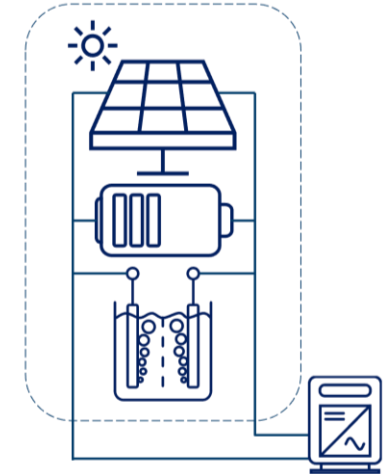
O. Astakhov et. al. Joule 2026 submitted.

PV-Module Storage Concept

Hybrid PV-Battery-Electrochemistry (PV-B-EC) concept



Energy flow



Electric coupling

- Self sustained operation in real scenarios
- Synergies for stability and efficiency
- Batteries can significantly reduce expensive EC capacity by shifting dedicated energy

O. Astakhov et. al. Joule 2026 submitted.

Outlook: PV-Storage integration for infrastructure-neutral solar expansion

- **Storage requirements depend on PV share and storage placement**, not just storage duration and capacity
- **Existing grid flexibility can accommodate ~20% PV**, ~2-hour storage enables daily balancing up to ~30%, while higher PV shares require **seasonal storage**
- **Locating storage closer to PV generation reduces infrastructure expansion**, lowering financial, environmental, and social burden
- **PV-module-level storage integration** can mitigate variability before it reaches the grid, enabling infrastructure-neutral PV deployment

Outlook: PV-Storage integration for infrastructure-neutral solar expansion

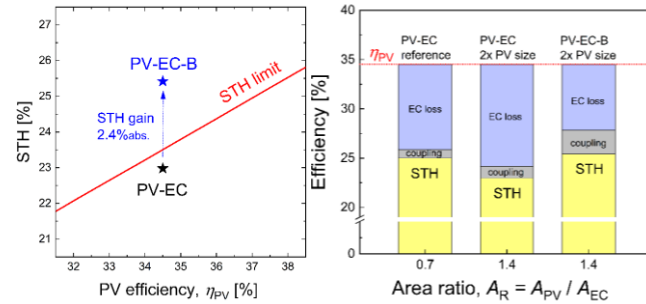
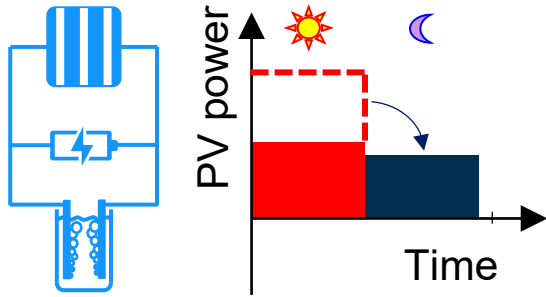
- **Storage requirements depend on PV share and storage placement**, not just storage duration and capacity
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- **Locating storage closer to PV generation reduces infrastructure expansion**, lowering financial, environmental, and social burden
- **PV-module-level storage integration** can mitigate variability before it reaches the grid, enabling more infrastructure-neutral PV deployment
- **Batteries are the most immediate solution** for module-level storage, with research priorities shifting toward durability, thermal robustness, voltage compatibility, and abundant materials
- **Electrochemical fuels are a promising pathway for seasonal storage**, requiring advances in efficiency and operation, alongside coordinated development across PV, battery, and electrochemical technologies



Thank you for your attention

Synergy in PV-Battery-Electrochemistry for continues, stable operation

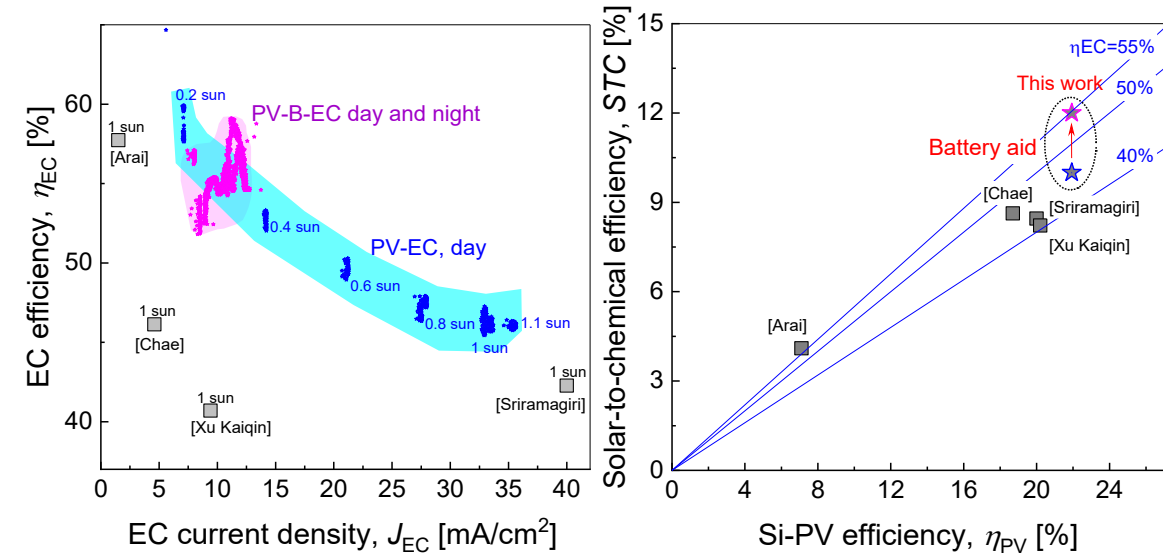
Direct-coupled PV-EC-B device minimum of components – maximum of advantages



- Stable self-sustained operation
- Electricity and solar fuels 24/7
- Same energy – lower power
- Relaxed EC operation
- **Synergistic efficiency gain!**
- Solar-to-hydrogen gain of 2.4%abs
- **Break STH limit** of the EC without battery by 2%abs
- EC capacity can be reduced by factor 2 while preserving STH

O. Astakhov et. al. J. Power Sources 2021
L.-C- Kin et al. Solar RRL 2022

U. Chibuko et. al. Int. J. of Hydrogen Energy
Vol. 127, 13 2025, Pages 38-50

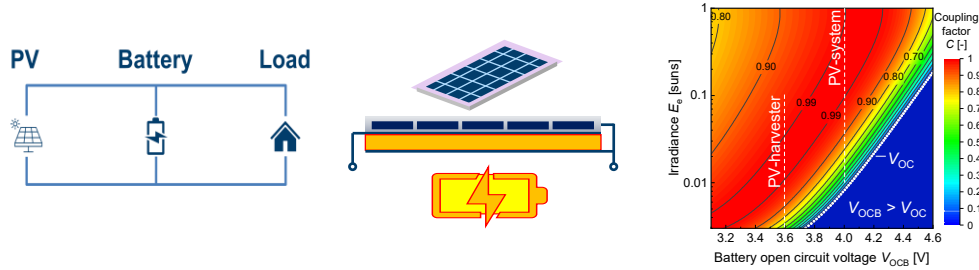


- EC-battery synergy - stable **CO2 reduction** in real PV conditions
- Realistic PV days and PV IVs
- Efficiency gain, stable product output in real day/night cycle

T. Cibaka et. al. EES Solar 2026
 DOI <https://doi.org/10.1039/D6EL00076B>

Feasibility of integrated PV-battery devices from room to field

PV-battery device concept



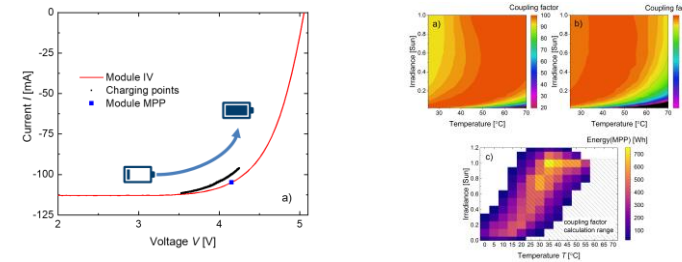
- Direct-coupled/integrated
- Compact and efficient from room to field

Astakhov et al., Solar Energy 206 (2020) 732

Shcherbachenko, Adv. Energy and Sust. Res. 5 (2024) 2400032

Kin et al., Journal of Material Chemistry A 12 (2024) 30862

Concept testing in lab conditions



- PV-Battery charging with 95% efficiency
- Experiment-based coupling predictions

Shcherbachenko et al., Solar RRL (2023) 2200857

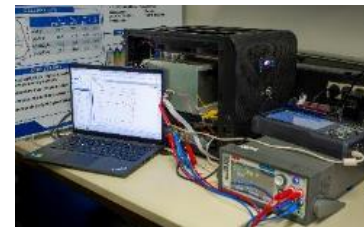
Chibuko et al., Solar Energy 249 (2023) 233

Outdoor prototype testing



- Integrated PV-battery modules
- 3 battery capacities
- over 1 year operation
- Key data on battery charge & temperature

Hardware emulation of real PV scenarios in the lab



- PV IV emulation + battery T control
- Any scale battery in real PV scenario
- Accurately reproducible on any timescale

M. Seidler et al., Journal of Power Sources 641 (2025) 236723

Kevin Milis

Regulatory Affairs Manager

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From Grid Congestion to Grid Resilience

The Role of Flexibility Enablers

dr. Kevin Milis
BSTOR

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The reality we face

- 🔌 Europe does not have an excess renewable generation problem
- 🔌 Europe has a grid usage problem
 - 🔌 Rapid growth in PV
 - 🔌 Grid capacity not keeping pace
 - 🔌 Congestion becoming structural
 - 🔌 Curtailment & connection delays increasing

Congestion is no longer local

- 🔌 From isolated bottlenecks → system-wide constraint
 - 🔌 Electrification of supply and demand
 - 🔌 Underutilisation of existing capacity
 - 🔌 Grid reinforcement cannot keep pace with system needs
 - 🔌 Growing connection queues

- 🔌 The challenge is system optimisation, not just expansion

Storage has become a necessity

- 🔌 Storage directly addresses congestion
 - 🔌 Shifts energy in time → reduces peak injections
 - 🔌 Absorbs excess generation → limits curtailment
 - 🔌 Provide local balancing → relieves constraints
 - 🔌 Maximises flows on existing grid capacity

- 🔌 Without flexibility: more curtailment & delays
- 🔌 With flexibility: more efficient system usage

Storage as a system asset

- 🔌 Storage is not just a market participant
- 🔌 System value is broader than arbitrage & balancing
 - 🔌 Congestion mitigation
 - 🔌 Grid optimization
 - 🔌 Renewable integration
 - 🔌 Reduction of wholesale price for all grid users
- 🔌 Storage is grid-enabling infrastructure

What needs to change (1)

Congestion & queue management

- 🔌 Current challenge: uncertain congestion impact of new grid users
- 🔌 Risk of
 - 🔌 Underestimation, leading to real congestion issues
 - 🔌 Overestimation, leading to unnecessary delays and costs
- 🔌 Need for realistic modelling of congestion impact

What needs to change (2)

Flexible connection frameworks

- 🔌 Flexible connection frameworks facilitate new connections
- 🔌 Rules should however be clear and non-discriminatory
- 🔌 Ensure that flexibility remains bankable and investable

What needs to change (3)

Recognise temporal dimension of “wire vs non-wire”

- 🔌 Grid reinforcement is essential
 - 🔌 But takes time (planning, permitting, construction)
 - 🔌 While congestion is happening now

- 🔌 In the short term, flexibility is the only available solution

Industry perspective

The barriers are not technical

- 🔌 Solutions for unlocking flexibility and managing congestion already exists
- 🔌 Key issues
 - 🔌 Regulatory uncertainty
 - 🔌 Slow or unclear processes
 - 🔌 Limited recognition and remuneration of system value
- 🔌 Deployment is constrained by framework, not feasibility

Key message

Do not block the solution

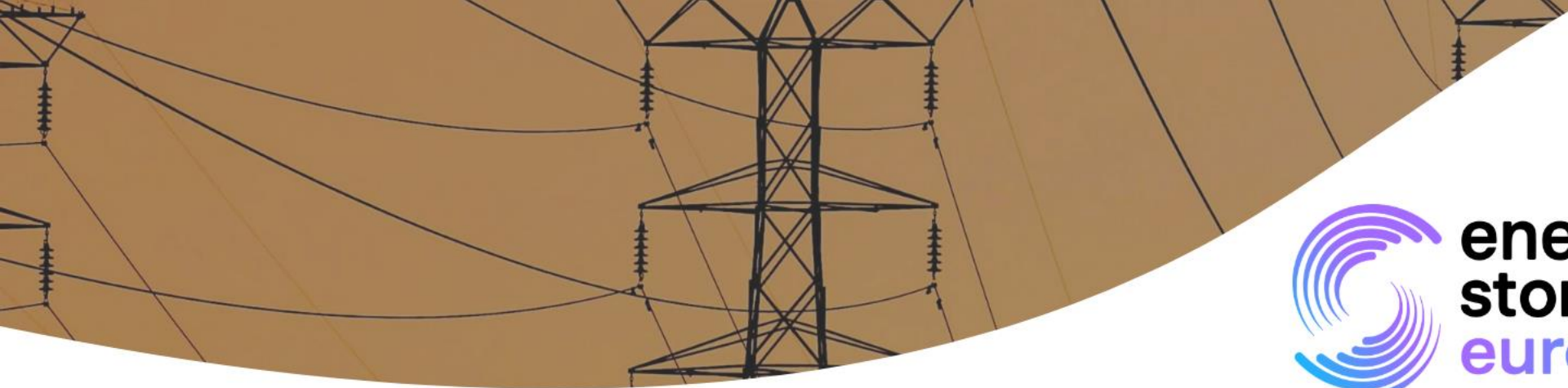
- 🔌 Through flexibility, storage can
 - 🔌 Reduce congestion
 - 🔌 Enable more renewables
 - 🔌 Improve system stability

- 🔌 Yet, storage often faces
 - 🔌 Regulatory uncertainty
 - 🔌 Limited grid access

- 🔌 Risk of blocking what solves the problem

From congestion to resilience

- 🔌 Improve how we manage grid access
 - 🔌 Adapt TSO remuneration to move away from RAB+
 - 🔌 Enable bankable flexible connection frameworks
 - 🔌 Recognise flexibility as immediate lever
-
- More efficient grid
 - Faster integration of renewables
 - Stronger, more resilient system



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Affairs Manager,
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**Dr Tsvetelina
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Forschungsze
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Dr Robert Kenny:
Directorate for
Energy, Mobility and
Climate, European
Commission, Joint
Research Centre



**Dr Venizelos
Efthymiou:**
Director, EPL
Technology
Frontiers Ltd



Moderator:
Daniel Vig:
Senior Policy
Officer,
Energy Storage
Europe

Continue the conversation on Grid Resilience in the upcoming conferences:



The session will also serve as a preview of the broader debate to be held during the opening of the **EU PVSEC 2026**, with a particular emphasis on the Dutch context with title “Grid Congestion management and the perspective of The Netherlands”.

<https://www.eupvsec.org/>

Date: 14-18 September 2026



To explore further the role of energy storage in grid resilience together with leading representatives from across the energy storage sector, join us at the **Energy Storage Europe Conference 2026** in Brussels.

<https://www.accelevents.com/e/energy-storage-europe-conference-2026>

Date: 6-8 October 2026



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