The Long and Short of It: Long Duration Energy Storage for Europe's Future

Webinar: 15 September 2022, 15:00 – 16:00 (CEST)

Co-organised by:

LDES LONG DURATION ENERGY STORAGE COUNCIL

EASE European Association for Storage of Energy

Welcome and Introduction

Larissa Fair
Director of Communications
at LDES Council

Agenda

15:00	**Welcome and Introduction** Larissa Fair, Director of Communications at LDES Council
15:05	**Presentation of Recommendations and Toolbox of Policy Options** Frank Wouters, Senior Vice President Energy Transition, Reliance (Board co-chair of LDES Council)
15:10	**Presentation of the Estimated 2030 and 2050 Targets and the Policy Framework Needed to Achieve It** Lidia Tamellini, Junior Policy Officer at EASE
15:15	**Panel discussion and Q&A** **Moderator**: Frank Wouters, LDES Council, Reliance **Panellist**: • Carl-Johan Linér, CEO at SaltX Technology • Rupert Pearce, CEO at Highview Power • Sigmund Brielmaier, Partnering and Portfolio Manager – Energy Storage at Siemens Energy
15:55	**Closing Remarks** Patrick Clerens, EASE Secretary General

Welcome

- The questions for the speakers will be collected during the webinar via the chat and addressed later in the Panel discussion.
- If you experience any technical issues, please reach out to Elina Cirule writing to e.cirule@ease-storage.eu
- A recording of this event will be available in the upcoming days on our websites for EASE members and LDES Council members.

Presentation of Recommendations and Toolbox of Policy Options

Frank Wouters
Senior Vice President Energy Transition at Reliance,
Board co-chair of LDES Council

The journey to net-zero

An action plan to unlock a secure, net-zero power system

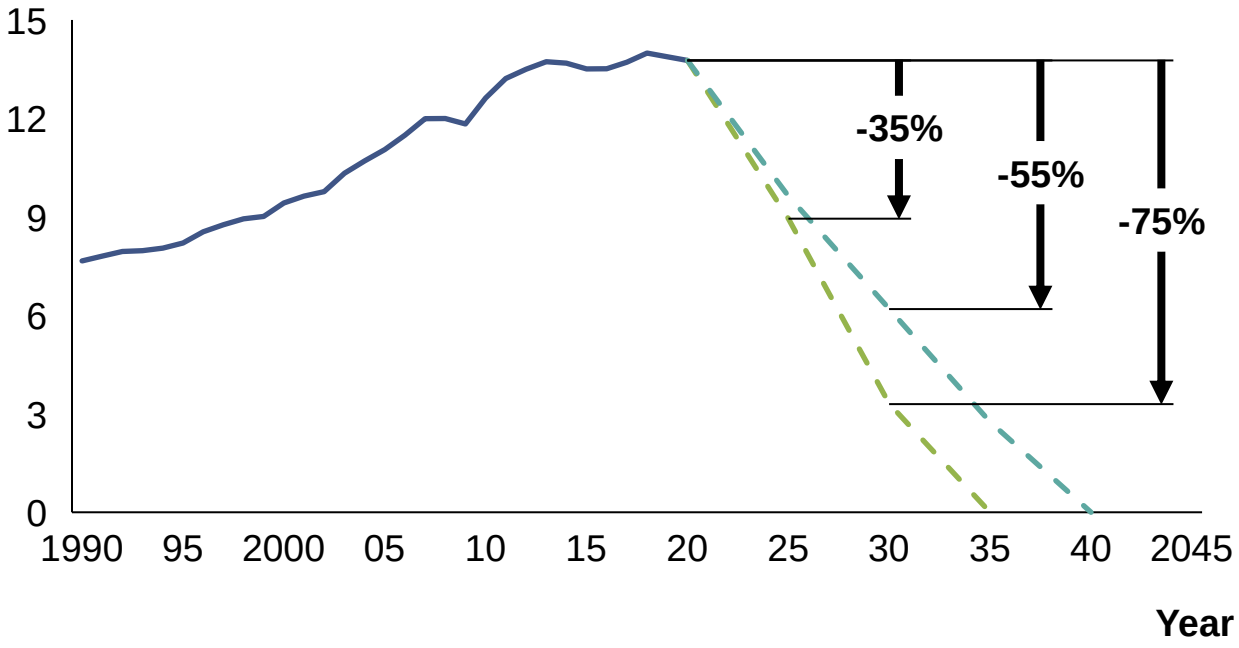
Energy transition increasingly about more than decarbonization – energy security and affordability are key imperatives

Historical emissions — Net-zero 2035 (MEDCs reference case)[1] — Net-zero 2040 (Global reference case)[2]

Deep and early decarbonization of power sector is key to achieving 1.5 C targets

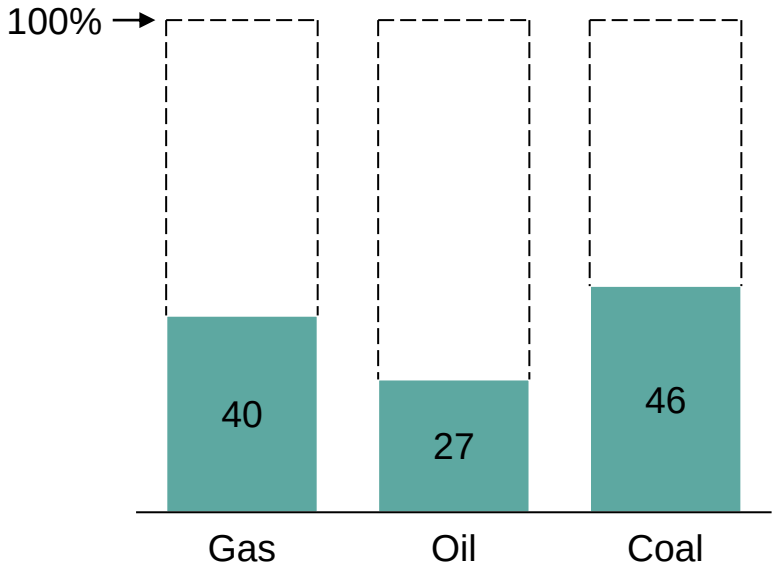
Global historical emissions of the power sector and assumed reduction pathways

Gt CO_2e



Energy transition also seen as means to reduce dependence on imports

European Union imports from Russia, %, 2021



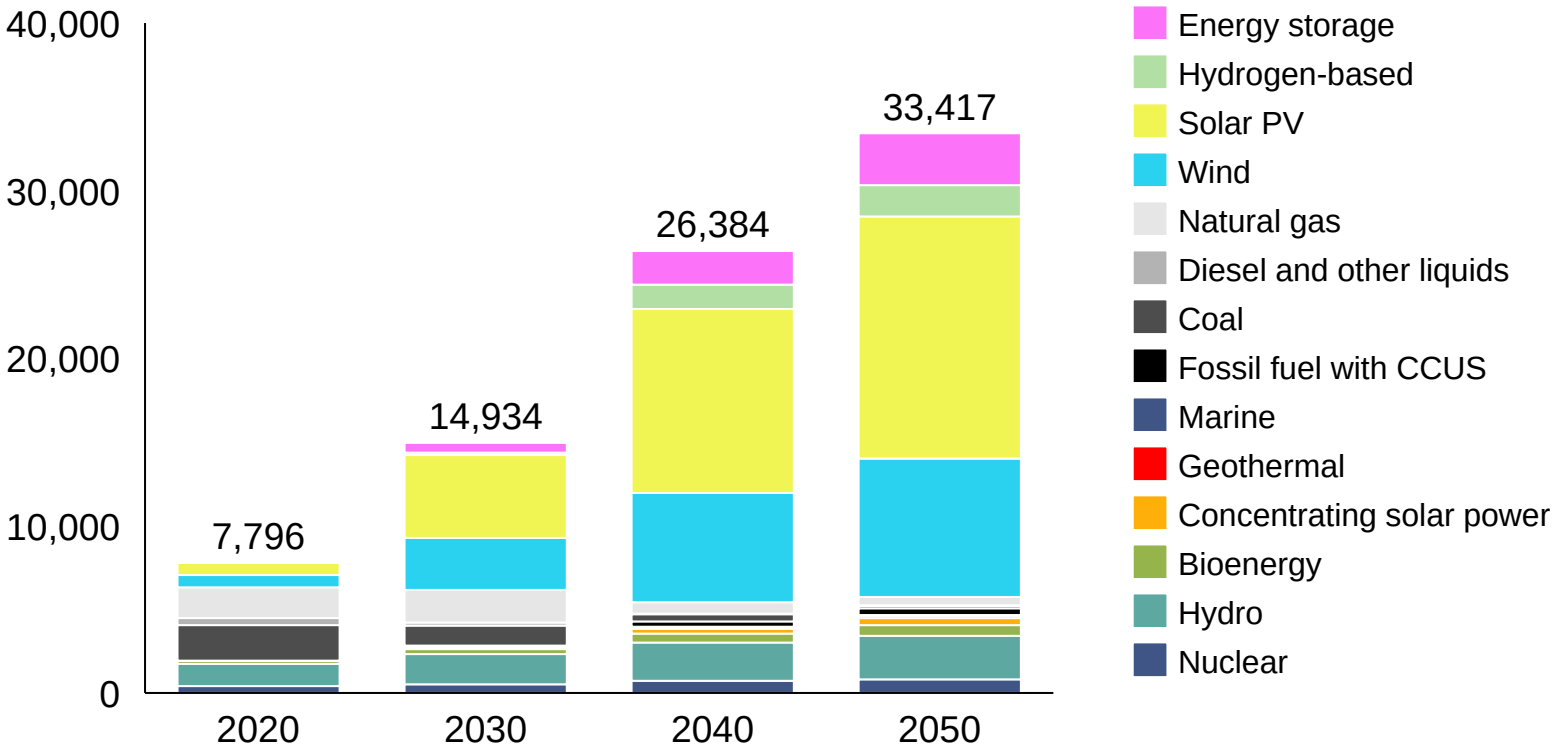
1. Informed by IEA Net Zero 2050 report on more economically developed countries (MEDCs) needs to get to net zero power by 2035. Consistent with US President Biden climate ambition.
2. Informed by IEA Net Zero 2050 report on the world's power sector needs to get to net zero by 2040.

Source: Net-zero power: Long duration energy storage for a renewable grid (November 2021), IEA, European Commission

Decarbonization of power will create a “flexibility gap”, requiring new resources to balance the net-zero grid – LDES can de-risk the transition

Power capacity especially of variable renewables – solar PV and wind – expected to increase significantly while conventional flexibility is phase out

Power capacity as modeled by IEA Net Zero by 2050 outlook (GW)



Potential sources of low-carbon flexibility

- **Load control and demand response** (including flexibility from operation of electrolyzers, vehicle-to-grid, etc.)
- **Power grid** expansion and meshing
- **Hydrogen-based resources** (fuel cells, engines, turbines)
- **Energy storage** (especially of increasing duration and of different energy carriers)

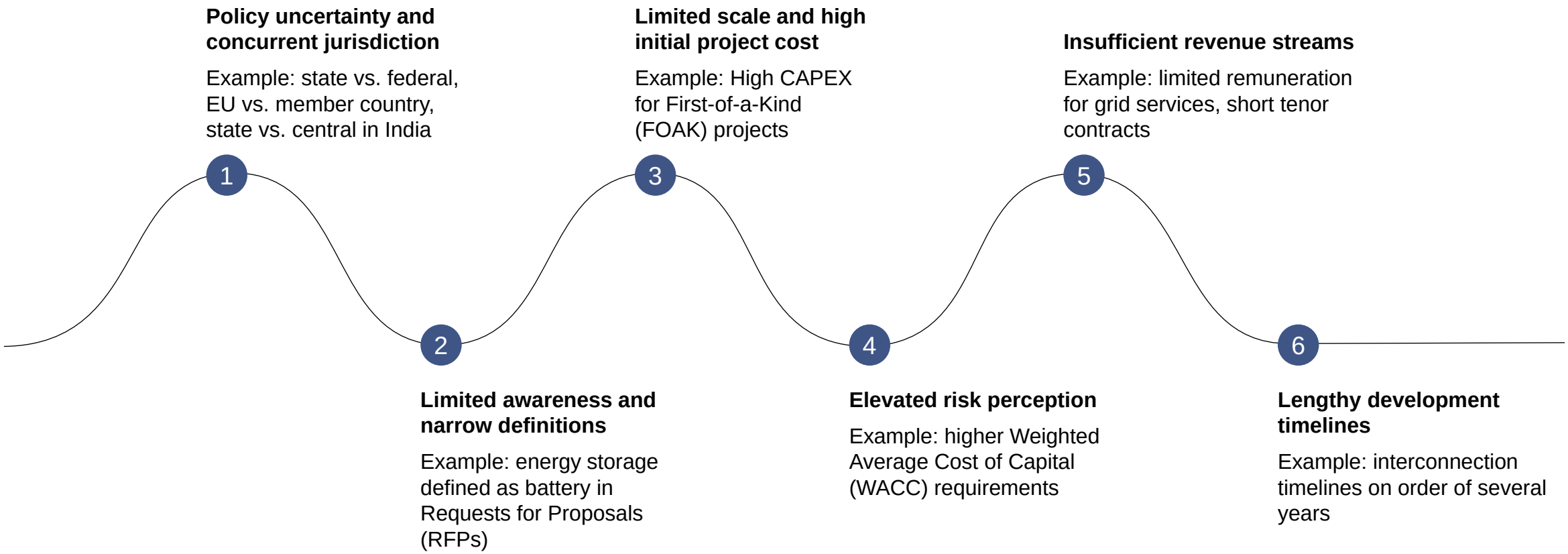
Source: IEA

Various technical approaches for LDES – some are commercial, most are nascent – but all can benefit from additional scale

Type	Description	Technology	Market readiness today
Mechanical 	Mechanical LDES store potential or kinetic energy in systems, so that they can release it in the future	Novel pumped hydro (PHS)	Commercial
		Gravity-based	Pilot
		Compressed air (CAES)	Commercial
		Liquid air (LAES)	Pilot (commercial announced)
		Liquid CO_2	Pilot
Thermal 	Thermal energy storage systems use thermal energy to store and release electricity and heat	Sensible heat (e.g., molten salts, rock material, concrete)	R&D/pilot
		Latent heat (e.g., aluminum alloy)	Commercial
		Thermochemical heat (e.g., zeolites, silica gel)	R&D
Chemical 	Chemical energy storage systems store electricity through the creation of chemical bonds	Power-to-gas-(incl. hydrogen, syngas)-to-power	Pilot (commercial announced)
Electrochemical 	Electrochemical LDES refers to batteries of different chemistries that store energy	Aqueous electrolyte flow batteries	Pilot/commercial
		Metal anode batteries	R&D/pilot
		Hybrid flow battery, with liquid electrolyte and metal anode	Commercial
		Hybrid cathode batteries	Commercial

Source: LDES Council The journey to net-zero: An action plan to unlock a secure net-zero power system (June 2022)

The LDES sector faces barriers to deployment today that policy and regulatory measures can help overcome



Source: LDES Council The journey to net-zero: An action plan to unlock a secure net-zero power system (June 2022)

Level of support would naturally evolve as LDES market matures

ILLUSTRATIVE

	Market creation ~ today-2025	**Market growth** ~ 2025-2030	**Market maturity** ~ 2030-2035
Project scale	• **Early commercial projects** following proof of concept pilots	• Increasing **scale and commercial maturity**, driven by cost declines	• Mature commercial **deployments at-scale**
Customer and investor perception	• **Variable viability** of early customer business cases • **High costs of capital** due to elevated risk perception	• Risk **perception improves** as technologies are better understood • Costs of capital reduce as **lower cost financing** starts to invest	• Asset class **fully de-risked** • Established customer and investor base that includes **traditional sources of project capital**
Policy support	• Use grants, revenue mechanisms, and targets to **improve project viability, drive ecosystem confidence, and set goals**	• Refinement of rules, long-term targets, and revenue mechanisms to **maintain support but drive continued competitiveness**	• **Full commercial exposure** with majority of direct policy support removed or scaled back
Impact	• Local and corporate decarbonization for **selected use cases / first-mover customers**	• Widening set of decarbonization use cases as **greater fraction of customer base** adopts	• Significant capacity penetration to **enable net-zero power systems** by end of decade

Source: LDES Council The journey to net-zero: An action plan to unlock a secure net-zero power system (June 2022)

Policy support is instrumental in accelerating climate tech

Support type	**Case examples** (year of implementation) Solar PV	Offshore wind
Long-term procurement and capacity targets	2030 RES target set (1998) State Renewable Portfolio Standards (1983)	20-year FiP (2008) Offshore wind target for 2045 (2021) Offshore wind target for 2030 (2021)
Offtake agreements / revenue contracts	20-year FiT granted (2000)	Offtake agreements (2021) Contract for Difference (CfD) (2017)
Access, grants, and incentives	Prioritized access to grids; state-owned development bank KfW grants subsidized loans (2000)	Centralized development, funding of grid connection costs (2014) Investments in supply chain (2021)

Source: LDES Council The journey to net-zero: An action plan to unlock a secure net-zero power system (June 2022)

The Council developed a “toolbox” of different options for consideration

Long-term market signals

Inform the trajectory of the energy system

- Carbon pricing and greenhouse gas reduction targets
- Procurement targets
- Grid planning
- Renewable energy targets
- Phase-out of fossil fuel subsidies
- Storage capacity targets

Revenue mechanisms

Enhance the viability of projects

- Cap and floor
- Long term bilateral contract for balancing / ancillary services
- Capacity market
- Nodal & locational pricing
- Contract for Difference
- Regulated asset base
- Hourly energy attribute certificates
- 24/7 clean PPA

Direct technology support and enabling measures

Create pathways for access and uptake

- Grants and incentives
- Investment de-risk mechanisms
- Sandboxes
- Market rules
- Targeted tenders
- Technology standards

Source: LDES Council The journey to net-zero: An action plan to unlock a secure net-zero power system (June 2022)

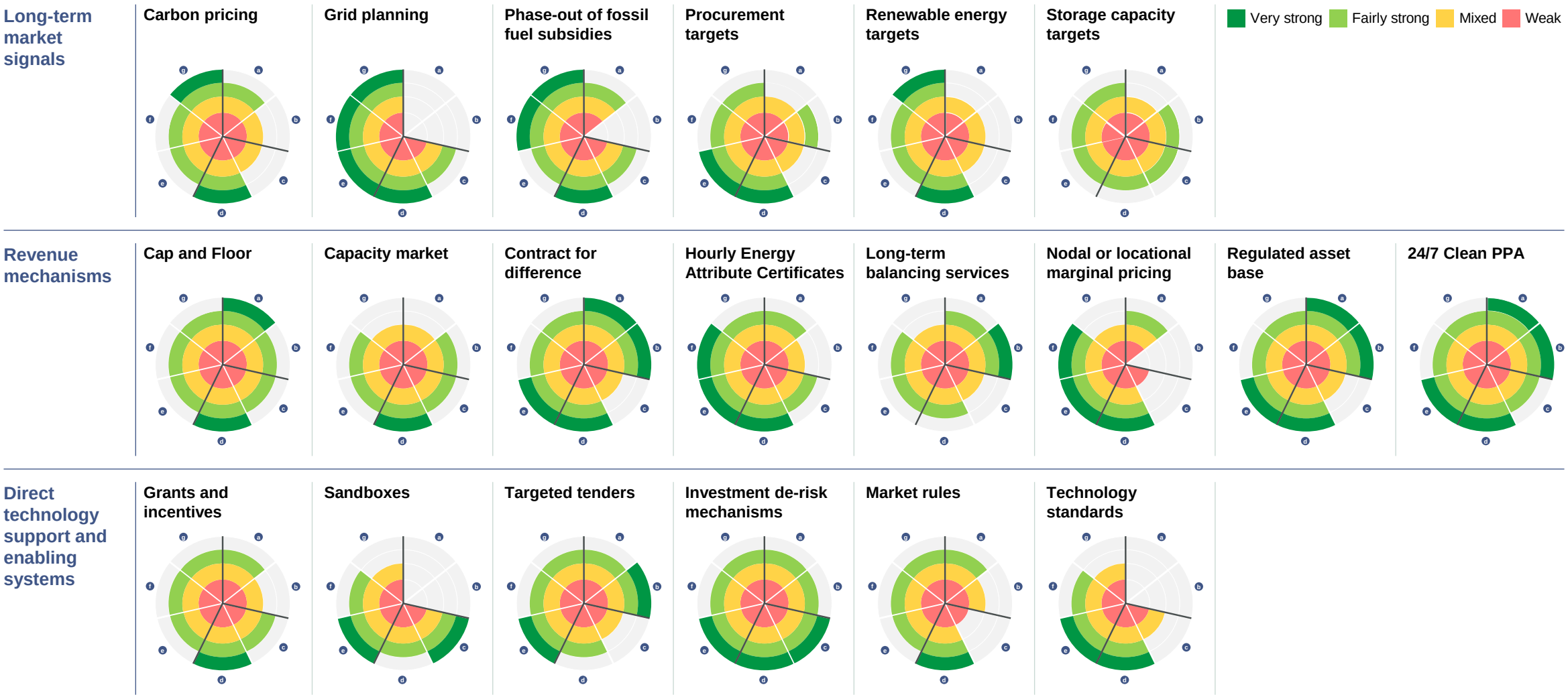
A qualitative assessment framework was developed to compare tools

Criteria	Indicator	Description of indicator
Viability enhancement Ability of tool to enhance business case for customers and investors	a Enhancement of returns	Can the tool **improve the economic business case** for LDES?
	b Reduction of project risk (spread on returns)	Can the tool **reduce the risks to customers and investors** of funding LDES projects?
Ease of implementation Relative effort and complexity of deploying tool	c Relative effort / complexity of integration	How **easy is the tool to implement, including integration** with existing systems, markets, and policies?
	d Track record and industry precedent	How strong is the **track record of the tool** in supporting deployment of energy technologies?
Long-term effectiveness Flexibility of tools to deliver long-term, sustained impact	e Adaptability as technology matures	How **flexible is the tool to be adapted** to maintain efficient support as the technology class matures?
	f Cost-effectiveness	Does the tool create **sufficient value for money** that outweigh the burden and potential costs of implementation?
	g Ability to accelerate decarbonization agenda	Does the tool **support a broader decarbonization agenda** and environmental progress?

Source: LDES Council The journey to net-zero: An action plan to unlock a secure net-zero power system (June 2022)

Individual policies are assessed against the framework indicators

There are a wide range of well-tested tools available to policymakers looking to accelerate the role of LDES in power systems



Source: LDES Council The journey to net-zero: An action plan to unlock a secure net-zero power system (June 2022)

Presentation of the Estimated 2030 and 2050 Targets and the Policy Framework Needed to Achieve It

Lidia Tamellini

Junior Policy Officer at EASE

Estimated 2030 and 2050 Targets

And the Policy Framework Needed to Achieve It

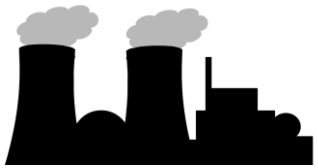
EASE – LDES Webinar
15 September 2022

EASE Members

European Association for Storage of Energy

Europe is Moving Away from Centralised Energy Generation

Driven by Decarbonisation Goals → *Accelerated* by REPowerEU



Centralised Dispatchable Generation

Increase and decrease production based on demand

Energy Transition

Today's Climate Goals:

2030

- ✓ 40% RES → **45% RES** proposed **REPowerEU***
  - ✓ >1200 GW in 2030 wind+solar → X3 today's capacity
- ✓ 55% GHG reduction

Net Zero by 2050

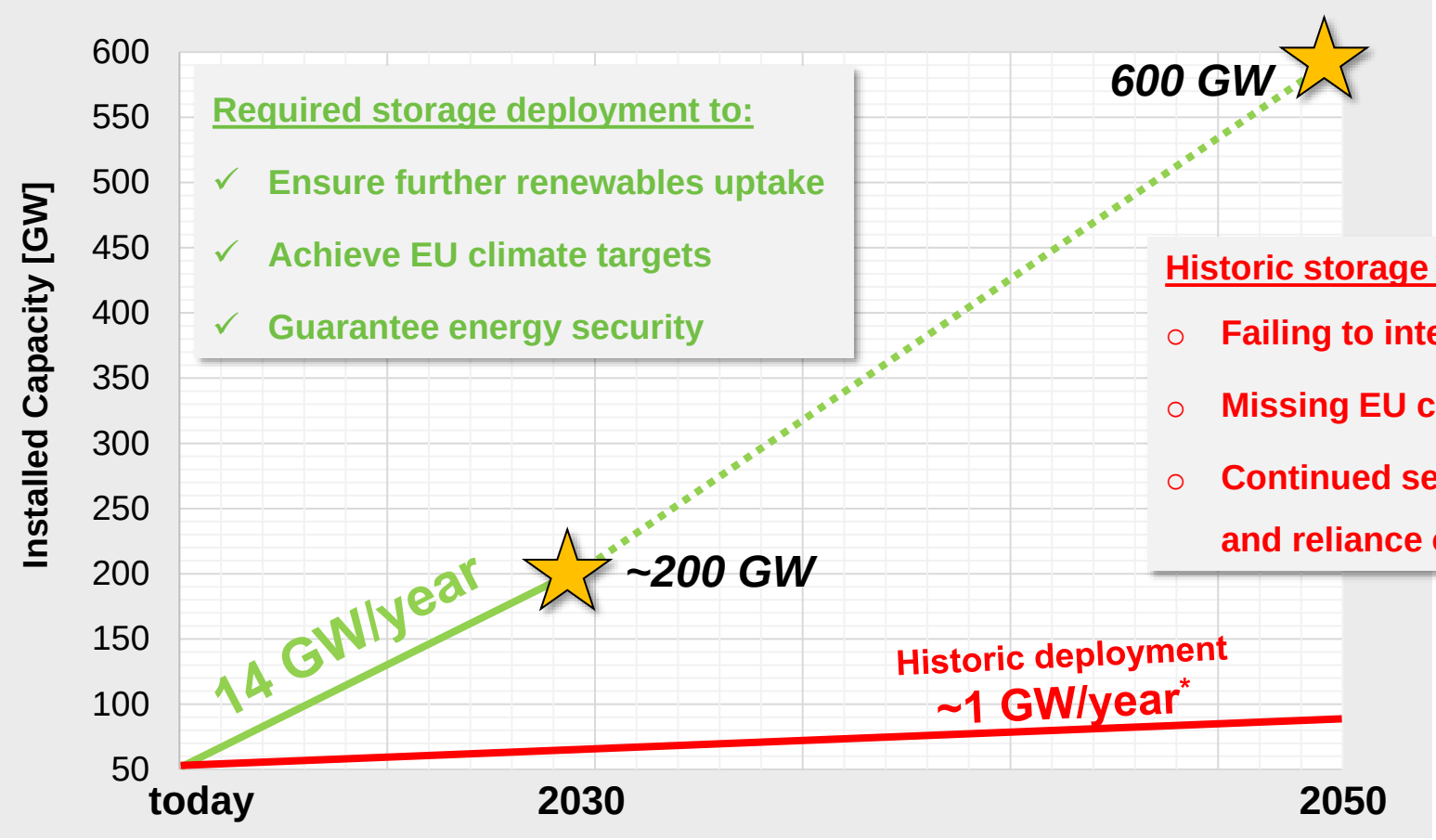
Decentralised Variable Generation

Reliant on weather → need flexible, dispatchable back-up to fill the gaps

*EUROPEAN COMMISSION, COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE EUROPEAN COUNCIL, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS REPowerEU Plan. (2022).

Energy Storage Estimates 2030 and 2050

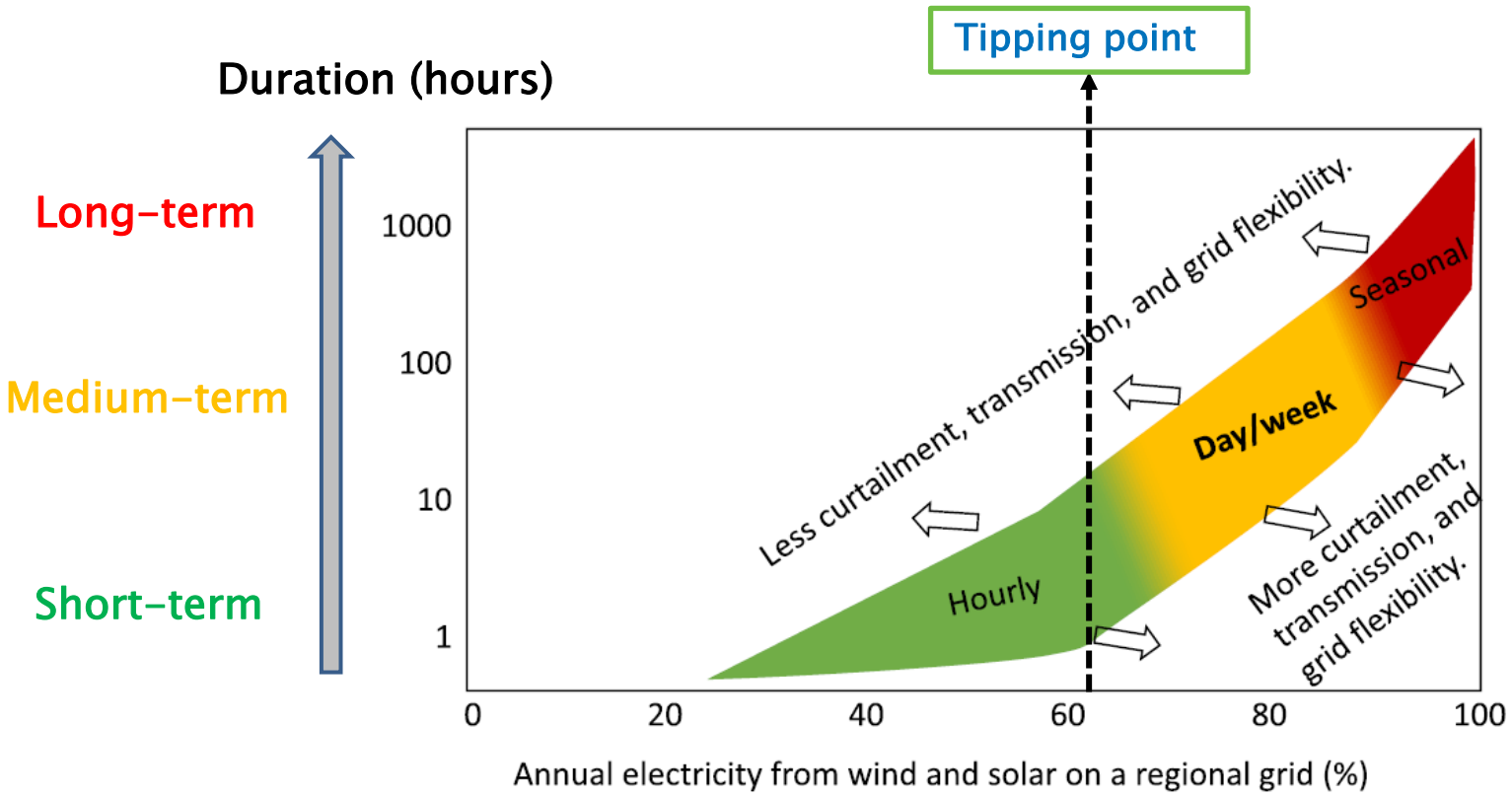
Compared to Historic Market Deployment



*https://www.iea.org/reports/energy-storage

Storage Duration vs. Wind and Solar in the Generation Mix

Hourly, Daily, Weekly, Seasonal Duration Needs



- Other flexibility solutions either increase or decrease storage duration needs
- >60% tipping point → multiple hour duration storage needed
- Need to look at nodal/local level balancing

Source: Albertus, P., et al. Long-Duration Electricity Storage Applications, Economics, and Technologies. *Joule* **4**, 21-32 (2020).

How will we Achieve this?

With a Comprehensive Energy Storage Strategy and Targets

1. Mainstream energy storage in the European Commission's implementation of the REPowerEU Plan

- ✓ By improving permitting, addressing lack of implementation of EU legislation in Member States, facilitating demonstration projects for storage etc.

2. Clear political commitment: Set energy storage strategy with targets for 2030 and 2050

- ✓ Create long-term investment signals

1. Mainstream energy storage in reaction to the crisis

Ensuring security of supply and energy efficiency

- **REPowerEU**: how to phase out fossil fuels in response to the invasion of Ukraine?

  - Energy storage can already **replace gas peakers** and provide carbon-free ancillary services.
  - **Curtailment minimisation** is essential to make the most out of the currently installed RES capacity.
  - Innovative technologies such as LDES need to be part of a medium and long-term plan to **overcome the security of supply issues** that have arisen.

1. Mainstream energy storage in reaction to the crisis

Ensuring security of supply and energy efficiency

- President Von Der Leyen unveiled yesterday the **temporary emergency measures** to face the energy prices crisis:
  - The emergency measures on revenues' caps don't affect energy storage (not an inframarginal technology as defined by the EC) in order for it to *"be available to run when needed, ensuring the stable operation of the electricity system throughout the winter season 2022-23."*
  - The mandatory reduction of consumption and energy efficiency measures can be boosted by the large-scale use of both behind-the-meter and front of the meter storage.
  - In October, State aid temporary framework will be rediscussed to make sure state guarantees will support households and industries during the emergency.

- **But these solution are temporary and only for the short term! We need a long term vision.**

2. Set energy storage strategy with targets

Clear political commitment, market design revision

- Long-term signals for investors – an EU-level strategy
  - **Energy storage as 4th pillar of the energy system**
    - Energy storage should not be legally classified as generation/consumption, but as a separate asset class
    - Prohibition of double taxation, non cost-reflective grid fees, discriminatory permitting procedures
    - Dedicated tenders and support schemes (storage-only auctions, CfDs)
  - **Targets enshrined into EU law**
    - Member States need a plan to cover flexibility and energy shifting needs following RES targets
- Market design revision
  - **Low-carbon capacity mechanisms**
  - **New products for congestion management, faster balancing, curtailment minimisation**
  - **Include energy storage in TSO and DSO system planning**
  - **Timestamp electricity to guarantee 24/7 renewable energy**

Thank you!

If you want to endorse these targets contact EASE team at e.cirule@ease-storage.eu

https://ease-storage.eu/publication/call-for-endorsement-energy-storage-targets/

Panel Discussion and Q&A

Carl-Johan Linér

CEO at SaltX Technology

Rupert Pearce

CEO at Highview Power

Sigmund Brielmaier

Partnering and Portfolio Manager – Energy Storage at Siemens Energy

Moderator:

Frank Wouters, Senior Vice President Energy Transition at Reliance, Board co-chair of LDES Council

Closing Remarks

Patrick Clerens

EASE Secretary General

POLICY
TECHNOLOGY
MARKET

ENERGY STORAGE Global Conference

BRUSSELS, 11 – 13 October 2022

Organised by: EASE European Association for Storage of Energy

Bronze Sponsor & Partner: LDES LONG DURATION ENERGY STORAGE COUNCIL

Join us at the ESGC 2022

We will cover the breadth of topics impacting the evolution of energy storage, with a focus on three main pillars: **Policy, Market and Technology**.

Each day will be dedicated to one of these topics, driven by relevant stakeholders. The objective is to facilitate dialogue and information exchange among **policymakers** and **industry leaders** participating in the Conference.

www.esgc.org

Register Now!

Thank you for joining the webinar!

Email
info@ldescouncil.com

Website
www.ldescouncil.com

Follow us
@LDESCouncil

Email
info@ease-storage.eu

Website
www.ease-storage.eu

Phone number
+32 2 743 29 82

Follow us
@EASE_ES