Innovation Fund
Stakeholder Consultation event

13 June 2023 - In person and online

Lunch time 13:00 – 14:00 CEST

Next session – workshops:

- Clean tech manufacturing including RES and storage → Room 0D (ground floor)
- Maritime → Room 4B (fourth floor)

Please note the event is livestreamed and recorded.

European Commission

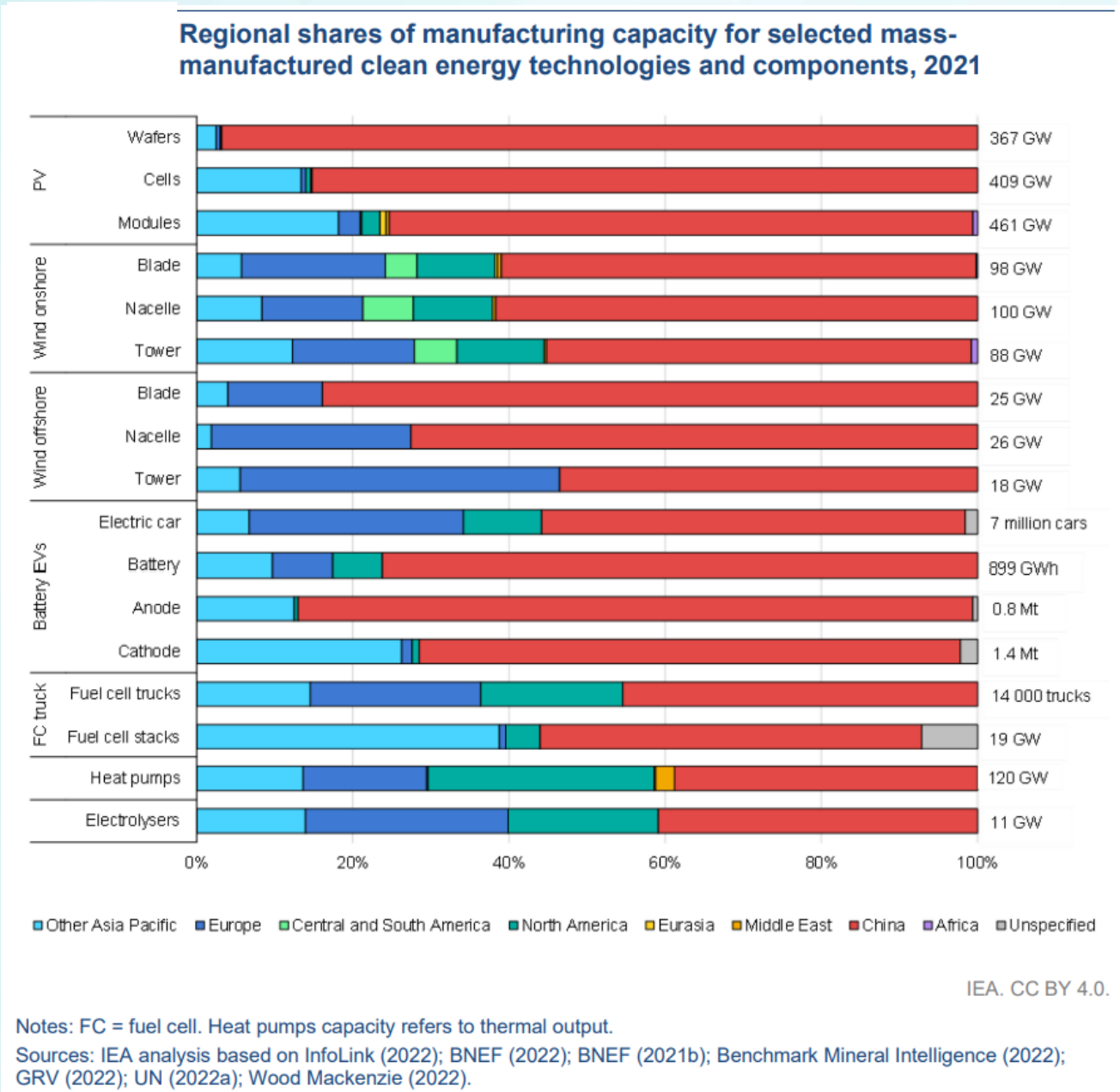
Session Introduction

Cleantech manufacturing

Laura Pereira

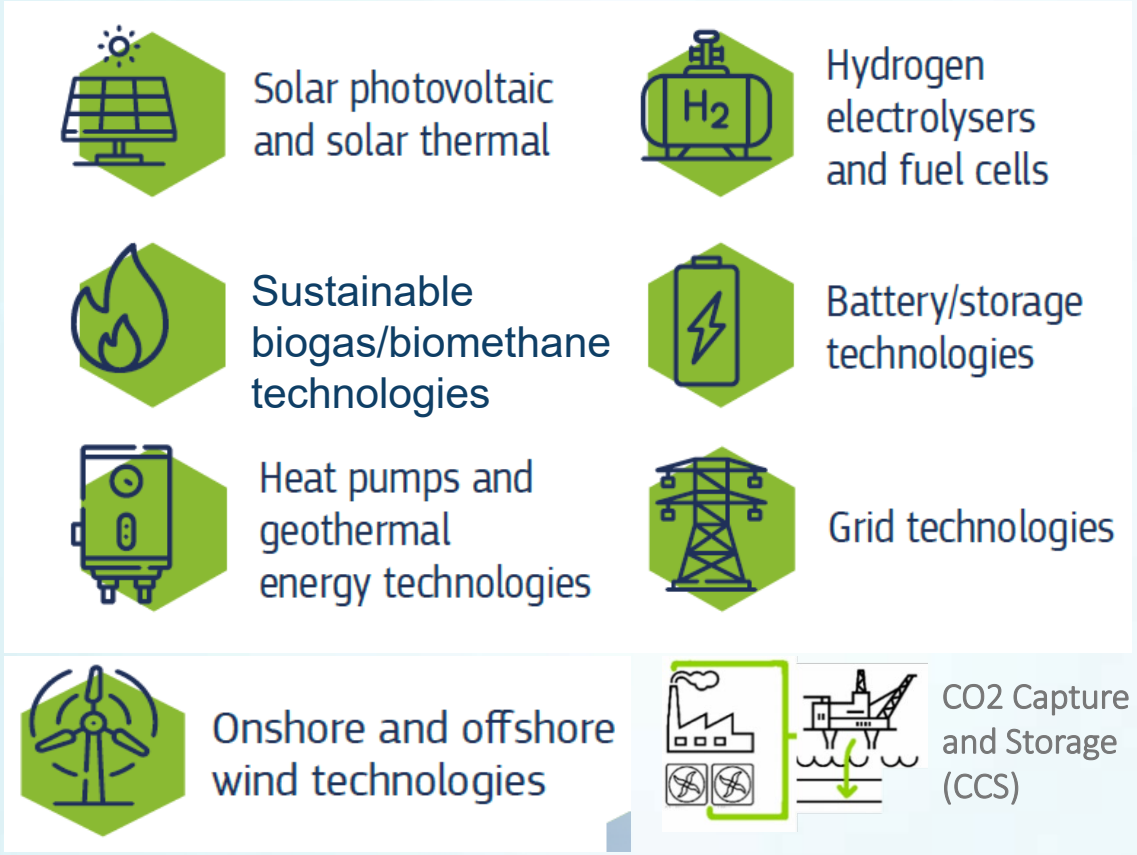
Net-zero industry act

- Adopted on 16 March 2023
- Aims at innovating and scaling up the manufacturing capacity of net-zero technologies in the Union
- Global market for key mass-manufactured net-zero technologies is set to triple by 2030 (around EUR 600 billion/year)



Net-zero Industry Act

- Wide definition for net-zero technologies, with nevertheless a focus on 8 specific areas (Annex)
- Ambition: scale up net-zero technology manufacturing in the EU to provide at least 40% of the EU's annual deployment needs by 2030



European Commission

NZIA needs assessment : Manufacturing capacity needed and related Factory CAPEX per technology in a NZIA policy scenario

Technology	Annual technology deployment in 2030	Current installed EU manufacturing capacity*	Share of EU production in EU demand	EU manufacturing capacity in 2030	New manufacturing capacity needed	Factory CAPEX (M€/unit/year)	Manufacturing capacity investment needs (Bn EUR)
Wind	42	13	85%	36	23	260	6.073
Solar PV	53	1	45%	24	22	340	7.579
Heat Pump	51	14	60%	31	17	333	5.624
Battery cell	610	75	90%	549	474	144	68.244
Electrolysers	25	2.3	100%	25	22	60	1.332
Total							**88.852**

* Stated manufacturing capacities vary within each value chain, and may therefore be different for specific stages within the value chain

Awarded clean tech projects in the Innovation Fund

Project	Country	Short description
TANGO (LS)	IT	PV Giga factory for the manufacture of innovative, high-performance photovoltaic (PV) modules
HELEXIO LINE	FR	the first full-scale plant to manufacture ‘ready to plug-in’ Building Integrated-Photovoltaic (BIPV)
ReLieVE (LS)	FR	Recycling of Li-ion Batteries for electric Vehicles
Listlawelbattcool	CZ	Light and structural laser welded battery cooler
CarBatteryReFactory	DE	Manufacturing an energy storage system based on second-life electric vehicle (EV) batteries
Northflex	PL/SW	Innovative battery pack technology
Northstor+ (LS)	PL	Production of innovative, stationary energy storage system
Green Foil Project	SW	Low CO2 Footprint Battery Foil for Li-ion Battery Production

Clean tech manufacturing topic in the 3 LSC (pre-evaluation)

- Available budget 700M€
- 39 submitted projects, funding request exceeding 2b€
- Covering major areas (PV, wind, batteries/storage, electrolysers/fuel cells,…)
- Diversity in technological solutions
- Covering different stages of supply chain (components, systems, recycling…)
- Projects taken together could make significant contribution to NZIA needs

	Total production capacities range across the supply chain in the 3LSC (GW, GWh for batteries)	NZIA 2030 policy objective (GW, GWh for batteries)	Contribution to 2030 NZIA objective (%)
solar	8 to 10	24	34-43 %
wind	1.4 to 2	36	4-6 %
batteries	45 to 90	549	8-16 %
electrolysers	13.3	25	53 %

Innovation stages in clean tech manufacturing

1. Industrial pilot lines
   - Pre-commercial project
   - Focus on process and product optimization, testing & validation
   - Higher level of innovation and technical risk
2. FOAK/SOAK (as in 3LSC clean tech manufacturing)
   - Full scale, commercial project
   - Innovation beyond incremental improvement as compared to SotA commercial production
   - Low technical risk, higher commercial risk
3. Early deployment through competitive bidding (as in renewable H2 auction)
   - Commercial projects
   - Support awarded primarily on highest cost-efficiency
   - Issues to be considered
     - Budgets are limited… focus on strategic components ?
     - Non uniform commodities : how to take into account non price elements (performance, efficiency,…)

Stakeholder insights

- Market insights in clean tech manufacturing, also vis-à-vis third countries
- Identification of pipeline of projects
- Identification of valuable R&I projects at national level /Horizon Europe that are ready to transition to the next stage in the innovation chain
- Lessons learned from evaluation of 3LSC
- Any specific issues on specification of calls, issues to be taken in the evaluation
- What other barriers can affect project execution
- Potential opportunities for auctioning (medium term)?

Innovation Fund -*Stakeholder insights*

The European Association for Storage of Energy (EASE)

Energy Storage

13 June 2023

Overview of the sector and innovative technologies

Use cases →	Generation/Services to Support Bulk Storage • Arbitrage • **Support to conventional generation** • **Ancillary Services RES Support** • **System Electric Supply Capacity** • **Capacity firming** • **RES Curtailment Minimisation** • **Seasonal Arbitrage**	Ancillary Services • Black start • Frequency Containment Reserve • Automatic Frequency Restoration Reserve • Manual Frequency Restoration Reserve • Replacement Reserve • Load Following • **Frequency stability** • Voltage support • New Ancillary Services	Services to Support Transmission Infrastructure • Transmission grid upgrade deferral • Contingency Grid Support • Transmission support • **Power oscillation damping** • **Angular stability** • **Reactive Power Compensation** • **Cross Sectoral Storage**	Services to Support Distribution Infrastructure • Distribution grid upgrade deferral • Contingency grid support • Voltage control • **Intentional islanding** • **Reactive power compensation** • **Cross Sectoral Storage**	Services to Support Customer Energy Management • End-user peak shaving • **Energy cost management** • Power Quality • **Maximizing self-production & self-consumption of electricity** • Continuity of energy supply • **Limitation of upstream disturbances** • **Compensation of the reactive power** • **EV integration**
Storage Technology	**Actors**				
Pumped Hydro Storage **Pumped Heat Electrical Storage**	TSO, Energy Supplier	TSO, Energy Supplier	DSO	DSO, Energy Supplier	
Compressed Air **Liquid Air**	TSO, Energy Supplier	TSO, Energy Supplier	DSO	DSO, Energy Supplier	DSO, Aggregator, Industrial Actors
Flywheel				DSO, Energy Supplier	DSO, Aggregator, Industrial Actors
Batteries - Stationary	TSO, Power Plant Operator	TSO, Aggregator	DSO, Private Actors, Industrial Actors	Power Plant Operator, Energy Supplier	DSO, Aggregator, Industrial Actors, Private Actors
Batteries - vehicle to grid		TSO, Aggregator	DSO, Aggregator	DSO, Industrial Actors, Private Actors	DSO, Aggregator, Industrial Actors, Private Actors
Magnetic Energy Storage				DSO, Energy Supplier	DSO, Industrial Actors
Supercapacitor		TSO		DSO, Energy Supplier	DSO, Industrial Actors
Power-to-X	Energy Supplier		Energy Supplier	Energy Supplier	Energy Supplier
Thermal Storage	DSO, Energy Supplier, Industrial Actors		DSO, Energy Supplier, Industrial Actors, Private Actors	DSO, Energy Supplier, Industrial Actors, Private Actors	DSO, Energy Supplier, Industrial Actors, Private Actors

**EASE*

***Hoogland, Onne, et al. "Study on Energy Storage." (2023).*

Planned pipeline of innovative projects

Scheme/Project	*Technology type*	*Entry into operation*	*EU / MS support schemes*	*Member State*
Girones	Mechanical - PHS	2024		Spain
CAES Zuidwending	Mechanical - CAES	2024	Connected Europe Facility	Netherlands
Hybridge	Chemical - P2G	2023		Germany
PepsiCo	Thermal Energy Storage	2023		Netherlands
ELYGAtor	Power to Hydrogen	2026	Innovation Fund	Netherlands
Romanian Recovery and Resilience Plan	Battery	2025	EU State aid	Romania
EVVE	Battery	2025	Innovation Fund	France

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EVVE	Battery	2025	Innovation Fund	France

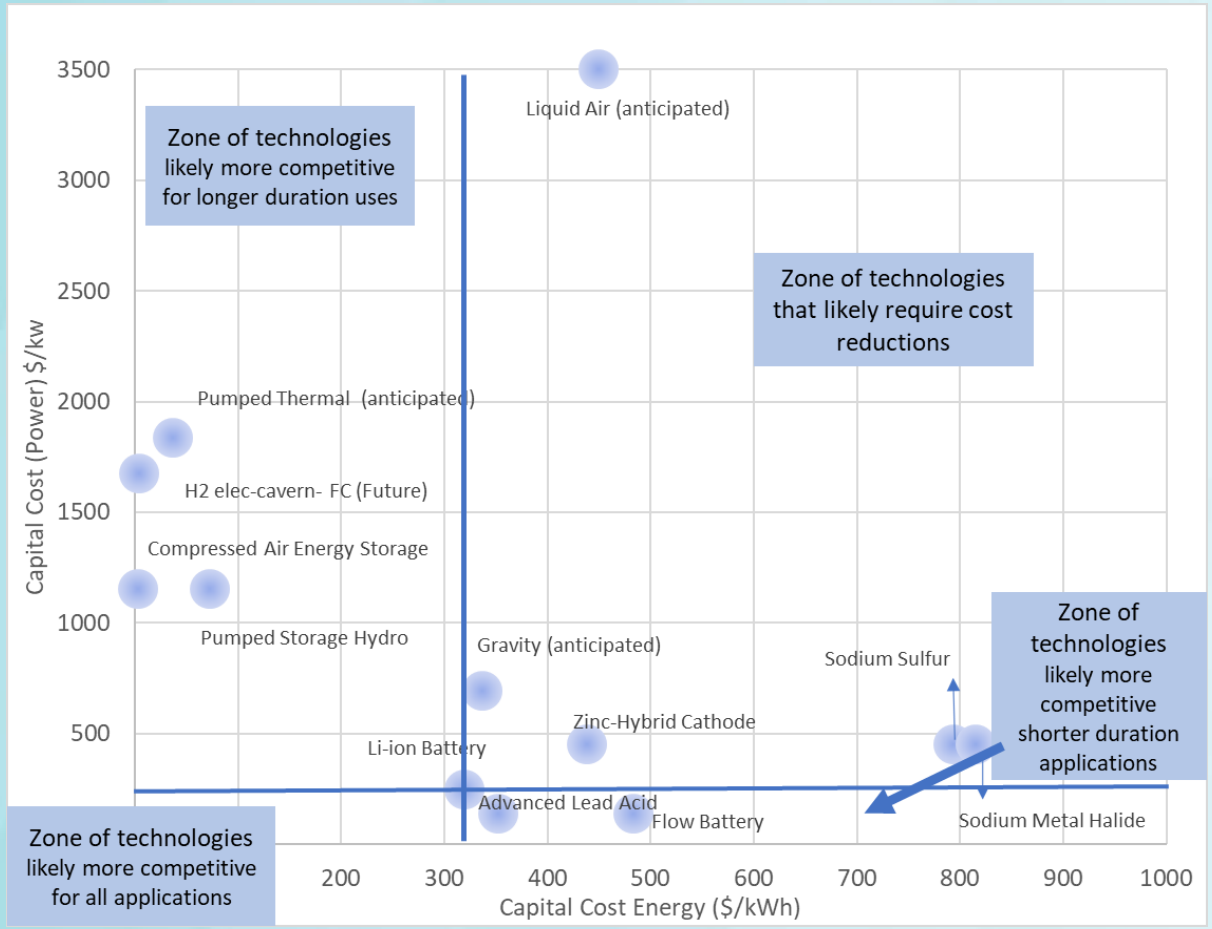
What can we see from this graph?

1. **Energy storage projects, despite** their innovative character and their contribution to GHG emissions removals, are underrepresented in funding mechanisms – also in the Innovation Hub

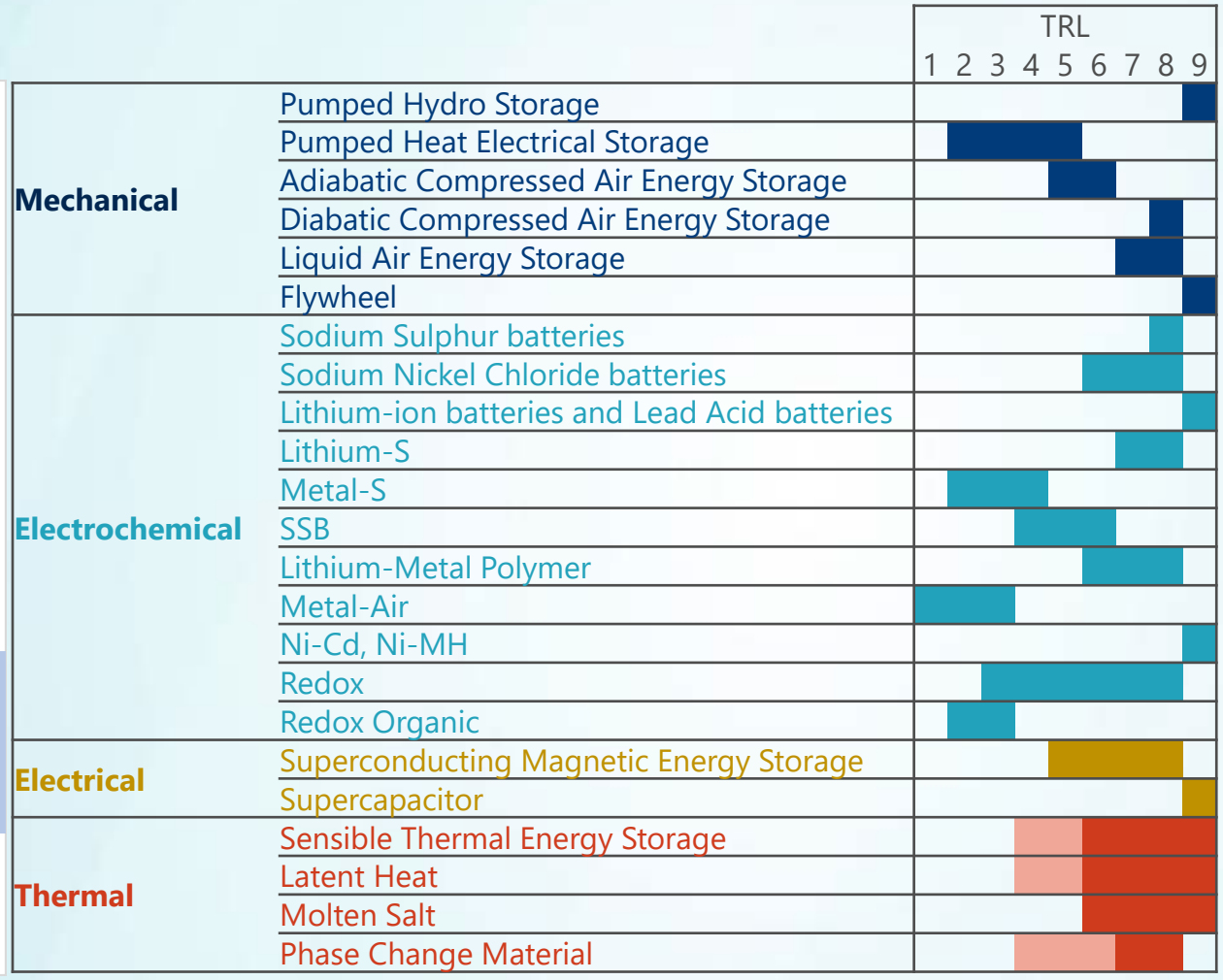
2. **Energy storage deployment – and innovative projects – vary significantly from country to country**: certain countries attract energy storage projects, other do not have anything in the pipeline.

European Commission

Technology Readiness Level (TRL) of envisaged projects



NREL (2022) Storage Futures Study - Key Learnings for the Coming Decade



Hoogland, Onne, et al. "Study on Energy Storage." (2023).

European Commission

Type of support required

		TRL	*types of support*
Mechanical	Pumped Hydro Storage	9	Financial instruments
	Pumped Heat Electrical Storage	2-5	Grants
	Adiabatic Compressed Air Energy Storage	5-6	Grants
	Diabatic Compressed Air Energy Storage	8	Financial instruments
	Liquid Air Energy Storage	7-8	Financial instruments
	Flywheel	9	Financial instruments
Electrochemical	Sodium Sulphur batteries	8	Financial instruments
	Sodium Nickel Chloride batteries	6-8	Grants
	Lithium-ion batteries and Lead Acid batteries	9	Financial instruments
	Lithium-S	7-8	Grants, Financial instruments
	Metal-S	2-4	Grants
	SSB	4-6	Grants
	Lithium-Metal Polymer	6-8	Grants
	Metal-Air	1-3	Grants
	Redox	2-8	Grants
	Redox Organic	2-3	Grants
Electrical	Superconducting Magnetic Energy Storage	5-8	Grants
	Supercapacitor	9	Financial instruments
Thermal	Sensible Thermal Energy Storage	4-9	Grants (Based on sectoral integration), Financial instruments
	Latent Heat	4-9	Grants (Based on sectoral integration), Financial instruments
	Molten Salt	6-9	Grants (Based on sectoral integration), Financial instruments
	Phase Change Material	4-8	Grants

Size and amount of financial support required

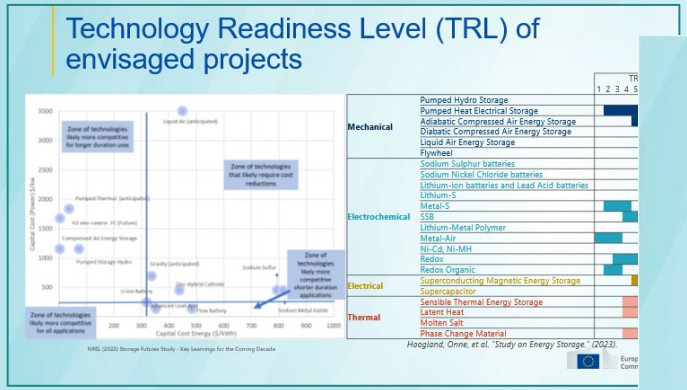
Projects	CAPEX (€/kW)	CAPEX (€/kWh)	OPEX (€/kW.year)	Magnitude of financial support	other EU funding streams
Pumped Hydro Storage	1880 (400 – 2200)	470 (40 – 470)	28	10M – 100M	HORIZON
Pumped Heat Electrical Storage	540 (300 – 780)	19 (13 – 21)	2.2 – 4.2	10M – 100M	HORIZON
Adiabatic Compressed Air	1600 (1200 – 2000)	450 (300 – 600)	10 – 15	2M – 30M	HORIZON
Liquid Air Energy Storage	2000 (500 – 3500)	450 (60 – 600)	40 – 80	2M - 100 M	HORIZON
Sodium Sulphur batteries	595 (241-2700)	675 (300-900)	6.5 – 11	NA	HORIZON RIA, IA EIC Accelerator
Metal Air batteries	145	20 – 150	n.a.	NA	HORIZON RIA, IA EIC Accelerator
Sodium-ion batteries	223 (expected)	25 – 77	n.a.	2M -	HORIZON RIA, IA EIC Accelerator
Redox flow batteries	(1000 – 2000)	300	5.3	2M – 50M	HORIZON RIA, IA EIC Accelerator
Thermal Energy Storage	(38.6 – 580)	0,1 – 50	0.01 – 170	2M – 30M	HORIZON IA EIC Accelerator
Power to Hydrogen	2979 (2000 – 5000)	10 (5 – 133)	30	2.4 M – 143 M	INNOVFUND HORIZON RIA, IA EIC Accelerator
Power to Ammonia	(1900 – 2900)		80	NA	EIC Accelerator
Power to Methane/Methanol	(1900 – 2900)		50	4M – 75M	HORIZON RIA, IA EIC Accelerator

Modified from Hoogland, Onne, et al. "Study on Energy Storage." (2023).

Case studies

Sector	Technology	Project/Location	Country
Steel recycling	Thermal Energy Storage	CIC EnergiGUNE	Spain
Electricity markets	Pump Hydro	Mooserboden Dam	Austria
Electricity markets	Mechanical - CAES	ALACAES	Switzerland
Gas markets	Chemical - P2G	Hybridge	Germany
District heating	Thermal Energy Storage – Sensible Heat	Aalborg	Denmark
Electricity markets	Power to Hydrogen	Puertollano Green Hydrogen Plant	Spain
Electricity market	Battery Reuse	Cactos	Finland

TRL, Case Studies



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Modified from Hoogland, Onne, et al. "Study on Energy Storage." (2023).

What can we see from this figure?

1. Energy storage technologies provide a wide array of services: not only for the electricity grid, but also for industries, for the gas sector – ensuring energy sector integration.

2. Energy storage technologies can be coupled with renewables – yet this is underappreciated in the Innovation Hub

European Commission

Conclusions and recommendations/1

1. Recommendation on Innovation Fund - Structure and focus:

a. The Innovation Fund needs to broaden its focus **beyond greenhouse gas (GHG) emissions removal**s, to prioritise the attainment of **climate targets while achieving energy security**.
   - This can be achieved by e.g. **introducing a technology-specific call or allocating a portion of the Fund exclusively for energy storage technologies**.
   - The urgency for the EU to reduce its reliance on fossil fuel imports, particularly from Russia, shall be addressed also by the Innovation Fund. Unfortunately, energy storage projects receive very limited visibility, despite providing unique energy shifting services and ensuring further renewables' integration.

b. **Combined renewable energy projects**, such as wind or PV coupled with energy storage projects, **should be better incentivised** by reflecting their innovative character and their contribution to GHG emissions removals.

Conclusions and recommendations/2

2. Recommendation on Innovation Fund - Member States' level:

a. **Set up technical assistance for Member States with low effective participation and project development assistance**. Energy storage deployment rates varies significantly from Member States to Member States: it is paramount to support those countries.

b. **Ensure compatibility of the Innovation Fund with the other national and European funding tools**, to ensure comprehensive coverage of expenses

Conclusions and recommendations/2

Legislation matters!

- Double taxation or grid tariff which imposed fully twice on electricity that is stored and fed back into the grid constitute a penalty for the business case of energy storage solutions is needed to be prevented
- Role of storage assets should be properly reflected by network operators in their network planning

Innovation Fund -*Stakeholder insights*

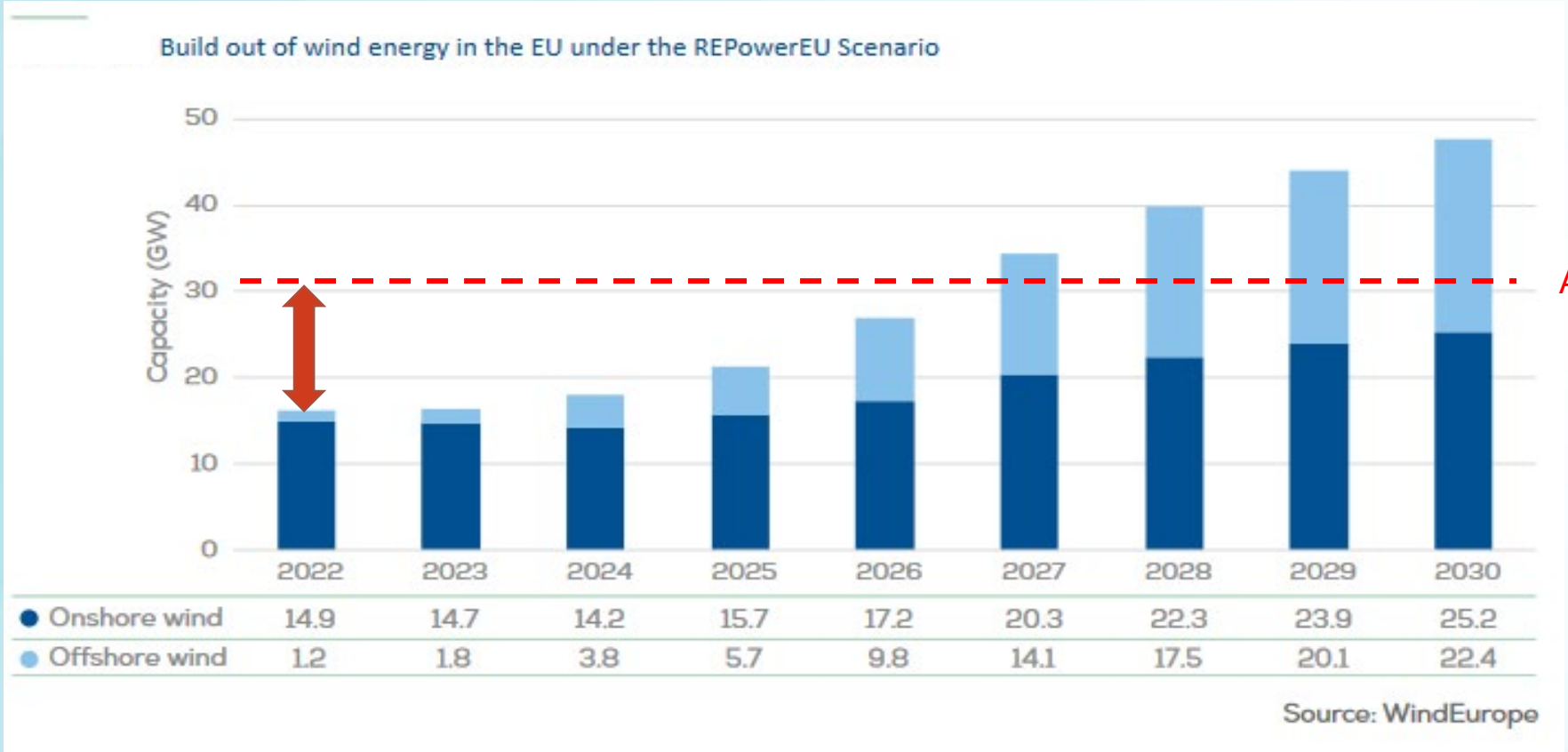
WindEurope

13 June 2023

European Commission

Europe is not building enough wind energy

Europe installs an average 15 GW/year of wind capacity. It needs 31 GW/year to meet REPowerEU



European Commission

Net Zero Industry Act

Non-binding target of 36 GW minimum production annual capacity in Europe

Segment	Industry	Sub-segment	2022-2030 demand growth*	Time to action*	Urgency assessment
Turbines	Onshore & Offshore wind	Total market	~3X *Capacity (MW)*	2024-2025	
	Offshore wind	>12 MW turbines	0-29 GW	2024	
Towers	Onshore & Offshore wind	All	~2.5X *Metric tons*	2025	
Foundations	Offshore wind	Monopiles	~12X *Metric tons*	2024-2025	
		Other grounded	~7X *Metric tons*	None	
		Floating	~23X *Metric tons*	2024	
WTIVs	Offshore wind	Total market	~7.5X *Vessel years*	2024-2025	
		>12 MW turbines	0-25 vessel years		

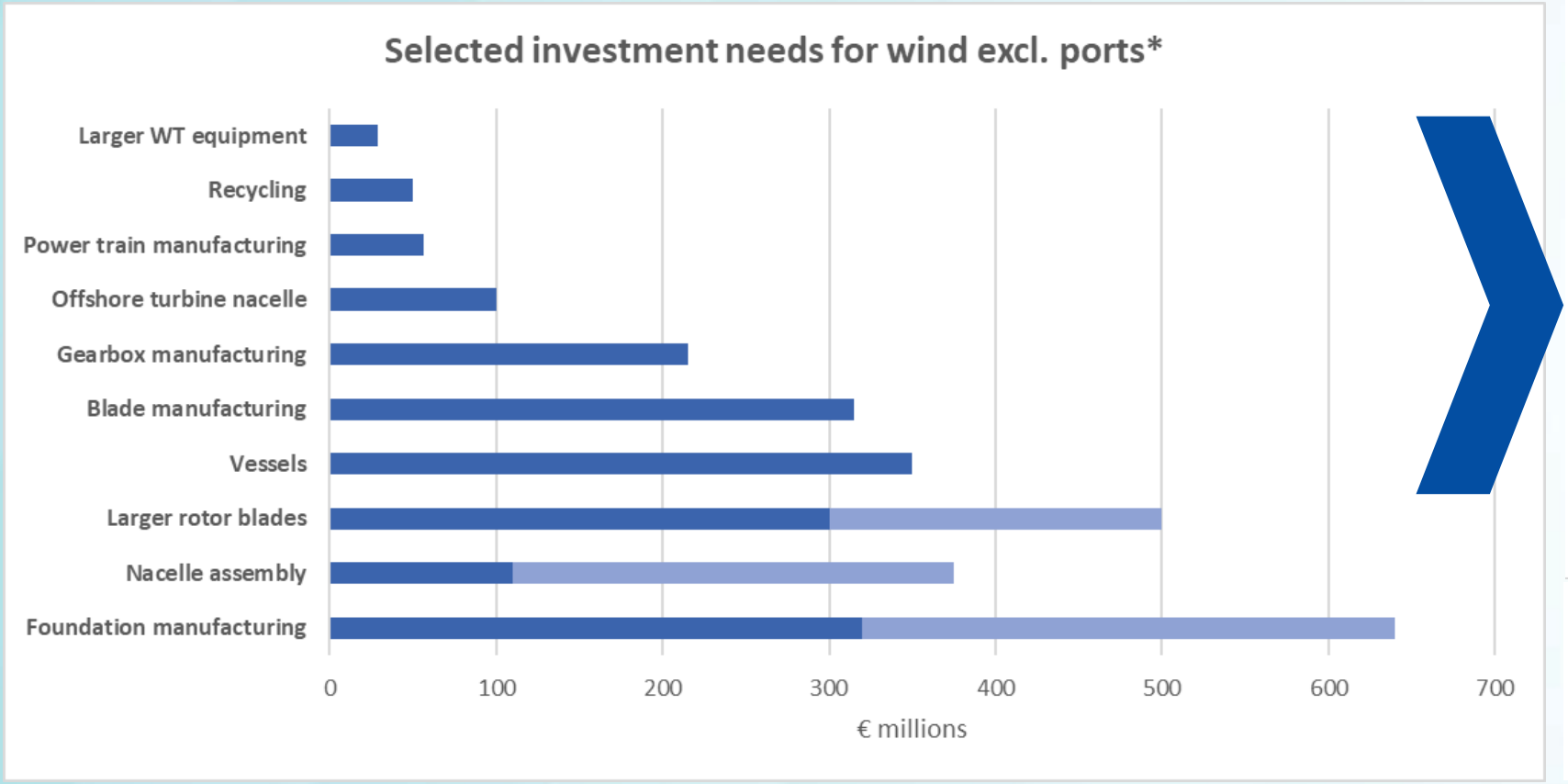
- The **Innovation Fund should be the bridging financing instrument for ramping up the clean energy supply chains** and develop the manufacturing capacity **at scale** by 2030.
- **The scope of the Innovation Fund must be recast ->** too heavily focused on rewarding technology breakthrough rather than actual scaling up existing supply chains of innovative technology solutions.
- We recommend **exempting the support granted to Net Zero Industry Projects from the 'degree of innovation' criteria**.
- We also recommend **allocating more funding to clean tech manufacturing and Net Zero Industry Projects**. In the last large scale only 23% of the budget was reserved for clean tech manufacturing compared to 33% for electrification and hydrogen.

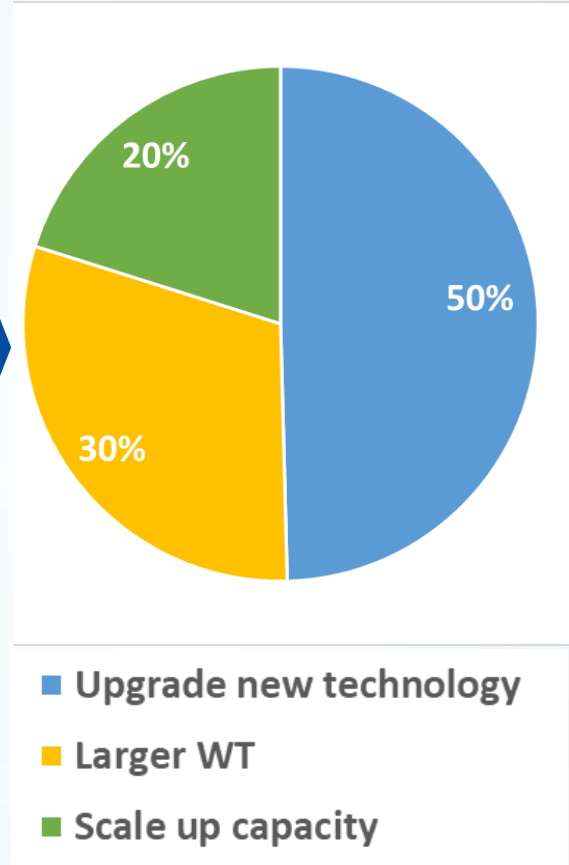
Source: Rystad Energy (2023) https://windeurope.org/intelligence-platform/product/the-state-of-the-european-wind-energy-supply-chain/

European Commission

Planned pipeline of innovative projects

Between €1.8bn and €2.3bn needed in the next 3 years





*Based on interviews with 5 companies actively searching for EU Funding resulting from the NZIA

European Commission

Conclusions and recommendations

- **We recommend more emphasis on the scalability criterion in the evaluations:** This should be brought forward to the first stage of the evaluation. This criterion is the most suited to ensure alignment with the objectives of the NZIA. Projects must ensure they either create new value chains or reinforce existing ones in Europe.

- **Grants + competitive bidding for contracts**: Scope must ensure proposals focus on scale-up rather than breakthrough innovation in clean tech manufacturing.

- **Rewording of the cost-efficiency award criterion**: We welcome the simplification of the cost-efficiency criterion.

- **Additional award criteria for sector-specific calls or topics**: Application process will be even more complex and is counterproductive. Adding more restrictive criteria will discourage companies to apply for funding. It is also unclear what the weight of these sector-specific criteria will be compared to the other criteria.

- **Revision of the definition of "relevant costs"**: Manufacturing projects' relevant costs should be linked more to CAPEX than OPEX. But we welcome the simplification of the cost calculation methodology and the consideration of OPEX.

- **Definition of small- and medium scale projects**: We agree with the new CAPEX thresholds for small- and medium scale projects.

- **Technical assistance for Member States with low effective participation and project development assistance**: We strongly recommend providing targeted project development assistance to a broader range of projects.

Innovation Fund -*Stakeholder insights*

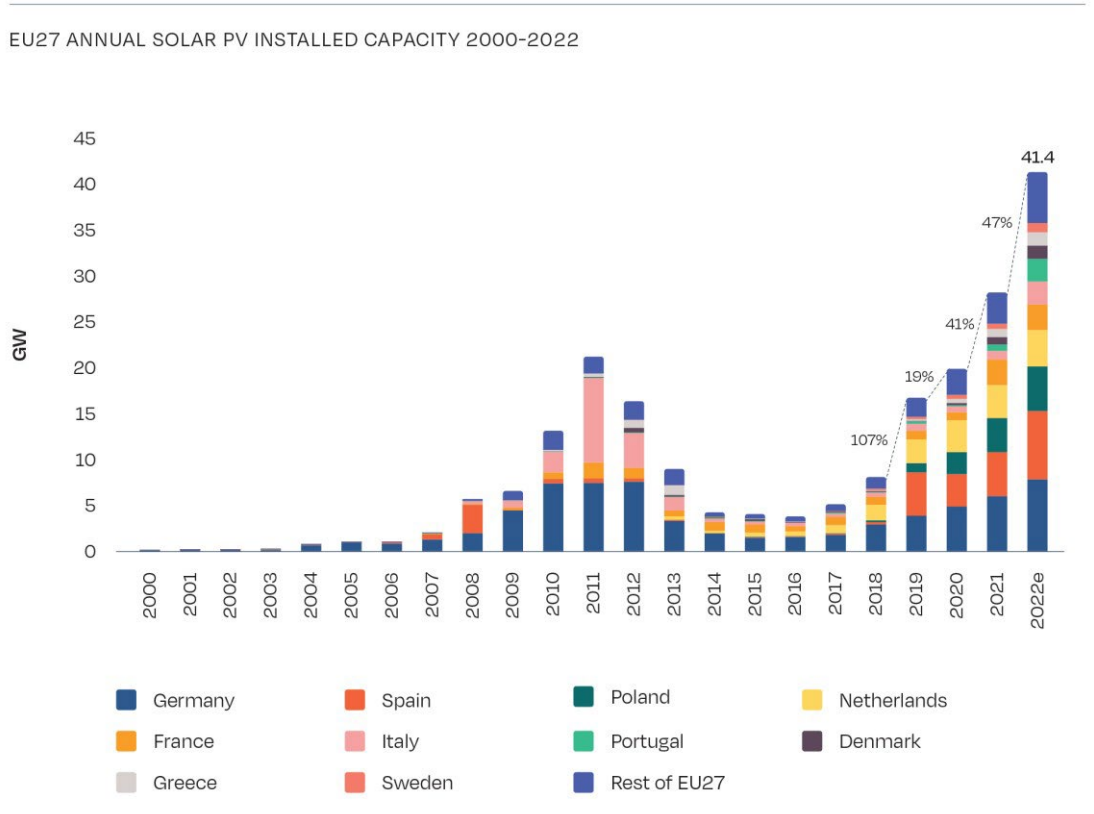
SolarPower Europe

Dries Acke - Director

13 June 2023

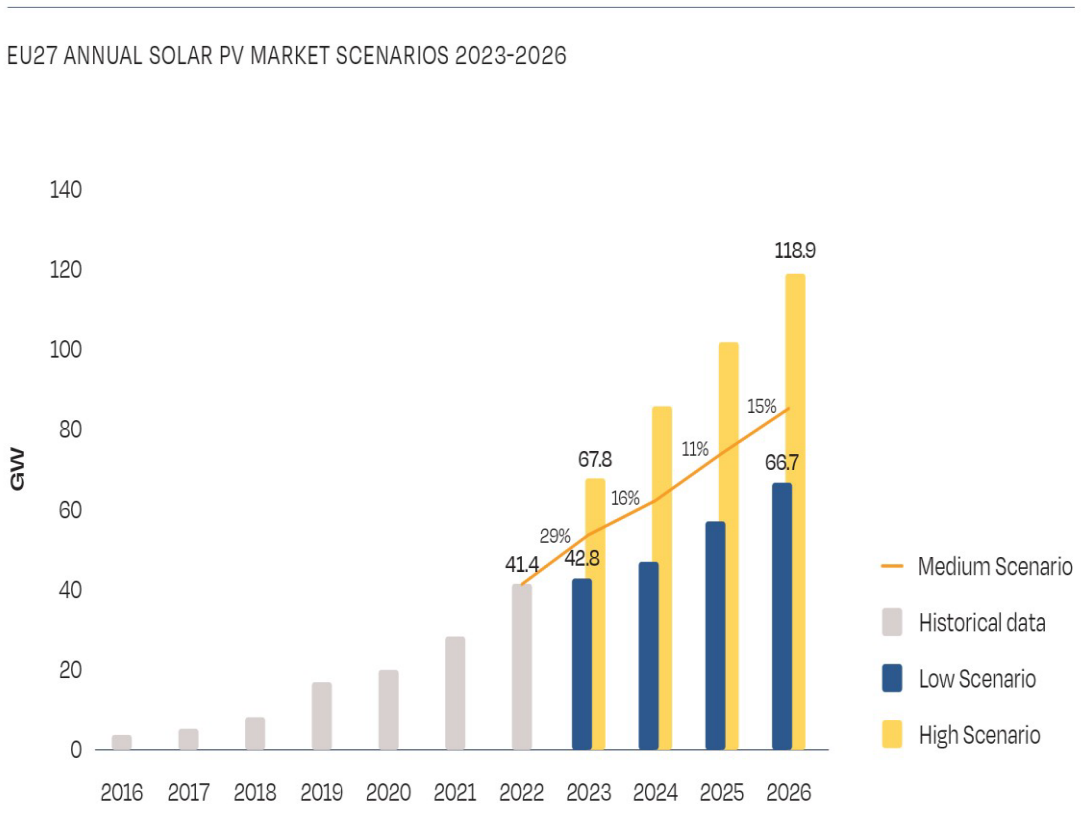
European Commission

Record installations in last years



41.4 GW installed in the EU in 2022, record solar year in EU history so far, 100% higher than in 2020

Further strong growth expected

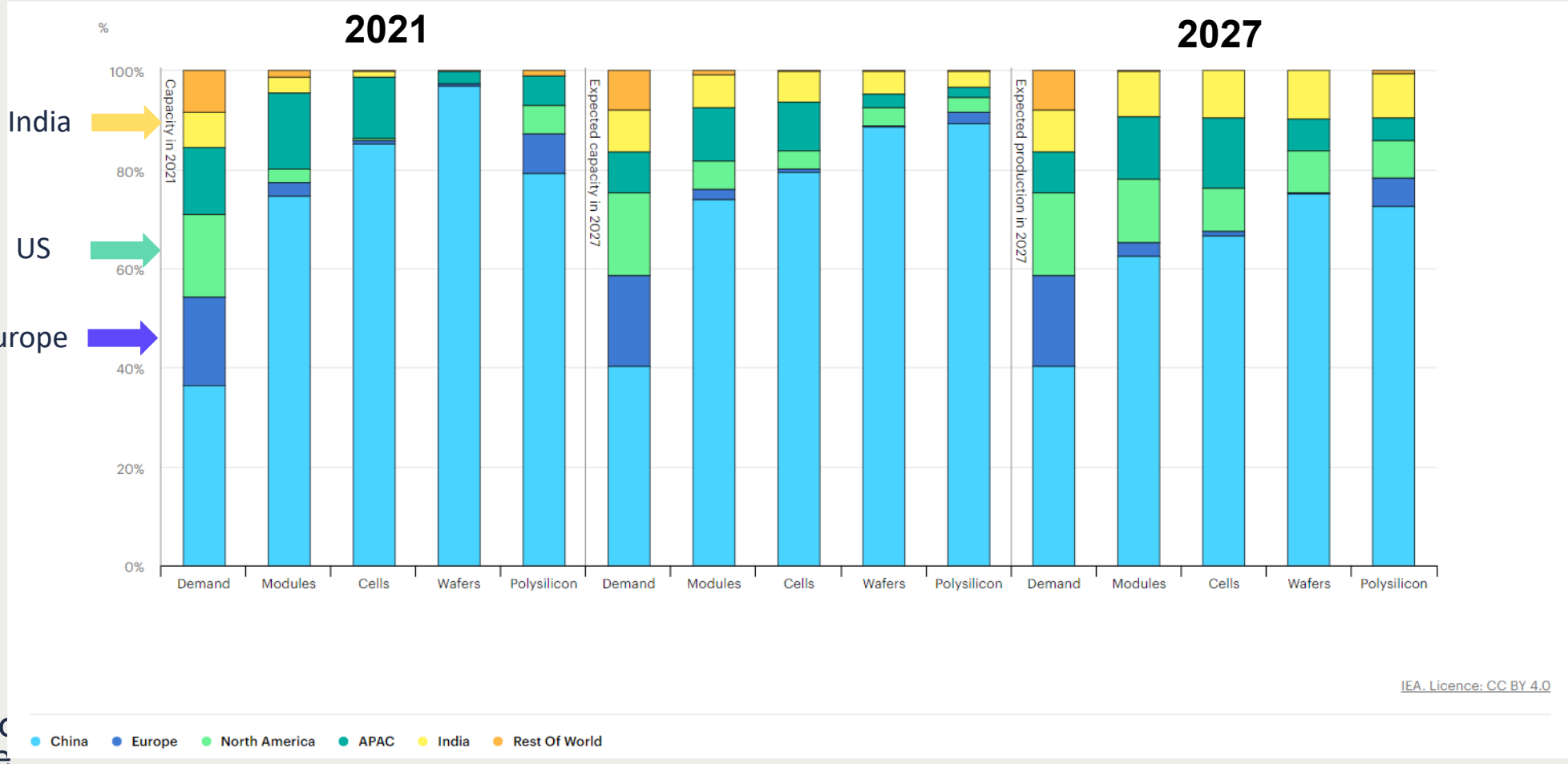


The next 4 years until 2026 will see further strong growth, reaching close to 100 GW in 2026.

SolarPower Europe

Solar supply chains rely almost entirely on China

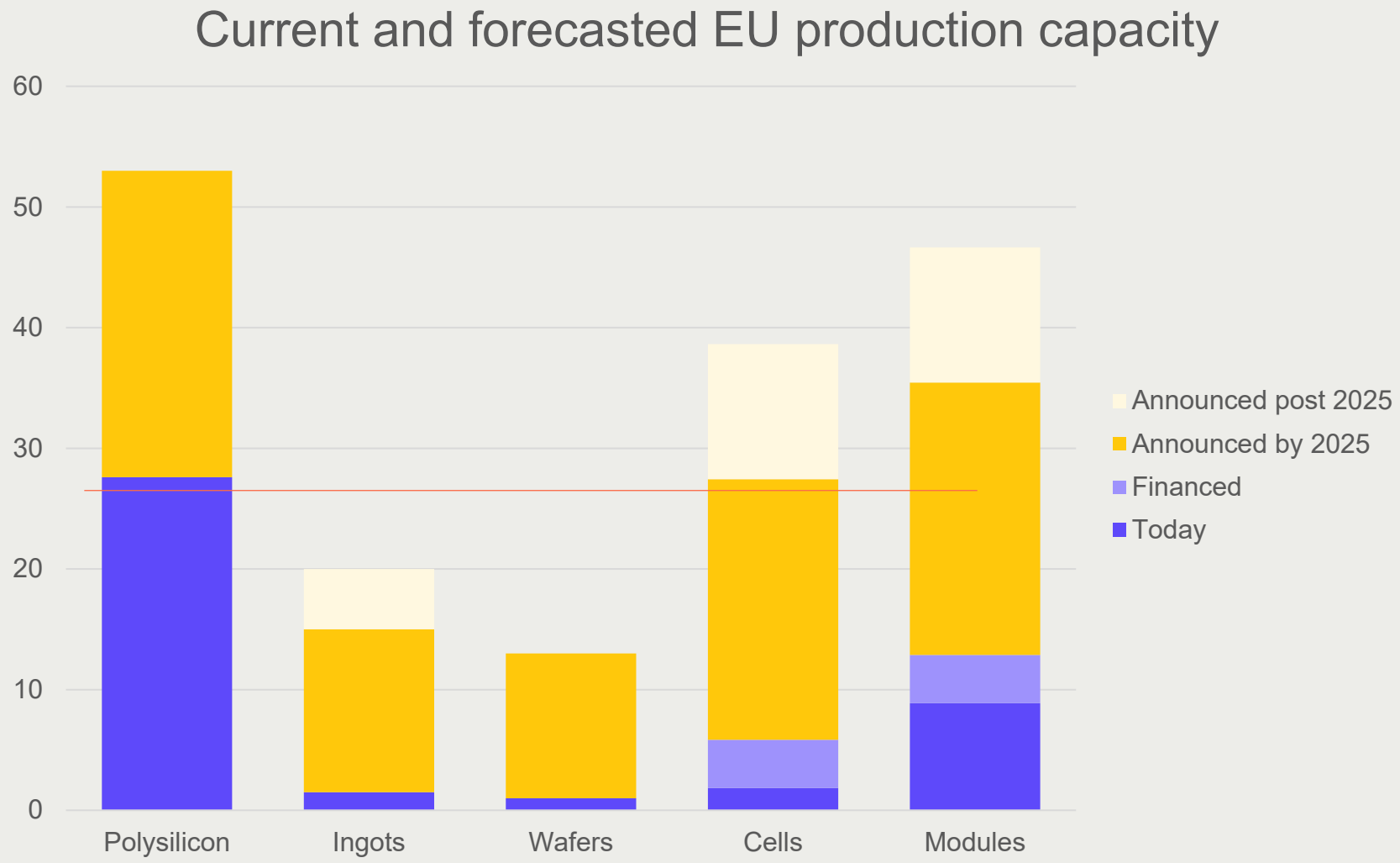
Diversification of global PV supply is happening. Solar industrial strategies in India and US are yielding results. Europe is left behind.



SolarPower Europe

Source: IEA

Solar supply chain in Europe is growing but far from scale needed and mostly on cell and module assembling



SolarPower Europe

Net-Zero Industry Act – SPE position

1. **Financing frameworks are inadequate to reaching the 2030 ambition for solar PV supply chains in Europe**
    - European Solar Industry Alliance estimates between **EUR 4.7 billion to EUR 6.4 billion annual** support are required in support of building competitiveness for a 30 GW PV value chain for a minimum duration of 10 years
    - Revise the State Aid rules under the Temporary Crisis and Transition Framework, allow for OPEX support and improve simplicity
    - Establish a European financial instrument dedicated to Net Zero Strategic technologies with high dependency on one source of supply -> **Innovation Fund as bridging financial instrument** under Net Zero Europe Platform, leveraging concept of double-sided auction and CfDs (example of Hydrogen Bank applied to European solar)
    - Some Members States leverage RRF/RePower EU funds: France (tenders), Italy (400m EUR), Romania (250m EUR)

2. **Non-price criteria in public procurement and auctions** are welcome on the condition that they are crystal clear, comprehensive, harmonized and applied only in technology specific auctions -> develop in Delegated Act. **Non price criteria alone will not scale solar manufacturing in Europe.**

Overview of the sector and innovative technologies

Company		Ingot	Wafer	Cell	Modules	Inverters /BOS	TRL
Norwegian Crystal	Norway	0.5 (+3.6)					8
NorSun	Norway	0.5 (+4)	0.5 (+4)				7+
MeyerBurger	Germany			0.4 (+ 2)	0.4 (+ 1.6)		5+
ENEL	Italy			0.2 (+ 3)	0.2 (+ 3)		7+/5+
NexWafe	Norway		+0.5				5+
Carbon	France			5	+3.5		8
VallisSolaris	Croatia	2	2	2	2		
Exiom/Iberdrola	Spain				+0.5		7+/8
GigaPV	Poland			1			7+
AstraSun	Romania	+1.2	+1.2	1			9
mcpv	Germany			5	5		7+
FuturaSun	Italy				1		8
Aurinka	Spain				+0.3		7+/8
Silicon Valen	Spain	5	5	5	+0.5 (+4.5)		
AE Solar	Romania	2	2	2	2		9

Examples of innovation:

- Production innovation of high efficiency PV cells e.g. Perovskite/Si Tandems
- Process innovation for lower production costs and solving supply chain/materials challenges (e.g. copper metalisation, shingling, IBC, ultrathin wafers…)
- Delivering a circular PV value chain (recycling of materials & components at the right level of quality)
- Application innivation through PV integration (BIPV, VIPV, floating PV incl. offshore…)

Main bottlenecks to reach pre-commercial status:

- Lack of a robust European PV industry with capacity to deliver on innovation throughout the entire value chain
- European PV companies lacking financial resources to take significant risk on new technologies

Innovation Fund

Session Moderation

13 June 2023

European Commission

Session Moderation

Cleantech

Laura Pereira

We want to hear your views and your experience

1. What are the most promising technologies and strategies for reducing emissions in this sector?
2. What are the main lessons learned from recent projects implemented in Europe, and how to avoid repeating mistakes in new projects?
3. Which areas would benefit from auctions in addition or as an alternative to grants? What additional funding measures are required?

What are the most promising technologies and strategies for reducing emissions in this sector?

1

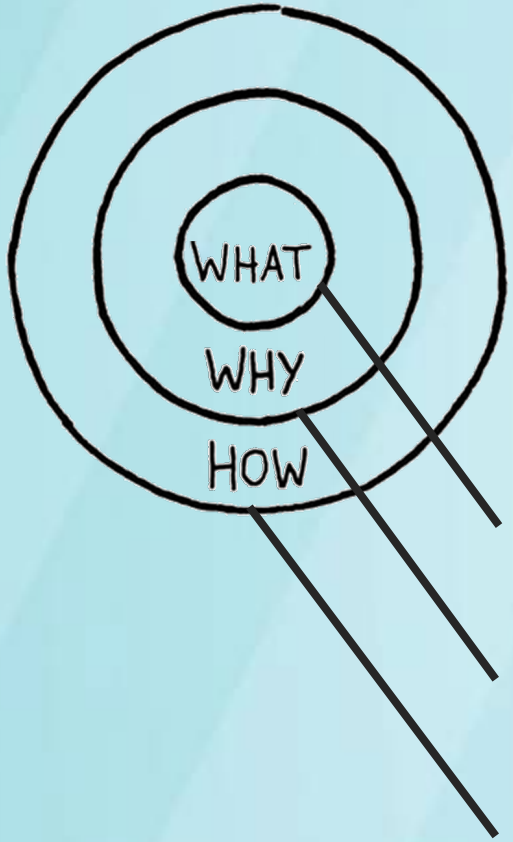
1. Innovative RES generation
2. Energy storage
3. Manufacturing of components for
    i. RES generation, including connection to the grid
    ii. Heat pumps
    iii. Electrolysers or fuel cells
    iv. Other clean-tech
4. Road transport, e.g., fuel use, logistics, modal change.
5. Buildings, e.g., smart buildings

+ their combinations

European Commission

What are the main lessons learned from recent projects implemented in Europe, and how to avoid repeating mistakes in new projects?

2



What went well, or what did not go so well?

Why has this happened this way?

How could this experience be replicated (if positive) or avoided (if negative)?

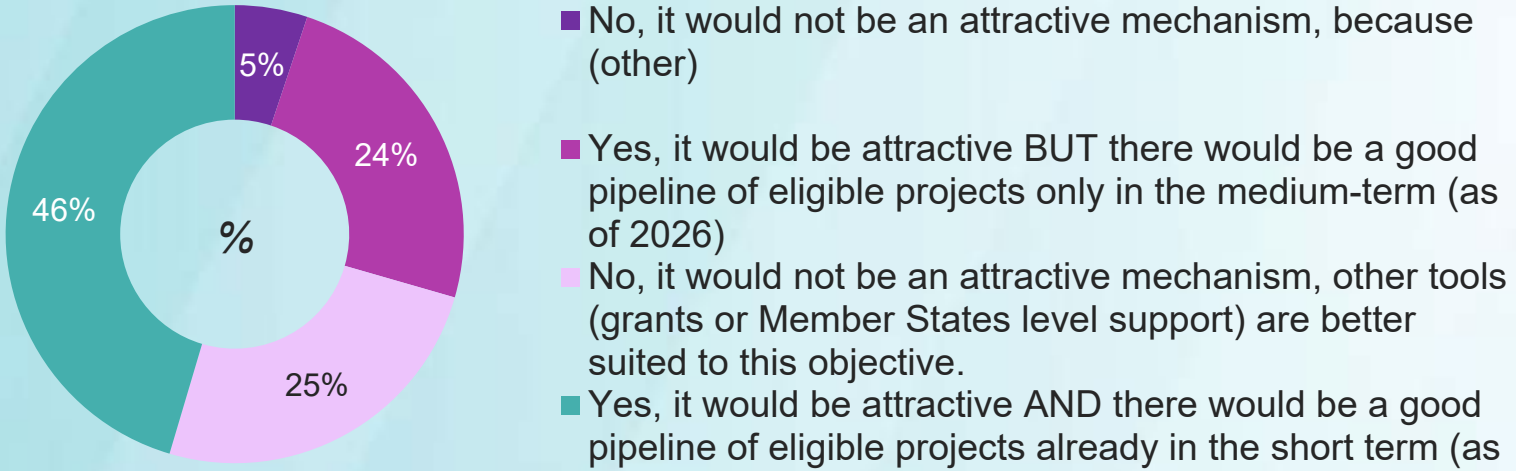
Examples of factors that help avoiding negative experiences and enabling reliable paths for implementation

1. Adequate allocation of funds and contingency
2. Realistic schedule
3. Proper forecasting of barriers
4. Timely management of risks
5. Diligent design and implementation/construction planning
6. Diligent progress monitoring
7. Experienced, well-trained and committed project team
8. Good networking with suppliers, project partners, regulatory agencies, local politicians and communities
9. Well developed and comprehensive contract documents
10. Adequate investigation during project commissioning

Which areas would benefit from auctions in addition or as an alternative to grants? What additional funding measures are required?

3

Attractiveness of pilot auctions for market players (Total # of respondents 369)



Almost half of respondents think pilot auctions development to target **manufacturing of components for renewable energy, energy storage, heat pumps or electrolysers, providing support per volume of manufactured output** would be an **attractive option** to market players

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Wrapping up: SLIDO polls [multiple choice]

1

What subsector are you from?

[ ] Renewables (RES)
[ ] Energy storage (ES)
[ ] Clean tech manufacturing
[ ] Buildings
[ ] Road transportation
[ ] Other

2

What kind of projects are you planning?

[ ] Innovative RES generation
[ ] Energy storage
[ ] Manufacturing of components for RES generation
[ ] Manufacturing of components for heat pumps
[ ] Manufacturing of components for electrolysers or fuel cells
[ ] Other clean-tech manufacturing
[ ] Fuel use for road transport
[ ] Energy use in buildings
[ ] Combinations of the above
[ ] Other

3

Which areas would benefit from auctions? Other funding measures required?

[ ] auctions are useful for the whole sector
[ ] auctions are useful for certain sectoral techs
[ ] public funding other than grants and auctions is required

Q&A on slido

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Thank you

https://cinea.ec.europa.eu/programmes/innovation-fund_en

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Innovation Fund
Stakeholder Consultation event

13 June 2023 - In person and online

Break time 15:30 – 16:00 CEST

Next session in Room 0D (ground floor)

Please note the event is livestreamed and recorded.

European Commission