



# EU SUSTAINABLE ENERGY WEEK



## BATTERIES IN ENERGY TRANSITION

*Session#19*

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## OVERVIEW OF BATTERIES ROLE IN ENERGY STORAGE

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# Sli.do question

**Would you consider installing a home battery in your house or apartment in the next 5 years? (e.g. to combine with photovoltaic panels or simply increase your security of electricity supply)**

**Answer 1:** Yes I'll definitely install a stationary battery at home!

**Answer 2:** I will consider installing a stationary battery at home only if the prices significantly drop or substantially.

**Answer 3:** I don't want to have a battery at home, but I would support a shared battery being installed in

**Answer 4:** I don't know, I need more information.

**Answer 5:** Not at my place and not in my backyard!





# Increase in flexibility needs

Even with 27% overall renewables target for 2030, renewables would account for 50% of electricity production, and **30% of electricity in 2030 will originate from variable renewables (sun and wind)**

**System flexibility needs are estimated to increase by a factor 2-3** to balance the variable renewable electricity production (preliminary result from ASSET project)

**Progressively we will need to look beyond main traditional flexibility means:**

- Flexible conventional power plants will tend to be displaced with CO2 price increasing and ever shorter operation time of such plants
- There is a limit for Pumped Hydro Storage development in EU even if today it accounts for roughly 90% of storage capacity

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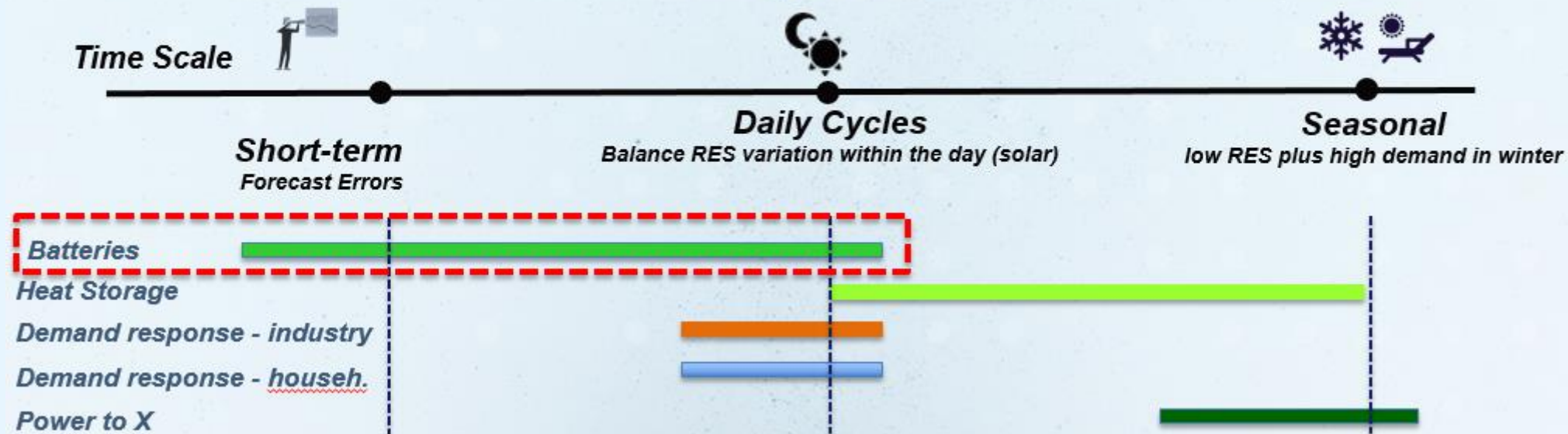
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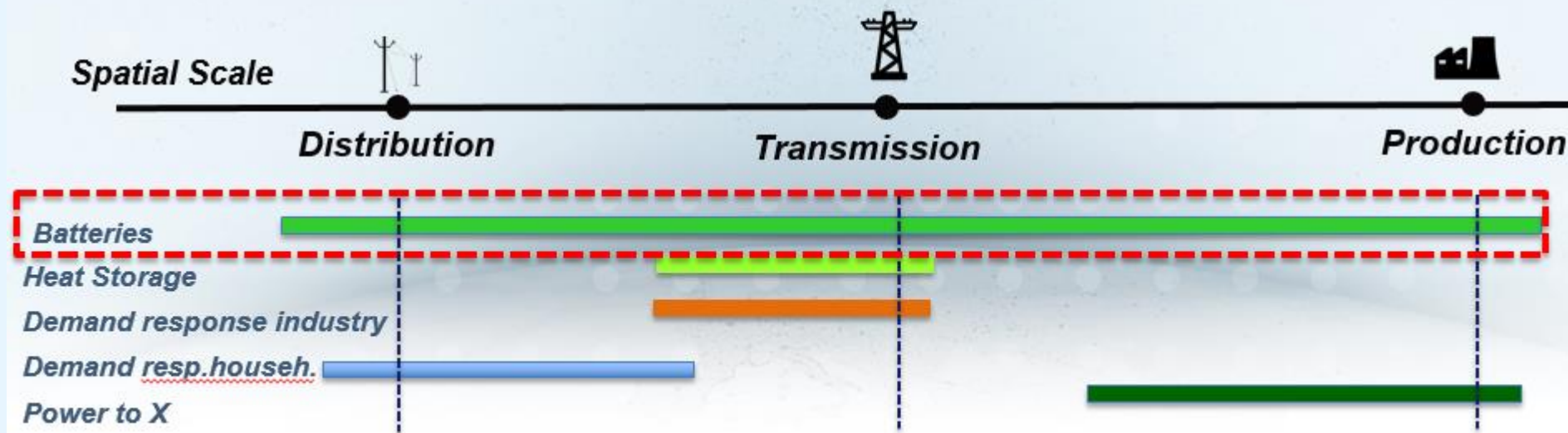


## Flexibility options : clean technologies coping with different timing needs



**Disclaimer:** the graph covers only selected **technologies with big untapped potential** and none is 100% clean  
Pumped Hydro Storage is today's main storage technology and covers daily storage needs (but: limited growth potential)

## Flexibility options : clean technologies coping with different location needs

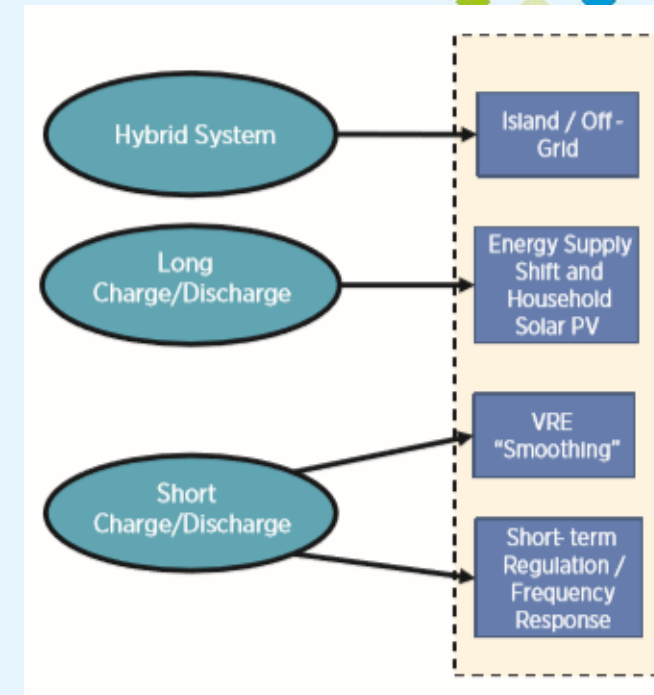


**Disclaimer:** the graph covers only selected **technologies with big untapped potential** and none is 100% clean  
Pumped Hydro Storage is today's main storage technology and plays important role at transmission level

# Batteries are not a silver bullet

- **not suited for seasonal energy storage** and
- **cost of energy storage they offer is still high** (compared e.g. to hydro pumped storage)
- , **but...**
- **fast reaction capability** makes them demanded for frequency regulation.
- **go very well together with PVs on your roof** and **start being used for grid congestion management**.
- have quite **good business case on islands**

Will Electric Vehicle batteries become a new player in energy market?!

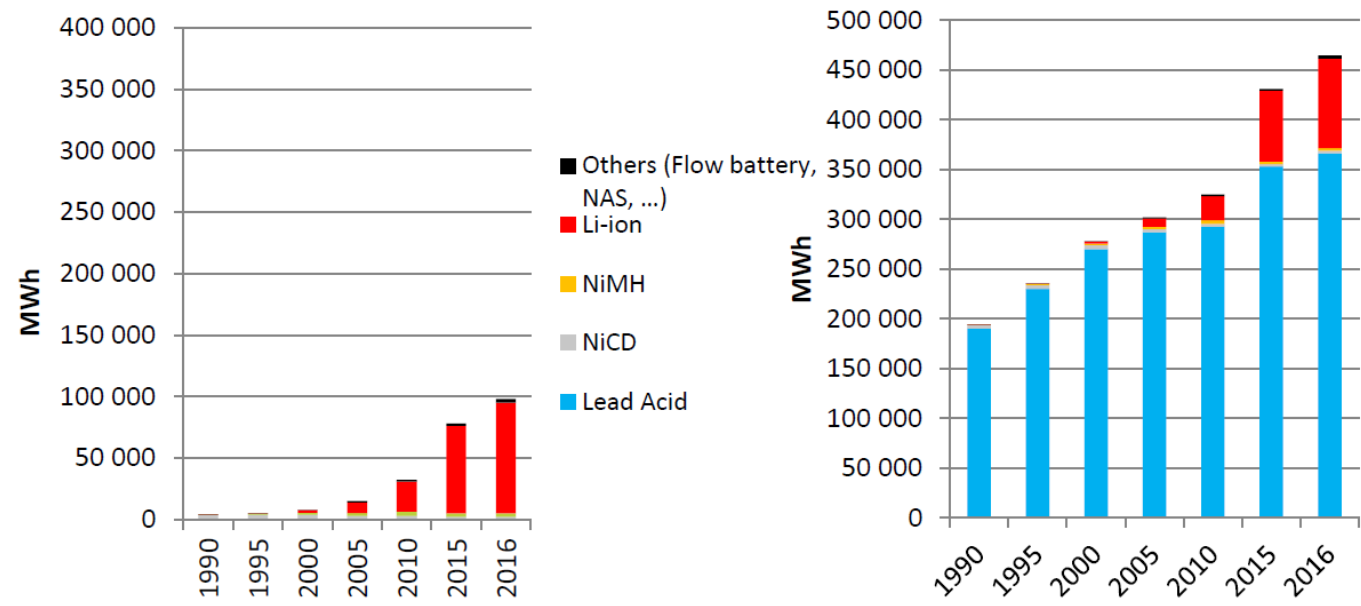




# Lead acid batteries still dominate the market, even if Li-ion batteries experience exponential growth

**For energy storage** (in the context of energy transition) **Li-ion batteries** are used most often.

**For traditional UPS** (uninterruptible power supply) **function, lead-acid batteries** are still used most often



Source: Avicenne Energy 2017

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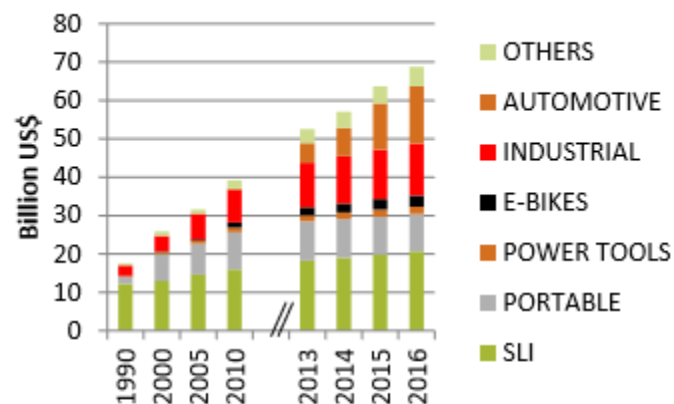
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# Battery uses

Global battery market (all chemistries)  
69 billion\$ in 2016 at pack level



## INDUSTRIAL

- MOTIVE: Forklift (95%), others
- STATIONARY: Telecom, UPS, Energy Storage System, Medical, Others (Emergency Lighting, Security, Railroad Signaling,, Diesel Generator Starting, Control & Switchgear,

AUTOMOTIVE: HEV, P-HEV, EV

OTHERS: Medical: wheelchairs, medical carts, medical devices (surgical power tools, mobile instrumentation (x-ray, ultrasound, EKG/ECG, large oxygen concentrators

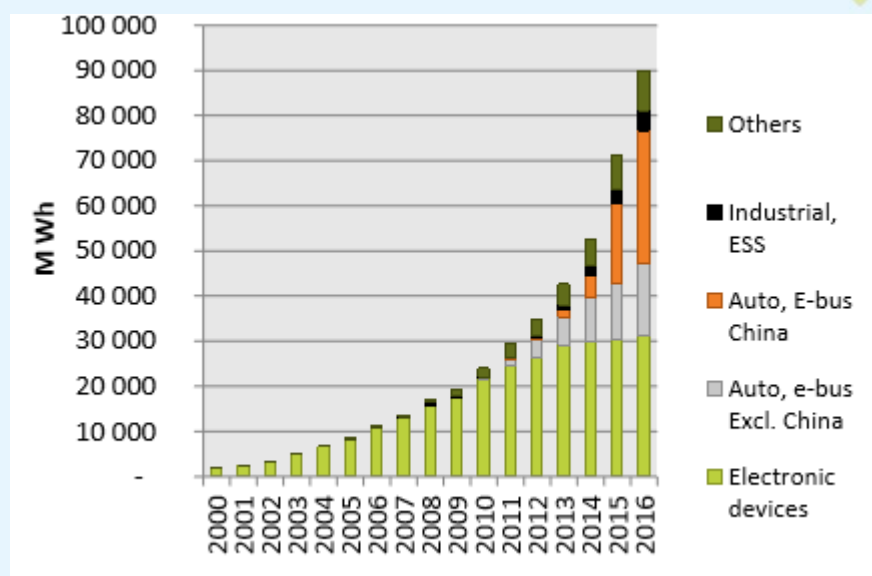
*These are still early days for  
batteries for energy storage.*

*They represent a tiny sub-category  
under industrial applications'*  
heading.

*Transport and consumer  
electronics sector are the main  
buyers today.*

Source: Avicenne  
Energy 2017

Global Li-ion battery market  
90 000 MWh, 23 B\$ Li-ion battery cell sales



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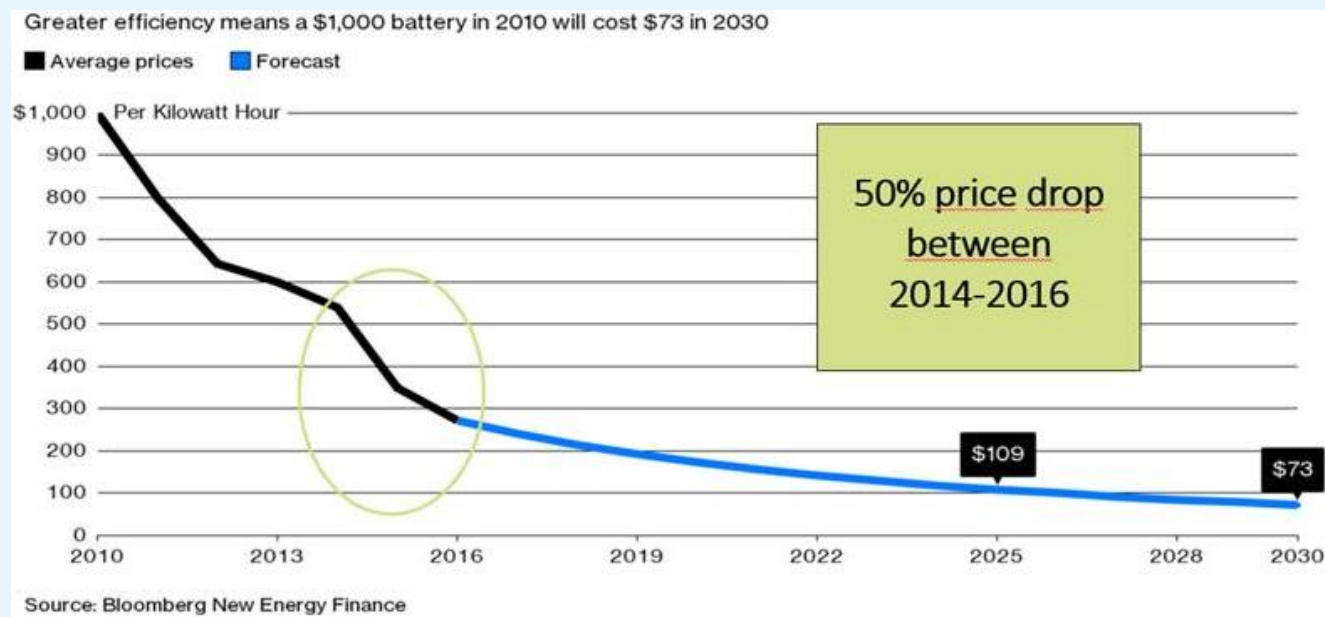
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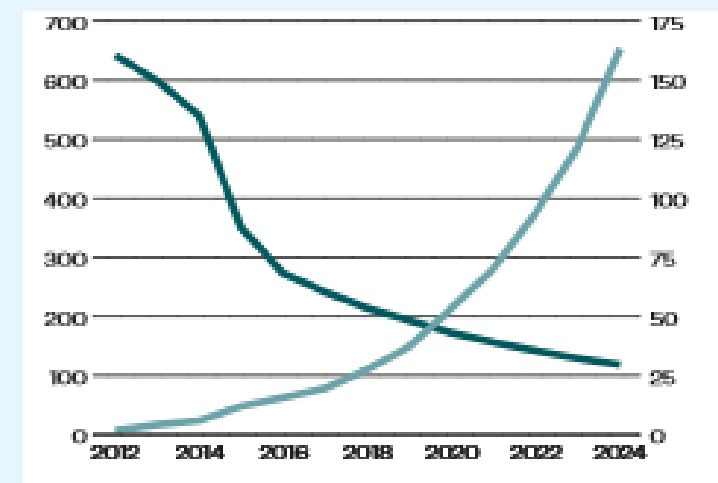


# Quick change we are witnessing is driven by sharp price decline for Li-ion batteries



Global battery cost in relation to EV battery growth

cost \$/kWh EV battery sales (GWh)



Source: BNEF

The correlation between battery cost decline and deployment is expected to be similar also for stationary applications

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# How come news so often come from Australia and US?

News headlines reflect the growing demand for batteries, not only in e-mobility but also in energy sector.

Given that

- demand for batteries is the biggest where grids are weaker and
- demand for batteries strongly correlates with demand for PVs,

very often news come from Australia or US:

«Home battery storage uptake tripled in 2017 in Australia, as costs tumble »

«Tesla building 100 MW battery in Australia»

“World’s Largest Storage Battery Will Power Los Angeles” (July 2016)



**EU electricity grid is probably the strongest in the world but batteries will still be needed at all levels.**

It's less than a month ago that quite a big 18 MW battery was inaugurated here in Belgium in Terhills and it's far from the first utility scale battery installed in the EU. UK probably has the biggest number so far.

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# EU will need batteries – but not just any

- EU doesn't want to replace fuel dependency with battery dependency.
- EU aspires to have batteries providing for real change = batteries produced sustainably
- At least 10 to 20 Giga-factories would be needed to cover EU 2025 demand alone

and global batteries market may reach EUR 250 billion a year.

Therefore the work done within the industry-led EU Battery Alliance is very important (industry, research community and other actors connected by a goal of establishment of healthy eco-system for batteries' production and deployment).

The work of stakeholders is facilitated by the Knowledge and Innovation Community InnoEnergy.

The Alliance's issued its first recommendations in Spring 2018.



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# Batteries Action Plan

The Commission responded to the first recommendations of the Battery Alliance in the Plan which was adopted as a part of the 3rd Mobility package on 16 May 2018. It looks into the whole value chain including:

- **possibilities of having full competitive value chain in Europe (with EIB financing, etc.)**
- **access to primary raw materials** and **promotion of reuse and recycling**
- **requirements for safe and sustainable battery production**
- **accelerated research and innovation** (100M€ additional funding at EU level alone to support priorities of SET-plan action on batteries. New Technology and Innovation Platform will soon be established).
- **skills along the whole value chain**
- **quick adoption and implementation of the Clean Energy and Clean Mobility packages to drive the market**

Learn more at <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52018DC0293> (2<sup>nd</sup> Annex)

See also [SET Implementation Plan for Batteries](#) as well as more detailed [Roadmap for R&I and accompanying measures for stationary batteries](#)

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# Clean Energy package will play strong role in deployment of stationary batteries

Just some examples:

- **New renewables targets** and **stricter rules on renewable electricity curtailment**
- **Abolition of discriminatory charges for network access**
- **Short-term price signals will be strengthened** and possibility of price caps will largely be removed
- **Energy trading will be carried out in close to real time and bid sizes will be modest** (day-ahead and intra-day market)
- **Access to ancillary services market and proper remuneration**
- Right to **dynamic electricity contracts** for households will also matter



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# Smart energy system cluster of H2020 projects (BRIDGE) also contributes to positive change

- BRIDGE aims are
  - To create a **structured view of obstacles to innovation**
  - To foster **continuous knowledge sharing** amongst projects
  - To deliver **conclusions** and **recommendations with a single voice**
- BRIDGE members are working along **four working groups** in order to identify the cross-cutting obstacles to innovation

Data  
management

Business Models

Regulations

Customer  
Engagement



- More info about BRIDGE: <http://www.h2020-bridge.eu/>

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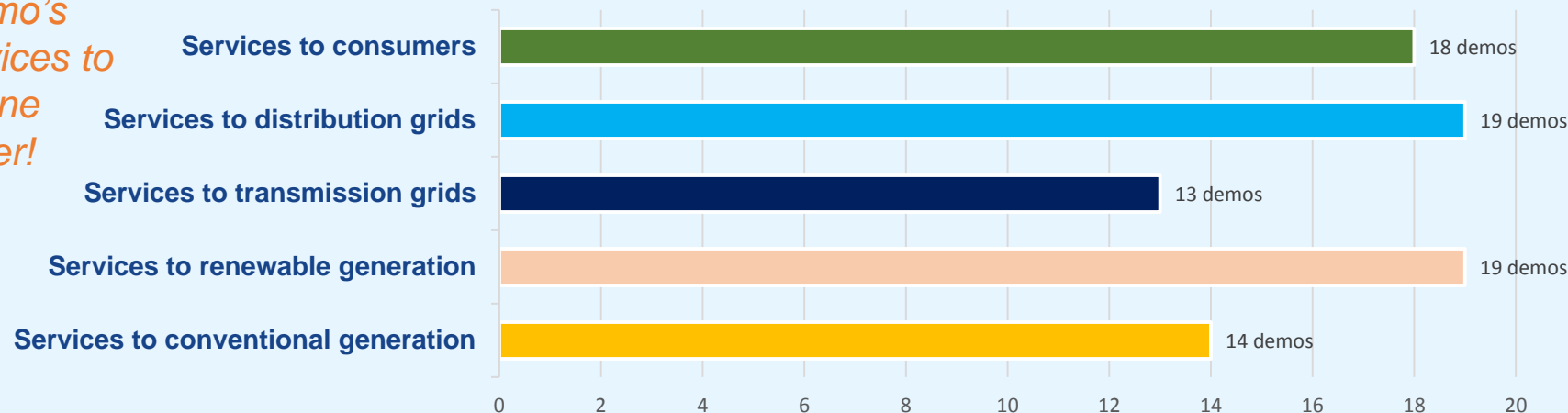
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# BRIDGE projects of H2020 with battery “component “ ...

.. cover a wide spectrum of services for energy system stakeholders:

*Some of demo's  
provide services to  
more than one  
market player!*



*While smart energy  
system projects of  
H2020 are technology  
neutral, batteries  
feature in many project  
proposals*

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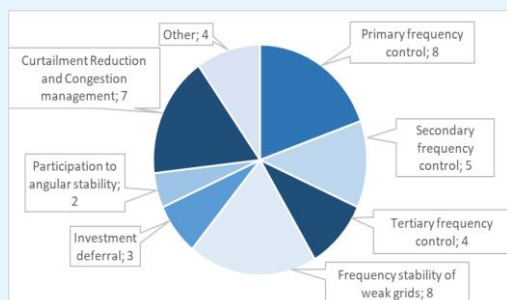


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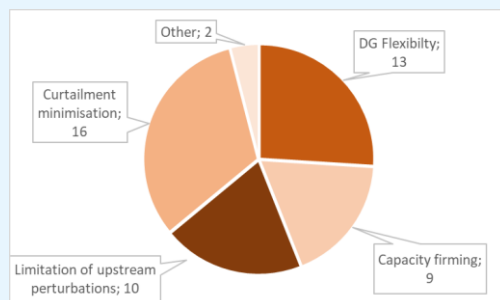


# Demos of BRIDGE projects of H2020 with battery “component “ ...

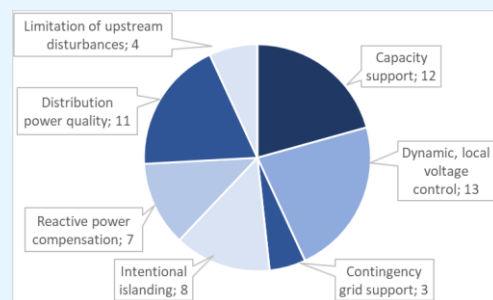
address services including...



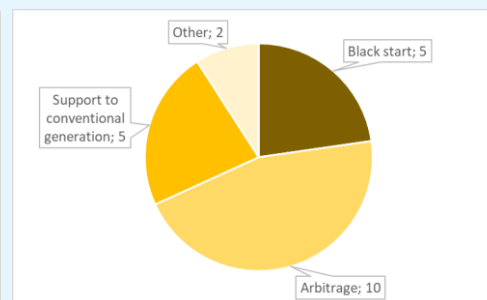
Transmission grids services



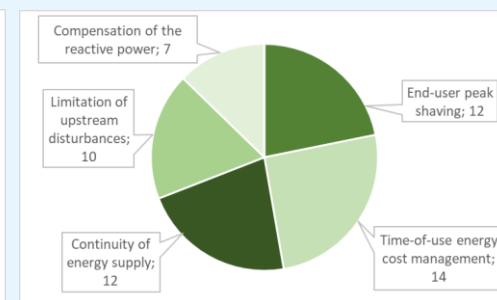
Renewable generation services



Distribution grids services



Conventional generation services



Services to Consumers

*This is just to show that batteries provide multitude of services to all market participants. The details will be available in the Bridge report on batteries to be published soon. Check [www.h2020-bridge.eu](http://www.h2020-bridge.eu) and follow @BRIDGE\_H2020 !*



# Contribution of smart grids and storage projects of H2020 to batteries' deployment.

Some of the services within BRIDGE demonstrations...

- Renewables cutting off reduced; more steady and flexible supply of renewables.
- **Increasing flexibility of conventional production** to react quickly to changes in RES generation
- **Peak Shaving**: industrial customers save on their electricity bills by reducing peak demand
- **Arbitrage**: charging when electricity is cheaper and discharging when it is more expensive
- **Frequency control**: maintaining balance between generation and demand
- **Congestion management** to avoid overloads and guarantee the security of the grid
- **Enabling consumers** to benefit from dynamic pricing and energy markets, etc.

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... BRIDGE projects test services from cross-border level down to building level

*N.B. not all BRIDGE projects are enumerated, just those with strong focus on battery integration*

*Majority of projects involve one or other type of Li-ion batteries, but not all. There are also projects involving flow-batteries, lead batteries, molten salt batteries etc*



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# 3 PROJECTS PRESENTED TODAY

All projects deal with renewables integration

- **TILOS: centralised renewables production coupled with big batteries.** Proud winner of two 2017 EUSEW awards!
- **INTERFLEX: shared batteries for neighbourhood's use and batteries to support charging of electric vehicles**
- **NETFFICIENT: batteries in individual homes and public buildings** (also 2<sup>nd</sup> use EV batteries reconfigured for stationary use!). **+Battery at medium voltage substation.**

**Projects selected for today's session are mostly implemented on islands** (GR, FR and DE): business case for batteries is the best on islands.

*Enjoy the nice virtual trip!*

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# Thank you for your attention!

Many thanks to INEA for help with selection & management of great projects!

Many thanks to BRIDGE support team – for promoting clustering among the projects!

Check [www.h2020-bridge.eu](http://www.h2020-bridge.eu) and follow @BRIDGE\_H2020



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# Sli.do opinion pool No2

Please vote!

(After 4 presentations, time permitting)

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