

7 December 2016

# NYSERDA ON-SITE POWER CONFERENCE

Status of the current market

Amy Grace

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# SMALL-SCALE PV AND STORAGE

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- Still a very small market, but we expect increasing uptake in the next 5-10 years.
- Biggest markets are Japan (50k), Germany (30k) – driven by subsidies.
- Italy growing market, also driven by subsidies.
- Australia a growing market – driven by competition among retailers and market design
- US – biggest markets are Hawaii and California. Little incentive due to market designs.
  
- Attractiveness for storage contingent on two factors: (1) high retail rates and (2) a low feed-in-tariff for excess generation
  - Difference needs to be large enough to offset the cost of the battery
  - In most markets, cost of storage not low enough and difference not high enough to make it work (exceptions are Germany and Australia. Germany has a subsidy.)
  - Even in leading markets, payback is long (19 years). Economics are not fantastic.
  
- In the US, net energy metering (NEM) eliminates the incentive to pay to store excess generation
  - Free storage

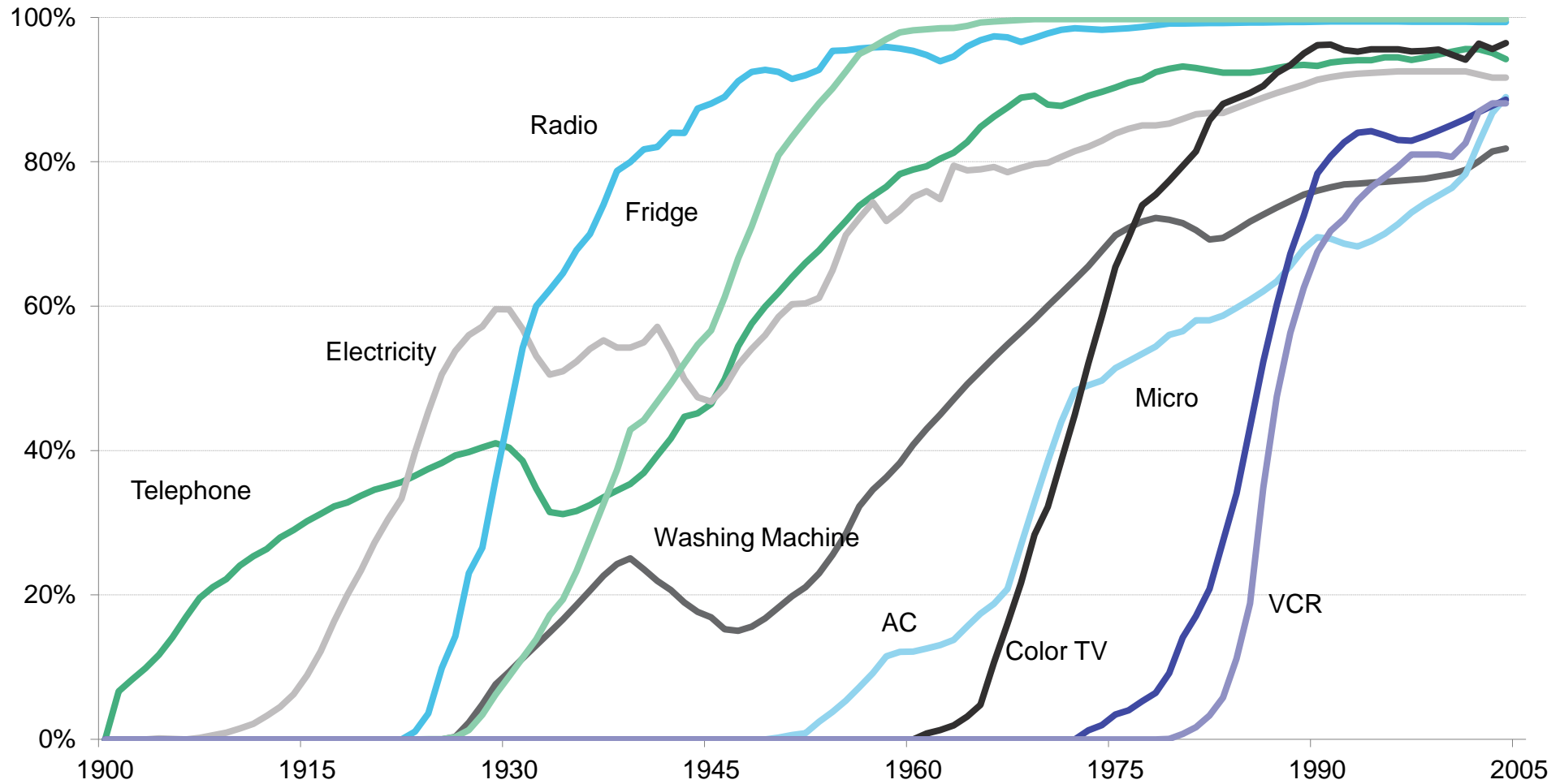
- In US retail rate structures need to change to improve economics, including implementing time-of-use rates, demand charges, or altering net-metering policies.
  - These changes might also erode PV economics.
- Time-of-use rates, where they exist, do not currently have a big enough difference between on- and off-peak rates for storage to make economic sense.
- Demand charges where consumers have to pay a fee based on their peak demand, storage is used to shave peak demand, particularly for commercial and industrial consumers – this is a drive in North America and South Korea, but not yet Europe.
- Storage for back-up power is a luxury limited to a small segment of the US market. Europeans don't need back-up power as grid is very reliable.
- Costs far too high to justify disconnecting from grid altogether
- Battery warranty life still too short, progress being made on battery and costs coming down.
- Safety – lithium ion batteries can catch fire if not properly installed or maintained. Not currently an issue, but are concerns, especially following Samsung Galaxy. Also one fire spikes concern.
- Future expectations – growing from 400MWh today to 760GWh in 2040 to become \$250bn market



# GLOBAL OVERVIEW

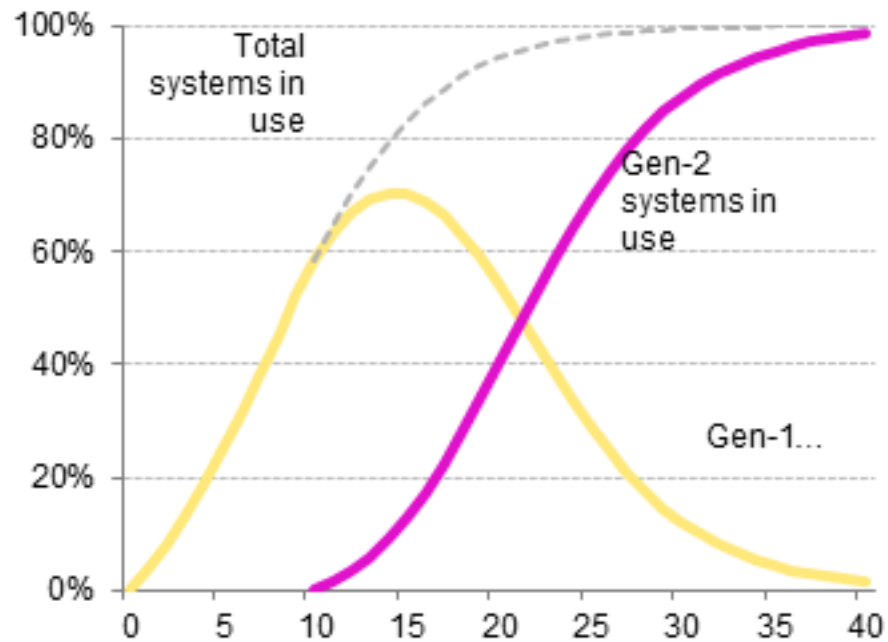
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# THE CONSUMER ADOPTION CURVE

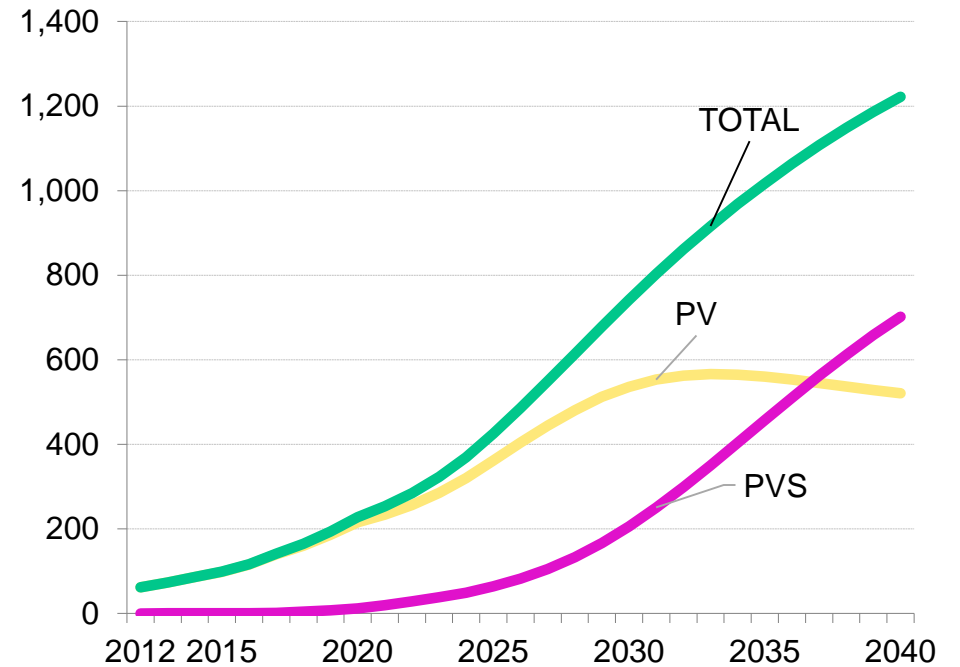


Source: Bloomberg New Energy Finance, NY times

**Illustrative multi-generation diffusion  
(% of addressable market)**



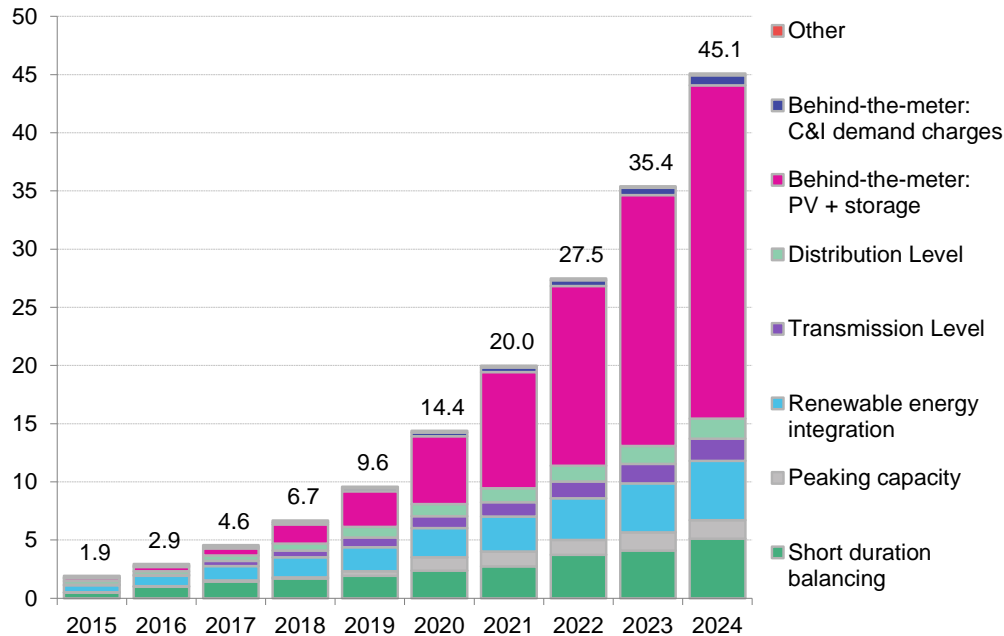
**Cumulative global small-scale PV and storage diffusion  
(GW)**



Source: Bloomberg New Energy Finance

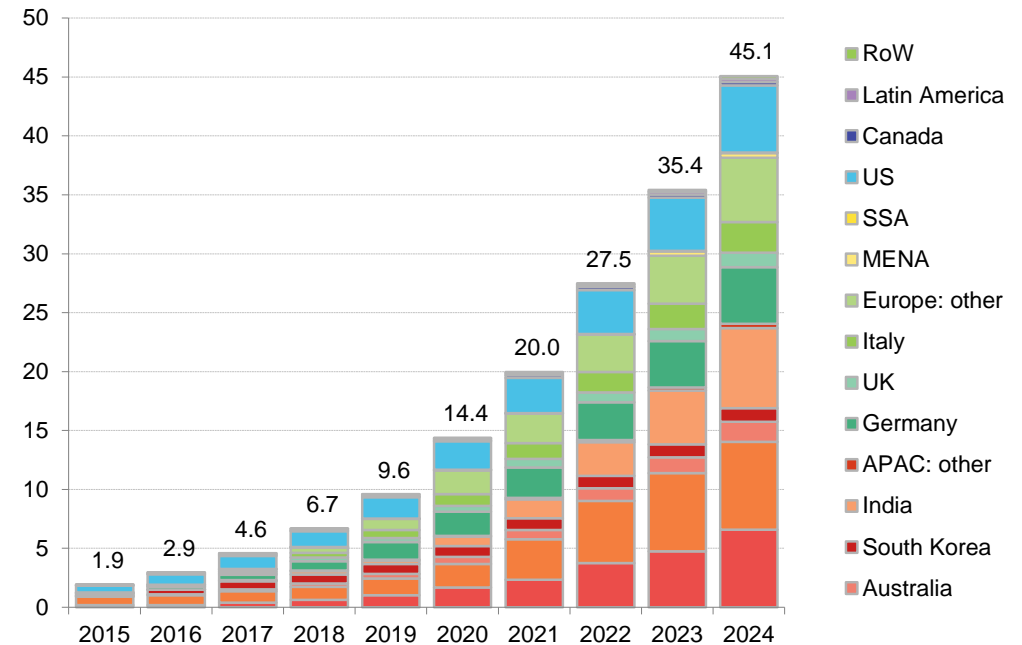
# GLOBAL ENERGY STORAGE FORECAST BY APPLICATION AND REGION, 2015-24

**Cumulative energy storage deployment by application, 2015-24 (GW)**



Source: Bloomberg New Energy Finance

**Cumulative energy storage deployment by country / region, 2015-24 (GW)**



Source: Bloomberg New Energy Finance

- By 2024, the total installed energy storage capacity will reach 45GW / 81GWh.
- The top five markets are Japan, India, the United States, China, and Germany. They represent 70% of the global total in 2024 (in terms of MW).
- Utility-scale storage deployments dominate in terms of total installed power output (MW) in 2016. They make up 84% of total installed capacity. Behind-the-meter energy storage becomes increasingly important throughout the 2016-24 period, and in 2021 it becomes the larger of the two market segments.



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[sales.bnef@bloomberg.net](mailto:sales.bnef@bloomberg.net)

Analyst Name

[aaanalyst@bloomberg.net](mailto:aaanalyst@bloomberg.net)

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