

# Comments to VGI Working Group

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# Overview

- SCE, PG&E, SDG&E and EPRI provided edits to the April straw proposal scope
- SCE also provided edits on the May 8 workplan, deliverables, reading list, and glossary
- SCE, PG&E, SDG&E and EPRI suggest modifications to the Scope and Workplan in order to:
  - Ensure terms, steps and deliverables are clear and concise
  - Ensure agreed-upon value and purpose for the different types of VGI prior to any technical work on communication protocols
  - Agree upon guiding principles and criteria to assess the different types of VGI and different tools to secure VGI values
  - Recommend prioritized VGI pilots
- We recommend creating two workstreams:
  - a business case/ value workstream for all types of VGI; and
  - a technical (communication protocol) workstream with a narrower scope

# Bridging the Gap

Possible definitions to establish consistency:

- VGI value groupings (and examples)
  - Wholesale market services: 1) frequency regulation, 2) spinning, non-spinning and supplemental reserve, 3) load following / ramping support for renewables
  - Distribution infrastructure benefits: 1) avoided cost of distribution upgrade deferral 2) voltage support
  - Customer / driver facing benefits: 1) retail energy time shift, 2) demand leveling 3) power quality, 4) power reliability, 5) monetizing of GHG and air pollution reduction
- VGI categories of tools (and examples)
  - Charging level incentives (rebates for lower level charging, modifying current allowance policy, demand charge design)
  - Managed charging (TOU rate design, TOU rate adoption, DR programs at the charging station, kiosk, circuit or building level, submetering)
  - V1G wholesale market services provided by unidirectional power flow enabling vehicles to charge including varying the charge rate
  - V2G wholesale market services

# Bridging the Gap (cont'd)

*Due to the difference in potential benefits, it is appropriate to prioritize some groups of VGI benefits over others. High potential activities such as developing policy and rate tools to defer distribution system upgrades and provide EV driver benefits should be prioritized over low potential activities such as, developing EV-related wholesale market services*

- Wholesale market services probably is a small market for EVs in the long-term with lots of completion from other DERs or other solutions such as exporting power
- Low tech policies and rates for EVs will delay the need for wholesale market services by many years
- Single family home charging market will become even more important because
  - About 75-90% of the market will be long-range BEVs and long-range PHEVs which means more home and less away-from-home charging
  - Most MUDs are actually single family attached homes (with garages and driveways) just like single family detached homes

# Workstream 1-Value Proposition and Enabling Policy

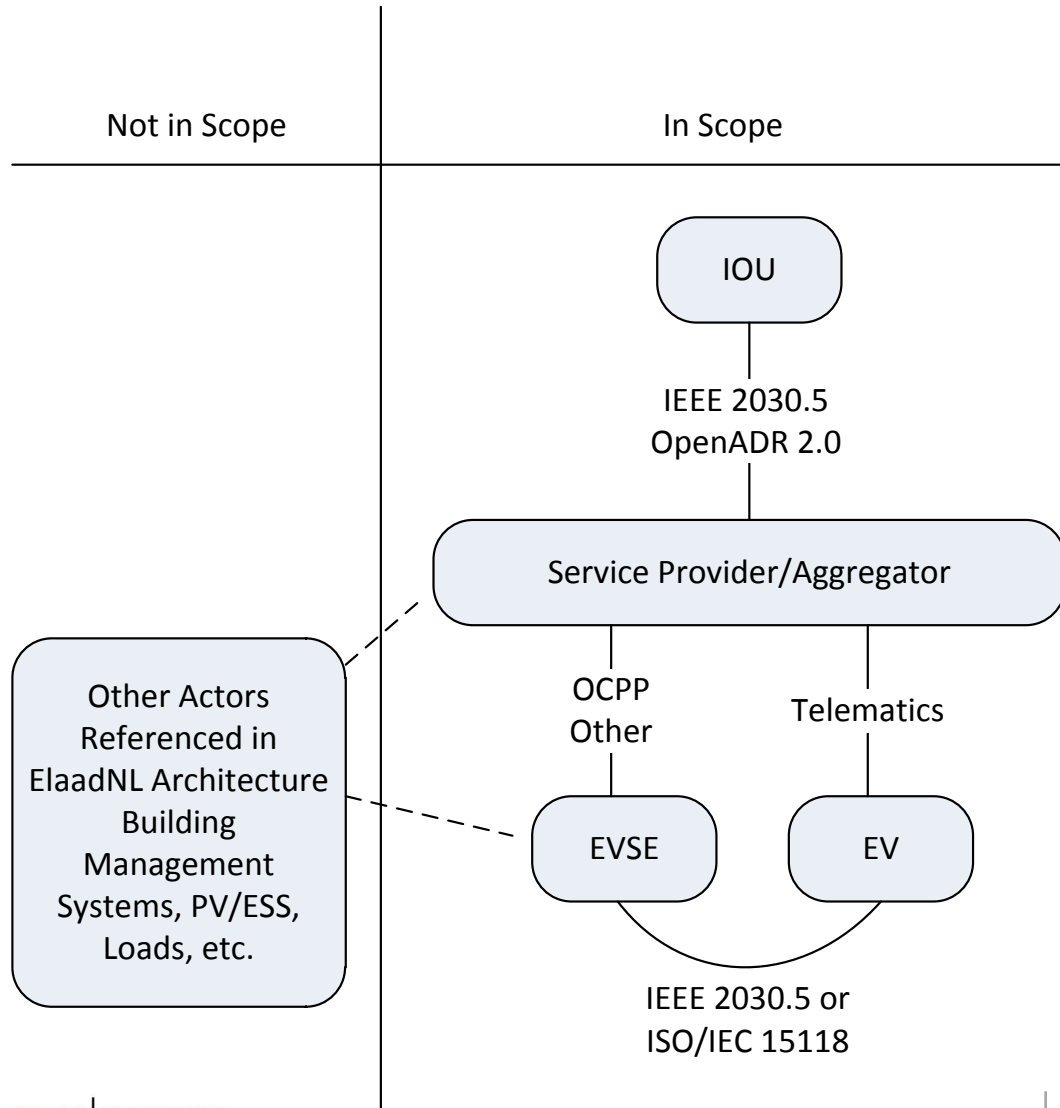
- Foundational activities and deliverables
  - Scope and objectives of VGI (Guiding Principles)
    - Proposed 24 principles including the 11 from the ACR's appendix B
    - Some of the most important objectives are minimizing network fees, reducing grid costs to non-EV drivers and cybersecurity issues
  - Terminology
  - Needs/problems to be solved for each category of VGI (Purpose)
  - Use cases and policy solutions developed to address the needs for individual scenarios
    - Residential, workplace, fleet, other
    - Communications/control solutions for wholesale market services
    - Non-wholesale market solutions
    - Validated by Guiding Principles or objectives
  - Recommendations on non-market VGI solutions to bring value to EV drivers and value to non-participating utility customers
  - Recommendations on priority VGI wholesale market use-cases to be studied in depth by the technical workstream

# Workstream 2- Technical Work

- Technical activities focusing on communication protocols are only valuable if there are well defined use cases and requirements
  - Determine technical solutions for use cases recommended by Workstream 1 (e.g., architectures, requirements, protocols)
    - Recommendations of protocol(s) to be determined by requirements (e.g., open standard, cybersecurity, functionality, etc.)
    - If multiple acceptable solutions exist then either pilots or customer adoption should be used to determine if one or more should co-exist
  - Determine implementation details for any proposed pilot(s) or program(s)

# Narrow the Technical Workstream - Communication Protocol Scope

- The needs of the Grid and the Customer are paramount
  - Value to them will provide value to secondary actors (automakers, service providers, aggregators)
  - Actors/use cases providing value added services should not be in scope of VGI (e.g., roaming, reservation, authorization, etc.)
  - ElaadNL scope not applicable



# Important to:

- Have this dialogue in a working group setting
- Seek data-driven policy decisions (not based on supposition)
- Understand the huge amount of available and upcoming data
- Understand how the changing EV market will change the charging markets
- Find ways to have EVs and other technologies help address the emerging duck curve
- Minimize equity concerns between different types of EVs / charging levels and different types of utility customers
- Find ways to have EV drivers save money compared to gasoline
- Focus on non-market VGI solutions as well as wholesale market VGI solutions
- Not have a not have a one-size-fits-all mandate due to the differing needs and costs in different market segments / VGI value categories
- Provide a clear business case to automakers, charging station providers and others who need to develop VGI

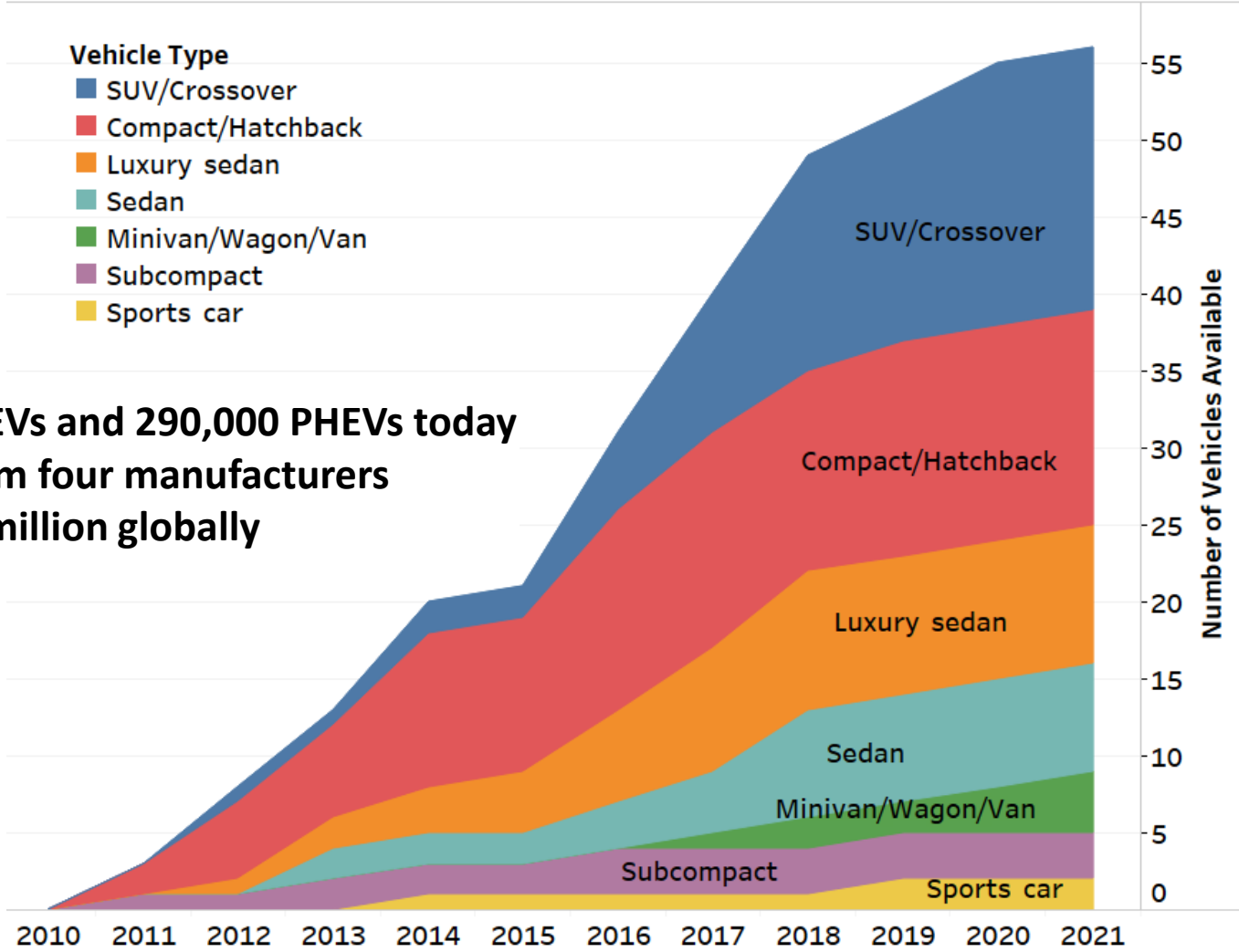


Thank you

# Appendix

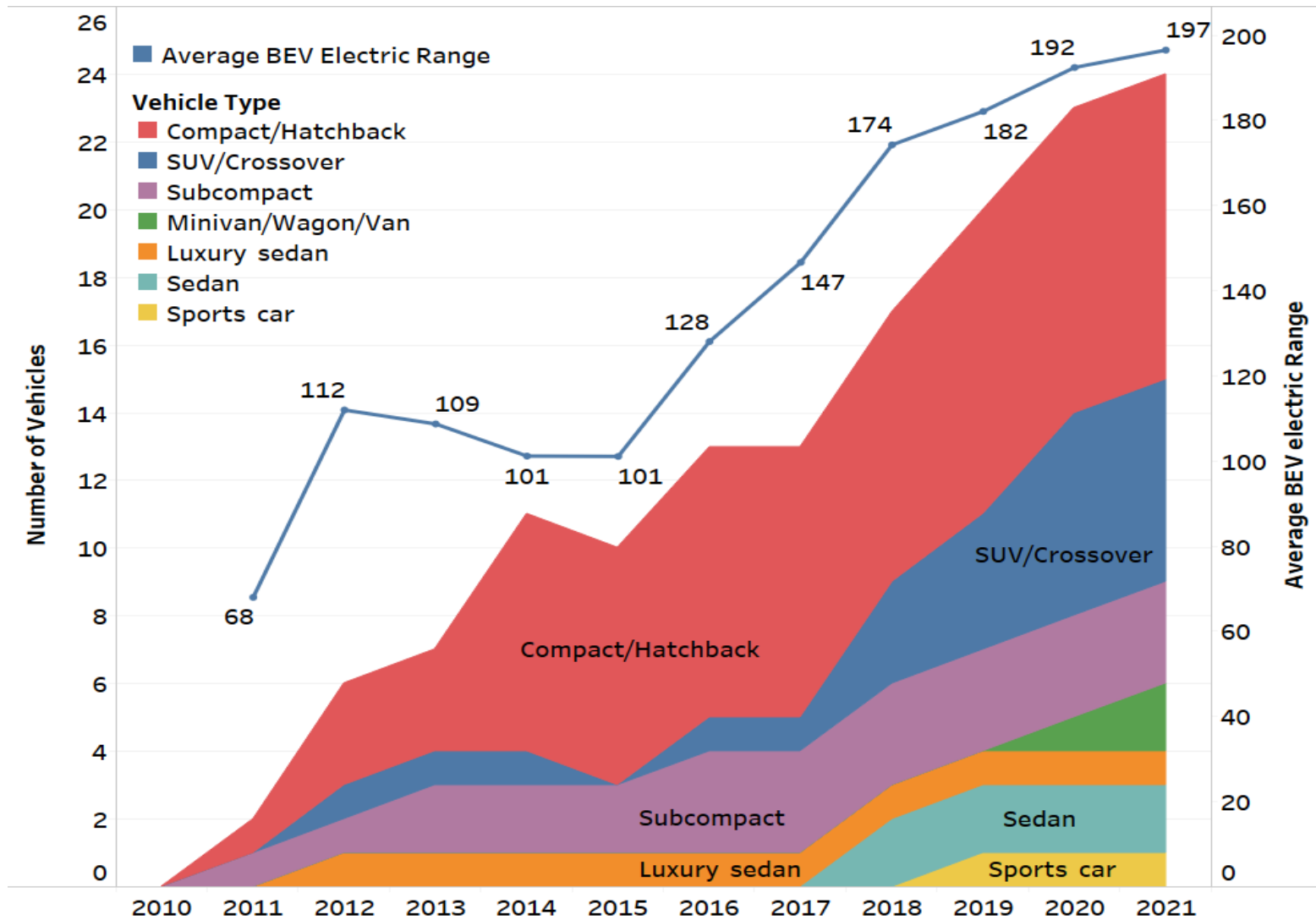
# Over 30 Plug-in EVs today from over 15 carmakers with 20+ more arriving 2017 – 2021

**315,000 BEVs and 290,000 PHEVs today**  
**Mostly from four manufacturers**  
**Over two million globally**



Source: EPRI

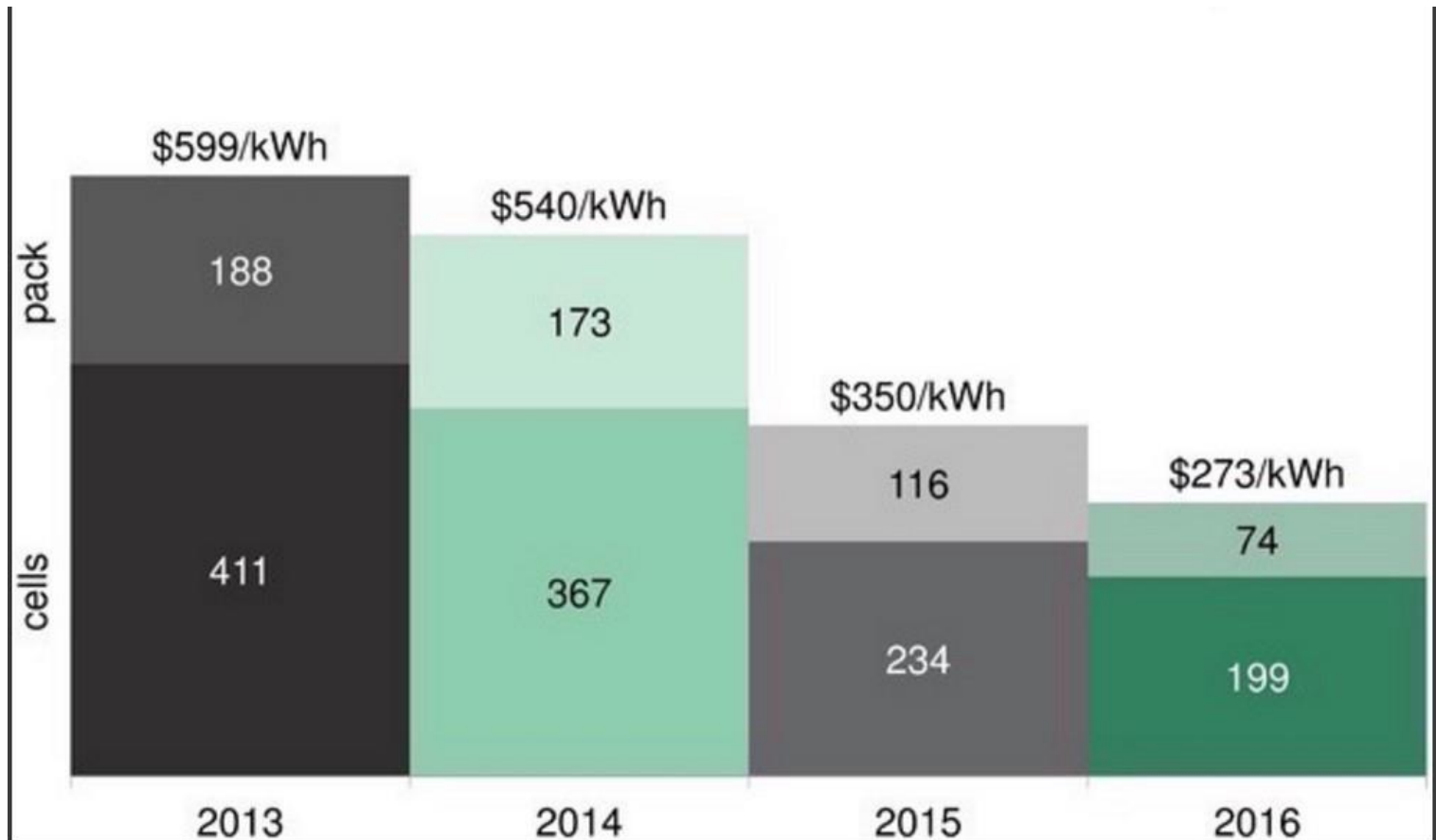
# Range of fully-electric vehicles is increasing



# Plug-in Hybrid EV Status and Trends

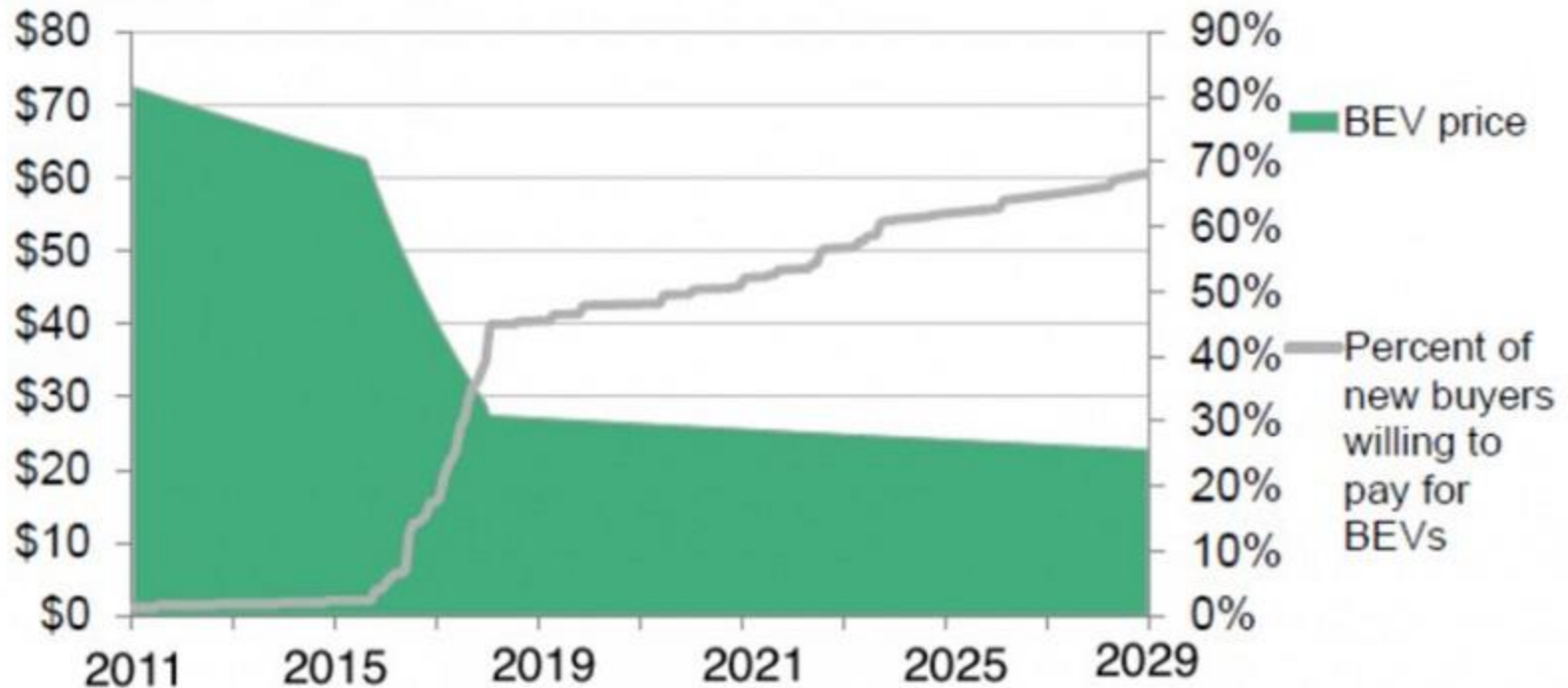
- Two-thirds of EV market are plug-in hybrid EVs
- Total PHEV range (per full tank and battery) is 300-500 miles
- 40-80% of total miles are electrified
- Best PHEVs can have more annual e-miles than BEVs
- Trend is toward larger batteries / e-miles
  - By 2022 CARB estimates 10 models with 30-100 mile e-range and ~20 with 20-30 mile e-range per charge
- PHEV Battery warranty required by Calif Air Resources Board to be 10 years, 150,000 miles

# Battery Prices Are Falling Fast



- Prices per kiloWatt-hour, from battery surveys by [Bloomberg New Energy Finance](#).
- Some experts predict \$200/kWh by 2020 and \$120/kWh by 2030
- In 2013, the International Energy Agency estimated BEV and Gasoline cost parity at \$300/kWh. Other estimates vary.

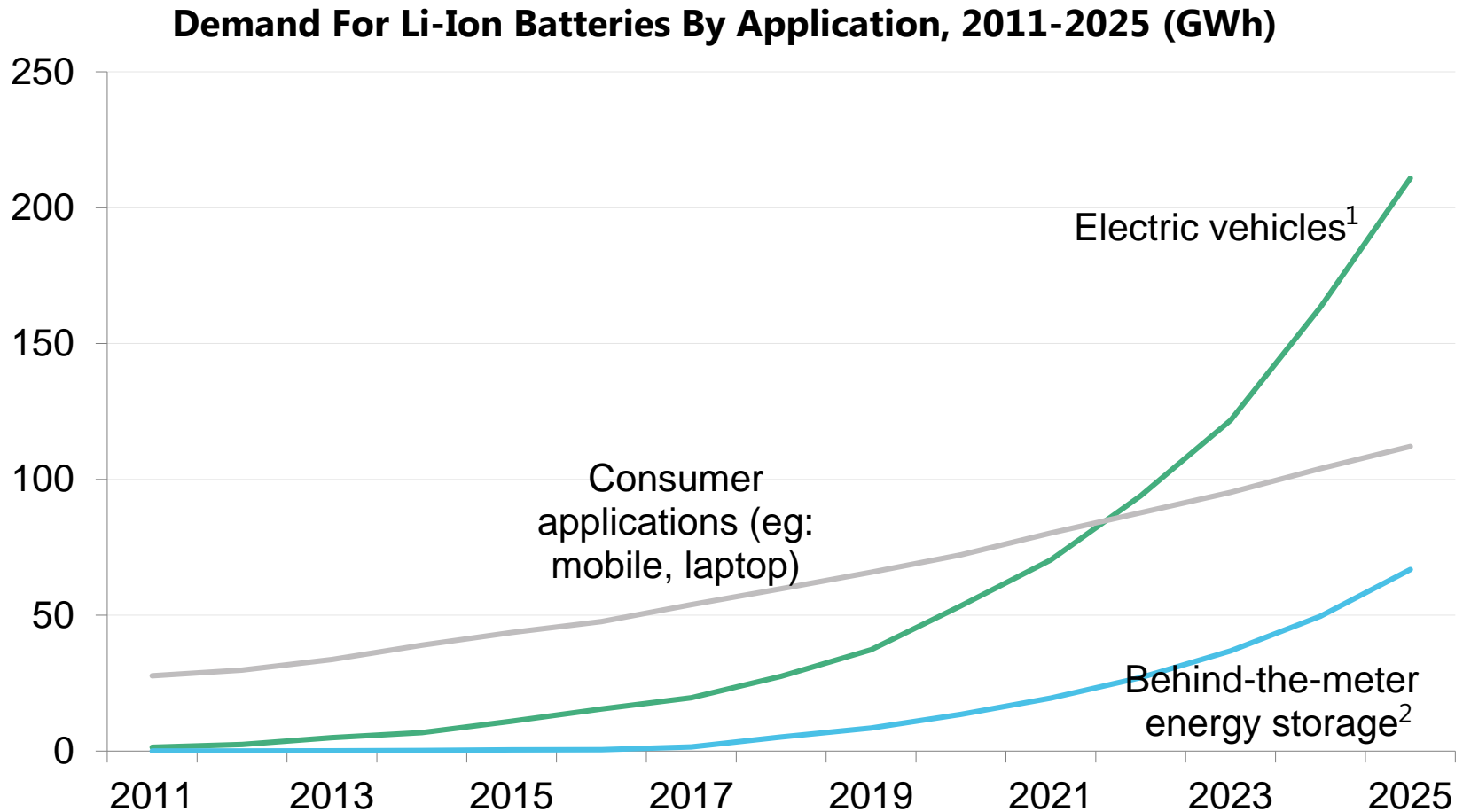
# BEV Market Potential at Today's Battery Prices is over 20 Percent according to Bloomberg New Energy Finance



■ Total addressable market for vehicles with a 200-mile range. Salim Morsy; BNEF

**CARB estimates 20- 25 BEV models with over 200 mile range in 5 years**

# The market demand for EV and stationary storage batteries will match consumer applications by 2020, according to Bloomberg New Energy Finance



1) EVs = light duty passenger BEVs and PHEVs

2) Behind-the-meter includes commercial, industrial and residential storage. Source: Bloomberg NEF