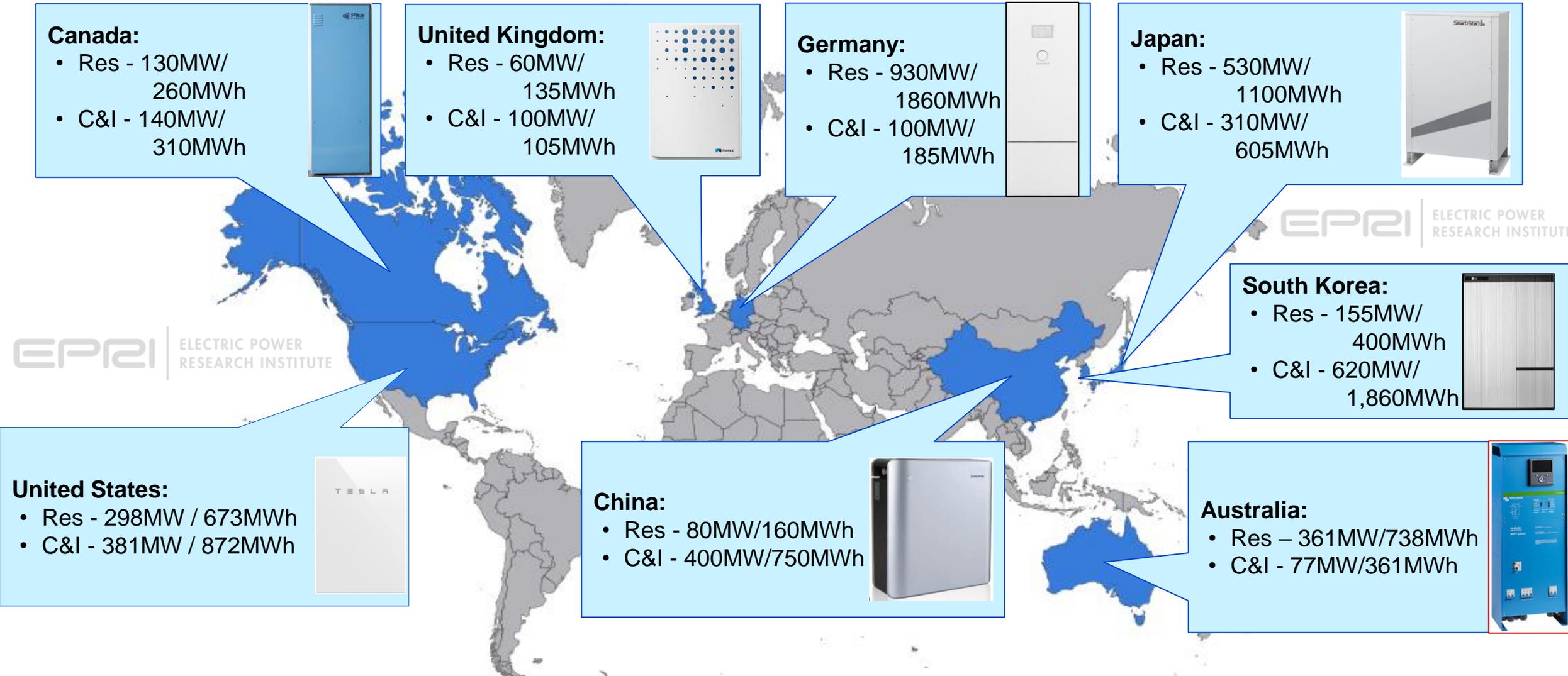# Increasing Residential Reliability

Responding to Grid Disruptions, PSPS Events, and Wildfire Events

Haresh Kamath
Sr. Program Manager, DER and Energy Storage
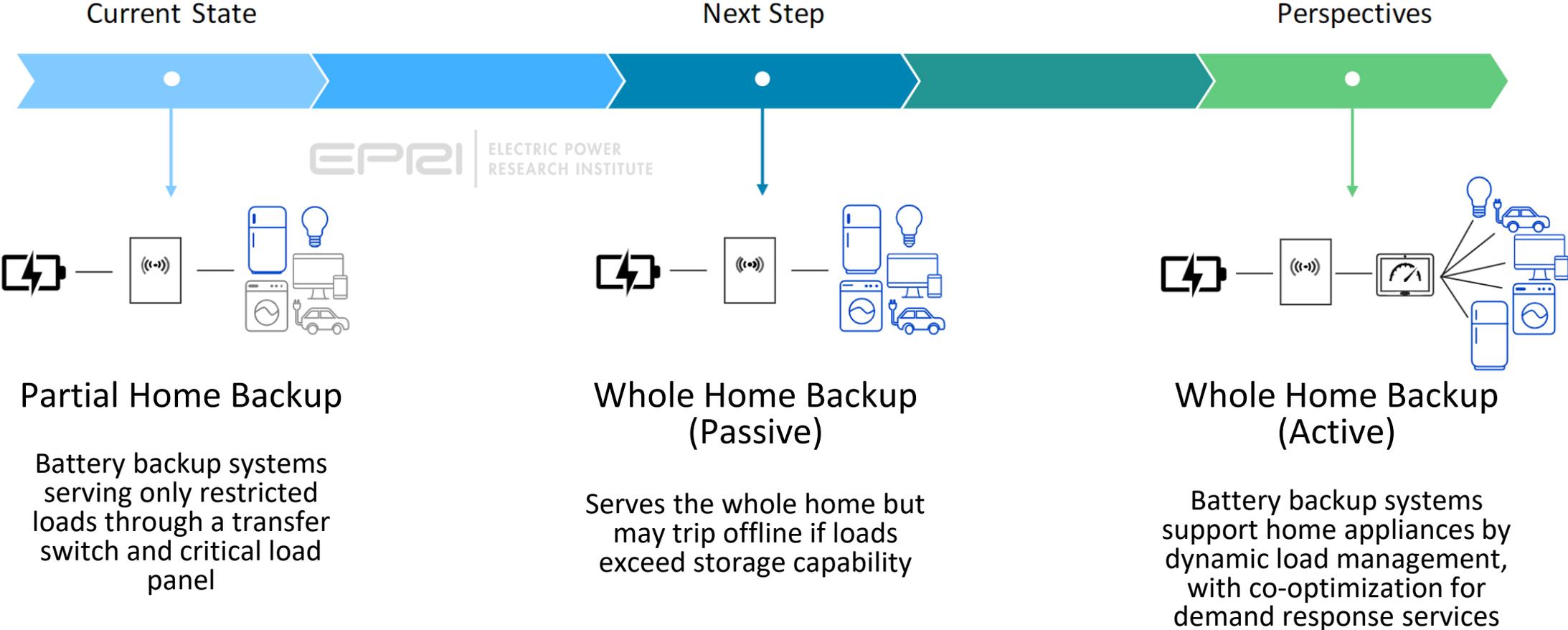
IEPR Microgrid Workshop
July 9th, 2020

Global Customer Energy Storage Deployment Update

Canada:
- Res - 130MW/ 260MWh
- C&I - 140MW/ 310MWh

United Kingdom:
- Res - 60MW/ 135MWh
- C&I - 100MW/ 105MWh

Germany:
- Res - 930MW/ 1860MWh
- C&I - 100MW/ 185MWh

Japan:
- Res - 530MW/ 1100MWh
- C&I - 310MW/ 605MWh

South Korea:
- Res - 155MW/ 400MWh
- C&I - 620MW/ 1,860MWh

United States:
- Res - 298MW / 673MWh
- C&I - 381MW / 872MWh

China:
- Res - 80MW/160MWh
- C&I - 400MW/750MWh

Australia:
- Res – 361MW/738MWh
- C&I - 77MW/361MWh

> 5 GW Operating Globally

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Evolution of Customer Resilience Solutions

Perspectives and expectations regarding what batteries can or will do as backup power are highly variable

Current State   Next Step   Perspectives

Partial Home Backup

Battery backup systems serving only restricted loads through a transfer switch and critical load panel

Whole Home Backup (Passive)

Serves the whole home but may trip offline if loads exceed storage capability

Whole Home Backup (Active)

Battery backup systems support home appliances by dynamic load management, with co-optimization for demand response services

Industry is Streamlining Load Control Management to the Customer

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Customer Solar + Battery Design: Room for Improvement

Load shedding platforms such as Span, Lumin, Eaton and others can allow streamlined and size-optimized energy storage installations. Load shedding may also be used in conjunction with demand response or time of use optimization
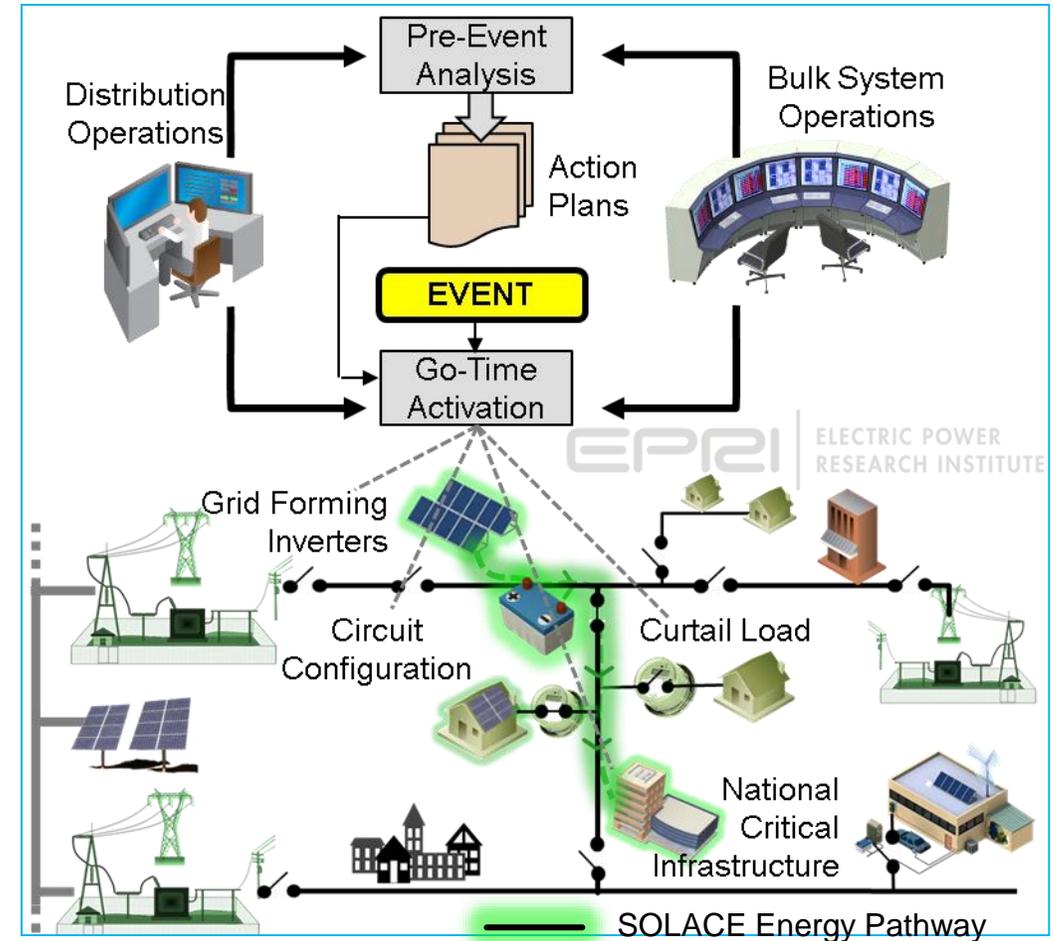
Energy storage installations frequently involve several separate enclosures, which add labor and introduce potential points of failure

6 Boxes

3 Boxes
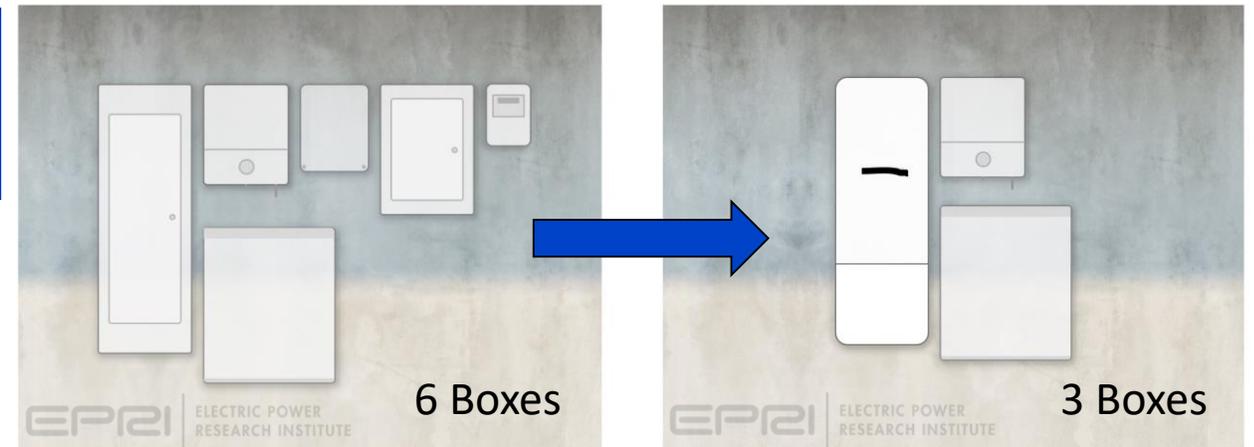
Cost Reduction, Customer Control, Optimizing Resilience

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The Future: Community-Level Resilience

- Leverage DER flexibility through local control, allowing community resilience

  - Solar and storage both behind and in front of the meter, connected through grid-forming inverters

  - Transportable storage to allow fast deployment

  - Controllable circuit configuration to create dynamic microgrid boundaries

  - Flexible loads to enhance power management

- These approaches may also bring other benefits

  - Control of DER and loads may allow flexible interconnection, accommodating more clean renewable generation

  - Customer savings and provision of grid services during normal operation

Cost-Effective Resilience through Grid-Scale Solutions

Together...Shaping the Future of Electricity

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