



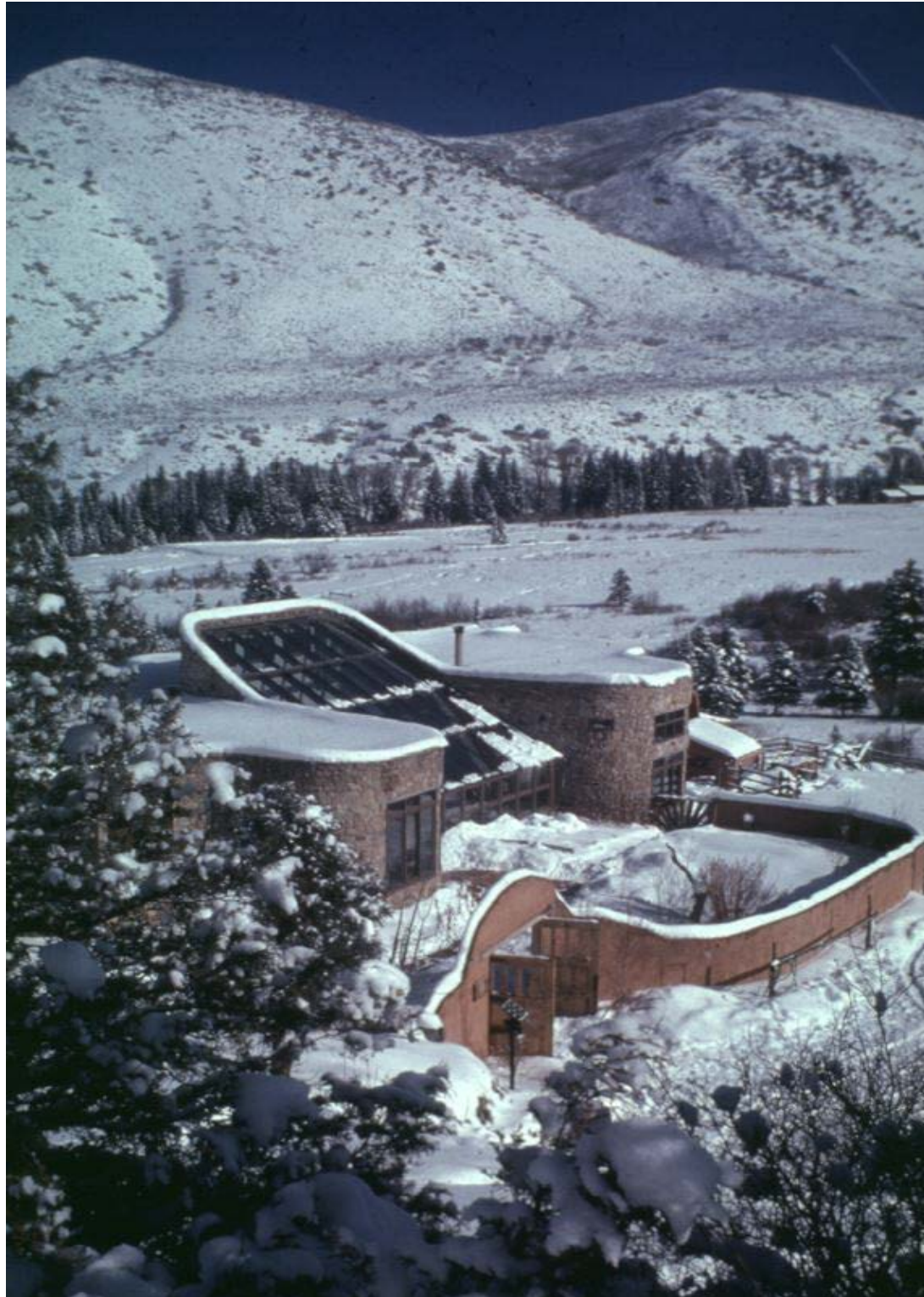
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Outcomes of the RMI PV BOS Charrette

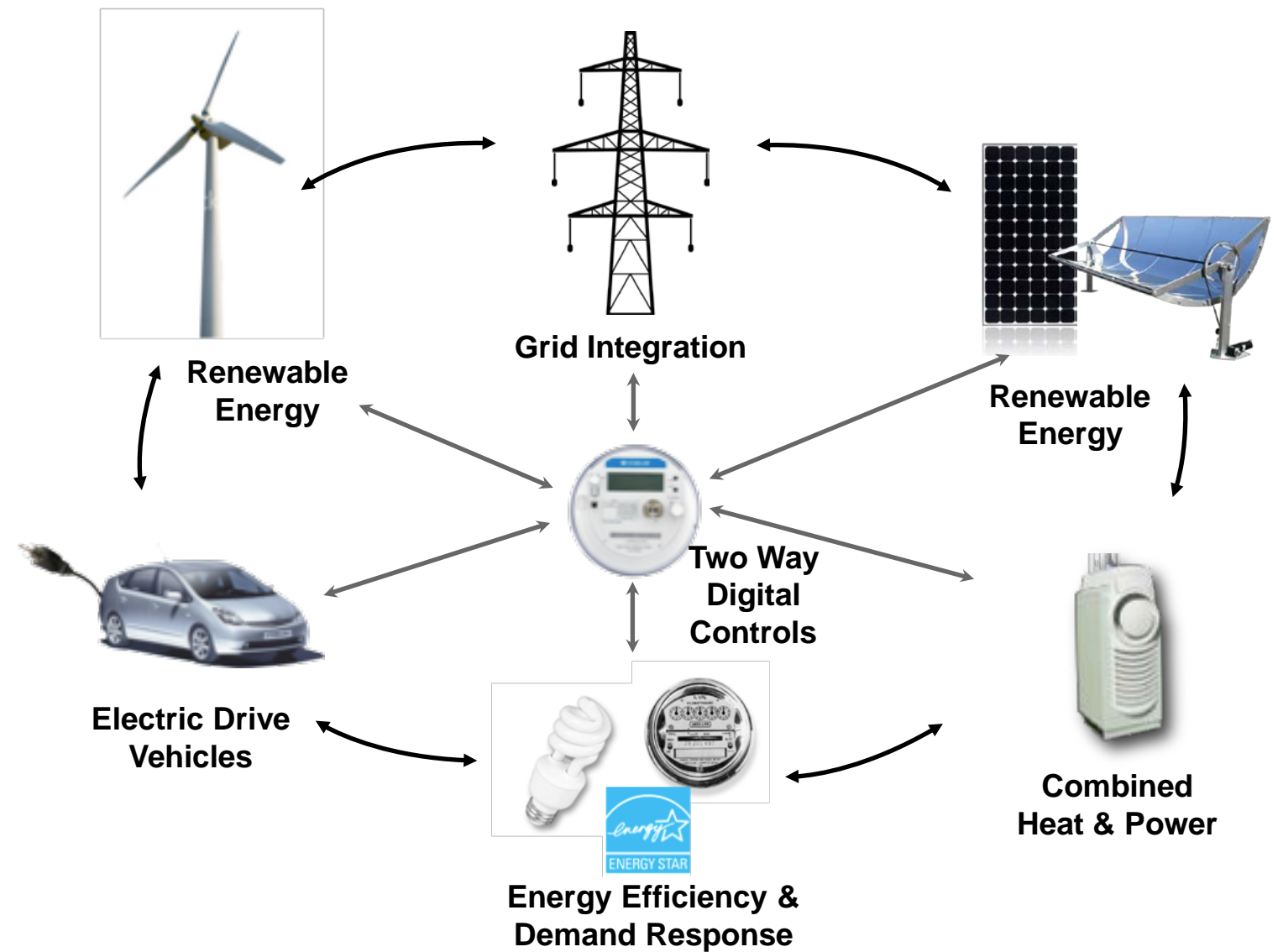
Presentation at DOE SunShot BOS Process Workshop
February 9, 2011

Sam Newman

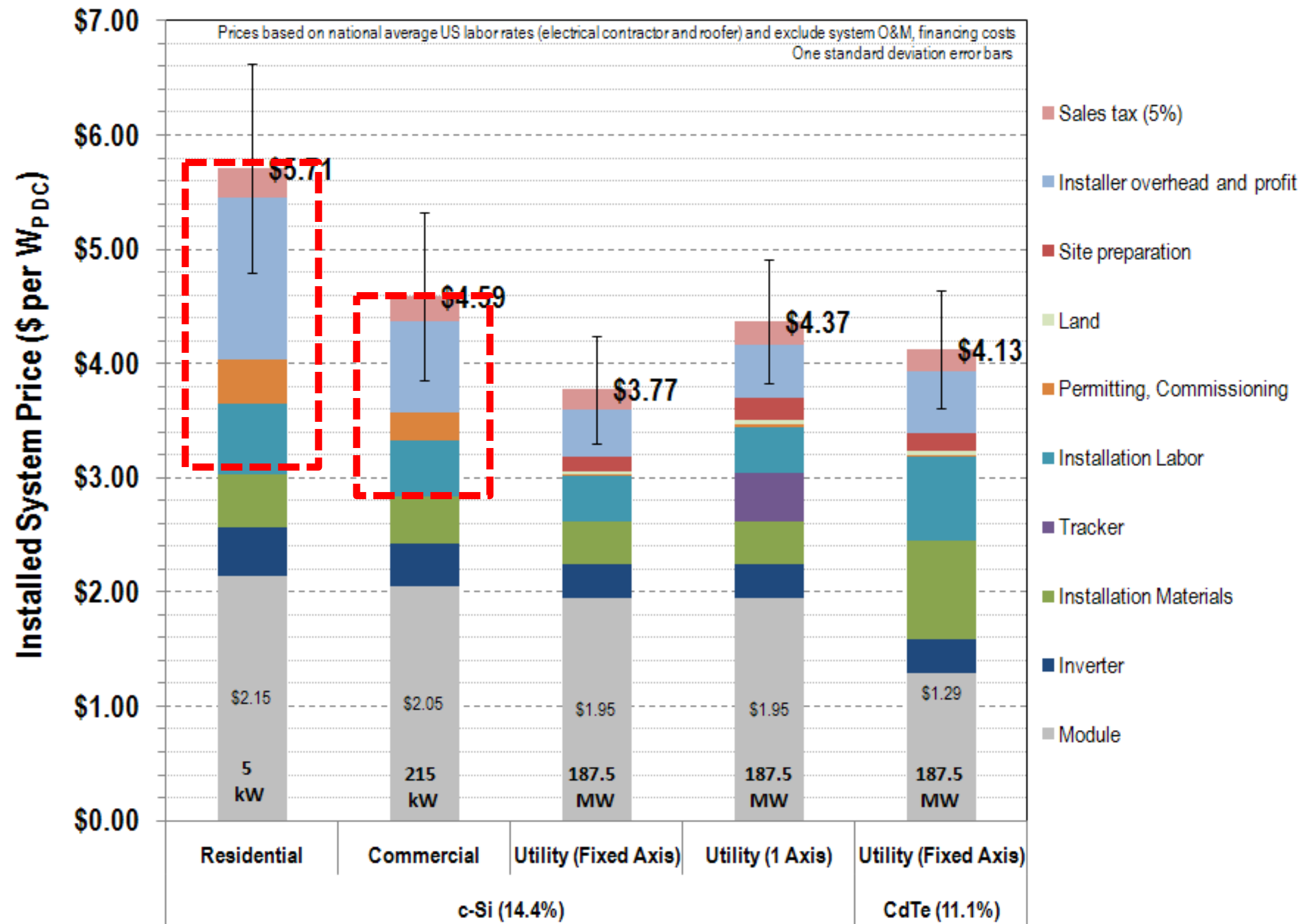
Rocky Mountain Institute works to find profitable and practical solutions to our energy challenges



Components of the Next Generation Utility

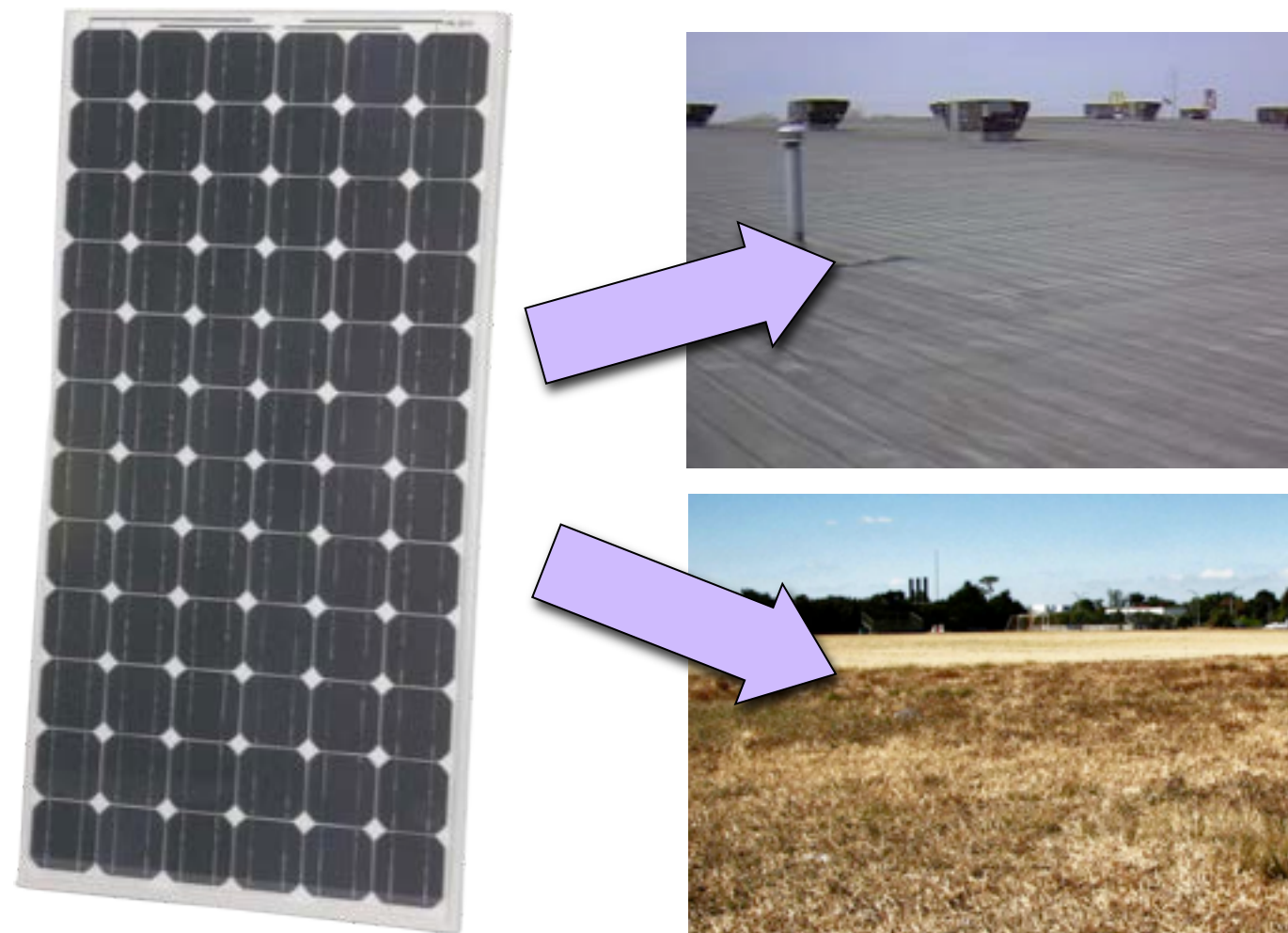


NREL System Price Model: Q4 2010 Results



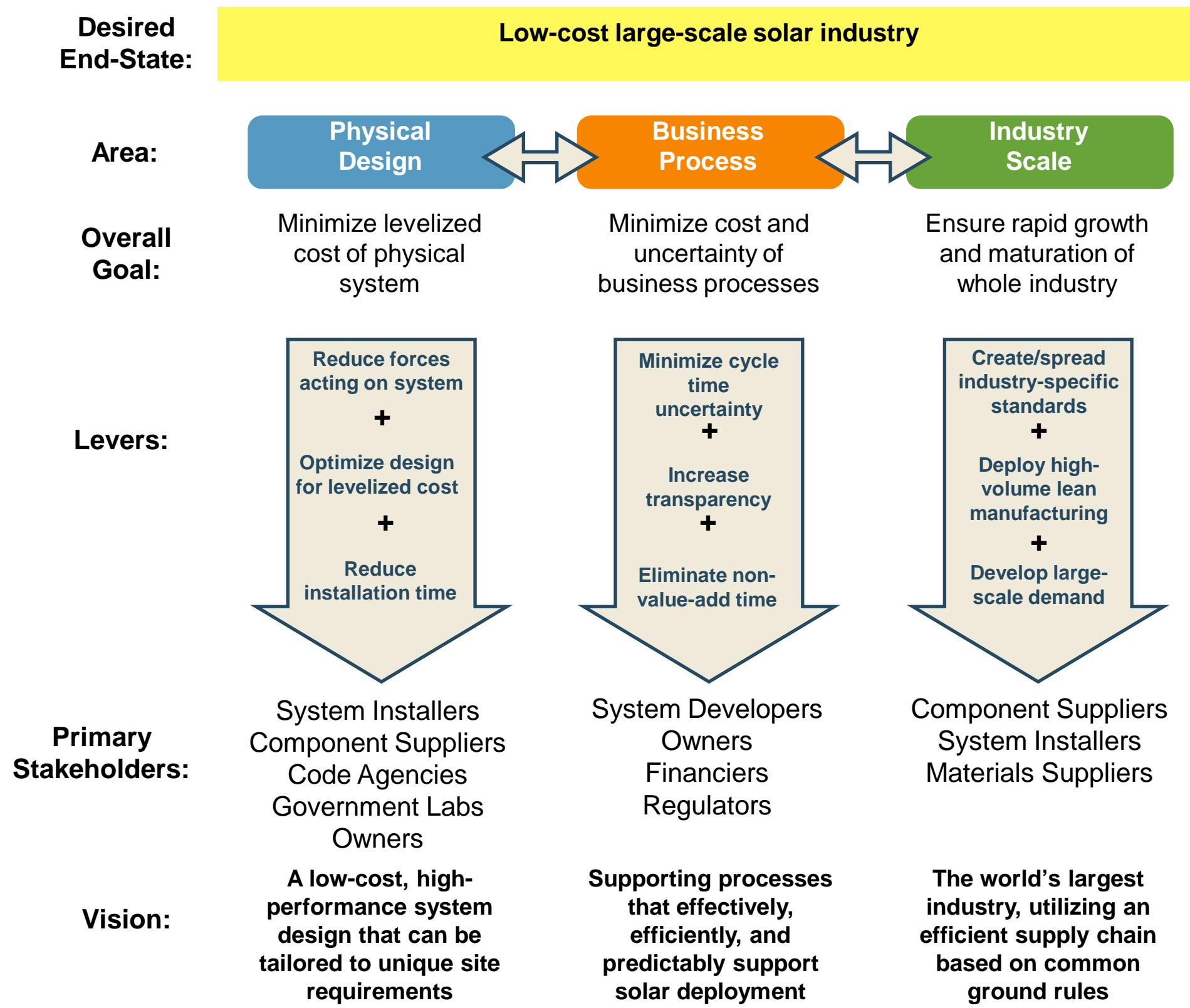
Source: NREL

RMI convened a group of experts to bring coordinated thinking to PV BOS challenges



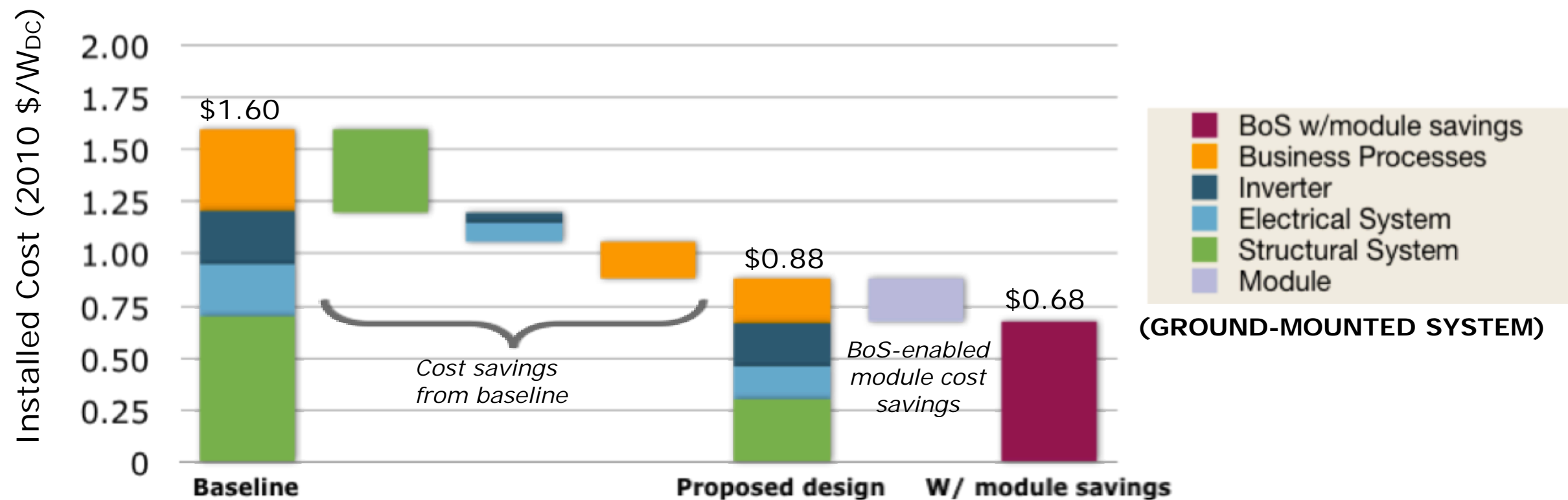
**To Download RMI Report and
Summary Presentation:**
www.rmi.org/rmi/SolarPVBOS

Industry-wide collaboration is needed on a systems approach to reduce BoS costs

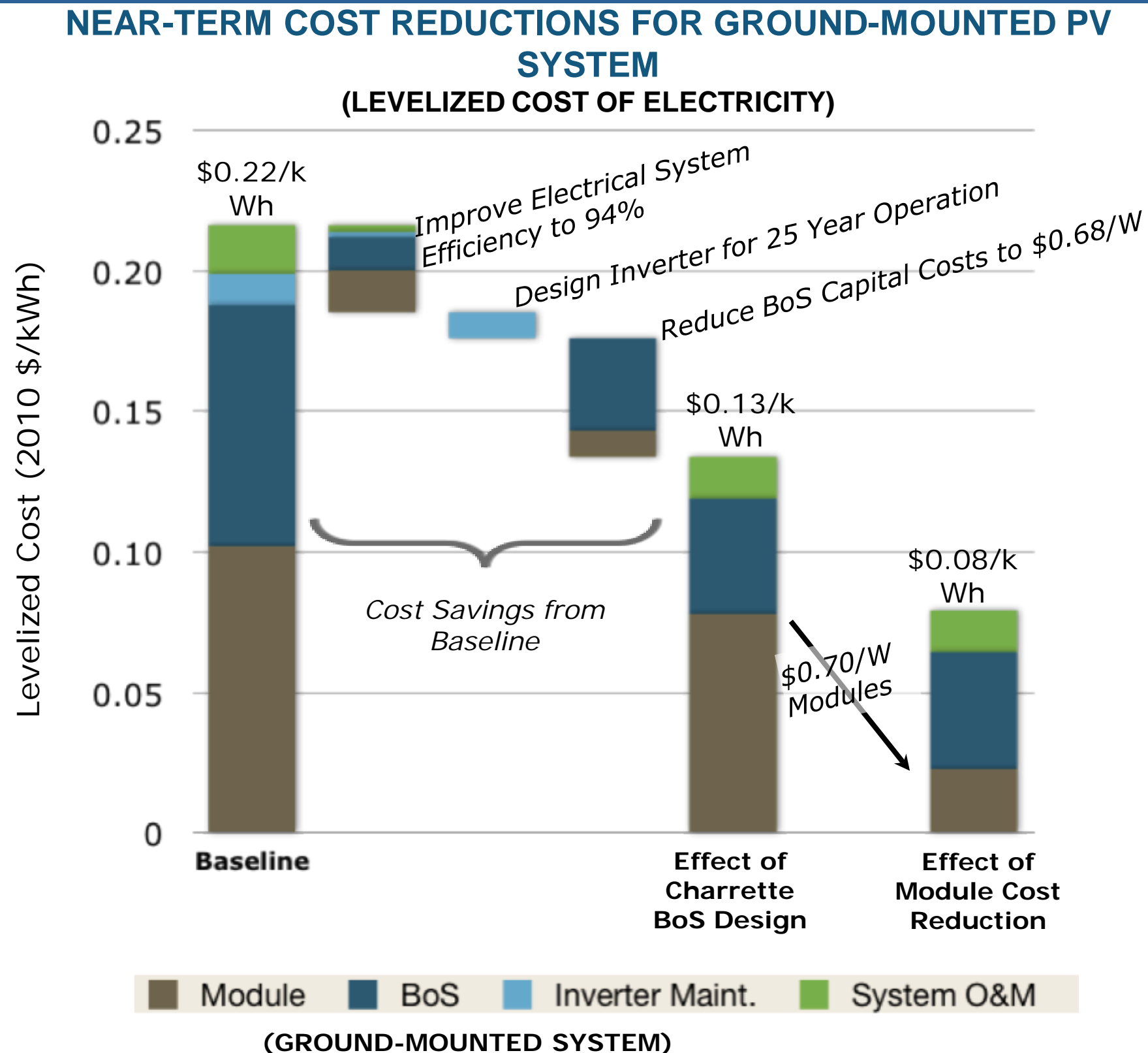


Charrette recommendations indicate potential to reduce BoS costs to \$0.60-\$0.90/watt in the near term

ESTIMATED IMPACT OF COST REDUCTION MEASURES
(For Ground-Mounted Installation)



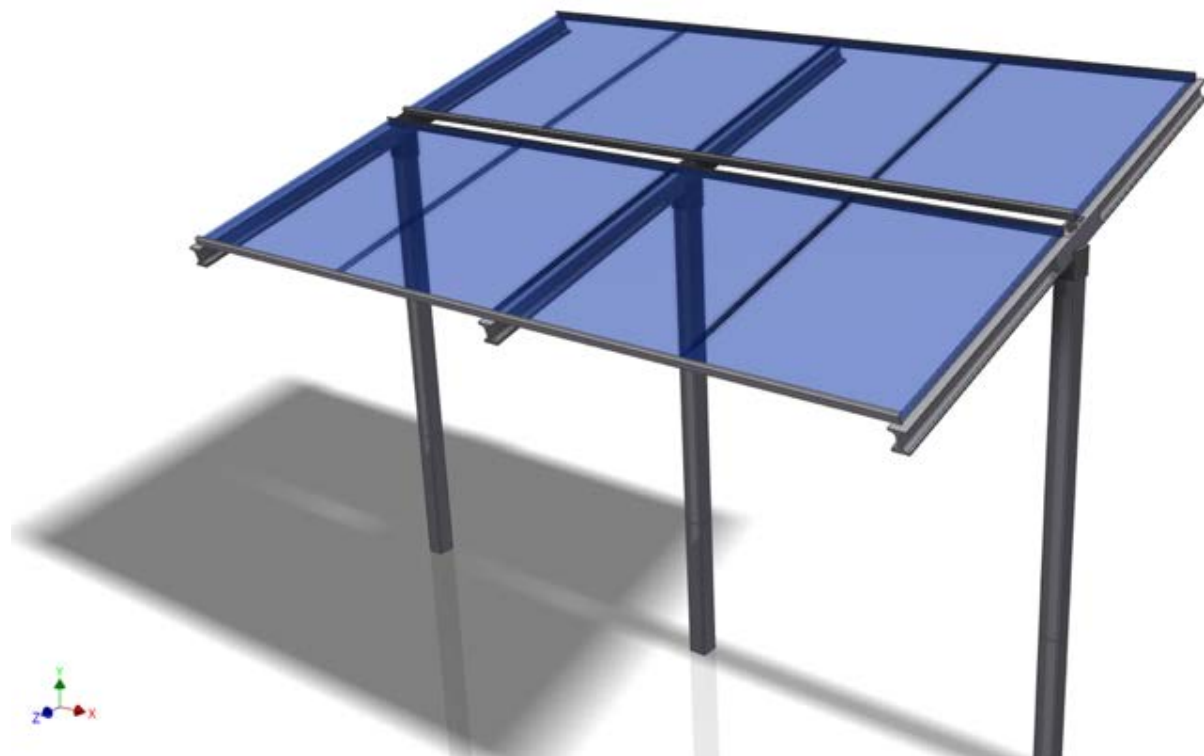
The LCOE view indicates the importance of system efficiency and reliability over time



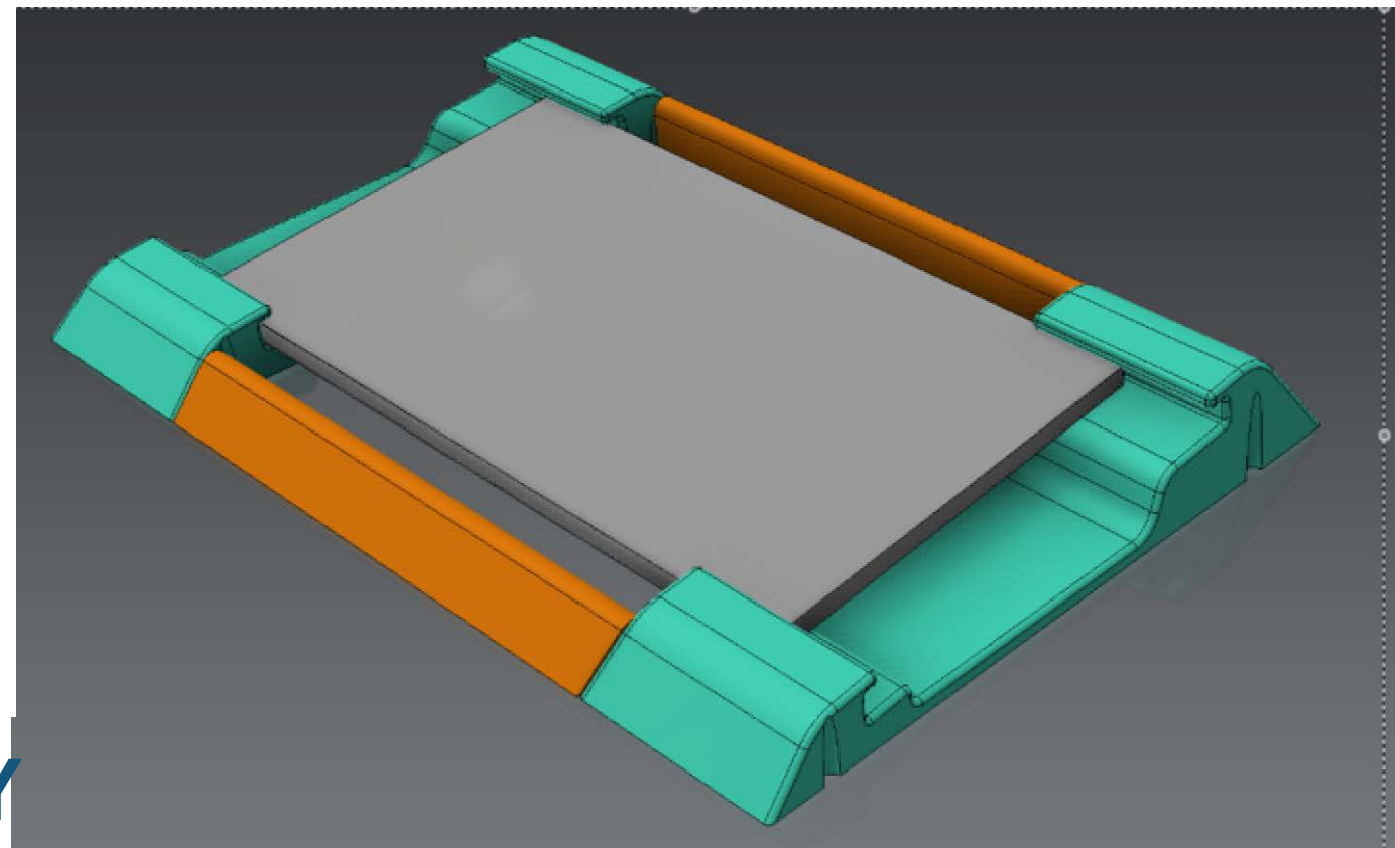
Structural design



WIND FORCES



SIMPLICITY, INSTALLABILITY



Power electronics

Design Themes from RMI Electrical Group

- 1. Decentralize inversion**
- 2. Raised voltage system**
- 3. Design to maximize utility services**
- 4. High frequency**
- 5. Constrain boundary conditions to allow module cost reduction**
- 6. Minimize serial conversion steps**

Process costs



What should the future system look like?





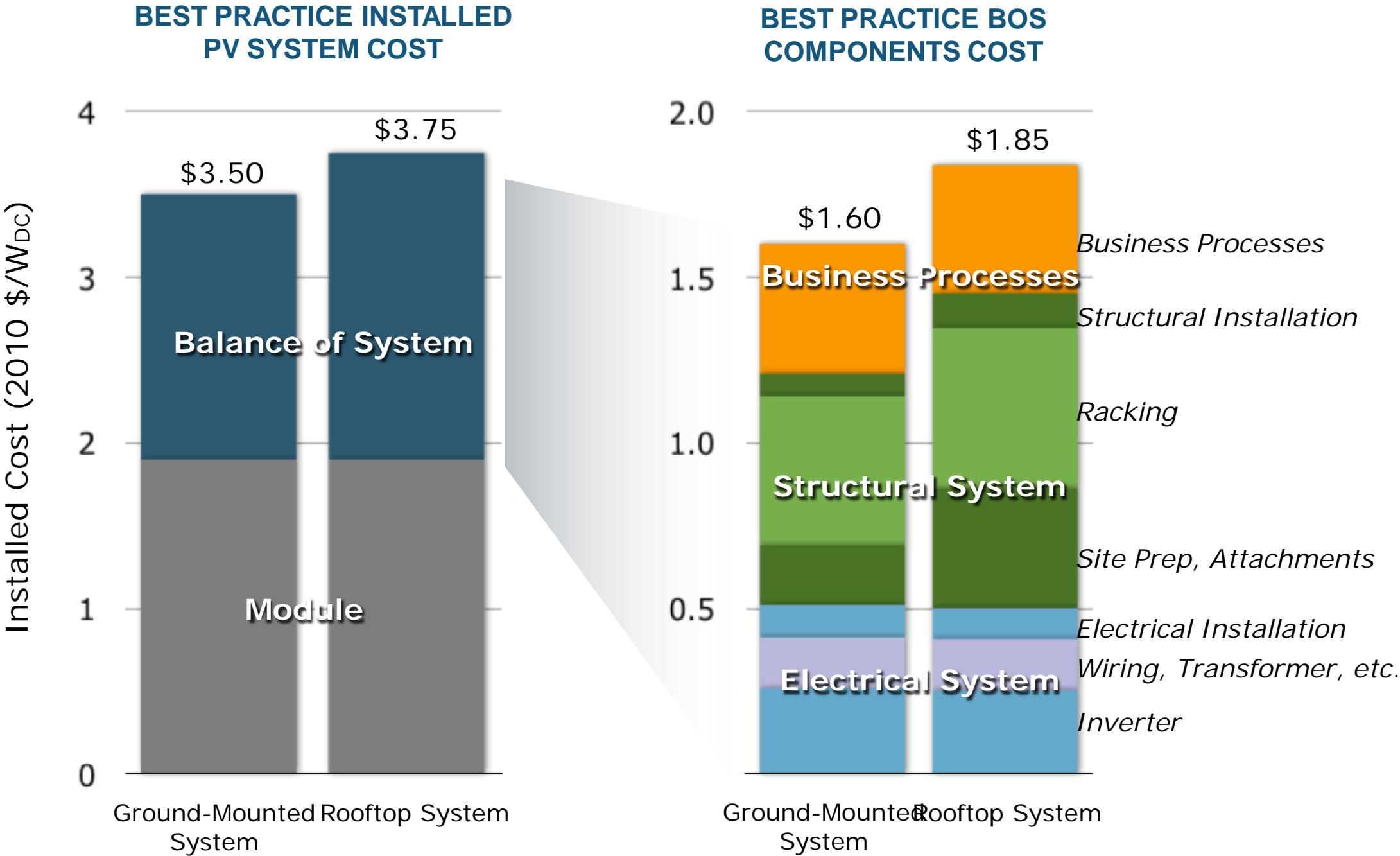
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Extra Slides

BoS Costs Account for ~50% of Total System Cost

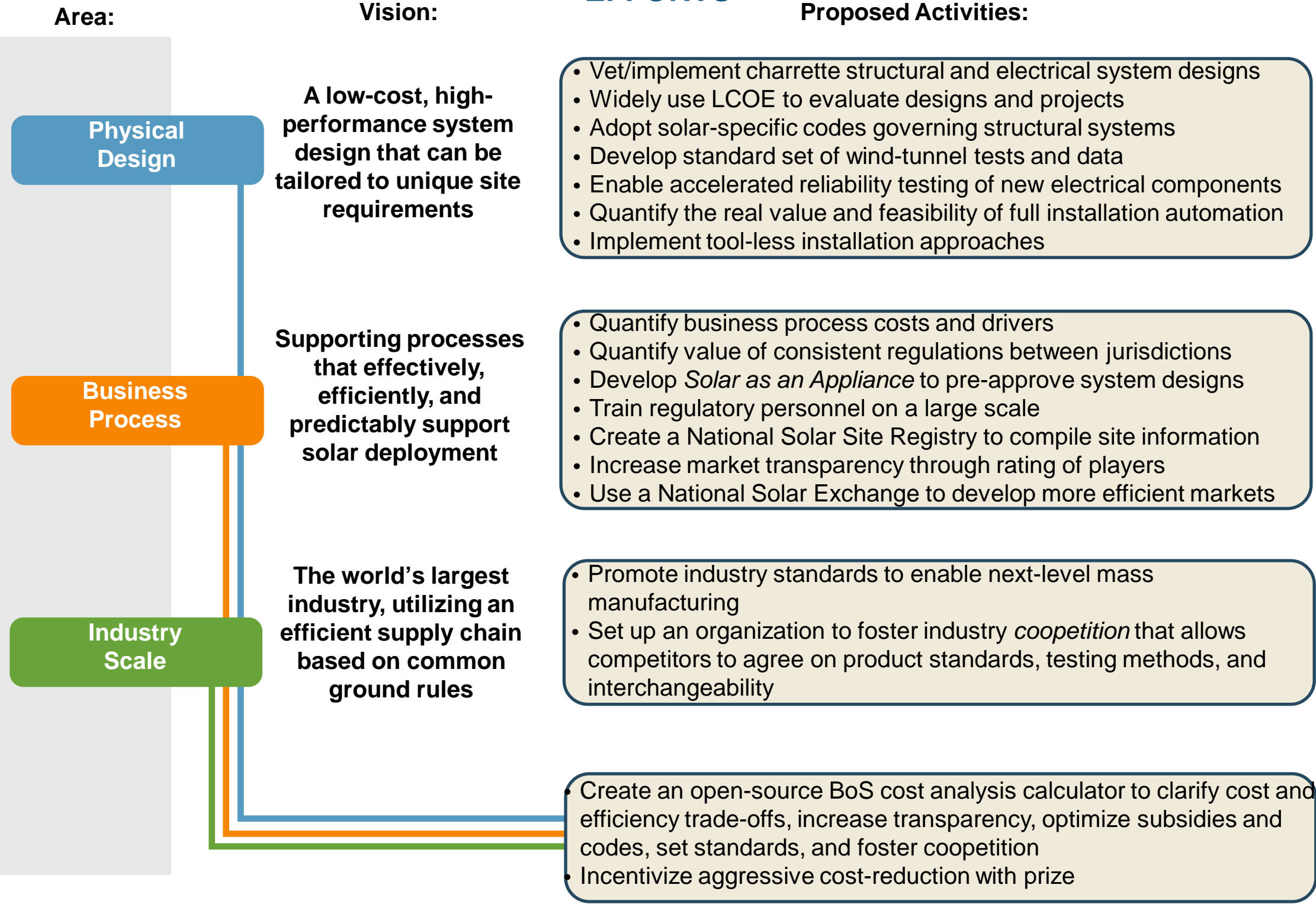


NOTE ON BASELINE COST ESTIMATES

These estimates for total system costs and specific cost components are based on discussions with PV industry experts and are intended to represent a best-practice cost structure for a typical commercial system (1-20MW ground-mounted, >250kW flat rooftop). Actual project costs are highly variable based on location and other project-specific factors.

Charrette Prioritized Recommendations For Near-Term Cost Reductions

RECOMMENDED HIGH-PRIORITY ACTIVITIES TO ENABLE AND ACCELERATE COST REDUCTION EFFORTS



There are Major Challenges to Cost Reduction in the BoS Industry

BoS costs are driven by value chain fragmentation and the need to accommodate high variability in sites, regulations, and customer needs. As a result:

- **Each PV system has unique characteristics and must be individually designed.**
- **There is no silver-bullet design solution for BoS.**
- **Many incremental opportunities for cost reduction are available across the value chain.**

In order to achieve transformational cost reductions, **a systems approach is needed that spans the entire value chain**, and considers improvements for one component or process in light of their impacts on, or synergies with other elements of the system. Also, **industry-wide collaboration will be necessary.**

Scale. Scale. Scale.

