

# Energy Design and Scoping Tool for DC Distribution Systems

NREL, LBNL, Colorado State University, Robert Bosch LLC, PVI Construction Management

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# DC Design and Scoping Tool

Science



Education



ENERGY INSTITUTE  
COLORADO STATE UNIVERSITY



**BOSCH**



**THE ALLIANCE  
CENTER**

Industry

Advocacy



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PVI

# DC Design and Scoping Tool

## It's a Direct Current World Out There

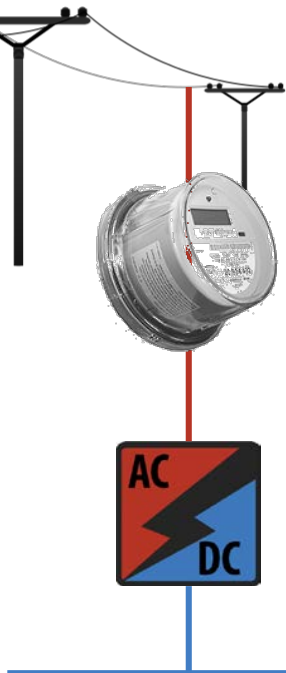
DC distribution systems can  
**save both energy and money...**

**...but how much?**

To answer that question,  
industry needs **rigorous and  
accurate** analysis tools

### Existing Studies

- Inconsistent assumptions
- Lo-fi models
- Dubious claims
- Conflicting results



Computing  
Equipment



Consumer  
Electronics



Motor  
Drives



Electric  
Vehicles

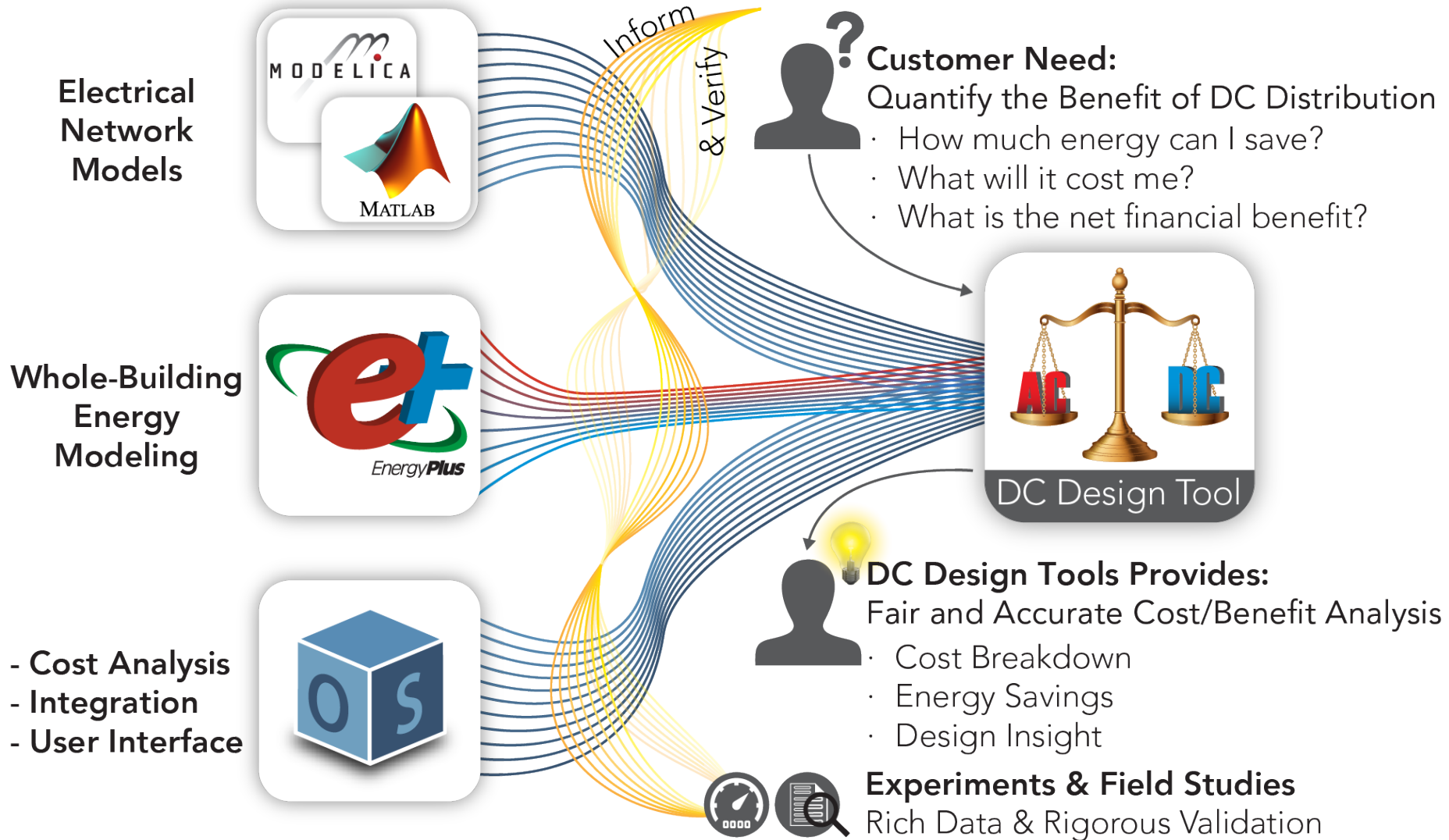


Energy  
Storage



Onsite  
Generation

# DC Design and Scoping Tool





# DC Design and Scoping Tool

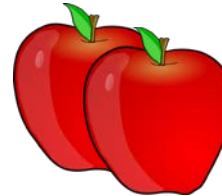
## The DC Energy Design and Scoping Tool will...

Fully capture effects of **converter losses** and device **part-load ratios**



Ensure accuracy via thorough **experimental validation**

Leverage whole-building **energy modeling tools** to calculate **HVAC impacts**



Provide a **fair comparison** between AC and DC design alternatives

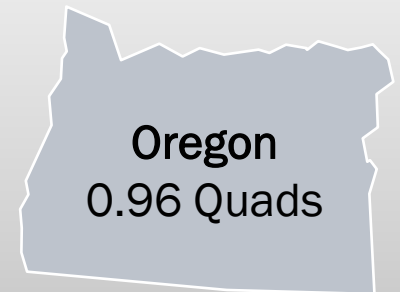
## DC Technical Potential Savings in 2030

U.S. buildings primary energy (electricity): 40 Quadrillion BTU

Electricity delivered through power electronics: 80%

Estimated savings per converter: 3%

$40 \times 0.8 \times 0.03 = 0.96$  Quads (\$19 Billion) per year



# Thank You

**National Renewable Energy Laboratory  
Lawrence Berkeley National Laboratory  
Colorado State University  
Robert Bosch LLC  
PVI Construction Management**

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