Energy Design and Scoping Tool for DC Distribution Systems

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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
DC Design and Scoping Tool

Customer Need:
Quantify the Benefit of DC Distribution
- How much energy can I save?
- What will it cost me?
- What is the net financial benefit?

DC Design Tools Provides:
Fair and Accurate Cost/Benefit Analysis
- Cost Breakdown
- Energy Savings
- Design Insight

Experiments & Field Studies
Rich Data & Rigorous Validation

Electrical Network Models
- Modelica

Whole-Building Energy Modeling
- EnergyPlus

- Cost Analysis
- Integration
- User Interface

Inform & Verify

DC Design 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%

\[ 40 \times 0.8 \times 0.03 = 0.96 \text{ Quads} \] ($19 \text{ Billion}) per year

Oregon
0.96 Quads
Thank You

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Lawrence Berkeley National Laboratory
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