Assessing Cost-Effectiveness

DER Benefit-Cost Analysis Case Studies

Agenda

Case Study Purpose & Process

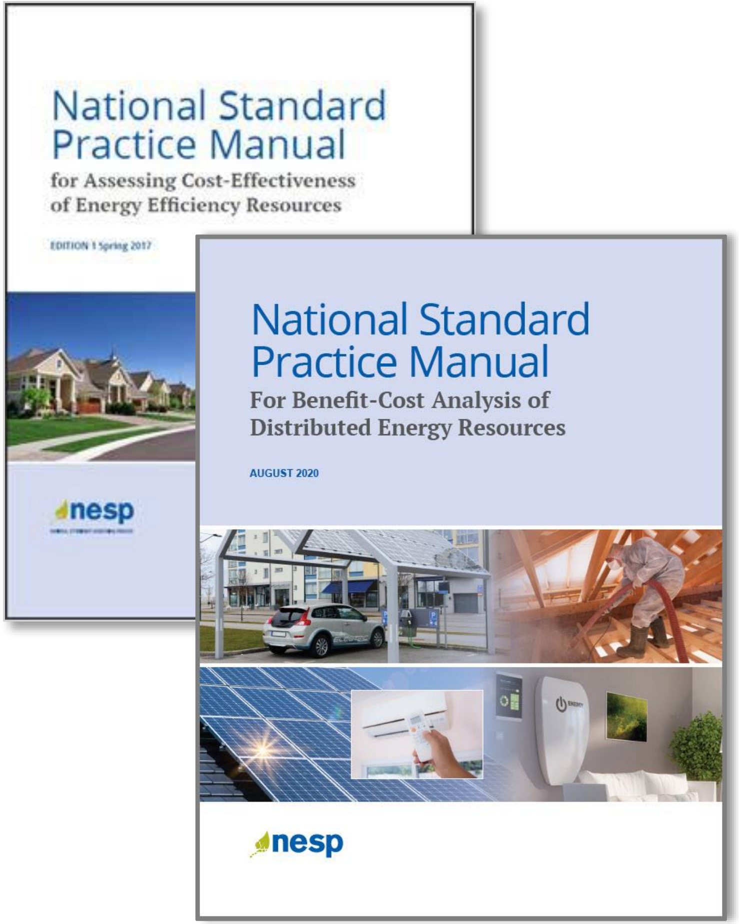
For Each Case Study:

- Key Assumptions
- Identification of Relevant Impacts
- Preliminary Results

Lessons Learned & Takeaways

What is the NSPM for DERs?

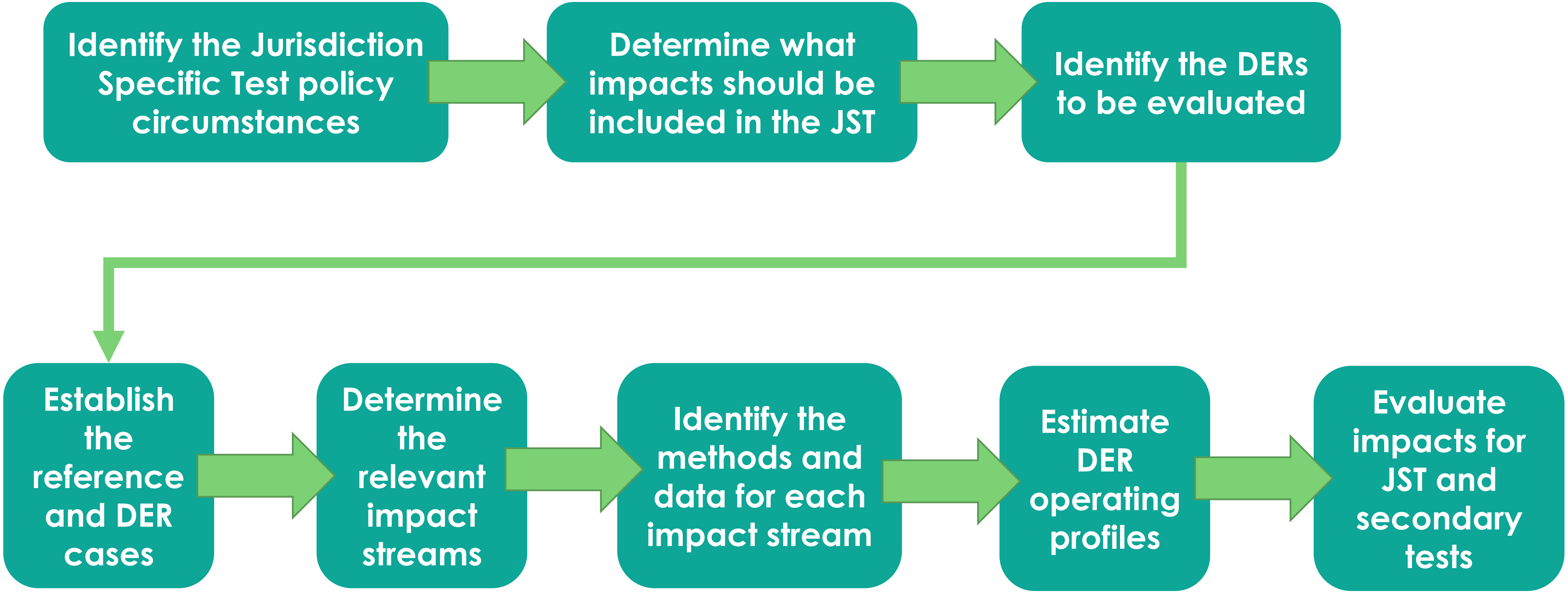
- Comprehensive framework for cost-effectiveness assessment of DERs
- Set of policy-neutral, non-biased, and economically-sound principles, concepts, and methodologies to support single- and multi-DER benefit-cost analysis (BCA) for:
  - Energy Efficiency, Demand Response, Distributed Generation, Distributed Storage, Building Electrification and Electric Vehicles
- Managed and funded by E4TheFuture (with support from US DOE via LBNL), developed by multiple co-authors & advisory group



Intention of the Case Studies

- Provide illustrative examples of applying the NSPM principles to real world inspired case studies
- Not intended to answer all questions that might come up with applying the NSPM or how things have to be done
- Instead, shows three illustrations of how things could be done in alignment with NSPM principles, given specific circumstances
- Is not a resource which describes all of the different methods and tools that can be used for benefit / cost quantification, that “library” is being produced in parallel

Process for Case Studies



Case Study 1: Key Assumptions

DERs	• Electric Vehicles
Reference Case	• Residential customer on flat rate charging EV when they desire
DER Case	• Customer receives incentive from utility for LV2 charger and switching to TOU
Policy Scenario	• Include GHG impacts in JST
Utility Scenario	• An IOU in the Midwest that is connected to MISO • Relatively low avoided energy and capacity costs • Generation mix with significant coal baseload

CS1: Identification of Relevant Impacts

Applicable Value Streams

Electric Utility System Impacts
Avoided energy costs
Avoided generation capacity costs
Avoided environmental compliance costs
Avoided T&D costs
Avoided ancillary services
Wholesale price suppression effects
Reduced risk
Utility financial incentives
Program administration

Societal Impacts
GHG emissions

N/A Because of JST Formulation

Host Customer Impacts
All host-customer impacts

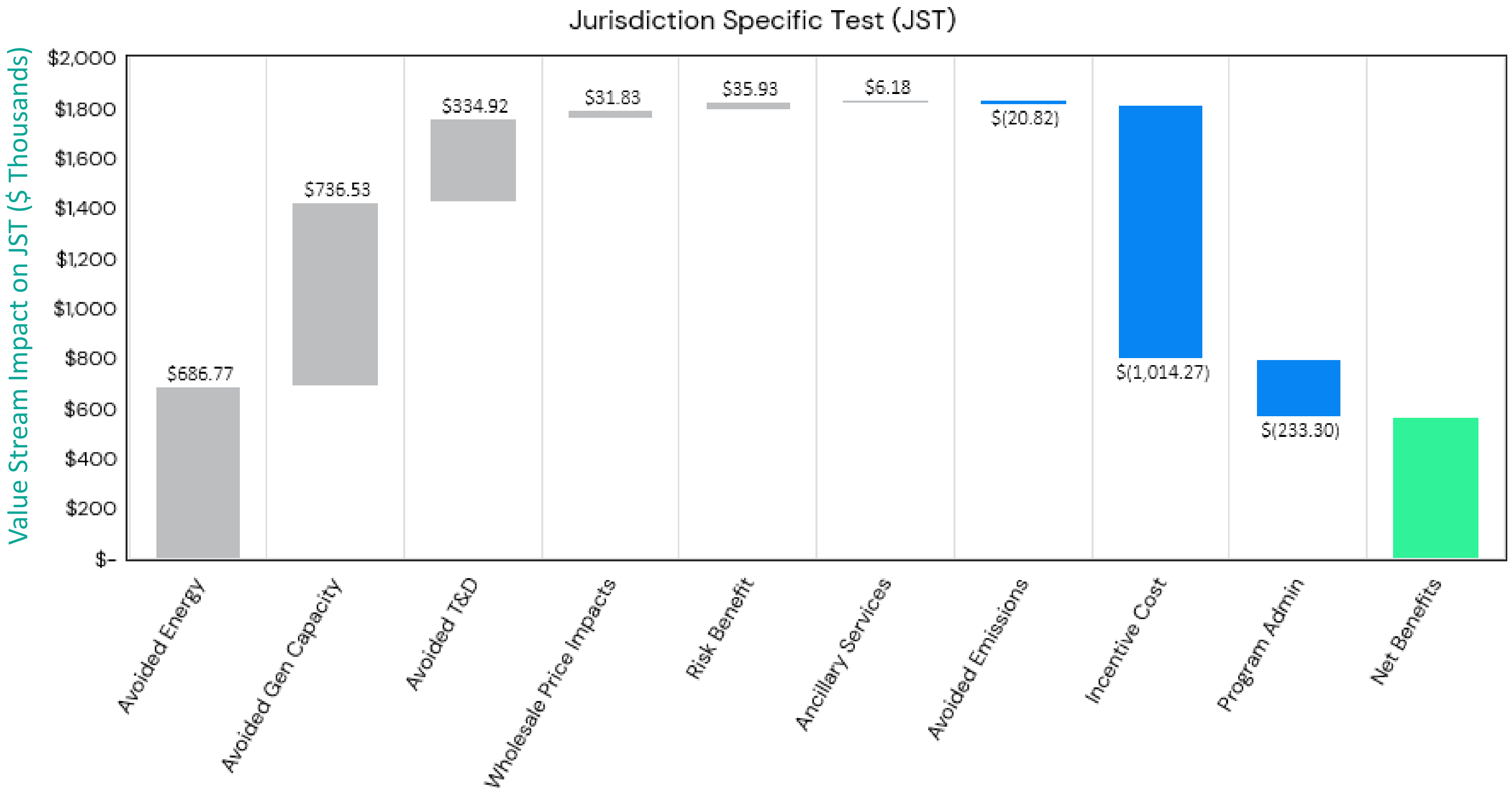
Societal Impacts
All societal impacts other than GHG emissions reductions / increases

Other Fuel Utility Impacts
All impacts for utilities other than the electric utility

N/A Because of DER Use Case Examined

Electric Utility System Impacts
Avoided credit and collection costs
Increased reliability
Increased resilience
Avoided Renewable Portfolio Standard (RPS) costs
Utility performance incentives

CS1: Preliminary Results



JST: 1.44

Net Benefits: $564,776

Case Study 2: Key Assumptions

DERs	• Behind the meter storage paired with PV
Reference Case	• Commercial customer on TOU rate with a rooftop solar PV array • No storage paired with PV array
DER Case	• Customer receives a $/kWh incentive from utility for installing storage onsite • Customer operates storage to maximize economic benefit from TOU • Storage charges only from PV array, allowing for customer to claim ITC for storage
Policy Scenario	• Include host customer impacts in JST
Utility Scenario	• An IOU utility in the West that isn't connected to an RTO • Relatively high avoided capacity costs • Generation mix with significant renewables • Aggressive state-level GHG emissions reductions targets

CS2: Identification of Relevant Impacts

Applicable Value Streams

Electric Utility System Impacts
Avoided energy costs
Avoided generation capacity costs
Avoided transmission costs
Avoided distribution costs
Avoided ancillary services
Avoided cap & trade compliance costs
Avoided environmental compliance costs
GHG rebalancing
Reduced risk
BESS interconnection costs
Program administration

Host Customer Impacts
Increased reliability
Federal Investment Tax Credit (ITC)
State financial incentive

Host Customer Impacts
Depreciation tax write-off
Operations & Maintenance (O&M) costs
Battery Energy Storage System (BESS) capital cost

N/A Because of JST Formulation

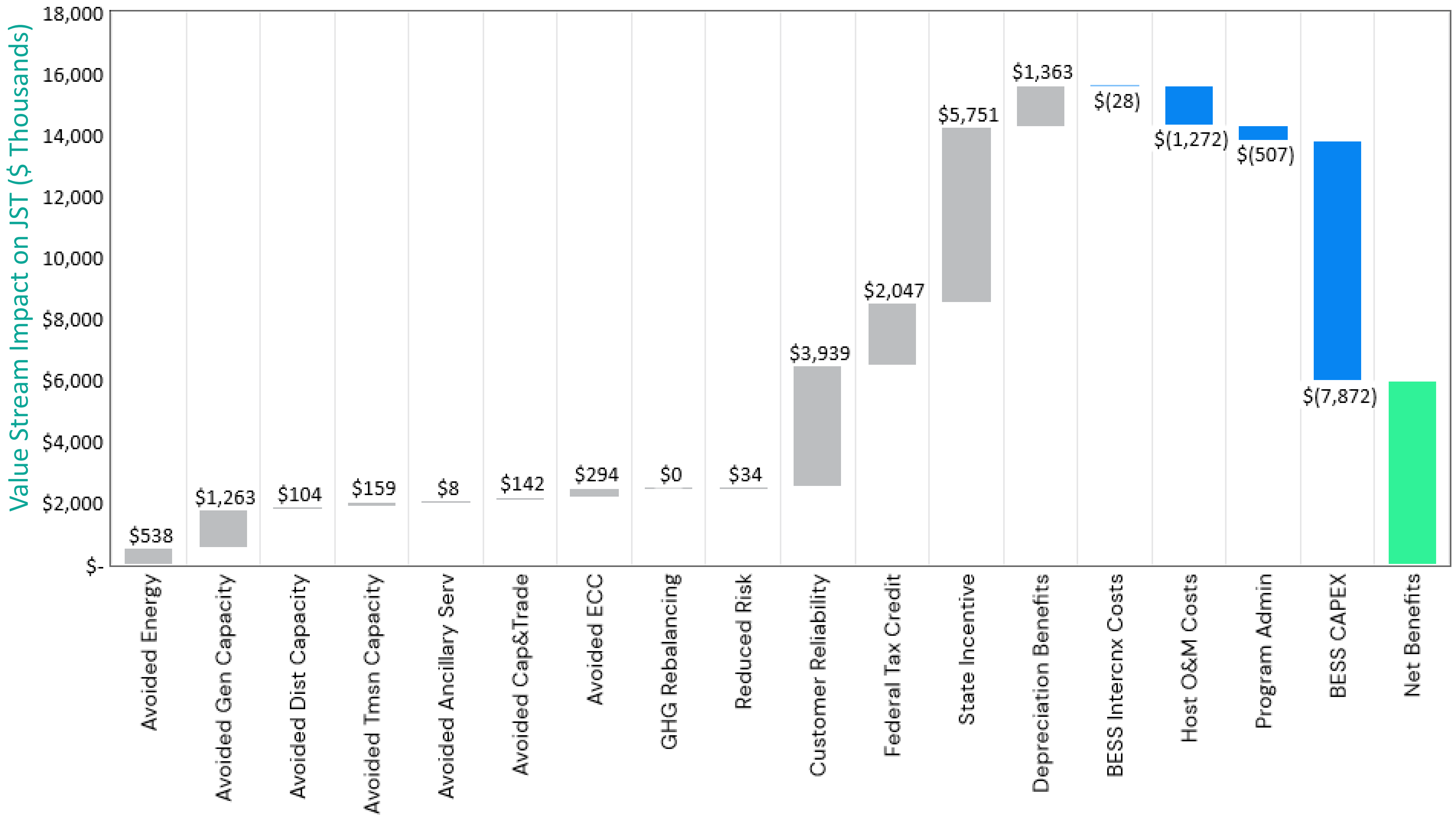
Electric Utility System Impacts
Utility financial incentives

Societal Impacts
All societal impacts

N/A Because of DER Use Case Examined

Electric Utility System Impacts
Avoided credit and collection costs
Increased reliability
Increased resilience
Avoided RPS costs
Utility performance incentives
Wholesale price suppression effects

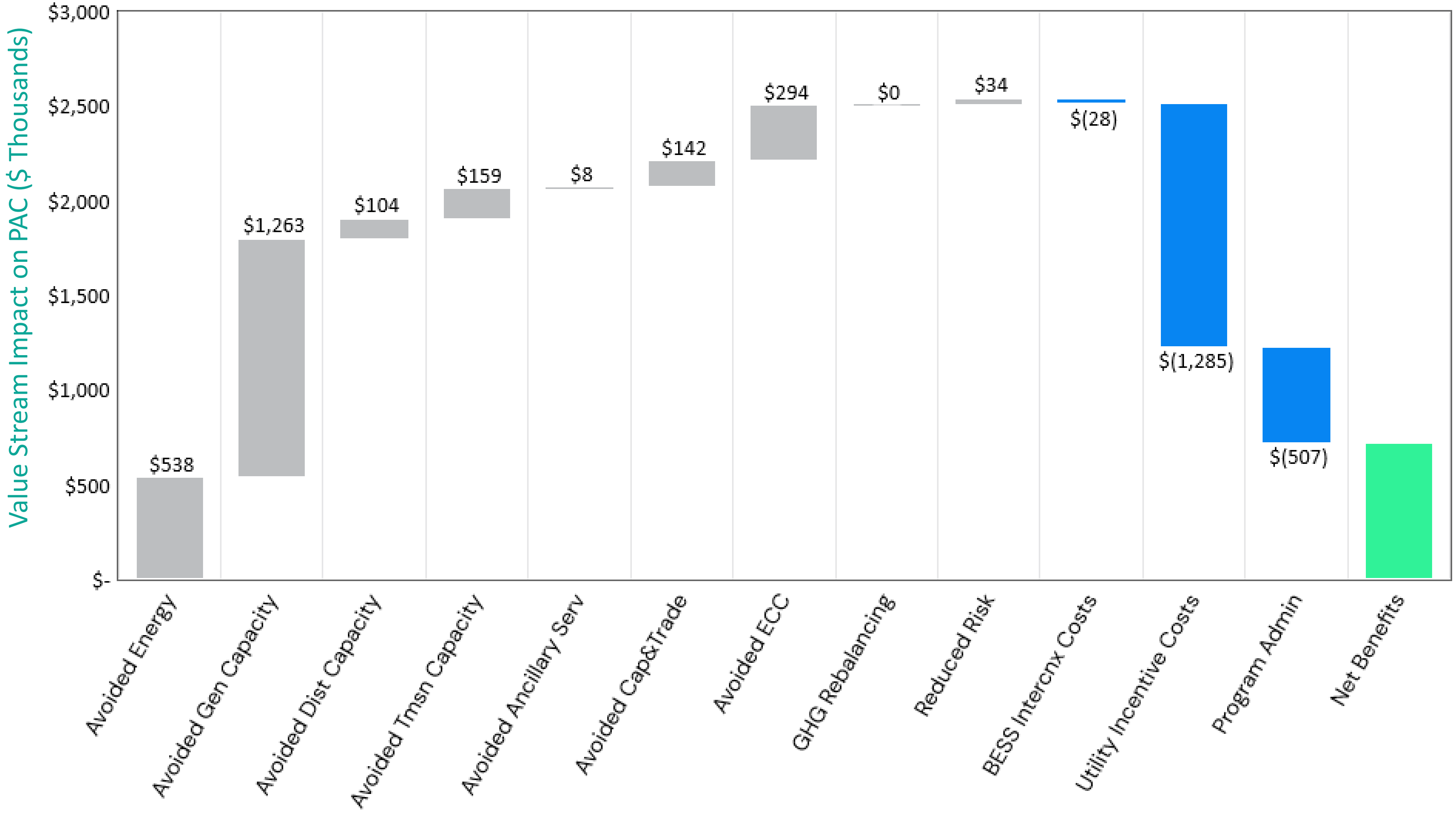
CS2: Preliminary Results JST



JST: 1.62

Net Benefits: $5,963,005

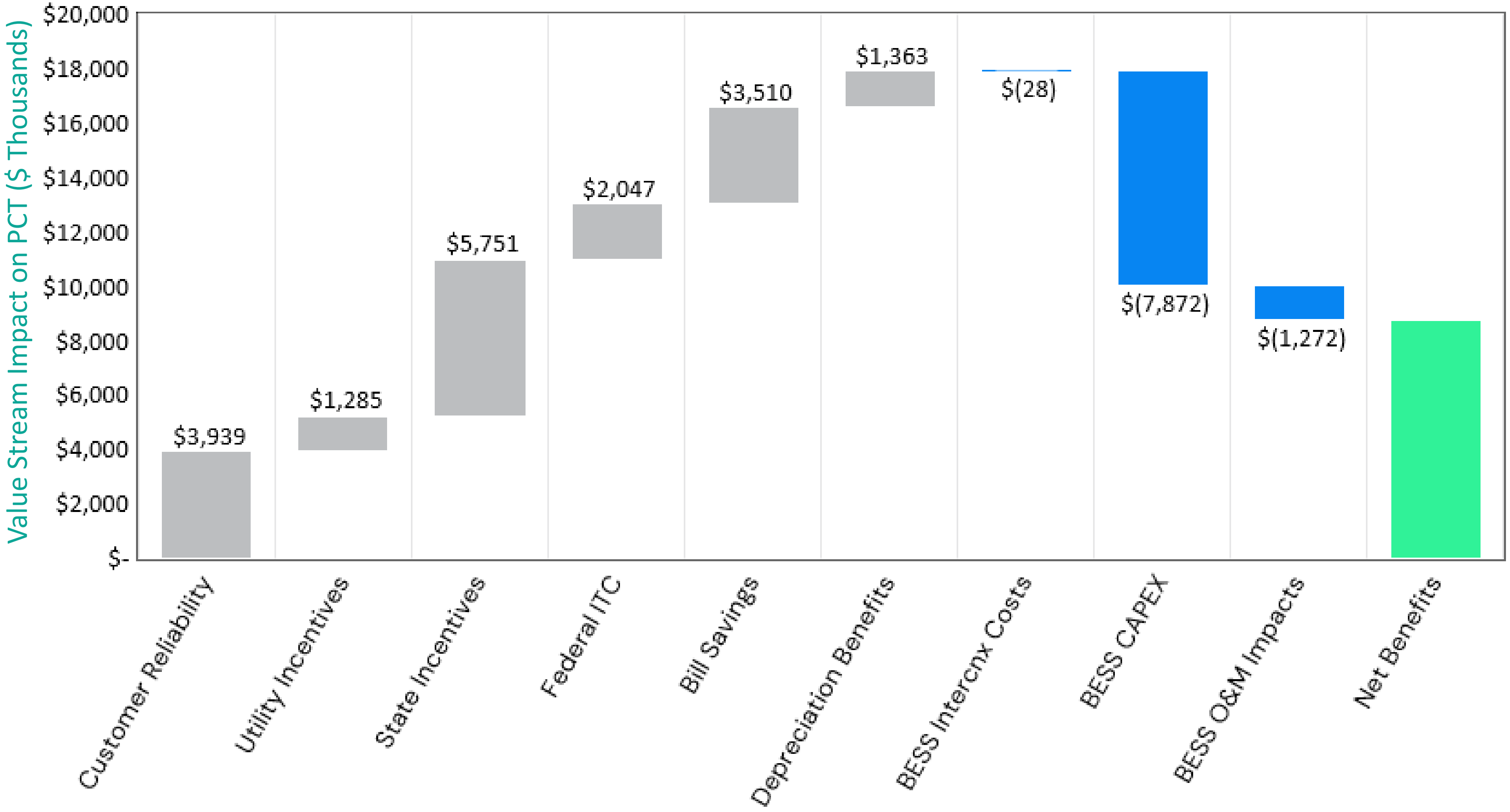
CS2: Preliminary Results PAC



PAC: 1.40

Net Benefits: $722,547

CS2: Preliminary Results PCT



PCT: 1.95

Net Benefits: $8,723,107

Lessons Learned & Takeaways

- Benefit cost results are heavily dependent on the DERs being examined, as well as the specific policy and utility scenarios
- The amount of time that should be spent on obtaining accurate data for value stream quantification should be proportional to the scale of the impact
- The influence of the “full picture” value streams that the NSPM advocates be included (depending on your policy situation) can have very significant impacts on cost-effectiveness

Questions?

Thank you for your attendance, follow up questions:

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