Energy Exchange℠

ADVANCING FEDERAL INFRASTRUCTURE THROUGH INNOVATION

CINCINNATI, OHIO
OCTOBER 25-27, 2022

Customer Damage Function Calculator

Create a baseline of costs incurred from an outage and justify investments in resilient solutions

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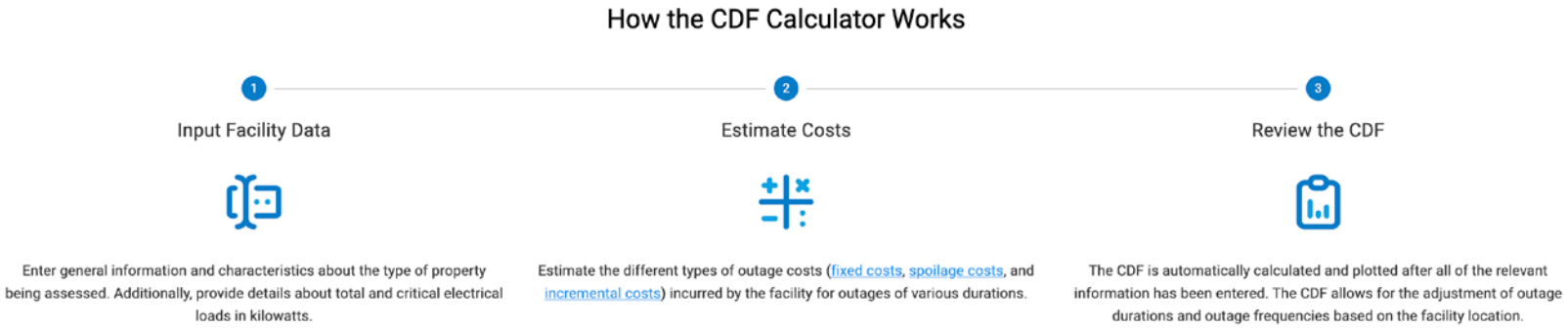
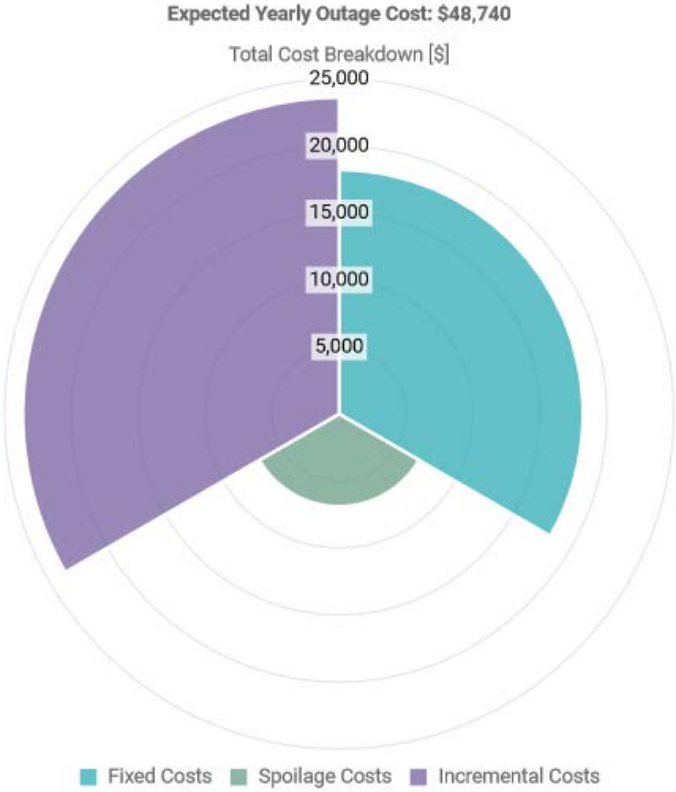
Customer Damage Function Calculator

- NREL developed / FEMP funding and support / Calculator
- Generate monetary values to justify investments in resilience solutions to prevent or lessen the impact of a grid outage at a facility
- Screening tool that provides justification to site/HQ leadership for resilience investments
  - Weighing the cost of a resilience investment against the benefit it provides
- Value of Resilience (VoR)
  - Understanding VoR is important for informing investment decisions in power systems resilience



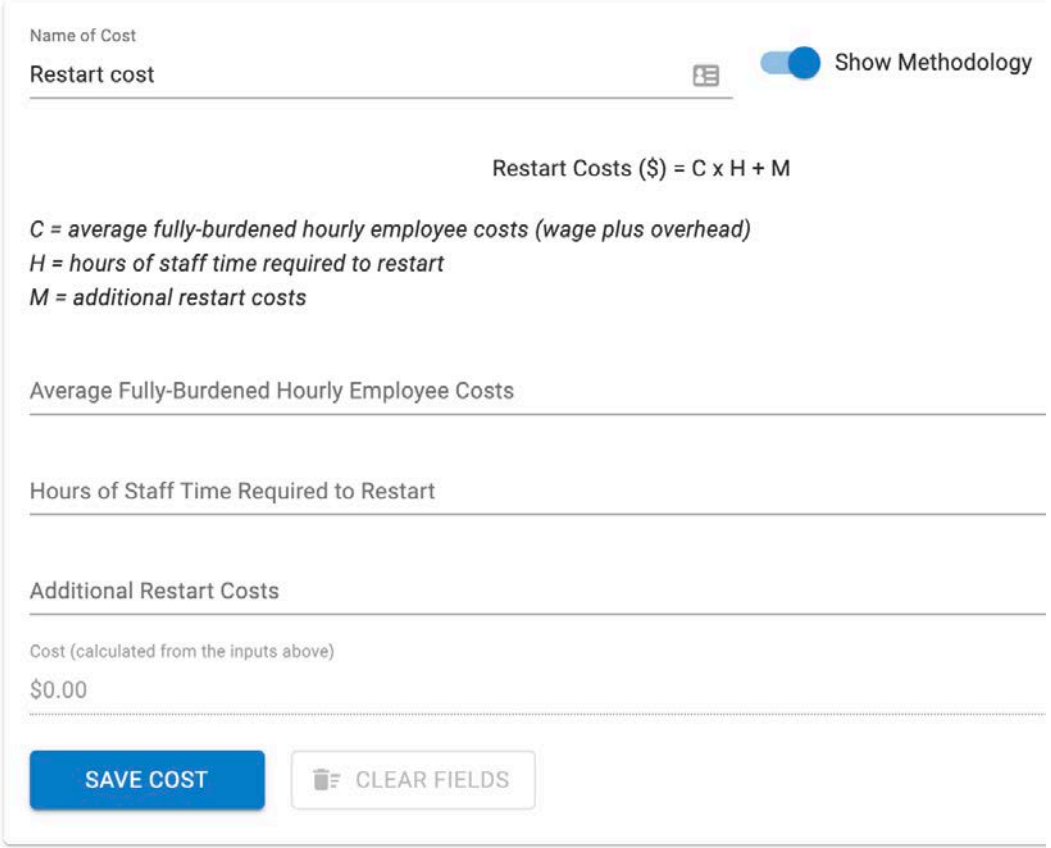
Impact

- **Purpose**
  - Provide a simple method for estimating site-specific power outage costs
  - Process elicits facility outage vulnerabilities and estimates of how costs vary with outage duration and frequency
  - First step in determining possible avoided costs with resilience investments
  - Agnostic to how the power outage occurs
- **Audience**
  - Assist facility owners, energy managers, consultants, and resilience planners to understand the costs of a grid outage at their site



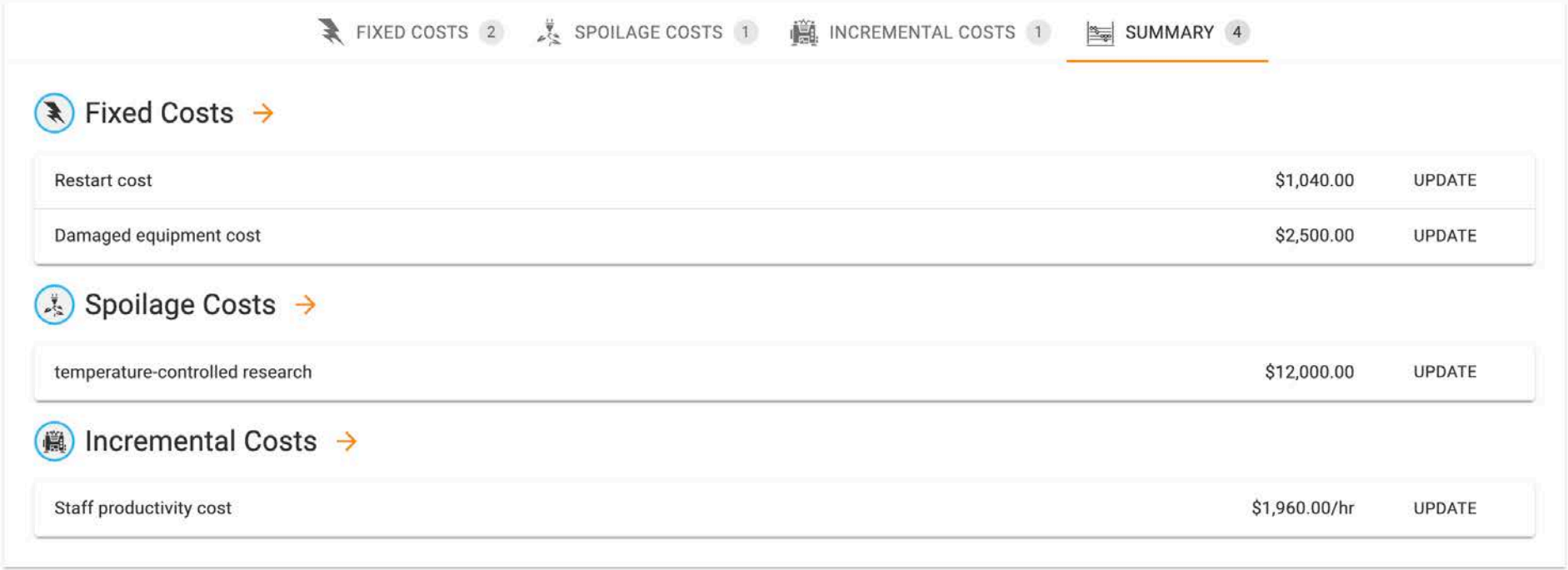
Cost Categories

- Fixed Costs occur immediately and are independent of outage duration
  - Computer data loss
  - Restart costs i.e., additional labor hours
  - Damaged equipment
- Spoilage Costs occur after outage exceeds a given duration
  - Food spoilage
  - Other temperature-controlled products
- Incremental Costs increase each hour the power is out
  - Lost production and customer sales
  - Backup fuel costs



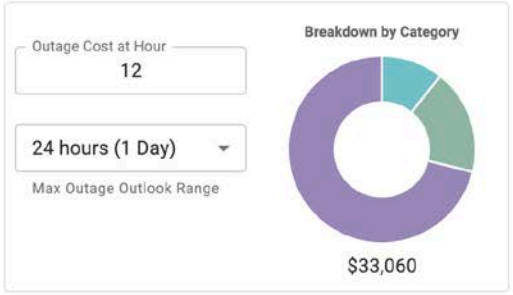
Process

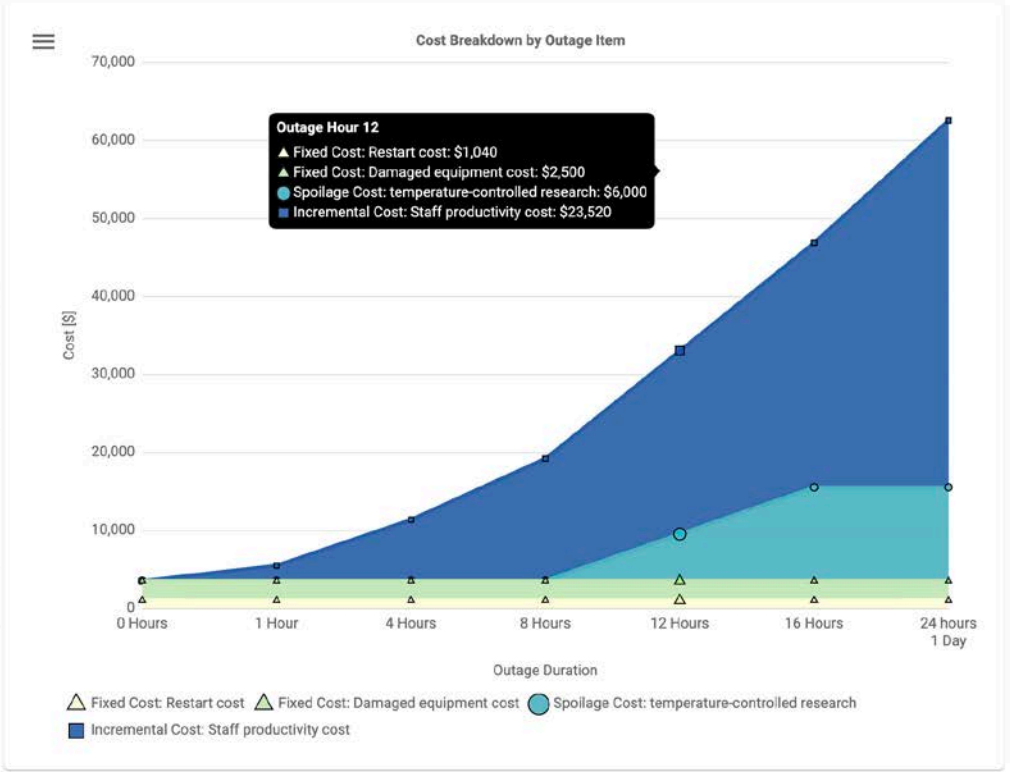
- Prompts user on potential types of outage costs
- Provides support for inputting values to calculate costs



Results

Calculates estimated outage costs over time from user inputs

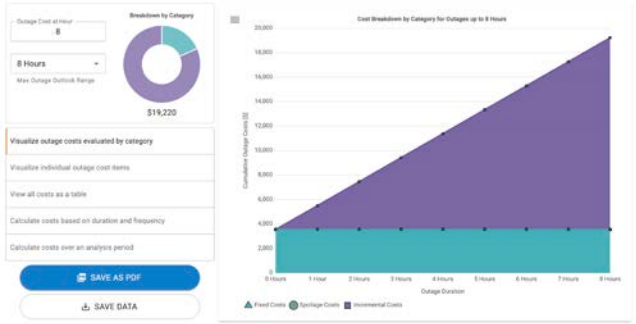




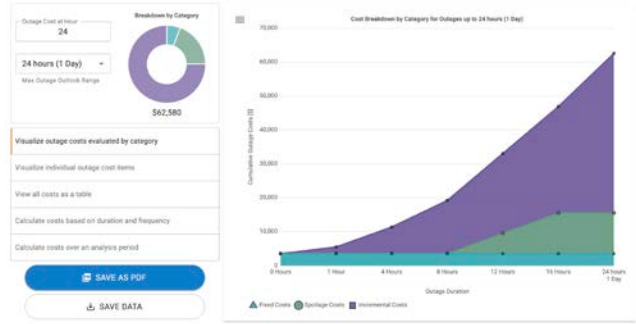
Results (continued)

- Calculates estimated outage costs over time for any outage duration
- Produces graphs and tables of cumulative outage costs
- Compiles results into pdf report or a local file download

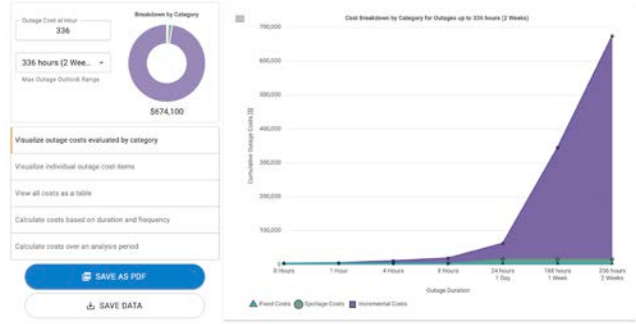
8-hour outage



1-day outage

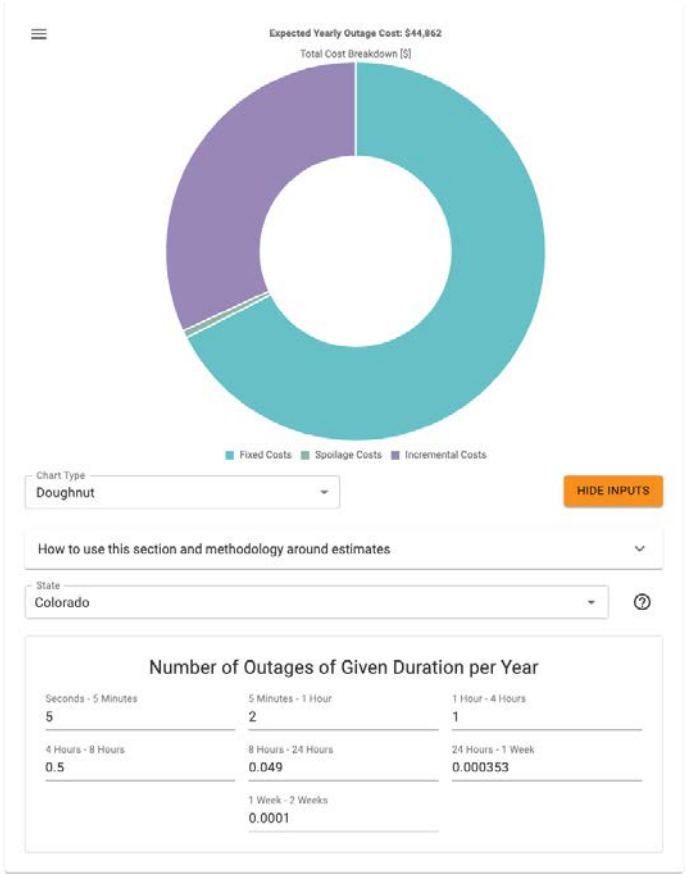


2-week outage



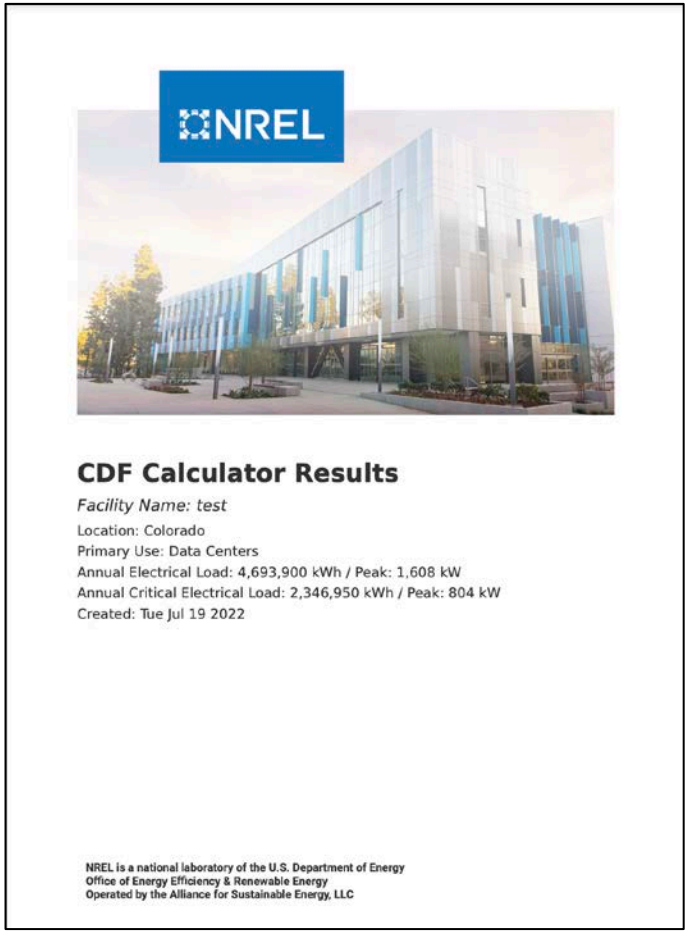
Calculating Cost of Inaction and Value of Resilience

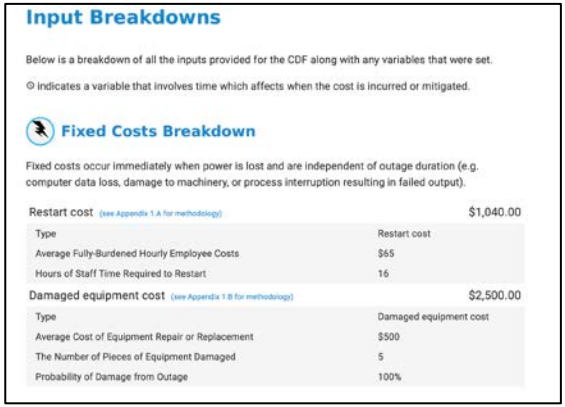
- Tool uses power outage frequencies and durations to convert CDF into estimate of annual or custom analysis period (years) outage costs.
- Creates an easy-to-use cost of inaction for reliability and resilience upgrades.
- Refined insight into how frequent outages impact the value of resilience upgrades and other outage mitigation steps

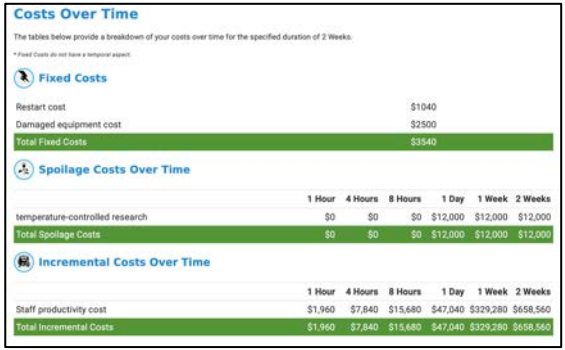


What Now?

- Entry point for resilience planning
  - TRN
  - REopt
- Justifying resilience investments
  - Leadership engagement
  - Export report to assist in decision making
- Data security
  - No authentication or user accounts
  - No data stored on NREL servers or databases







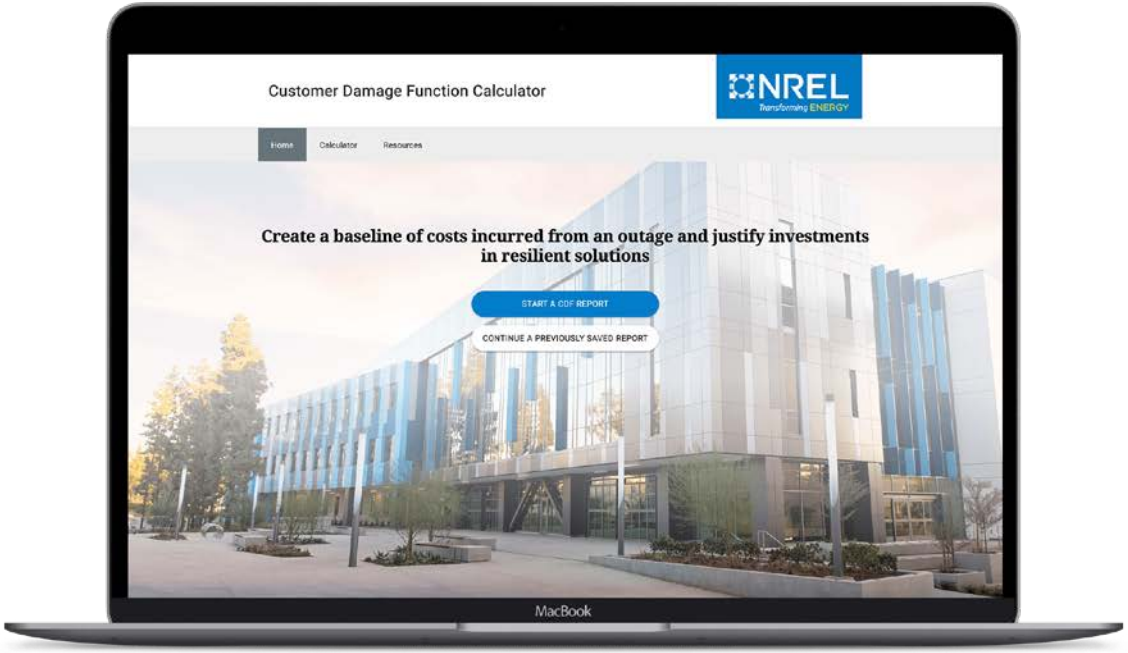
Next Steps – Collaboration – Integration

- Promote tool as a final product
  - Understand user base
  - Find unknown gaps that can be addressed to improve the experience
- Future work could integrate outputs with tools such as REopt and TRN
- Integration of resilience valuation metrics into contracting
- For updates on the tool or to learn more, please reach out to ethan.epstein@ee.doe.gov

CDF Calculator is developed and maintained by the National Renewable Energy Laboratory with funding and support from the U.S. Department of Energy's Federal Energy Management Program

Live Demo

cdfc.nrel.gov



Thank you!

Questions?

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