Summary of financing options
Considerations for what financing option is right for your project
Case study examples for each option

Available at:
Financing Goals

- CHP ownership and financing strategy is all about allocating project risks and responsibilities.

- A thorough understanding of the goals of your project and the risks you are willing to take on will determine your best financing option.

- Ownership strategies have changed over time and will continue to evolve.
CHP Financing Options

Self Ownership
- Internal Funds
  - Loans/Bonds
  - Equity Financing
  - PACE
- Debt Financing
  - Capital Lease
  - Operating Lease
  - Power Purchase Agreement
  - Special Purpose Entity

Third-Party Ownership
- Lease Financing
- Contract Financing
Utility-Owned CHP Structure

Simplified Structure for Utility-Owned CHP

Meter Points for Utility-owned CHP

1. Fuel to Gas Turbine
2. Fuel to Duct Burner
3. Steam/Thermal to Host
4. Electricity Produced by CHP
5. Electricity to Customer
   Utility continues to serve Customer Electric Load

Source: Sterling Energy Group, LLC
Florida Public Utilities / Rayonier 21 MW CHP Overview – Eight Flags CHP

Source: Chesapeake Utilities, http://www.chpk.com/eight-flags-energy/
Typical Financing Timeframe

Start-to-finish: 3 – 6 months

- Identify lender to provide financing: 1/2 – 1 1/2 months
- Draft term sheet: 1/2 – 1 1/2 months
- Negotiate contract terms and conditions: 1 – 2 months
- Finalize contract language and obtain financing: 1 – 2 months
CHP Capacity by Ownership

Pre-1985

1985 - 2005

2006-2017

- Self
- 3rd Party
- Joint
- Utility
- Unknown

Source: DOE/ICF CHP Installation Database (U.S. installations as of Dec. 31, 2017)
CHP System Size Impact on Ownership

CHP Installations by Size Range and Ownership

- **<1 MW**
- **1 - 5 MW**
- **5 - 20 MW**
- **20 - 50 MW**
- **≥50 MW**

**Number of Sites**

Source: DOE/ICF CHP Installation Database (U.S. installations as of Dec. 31, 2015)
The CHP policies and incentives database is an online U.S. CHP policy database hosted by the Environmental Protection Agency.

dCHPP allows users to search for CHP policies and incentives at federal, state, and local levels.

Policy/incentive results include information such as:
- Summary info
- CHP eligibility requirements

Information is updated annually.

Available at: https://www.epa.gov/chp/dchpp-chp-policies-and-incentives-database
Facts:

- Congress approved $600 in FY2018 funding for economic recovery in disaster areas.
- Atlanta office $147 million allocation
- EAA funds can be awarded to assist a wide variety of activities related to disaster recovery focused on economic development, including economic recovery strategic planning grants and construction assistance.
- Includes “Resiliency projects to increase the ability of a community or region to anticipate, withstand, and bounce back from future economic injuries and disasters.”
Timely Resiliency Incentives/Financing Programs

FEMA

2018 Pre-Disaster Mitigation Grant

Facts:

- Congress approved $235 million in FY2018 funding for economic recovery in disaster areas
- States receive $575K allocation and remaining funds are awarded competitively
- Local governments are eligible subapplicants
- After natural hazard mitigation projects, FEMA will select projects to fund “Generators for critical facilities identified in a FEMA-approved mitigation plan and meet the standards set by local building codes.”
- Application period is Oct 1-Jan 31, 2019
- More info:
- https://www.fema.gov/pre-disaster-mitigation-grant-program
Timely Resiliency Incentives/Financing Programs

Funding Opportunities:

- Building U.S. Communities’ and Businesses’ Resilience to Extreme Events – NOAA Climate Program Office
- EPA Smart Growth Grants and Other Funding
- FEMA Preparedness Grants
- FEMA Hazard Mitigation Assistance
- USDA Natural Resources Conservation Service
- More info: https://toolkit.climate.gov/content/funding-opportunities
The Better Buildings Financing Navigator

The Navigator is an online tool that helps public and private organizations find financing solutions for energy efficiency projects.

With the Navigator, you can…

1. **Explore**: Learn the basics of the efficiency financing market

2. **Find**: Answer a few simple questions to see which financing options might be a fit for your project

3. **Connect**: Speak to Better Buildings Financial Allies who may be able to finance your project

Available at: [https://betterbuildingssolutioncenter.energy.gov/financing-navigator](https://betterbuildingssolutioncenter.energy.gov/financing-navigator)
Who are the Better Buildings Financial Allies?

- 30+ leading financing companies that have committed to funding efficiency, renewables, and generation projects
- Primarily project financing companies
- Some institutional investors (e.g. Citi) and specialty providers (e.g. Energi)
- Active in all sectors including government, C&I, MUSH, multifamily, and residential across the U.S.
- Represent large, medium, and start-up companies
- They are available to help you!
CHP for Resiliency Accelerator
CHP for Resiliency Accelerator

**Purpose:**
- Incorporate consideration of CHP into resiliency planning efforts at the city, state, and utility levels
- Collaborate with Partners to:
  - Assess opportunities for CHP to maintain critical operations
  - Document Partner process for replicability

**Key Materials Developed:**
1. DG for Resiliency Planning Guide
2. CHP for Resiliency Screening Tool
3. DER Matrix – Issue Brief
4. Partner Profiles

The Combined Heat and Power (CHP) for Resiliency Accelerator will support and expand the consideration of CHP solutions to keep critical infrastructure operational every day and night regardless of external events. As a collaborative effort with states, communities, utilities, and other stakeholders, Partners will examine the perceptions of CHP among resiliency planners, identify gaps in current technologies or information relative to resiliency needs, and develop plans for communities to capitalize on CHP’s strengths as a reliable, high efficiency, lower emissions electricity and heating/cooling source for critical infrastructure.

Get Involved
Better Buildings programs host interactive webinars featuring a variety of topics exploring cost-effective ways to integrate energy savings into their daily building operations.

Accelerators News
The latest Energy Department breaking news, announcements, and updates featuring Better Buildings Accelerators.

DG for Resiliency Guide
This guide provides information and resources on how Distributed Generation (DG), with a focus on CHP, can help communities meet resilience goals and ensure critical infrastructure remains operational regardless of external events.

https://betterbuildingsinitiative.energy.gov/accelerators/combined-heat-and-power-resiliency
The Distributed Generation (DG) for Resilience Planning Guide

- Web-based guide that provides information and resources on how distributed generation (w/a focus on CHP), can help communities meet resilience goals and ensure critical infrastructure remains operational regardless of external events.

Available at: https://resilienceguide.dg.industrialenergytools.com/
Two Main Sections to the Guide

- **Stakeholder Action Pages**
  - Decision Makers
  - Utilities
  - Take Action
  - Resource Library

- **Information and resources for resiliency planners to actively use to incorporate CHP in their planning process.**

- **101 Pages: Background Information**
  - Critical Infrastructure
  - Combined Heat and Power
  - Solar + Energy Storage
  - Microgrids
  - Applying CHP in Critical Infrastructure
  - Case Studies
Take Action Page

- Provide user with an efficient approach to quickly assess a critical infrastructure portfolio for potential DG deployment, and/or;
- Provide a framework for reviewing existing resiliency strategies and policies, and developing new programs.

- **Steps 1 & 2: Identify and Rank CI Sectors and Subsectors Conducive to DG Technologies**
  - Provides users with criteria for identifying and prioritizing CI sectors conducive to DG technologies

- **Step 3: Individual Site Assessments and Next Steps**
  - **Individual Site Assessments**: Tools that can be used to perform individual site assessment of DG technologies are provided for users:
    - CHP Site Screening Tool
    - Solar + Storage Screening Tool
    - Microgrid Modeling Tools

<table>
<thead>
<tr>
<th>CI Sector</th>
<th>Sub-sector Conducive to CHP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation</td>
<td>Airports</td>
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<tr>
<td>Information Technology</td>
<td>Data Centers</td>
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<tr>
<td>Government Facilities</td>
<td>College/Universities Schools</td>
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<td></td>
<td>Schools</td>
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<td>Prisons</td>
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<td>Military Bases</td>
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<tr>
<td>Emergency Services</td>
<td>Police Stations</td>
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<td>Fire Stations</td>
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<tr>
<td>Water and Wastewater Systems</td>
<td>Waste Water Treatment Plants</td>
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<tr>
<td>Food and Agriculture</td>
<td>Food Processing</td>
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<tr>
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<td>Food Distribution Centers</td>
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<td></td>
<td>Supermarkets</td>
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<tr>
<td>Commercial Facilities</td>
<td>Lodging</td>
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<td></td>
<td>Multi-Family Buildings</td>
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<tr>
<td>Healthcare and Public Health</td>
<td>Hospitals</td>
</tr>
<tr>
<td></td>
<td>Nursing Homes</td>
</tr>
<tr>
<td>Healthcare and Public Health</td>
<td>Chemicals / Pharmaceuticals</td>
</tr>
<tr>
<td></td>
<td>Food Processing</td>
</tr>
</tbody>
</table>
CHP for Resilience Screening Tool

- Live Demo
Issue Brief – Examining the Performance of Different DERs in Disaster Events

- Explores how different DERs are impacted by various types of natural disasters (flooding, high winds, extreme temperature, etc.)

- Goal: To assist stakeholders in evaluating the technology options best able to meet their resilience priorities
# Matrix of DER vulnerability to weather events

<table>
<thead>
<tr>
<th>Natural Disaster or Storm Events</th>
<th>Flooding</th>
<th>High Winds</th>
<th>Earthquakes</th>
<th>Wildfires</th>
<th>Snow/Ice</th>
<th>Extreme Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery Storage</td>
<td><img src="image" alt="Flooding Icon" /></td>
<td><img src="image" alt="High Winds Icon" /></td>
<td><img src="image" alt="Earthquakes Icon" /></td>
<td><img src="image" alt="Wildfires Icon" /></td>
<td><img src="image" alt="Snow/Ice Icon" /></td>
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</tr>
<tr>
<td>Biomass/Biogas CHP</td>
<td><img src="image" alt="Flooding Icon" /></td>
<td><img src="image" alt="High Winds Icon" /></td>
<td><img src="image" alt="Earthquakes Icon" /></td>
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<tr>
<td>Distributed Solar</td>
<td><img src="image" alt="Flooding Icon" /></td>
<td><img src="image" alt="High Winds Icon" /></td>
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</tr>
<tr>
<td>Standby Generators</td>
<td><img src="image" alt="Flooding Icon" /></td>
<td><img src="image" alt="High Winds Icon" /></td>
<td><img src="image" alt="Earthquakes Icon" /></td>
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</table>
Design considerations and other strategies to increase resilience of DERs

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<tbody>
<tr>
<td><strong>Resource</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Battery Storage</strong></td>
<td>Elevate equipment above fixed and storm surge levels</td>
<td>Use NEMA-rated enclosures to minimize exposure to debris</td>
<td>Design EMS or protection systems to shut down at harmful wind speeds or conditions</td>
<td>Utilize shock mount system enclosures to maintain integrity of individual system components</td>
<td>Use built-in fire suppression system</td>
<td>Design enclosures to withstand snow/ice loads</td>
</tr>
<tr>
<td></td>
<td>For biogas, coordinate with the wastewater treatment on potential planned shutdowns</td>
<td>For biogas, use rigid covers to protect digester tanks</td>
<td>For biogas, cover or protect onsite fuel supply stockpiles</td>
<td>Maintain industry standards for facilities sited near seismic activity</td>
<td>For biogas, use enclosures, fire protection, or containment strategies for fuel supply.</td>
<td>Design with proper freeze protection</td>
</tr>
<tr>
<td><strong>Biogas/Biomass CHP</strong></td>
<td>Elevate equipment and biomass stockpiles above flood levels</td>
<td>Elevate controls and electronics above fixed and storm surge levels</td>
<td>Use site drainage strategy</td>
<td>Use secure, flush-mounted systems for rooftop solar</td>
<td>Ensure roof mount design meets ASCE building code for seismic areas</td>
<td>Maintain industry standards for facilities sited near seismic activity</td>
</tr>
<tr>
<td></td>
<td>For ground mount, avoid sitting in flood zones</td>
<td>Elevate controls and electronics above fixed and storm surge levels</td>
<td>Use site drainage strategy</td>
<td>Use rigid covers to protect digester tanks</td>
<td>If ground-mount, site in open areas away from flammable material (trees, shrubs, etc.)</td>
<td>Use rigid covers to protect digester tanks</td>
</tr>
<tr>
<td><strong>Distributed Solar</strong></td>
<td>Design foundation for conditions in high water table</td>
<td>Use rigid covers to protect digester tanks</td>
<td>Design systems for ground acceleration ratio based on typical seismic activity</td>
<td>Extend gravel apron around base of turbine</td>
<td>Install electric-thermal ice protection systems</td>
<td>Use ice-resistant coating on blades</td>
</tr>
<tr>
<td></td>
<td>Elevate controls and electronics above fixed and storm surge levels</td>
<td>Elevate controls and electronics above fixed and storm surge levels</td>
<td>Design systems for ground acceleration ratio based on typical seismic activity</td>
<td>Extend gravel apron around base of turbine</td>
<td>Use ice-resistant coating on blades</td>
<td>Design uninterruptable power supply to operate within adequate temperature range</td>
</tr>
<tr>
<td><strong>Distributed Wind</strong></td>
<td>Elevate equipment above fixed and storm surge levels</td>
<td>Locate systems indoors or with container designed to withstand high wind and debris</td>
<td>Use fire protection systems for above-ground facilities associated with gas delivery networks</td>
<td>No additional design consideration needed</td>
<td>Check generator batteries during cold weather</td>
<td>To ensure fuel availability, purchase &quot;firm supply&quot; to avoid curtailment</td>
</tr>
<tr>
<td><strong>Natural Gas CHP</strong></td>
<td>Elevate equipment above fixed and storm surge levels</td>
<td>Elevate equipment above fixed and storm surge levels</td>
<td>Locate systems indoors or with container designed to withstand high wind and debris</td>
<td>Locate systems indoors or with container designed to withstand high wind and debris</td>
<td>Ensure system is protected from temperatures</td>
<td>Standby Generators</td>
</tr>
</tbody>
</table>
Other Resources: Packaged CHP Accelerator

- **Goals**
  - Research and validate that total project costs and installation times for packaged CHP systems can be reduced by 20% or more
  - Evaluate the integration of new technologies with packaged CHP systems and identify R&D challenges and opportunities around packaged CHP and related technologies

- **Partners**
  - **CHP Supplier Partners** – CHP system packagers and solution providers participating in the national eCatalog of packaged CHP systems
  - **CHP Engagement Partners** – Utilities, federal agencies, states, cities or other market entities committed to promoting packaged CHP (via the eCatalog)

Visit the Packaged CHP Accelerator Website: [https://betterbuildingsinitiative.energy.gov/accelerators/packaged-chp](https://betterbuildingsinitiative.energy.gov/accelerators/packaged-chp)
Other Resources: Sustainable Water Infrastructure of the Future (SWIFt) Accelerator

- **Goals**
  - Catalyze the adoption of innovative and best-practice approaches in data management, technologies, and financing for infrastructure improvement
  - Improve the energy efficiency of the partners’ participating water resource recovery facilities by at least 30% and integrate at least one resource recovery measure

- **Accelerator Partners**
  - State, regional, and local agencies engaging with water resource recovery facilities in their jurisdiction to accelerate a pathway toward a sustainable infrastructure

- **Energy Data Management Manual for the Wastewater Treatment Sector**
  - Step-by-step guide for wastewater treatment plants on how to appropriately track energy performance
  - Describes the benefits of energy data management, and how it can help drive savings when linked to a strong energy management program

Visit the Sustainable Water Infrastructure of the Future (SWIFt) Accelerator Website: [https://betterbuildingsinitiative.energy.gov/accelerators/packaged-chp](https://betterbuildingsinitiative.energy.gov/accelerators/packaged-chp)
Questions?

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703-934-3324