Resilience Roundtable Part 1: Finding the Balance between Resiliency, Storage + Renewables, and Energy Efficiency

Thursday, July 11, 2019

9:00-10:30 AM

Speakers

- Krystal Laymon, U.S. Department of Energy
- Anne Hampson, ICF
- Eric Coffman, Montgomery County, MD
- Dennis Gonzalez, Puerto Rico Public Housing Administration

U.S. DEPARTMENT OF ENERGY

Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

Snapshot: Federal Resiliency Activities

JUNE 2019

Weatherization & Intergovernmental Programs (WIP) Office

WIP's mission is to enable strategic investments in energy efficiency and renewable energy technologies through the use of innovative practices across the United States by a wide range of stakeholders, in partnership with state and local organizations and community-based nonprofits.

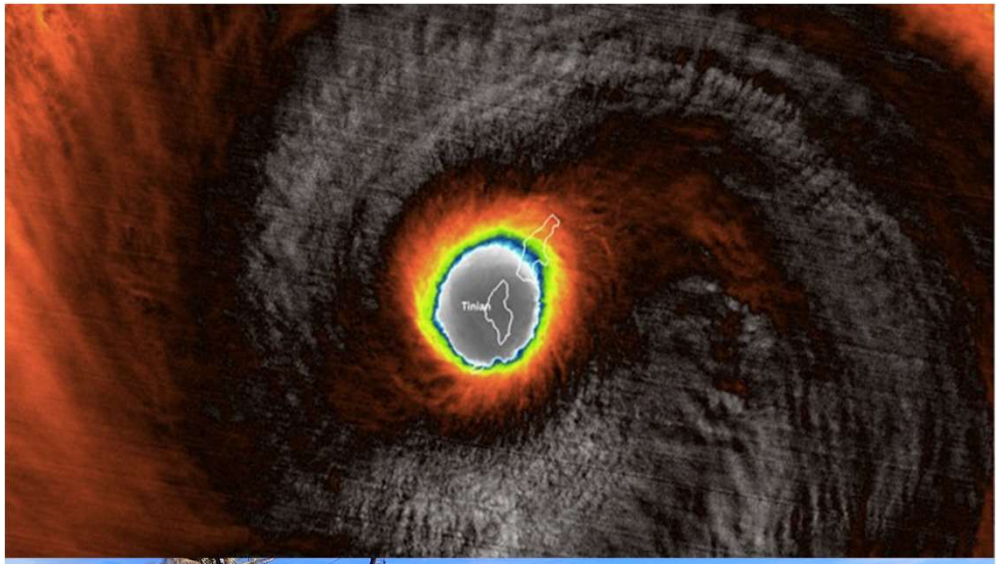
State Energy Program

Weatherization Assistance Program

Partnerships and Technical Assistance

Strategic & Interagency Initiatives

Commonwealth of Northern Mariana Islands (CNMI)



Puerto Rico

Puerto Rico Solar Photovoltaic (PV) Pilot Program

- Puerto Rico's State Office of Energy Policy requested DOE WAP funding be dedicated, to provide photovoltaic (PV) and battery storage to WAP-eligible single-family homes.

- DOE's SEP 2 solar PV and battery storage in Mona Island, a natural reserve where research is conducted. **Remaining funds used for residential PV project.**

.

CNMI's Care Package Deployment

- CNMI's Energy Division was able to receive support from the State Energy Program to deliver over 950 relief care packages to those affected by the storm.
- Care packages included portable burner butane stoves so people could still cook food for their families, baby wipes, and toilet tissue

Statewide Assistance for Energy Reliability and Resiliency, (SAFER^2) Wisconsin

Overview:	
DOE Funding: $300,000 **Cost Match*:* 20%**	**Partners:** Wisconsin Emergency Management, Focus on Energy, Public Service Commission of Wisconsin, Wisconsin Clean Cities, Wisconsin Energy Institute

Project Goals:

Impact:

Financing Advanced Microgrids, New Jersey

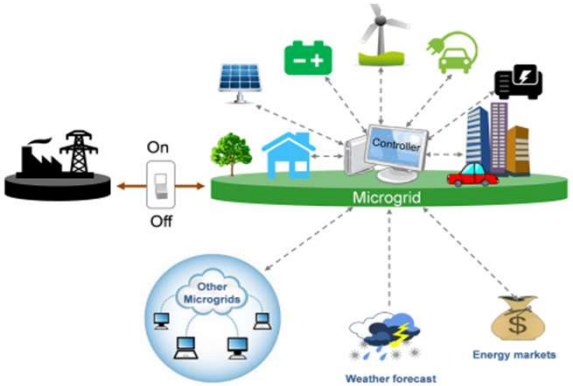
Overview:

DOE Funding: $299,840
Cost Match*:* 29%

Partners: New Jersey Institute of Technology, Rutgers University, New Jersey Clean Cities Coalition

Project Goals:

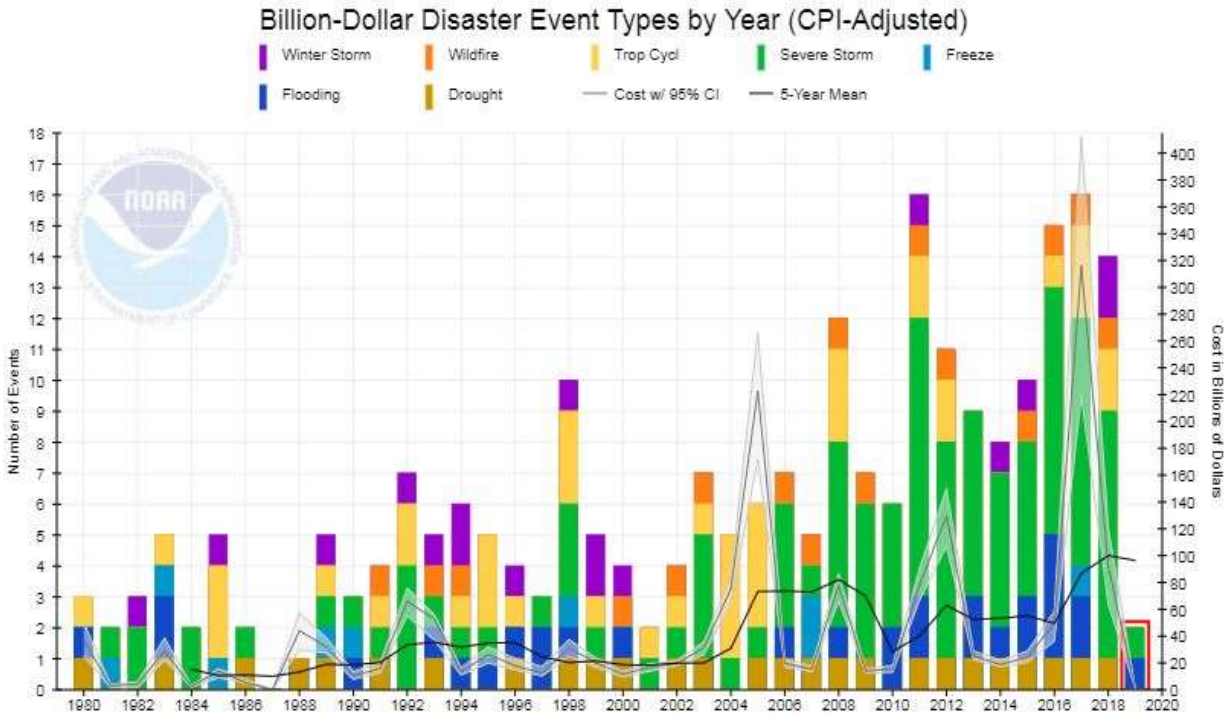
Impact:



Disaster Recovery Reform Act of 2018

Established more than 50 new authorities and requirements across FEMA:

- Building Resilient Infrastructure and Communities (BRIC)
- Building Codes and Enforcement
- Wildfire Prevention
- Hazard Mitigation Grant Program for Earthquakes



NOAA National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters (2019). https://www.ncdc.noaa.gov/billions/

Now Released!

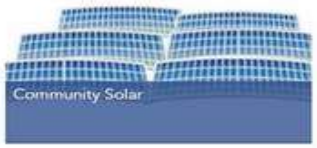
Clean Energy for Low Income Communities Accelerator (CELICA) Online Toolkit

CELICA PROGRAM DEVELOPMENT ACTIVITIES

Program development refers to the planning and implementation actions program administrators take to create and manage a program.

CELICA PROGRAM MODELS

Program model refers to the defining features of a program, such as target market, key product and service attributes, terms and conditions, resource flows and benefits.



Clean Energy for Low Income Communities (CELICA): Outcomes

Partners successfully leveraged resources to commit up to $335 million to help 155,000 low income households access energy efficiency and renewable energy benefits, and demonstrated promising program models for:

Single Family

Example: **State of Connecticut** and CT Green Bank's bundled energy efficiency and solar program has been so successful that *solar PV systems are owned by households in low income communities as much as those in non-low-income areas.*

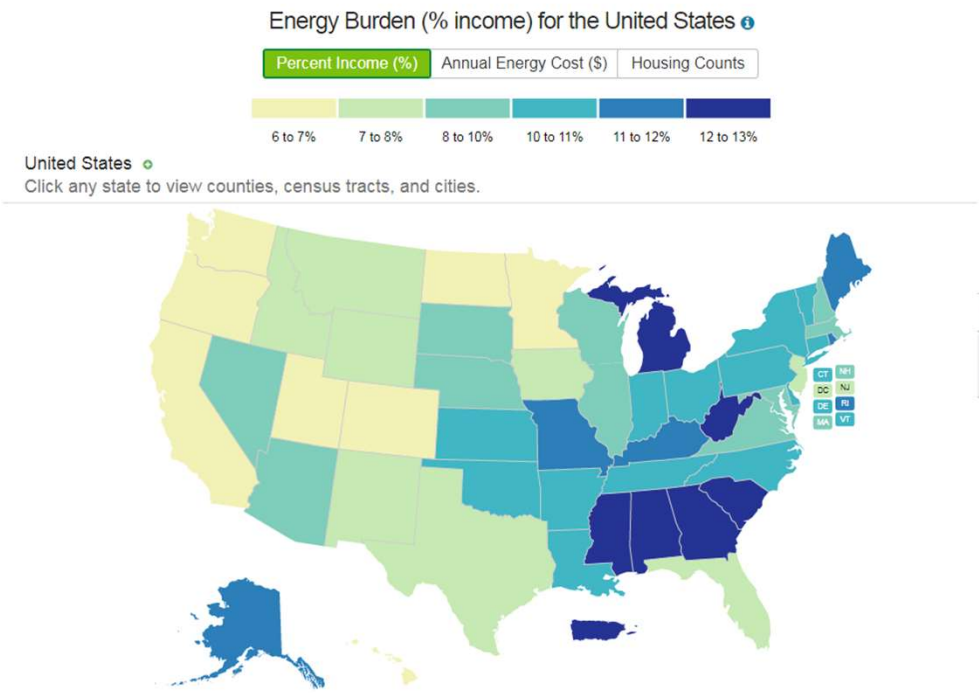
Multifamily Affordable

Example: **District of Columbia** is incentivizing building owners to *serve 100,000 low income households with 240-300MW solar PV.*

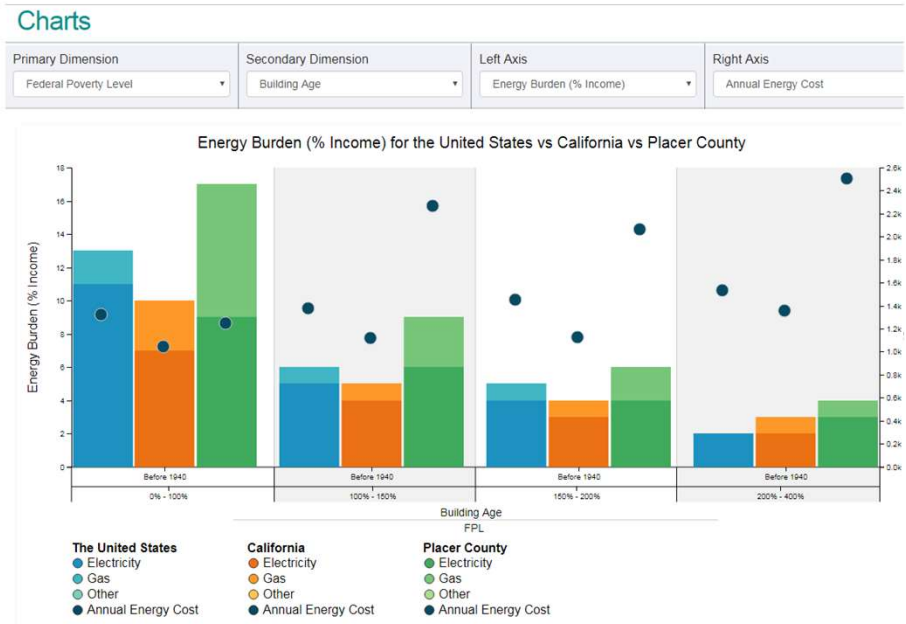
Low Income Community Solar

Example: **State of Michigan** Energy Office's low income community solar program partnered with utilities to deliver *$350/yr in additional savings for participating, previously weatherized, low income households.*

Launched - Low-income Energy Affordability Data (LEAD) Tool



Goal: Help stakeholders make data-driven decisions on energy goals and program planning by improving their understanding of low income and moderate income household energy characteristics.



https://www.energy.gov/eere/slsc/maps/lead-tool

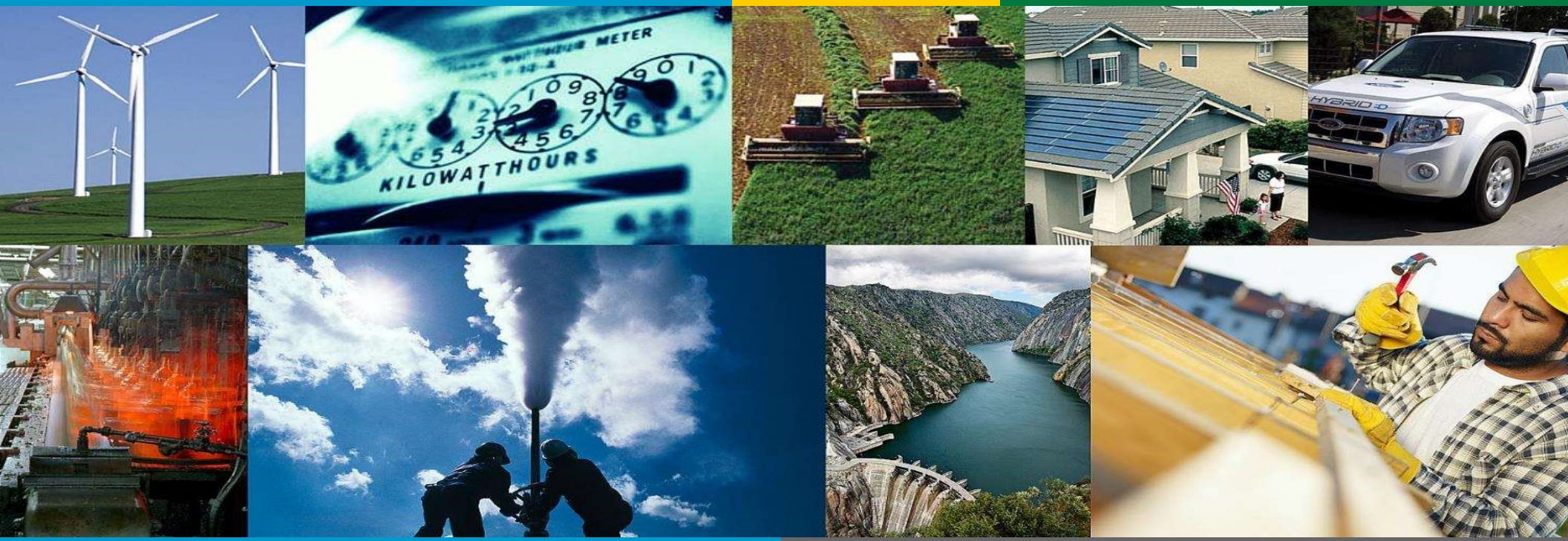
Questions?

Krystal Laymon

Office of Energy Efficiency & Renewable Energy
U.S. Department of Energy

Krystal.Laymon@ee.doe.gov

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy



2019 Better Buildings, Better Plants Summit

July 10, 2019

U.S. Department of Energy (DOE) CHP for Resiliency Accelerator

Anne Hampson, ICF

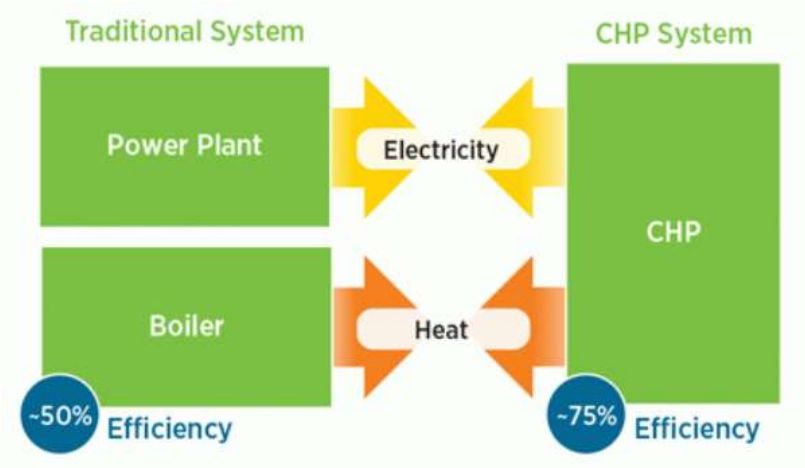
What is CHP and How Does it Increase Resilience?

What is CHP?

- CHP, or cogeneration, is the production of electricity and capture of waste heat to provide useful thermal energy for space heating, cooling, DHW, or industrial processes (recip. engines, steam turbines, microturbines, fuel cells)

How Does CHP Increase Resilience?

- For end users:
  - Provides continuous supply of electricity and thermal energy for critical loads
  - Can be configured to automatically switch to “island mode” during a utility outage, and to “black start” without grid power
  - Ability to withstand long, multiday outages
- For utilities:
  - Enhances grid stability and relieves grid congestion
  - Enables microgrid deployment for balancing renewable power and providing a diverse generation mix
- For communities:
  - Keeps critical facilities like hospitals and emergency services operating and responsive to community needs



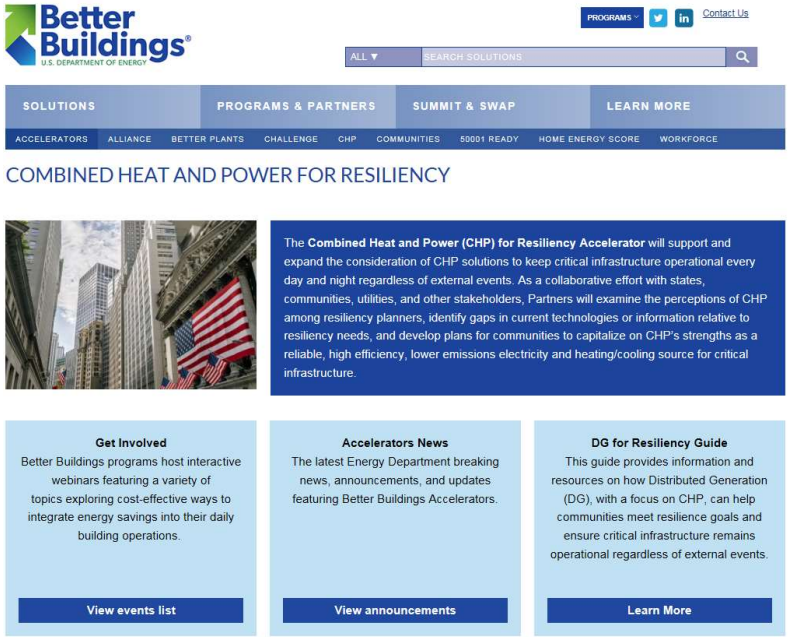
CHP for Resiliency Accelerator

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:

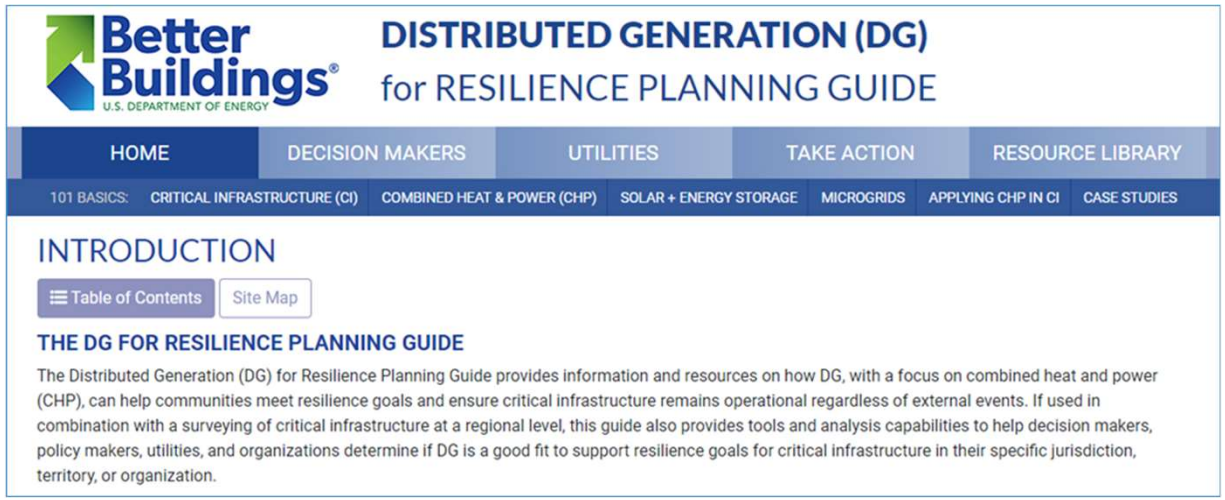
1. DG for Resiliency Planning Guide
2. CHP for Resiliency Screening Tool
3. DER Matrix – Issue Brief
4. Partner Profiles



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 Take Action Pages

- Information and resources for resiliency planners to actively use to incorporate CHP/DERs in their planning process
  - Decision Makers
  - Utilities
  - Take Action
  - Resource Library

101 Background Information Pages

- Background information on critical infrastructure, DERs, and how to apply in end-use sectors
  - Critical Infrastructure
  - Combined Heat and Power
  - Solar + Energy Storage
  - Microgrids
  - Applying CHP in Critical Infrastructure
  - Case Studies

DG for Resilience Planning Guide: Take Action

- Provides 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 2. Critical Infrastructure Sub-Sectors Conducive to CHP

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

CHP for Resilience Screening Tool

Allows users to screen and rank individual sites or portfolios of buildings based on a variety of resilience metrics and their suitability for CHP

Resiliency Screening

- **Inputs:** User-defined critical infrastructure ranking criteria, as well as microgrid and load factor ranking assessments
- **Results:** Users receive a resiliency score, microgrid score, load factor score, historical CHP uptake, and combined total resilience score

CHP Screening

- **Inputs:** Resiliency score (from resiliency screening), site location, energy consumption data, and energy price data
- **Results:** Estimated CHP size and stoplight screening assessment (taking into account resiliency screening)

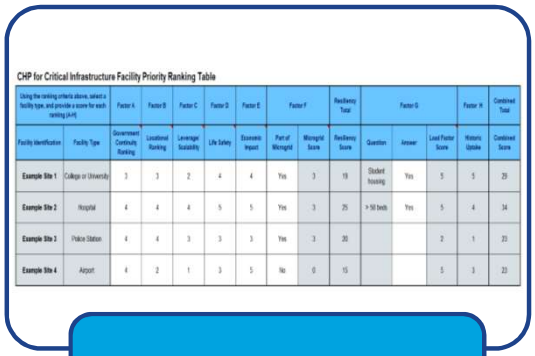
Stoplight Screening Assessment

This site has a high potential for CHP, contact your CHP TAP for more information

This site has medium potential for CHP, contact your CHP TAP for more information

Limited CHP Potential

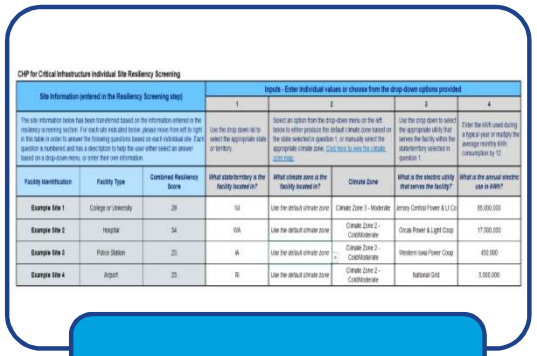
CHP for Resilience Screening Tool



CHP for Critical Infrastructure Facility Priority Ranking Table

Using the ranking criteria above, select a facility type, and provide a score for each ranking (A-H)		Factor A	Factor B	Factor C	Factor D	Factor E	Factor F		Resiliency Total	Factor G			Factor H	Combined Total
Facility Identification	Facility Type	Government Continuity Ranking	Locational Ranking	Leverage/ Scalability	Life Safety	Economic Impact	Part of Microgrid	Microgrid Score	Resiliency Score	Question	Answer	Load Factor Score	Historic Upside	Combined Score
Example Site 1	College or University	3	3	2	4	4	Yes	3	19	Student housing	Yes	5	5	29
Example Site 2	Hospital	4	4	4	5	5	Yes	3	25	> 50 beds	Yes	5	4	34
Example Site 3	Police Station	4	4	3	3	3	Yes	3	20			2	1	23
Example Site 4	Airport	4	2	1	3	5	No	0	15			5	3	23

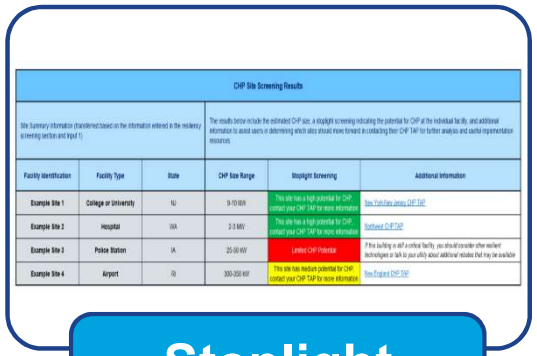
Resiliency Screening



CHP for Critical Infrastructure Individual Site Resiliency Screening

Site Information (entered in the Resiliency Screening step)			Inputs - Enter individual values or choose from the drop-down options provided			
			1	2	3	4
The site information below has been transferred based on the information entered in the resiliency screening section. For each site indicated below, please move from left to right in this table in order to answer the following questions based on each individual site. Each question is numbered and has a description to help the user either select an answer based on a drop-down menu, or enter their own information.			Use the drop down list to select the appropriate state or territory.	Select an option from the drop-down menu on the left below to either produce the default climate zone based on the state selected in question 1, or manually select the appropriate climate zone. Click here to view the climate zone map.	Use the drop down to select the appropriate utility that serves the facility within the state/territory selected in question 1.	Enter the kWh used during a typical year or multiply the average monthly kWh consumption by 12.
Facility Identification	Facility Type	Combined Resiliency Score	What state/territory is the facility located in?	What climate zone is the facility located in?	Climate Zone	What is the electric utility that serves the facility?	What is the annual electric use in kWh?
Example Site 1	College or University	29	NJ	Use the default climate zone	Climate Zone 3 - Moderate	Jersey Central Power & Li Co	85,000,000
Example Site 2	Hospital	34	WA	Use the default climate zone	Climate Zone 2 - Cold/Moderate	Ocean Power & Light Coop	17,500,000
Example Site 3	Police Station	23	IA	Use the default climate zone	Climate Zone 2 - Cold/Moderate	Western Iowa Power Coop	450,000
Example Site 4	Airport	23	RI	Use the default climate zone	Climate Zone 2 - Cold/Moderate	National Grid	5,000,000

CHP Screening



CHP Site Screening Results

Site Summary information (transferred based on the information entered in the resiliency screening section and input 1)			The results below include the estimated CHP size, a stoplight screening indicating the potential for CHP at the individual facility, and additional information to assist users in determining which sites should move forward in contacting their CHP TAP for further analysis and useful implementation resources.		
Facility Identification	Facility Type	State	CHP Size Range	Stoplight Screening	Additional Information
Example Site 1	College or University	NJ	9-10 MW	This site has a high potential for CHP, contact your CHP TAP for more information	New York/New Jersey CHP TAP
Example Site 2	Hospital	WA	2-3 MW	This site has a high potential for CHP, contact your CHP TAP for more information	Northwest CHP TAP
Example Site 3	Police Station	IA	25-50 kW	Limited CHP Potential	If this building is still a critical facility, you should consider other resilient technologies or talk to your utility about additional rebates that may be available
Example Site 4	Airport	RI	300-350 kW	This site has medium potential for CHP, contact your CHP TAP for more information	New England CHP TAP

Stoplight Screening Results

Resiliency Screening Factors: Government Continuity, Locational Ranking, Leverage/Scalability, Life Safety, Economic Impact, Microgrid, and Load Factor

Access the tool at the accelerator website under "Featured Resources":
https://betterbuildingsinitiative.energy.gov/accelerators/combined-heat-and-power-resiliency

CHP for Resilience Screening Tool: Valuing Resilience

Provides a framework for users to assign a value of resilience to individual sites, and understand the affects on overall potential

One-time Resilience Payment ($)

- Estimates the impact of placing a simple monetary value on resilience
- **The University of Texas Medical Branch (UTMB)** – Identified 6 CHP options compared to a base-case standby generators and assigned a premium cost for CHP based on resilience

Energy Resilience Value ($/kWh)

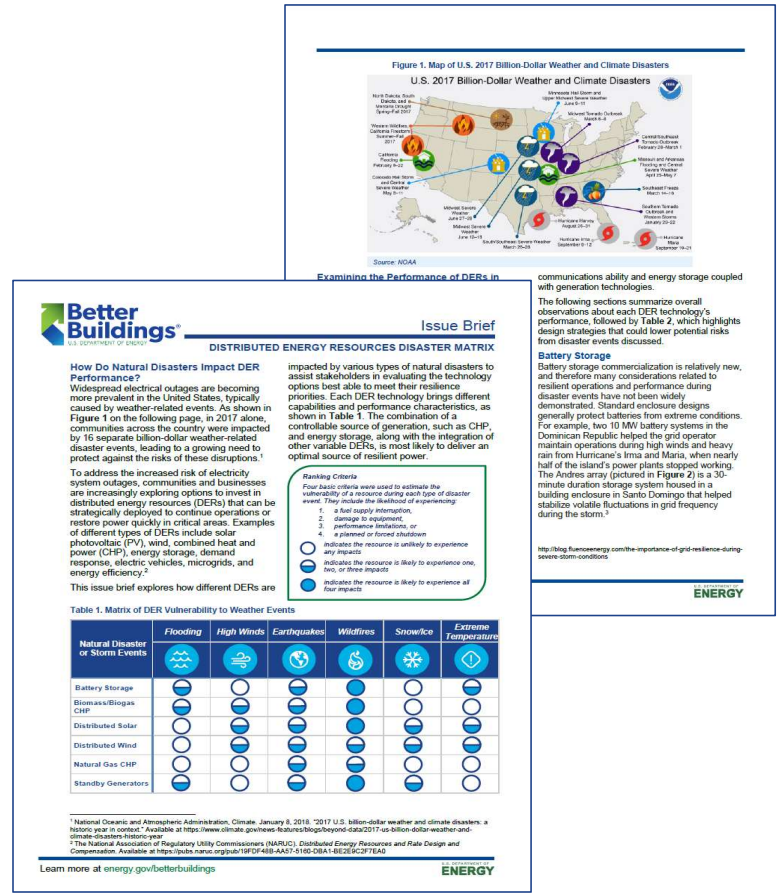
- Cost of downtime to the facility, or the extra portion of electricity prices they would be willing to pay for assured resilience
- **Downtown Cleveland Microgrid** – Cleveland Thermal and Cuyahoga County are considering a 48 MW downtown microgrid, and are estimating paying 5 cents/kWh more for electricity for increased energy resilience

Capacity Resilience Value ($/kW)

- Similar to capacity incentives for CHP systems, this determines the value of resilience based on system size
- **Clemson University** – Currently installing a 15 MW CHP system w/black start capability, and expecting to pay additional $12,500/month on extra facilities charges for upgraded electrical equipment

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



Better Buildings U.S. DEPARTMENT OF ENERGY — Issue Brief

DISTRIBUTED ENERGY RESOURCES DISASTER MATRIX

How Do Natural Disasters Impact DER Performance?

Widespread electrical outages are becoming more prevalent in the United States, typically caused by weather-related events. As shown in **Figure 1** on the following page, in 2017 alone, communities across the country were impacted by 16 separate billion-dollar weather-related disaster events, leading to a growing need to protect against the risks of these disruptions.[1]

To address the increased risk of electricity system outages, communities and businesses are increasingly exploring options to invest in distributed energy resources (DERs) that can be strategically deployed to continue operations or restore power quickly in critical areas. Examples of different types of DERs include solar photovoltaic (PV), wind, combined heat and power (CHP), energy storage, demand response, electric vehicles, microgrids, and energy efficiency.[2]

This issue brief explores how different DERs are impacted by various types of natural disasters to assist stakeholders in evaluating the technology options best able to meet their resilience priorities. Each DER technology brings different capabilities and performance characteristics, as shown in **Table 1**. The combination of a controllable source of generation, such as CHP, and energy storage, along with the integration of other variable DERs, is most likely to deliver an optimal source of resilient power.

Ranking Criteria

Four basic criteria were used to estimate the vulnerability of a resource during each type of disaster event. They include the likelihood of experiencing

1. *a fuel supply interruption,*
2. *damage to equipment,*
3. *performance limitations, or*
4. *a planned or forced shutdown*

indicates the resource is unlikely to experience any impacts

indicates the resource is likely to experience one, two, or three impacts

indicates the resource is likely to experience all four impacts

Table 1. Matrix of DER Vulnerability to Weather Events

Natural Disaster or Storm Events	Flooding	High Winds	Earthquakes	Wildfires	Snow/Ice	Extreme Temperature
Battery Storage	◒	○	◒	●	○	◒
Biomass/Biogas CHP	◒	◒	◒	●	○	○
Distributed Solar	○	◒	◒	●	◒	◒
Distributed Wind	○	◒	◒	◒	◒	◒
Natural Gas CHP	○	○	◒	◒	○	○
Standby Generators	◒	○	◒	●	◒	○

[1] National Oceanic and Atmospheric Administration, Climate. January 8, 2018. "2017 U.S. billion-dollar weather and climate disasters: a historic year in context." Available at https://www.climate.gov/news-features/blogs/beyond-data/2017-us-billion-dollar-weather-and-climate-disasters-historic-year

[2] The National Association of Regulatory Utility Commissioners (NARUC). *Distributed Energy Resources and Rate Design and Compensation*. Available at https://pubs.naruc.org/pub/19FDDF46B-AA57-5160-DBA1-BE2E9C2F7EA0

Learn more at energy.gov/betterbuildings — U.S. DEPARTMENT OF ENERGY

Figure 1. Map of U.S. 2017 Billion-Dollar Weather and Climate Disasters

U.S. 2017 Billion-Dollar Weather and Climate Disasters

Source: NOAA

Examining the Performance of DERs in

communications ability and energy storage coupled with generation technologies.

The following sections summarize overall observations about each DER technology's performance, followed by **Table 2**, which highlights design strategies that could lower potential risks from disaster events discussed.

Battery Storage

Battery storage commercialization is relatively new, and therefore many considerations related to resilient operations and performance during disaster events have not been widely demonstrated. Standard enclosure designs generally protect batteries from extreme conditions. For example, two 10 MW battery systems in the Dominican Republic helped the grid operator maintain operations during high winds and heavy rain from Hurricane's Irma and Maria, when nearly half of the island's power plants stopped working. The Andres array (pictured in **Figure 2**) is a 30-minute duration storage system housed in a building enclosure in Santo Domingo that helped stabilize volatile fluctuations in grid frequency during the storm.[3]

http://blog.fluenceenergy.com/the-importance-of-grid-resilience-during-severe-storm-conditions

U.S. DEPARTMENT OF ENERGY

Matrix of DER vulnerability to weather events

Natural Disaster or Storm Events	Flooding	High Winds	Earthquakes	Wildfires	Snow/Ice	Extreme Temperature
Battery Storage	◒	○	◒	●	○	◒
Biomass/Biogas CHP	◒	◒	◒	●	○	○
Distributed Solar	○	◒	◒	●	◒	◒
Distributed Wind	○	◒	◒	◒	◒	◒
Natural Gas CHP	○	○	◒	◒	○	○
Standby Generators	◒	○	◒	●	◒	○

Design considerations and other strategies to increase resilience of DERs

Natural Disaster or Storm Event	Flooding	High Winds	Earthquakes	Wildfires	Snow/Ice	Extreme Temperature
Resource						
Battery Storage	• Elevate equipment above flood and storm surge levels • Use NEMA-rated enclosures that protect against water damage • Factor equipment repair or replacement in O&M plans	• Use NEMA-rated enclosures to minimize exposure to debris • Design EMS or protection systems to shut down at harmful wind speeds or conditions.	• Utilize shock-mount system enclosures to maintain integrity of individual system components	• Use built-in fire suppression system	• Design enclosures to withstand snow/ice loads • Design with sealings and venting to address moisture • Use NEMA-rated enclosures to minimize exposure to moisture	• Design protection or EMS to withstand extreme temperatures • Design system to shut down to protect component integrity
Biogas/Biomass CHP	• Elevate equipment and biomass stockpiles above flood levels • For biogas, coordinate with the wastewater treatment on potential planned shutdowns	• For biogas, use rigid covers to protect digester tanks • For biomass, cover or protect onsite fuel supply stockpiles	• Maintain industry standards for facilities sited near seismic activity	• For biomass, use enclosures, fire protection, or containment strategies for fuel supply.	• Design with proper freeze protection • Protect biomass stockpiles from excess snow and ice	• Use heating jackets designed for optimal temperatures and adequate thermal management systems • Ensure systems are designed for regional temperature ranges
Distributed Solar	• Design systems and framing for easy runoff and drainage, especially for commercial rooftop systems with flat roofs • For ground mount, avoid siting in flood zones	• Use secure, flush-mounted systems for rooftop solar • Use flexible racking and anchoring systems • Maintain ASCE standards for rooftop systems based on expected wind loads	• Ensure roof mount design meets ASCE building code for seismic areas	• If ground-mount, site in open areas away from flammable material (trees, shrubs, etc.)	• Manually remove snow/ice to clear panels • Automonous mechanical cleaning (tiled removal) • Install bifacial systems capable of absorbing irradiance on the back or front of panels	• Site systems in applicable weather conditions • Enhance design to maximize cooling and airflow in order to ensure optimal temperature conditions for modules and electrical components (inverters)
Distributed Wind	• Design foundation for conditions in high water table • Elevate controls and electronics above flood and storm surge levels • Use site drainage strategy	• Include design features and braking procedures to withstand hurricane force winds (feather blades, lock rotors, change orientation, etc.)	• Design systems for ground acceleration rating based on typical seismic activity	• Extend gravel apron around base of turbine	• Install electro-thermal ice protection systems • Use ice-resistant coating on blades	• Design uninterruptible power supply to operate within adequate temperature range • Add on "cold weather packages"
Natural Gas CHP	• Elevate equipment above flood and storm surge levels	• Locate systems indoors or protect with containers designed to withstand high wind and debris	• Shock-mount system enclosures • Maintain industry standards for pipelines sited near seismic activity	• Use fire protection systems for above-ground facilities associated with gas delivery networks	• No additional design consideration needed	• To ensure fuel availability, purchase "firm supply" to avoid curtailment
Standby Generators	• Elevate equipment above flood and storm surge levels • Store enough fuel onsite to avoid delivery issues	• Locate systems indoors or protect with containers designed to withstand high wind and debris	• Purchase an earthquake-resistant model (IBC certified; subject to shake table testing)	• Avoid siting in areas prone to wildfire • Store enough fuel onsite to avoid delivery issues	• Store enough fuel onsite to avoid delivery issues	• Check generator batteries during cold weather • Enclose the system to protect from temperatures. • Store "winter diesel" fuel in cold climates with additives to prevent gelling

Partner Profiles

- Summary of individual partner achievements throughout the accelerator and future plans
- Short profiles containing:
  1. Partners' approach to resiliency planning
  2. Program or project implementation related to CHP/DG
  3. Lessons learned and future plans
  4. Additional resources and information

CHP FOR RESILIENCY ACCELERATOR PARTNER PROFILES

The partner summary table highlights key partner accomplishments, initiatives, and strategies related to resilience planning, and implementing CHP or DG programs or projects. Please click on an individual partner to see more information in their individual partner profile. Partner profiles were completed through multiple interviews with each partner listed below and focus on 4 aspects: 1.) Resilience Planning, 2.) Program or Project Implementation, 3.) Lessons Learned, and 4.) Additional Information.

Partner Name	Partner Type	Key Accomplishments
City of Boston	City	Coordinated a pilot project for a multi-user CHP district energy microgrid and Community Energy Study
Healthcare Without Harm	Non-Profit Organization	Helped develop toolkits and initiatives focused on resilient healthcare facilities for the US Department of Health and Human Services' (HHS)
Hoboken, NJ	City	Completing a feasibility study for the development of a city-wide microgrid to connect and power critical and community facilities
International District Energy Association (IDEA)	Non-Profit Organization	Organizes stakeholder engagement events that highlight the importance of CHP, microgrids, and district energy in increasing energy resilience
Maryland Energy Administration	State Agency	Administers a CHP grant program designed to encourage the growth of CHP to improve end-user resilience throughout the state
Massachusetts Department of Energy Resources	State Agency	Provided project implementation support to add resiliency capabilities to clean energy technologies at hospitals
Miami-Dade Water and Sewer Department	City	Increasing the capacity of cogeneration units at two wastewater facilities studying of individual facilities to evaluate CHP and DER options
Missouri Department of Economic Development, Division of Energy	State Agency	Collaborated with Spire on several initiatives, such as co-hosting CHP summits focused on energy resiliency for critical facilities
Montgomery County, MD	County	Leading implementation of two pilot projects to enhance resiliency of individual facilities and the electric system with CHP
National Grid	Utility	Facilitated the interconnection of 900 MW of DERs for customers, and examining the feasibility of community microgrids in New York

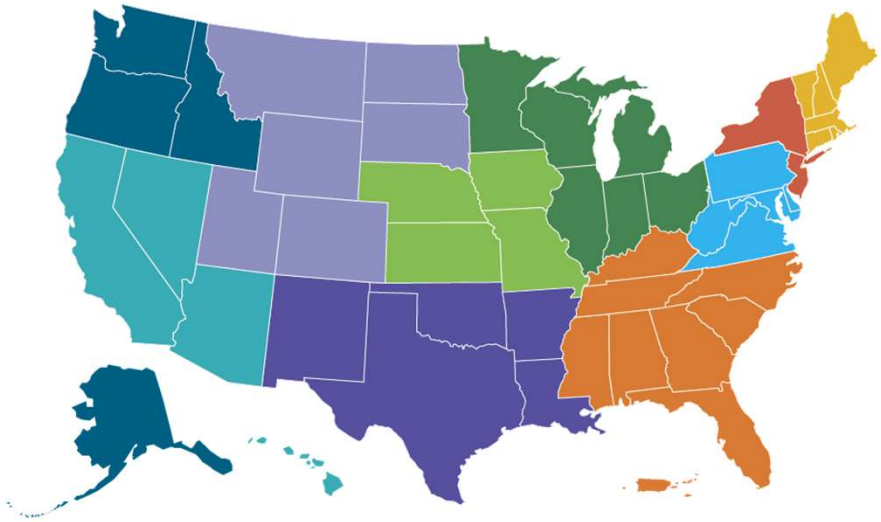
CHP Technical Assistance Partnerships (TAPs) Are Here to Help

Northwest WA, OR, ID, AK
www.northwestCHPTAP.org
David Van Holde, P.E.
Washington State University
360-956-2071
VanHoldeD@energy.wsu.edu

Upper-West UT, CO, WY, MT, ND, SD
www.upperwestCHPTAP.org
Gavin Dillingham, Ph.D.
HARC
281-216-7147
gdillingham@harcresearch.org

Midwest MN, WI, MI, IL, IN, OH
www.midwestCHPTAP.org
Cliff Haefke
University of Illinois at Chicago
312-355-3476
chaefk1@uic.edu

New England VT, NH, ME, MA, RI, CT
www.newenglandCHPTAP.org
David Dvorak, Ph.D., P.E.
University of Maine
dvorak@maine.edu
207-581-2338



New York-New Jersey NY, NJ
www.newyorknewjerseyCHPTAP.org
Tom Bourgeois
Pace University
914-422-4013
tbourgeois@law.pace.edu

Mid-Atlantic PA, WV, VA, DE, MD, DC
www.midatlanticCHPTAP.org
Jim Freihaut, Ph.D.
The Pennsylvania State University
814-863-0083
jdf11@psu.edu

Southeast KY, TN, NC, SC, GA, FL, AL, MS
www.southeastCHPTAP.org
Isaac Panzarella, P.E.
North Carolina State University
919-515-0354
ipanzarella@ncsu.edu

Western CA, NV, AZ, HI
www.westernCHPTAP.org
Gene Kogan
Center for Sustainable Energy
858-633-8561
gene.kogan@energycenter.org

Southcentral TX, NM, OK, AR, LA
www.southcentralCHPTAP.org
Gavin Dillingham, Ph.D.
HARC
281-216-7147
gdillingham@harcresearch.org

Central NE, IA, KS, MO
www.centralCHPTAP.org
Cliff Haefke
University of Illinois at Chicago
312-355-3476
chaefk1@uic.edu

Questions?

Anne Hampson
Anne.Hampson@icf.com
703-934-3324

Tarla Toomer
Tarla.Toomer@ee.doe.gov
202-586-7989

OFFICE OF ENERGY & SUSTAINABILITY

MONTGOMERY COUNTY RESILIENT PUBLIC INFRASTRUCTURE

Eric R. Coffman
Chief – Office of Energy and Sustainability
Department of General Services
Montgomery County, Maryland

One department, One mission:

Delivering **G**reen **S**ervice

Montgomery County DEPARTMENT OF GENERAL SERVICES
DGS
Delivering Great Service!

About Montgomery County

- Montgomery County, Maryland
- Outskirts of the National Capital Region
- Approximately 1.1 million people
- High tech knowledge based economy
- 400+ County government facilities
- Part of the national capital region emergency management system

Growing Threats and Vulnerabilities

Resilient Infrastructure

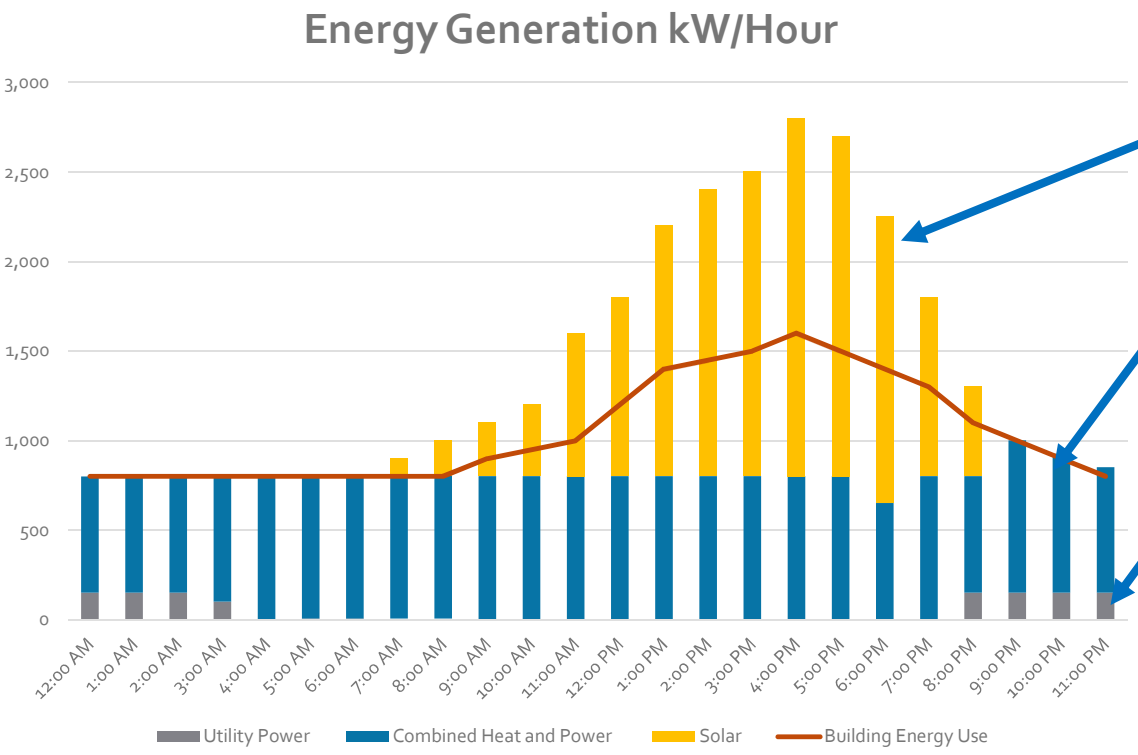
- Identify vulnerabilities in County portfolio of services
- Focus on singular or priority assets
- Facilities that have thermal load for CHP heating/cooling
- Sufficient volume to justify a P3
- Combine with efficiency improvements
- Priorities include:
  - Communications and command and control
  - Transportation and mobility services
  - Key shelter sites without natural gas fired generation
  - Animal shelter
  - Select fire stations and police stations

Public Safety Headquarters Microgrid Project

Project Summary

- Public Safety Headquarters, Correctional Facility, Upcoming Recreation Center/Shelter and Animal Shelter
- "Microgrid as a Service" Third party designs, finances, builds, maintains and operates
- Duke Energy Renewables owns the generation facilities Schneider Electric built and maintains the system
- County purchases electricity for 25 years
- Models that can be replicated across the County's portfolio and other governments
- Commissioning, energy assurance and continual testing plan
- Multiple contingencies and "bounce back" options
- Storage Ready
- Extensive commissioning an annual energy assurance testing

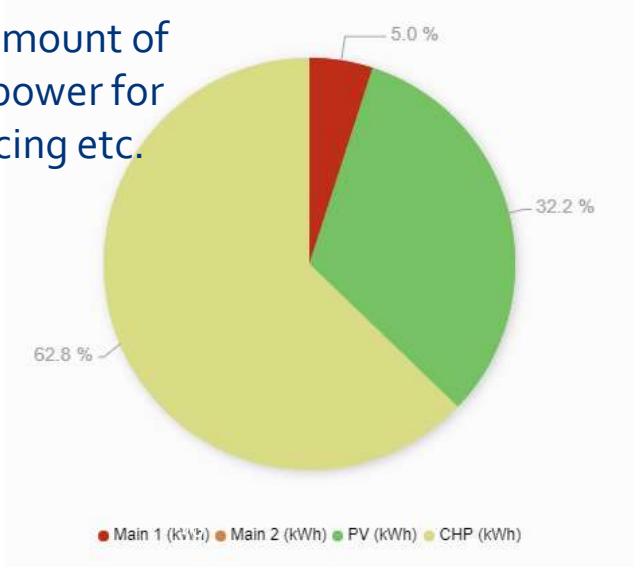
PSHQ BLUE SKY OPERATING CONDITION (EXAMPLE)



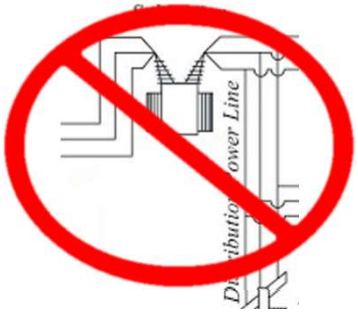
Export to Grid of Virtually Net Meter

CHP Electrical and Thermal Baseload

Small amount of utility power for balancing etc.



PSHQ OUTAGE EVENT

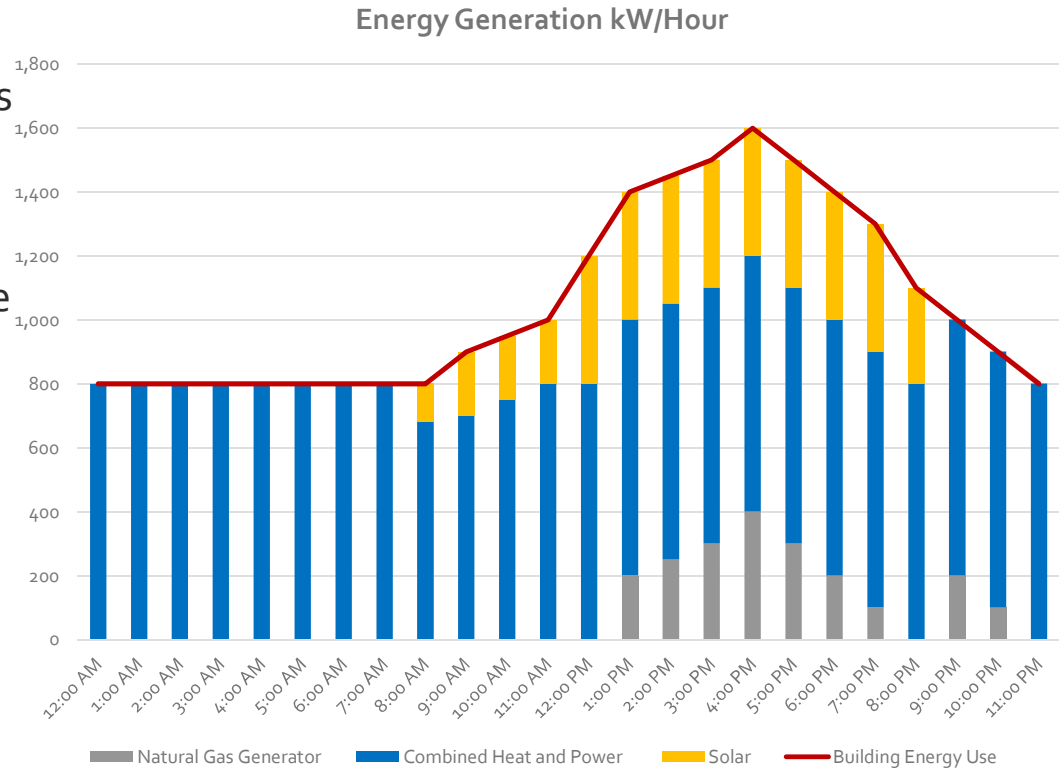


< 1 min generators online

< 5 minutes CHP comes back online

< 10 minutes solar starts paralleling

168 hours plus of grid independent operation



PROJECT PARTNERS

Finance, EPC, CHP

Schneider Electric

DUKE ENERGY

2G

REC SOLAR

Funding, Technical Support Partnership

Maryland Energy Administration

EmPOWER MARYLAND

PotomacEdison™ A FirstEnergy Company

pepco An Exelon Company

U.S. DEPARTMENT OF ENERGY

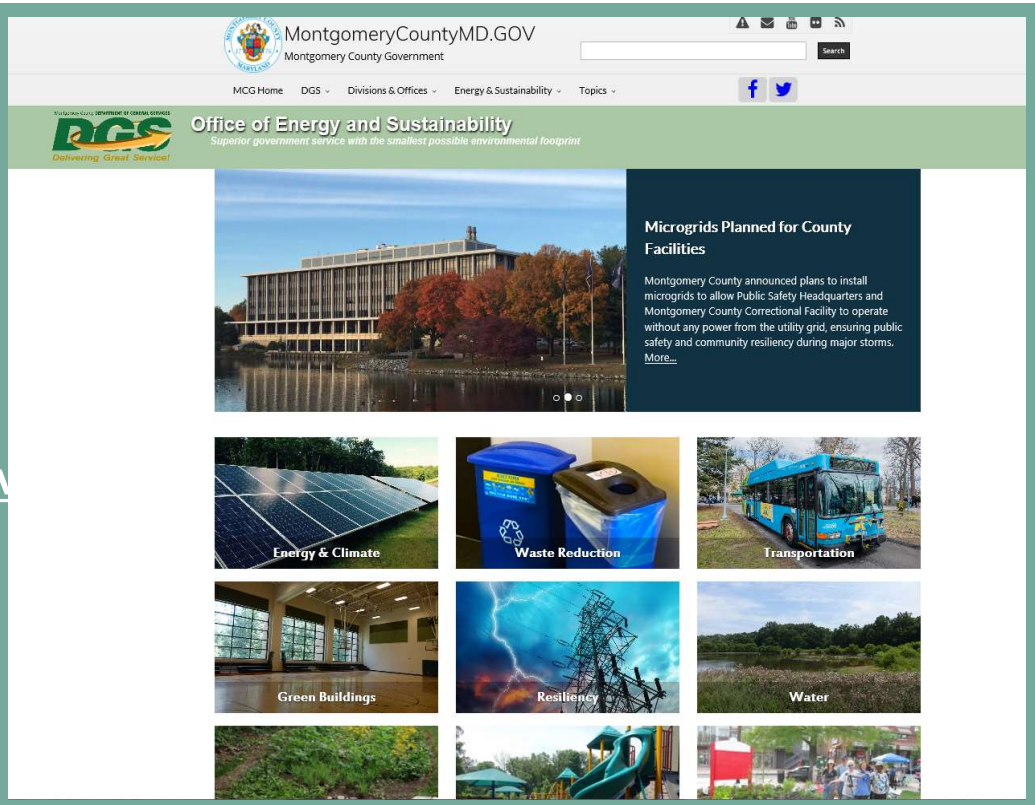
PEER

What's Next for Montgomery County

- Expand on Microgrid Concept
  - Upscale to community/public purpose
  - Downscale to smaller facilities
  - Update design standards to microgrid ready for crucial facilities
  - Implement parallel efficiency projects
- Smart Energy Transit Depot Project
- Resiliency Hub Pilot
- Green Government Center Study

Thank You

Eric R. Coffman
Chief
Office of Energy and Sustainability
Department of General Services
Montgomery County, MD
240-777-5595
Eric.Coffman@montgomerycountymd.gov
www.montgomerycountymd.gov/dgs-oes
Twitter @MoCoOES
Facebook @MocoGreenDGS



CONSTRUIMOS

RECOVERY STATUS

Puerto Rico Department of Housing

FUND SOURCES

VIVIENDA

RECOVERY STATUS

CONSTRUIMOS

PUBLIC ASSISTANCE

GOVERNMENT OF PUERTO RICO

Department of Housing

STEP PROGRAM | CURRENT STATUS

VIVIENDA

RECOVERY STATUS

>108,000

Task Orders for Repairs Completed

~$1,129M

Cost of Task Orders

$10,409.05

Average Cost per Home

$1,354 M

Funds Obligated for Repair and Program Administration

FEMA

STEP PROGRAM | DISBURSEMENTS

VIVIENDA

RECOVERY STATUS

Invoiced Amounts	FEMA Approved Disbursements
$1,087.73M Repair Works	$978.63M Repair Works
$179.04M Administration	$162.85M Administration
$1,266.77M Program Total	$1,141.49M Program Total (No Findings!)

FEMA

CONSTRUIMOS

CDBG-DR

GOVERNMENT OF PUERTO RICO

Department of Housing

HUD & PRDOH

"Constant Coordination"

"Building Recovery Programs"

"Developing Controls"

"Monitoring & Compliance"

CDBG-DR | ACTION PLANS

VIVIENDA

ACTION PLAN

$1.5 BILLION

- FEDERAL REGISTER NOTICE
  FEBRUARY 9, 2018
- ACTION PLAN APPROVED
  JULY 29, 2018
- SIGNED GRANT AGREEMENT
  SEPTEMBER 20, 2018

ACTION PLAN 1ST AMENDMENT

$8.2 BILLION

FEDERAL REGISTER NOTICE
AUGUST 20, 2018

- ACTION PLAN AMENDMENT PUBLISHED FOR PUBLIC COMMENT
  SEPT 21, 2018
- PUBLIC COMMENT PERIOD
  SEPT 21 OCT 21, 2018
- ACTION PLAN AMENDMENT SUBMITTED TO HUD FOR FINAL APPROVAL
  NOVEMBER 16, 2018
- ACTION PLAN AMENDMENT APPROVED
  FEBRUARY 28, 2019

FUTURE ACTION PLAN AMENDMENTS

RELATIVE TO FUTURE REGISTER NOTICE

POWER GRID
~$1.9 BILLION

MITIGATION FUNDS
$8.3 BILLION

THESE AMOUNTS ARE ESTIMATED AND SUBJECT TO CHANGE

ESTIMATED TOTAL
$19.9 BILLION

RECOVERY STATUS

CDBG-DR | PROCUREMENT

VIVIENDA

RECOVERY STATUS

PROCUREMENT TYPES

46

GSA	IFB	NOFA	MP	SP	RFP	RFQ
1	3	1	14	15	10	2

CDBG-DR | PROCUREMENT

VIVIENDA

RECOVERY STATUS

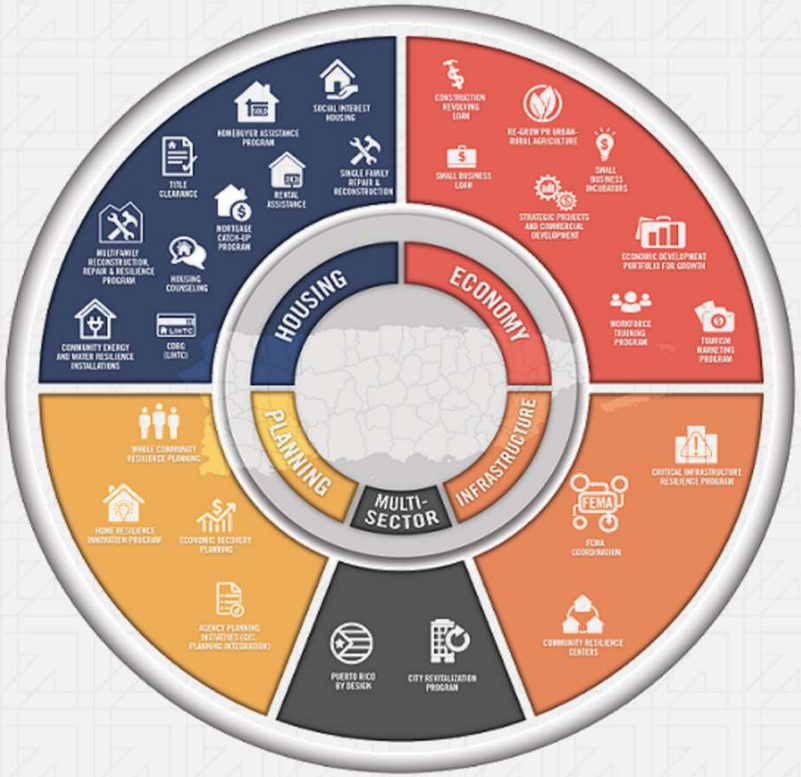
PROCUREMENT STATUS

42

10 Pending Award → $586,332,257.30

32 Awarded → $263,287,042.08

CDBG-DR | CURRENT ALLOCATIONS



Funds Available Under Grant Agreement Executed on September 20, 2018

Funds Pending Grant Agreement

SECTOR	1ST AP(1)	2ND AP(1)	TOTAL(1)
Administration	$75.3	$411.0	$486.3
Planning	$175.3	$309.7	$485.0
Housing	$1,011.6	$2,750. 0	$3,761.6
Econ. Dev.	$145.0	$1,285.0	$1,430.0
Infrastructure	$100.0	$1,375.0	$1,475.0
Multi-Sector	$0.0	$1,900.0	$1,900.0
Unallocated(2)	$0.0	$190.0	$190.0
TOTAL	$1,507.2	$8,220.7	$9,727.9

Notes:
(1) *All amounts in millions of dollars.*
(2) *Unallocated amounts are due to HUD's declined of the Mortgage Catchup Program and increase of funds to the Tourism & Business Marketing Program*

VIVIENDA

RECOVERY STATUS

CDBG-DR | RESILIENCY

a. *Green Building Standard for Replacement and New Construction of Residential Housing.* Grantees must meet the Green Building Standard in this subparagraph for: (i) All new construction of residential buildings and (ii) all replacement of substantially damaged residential buildings.

* FR | Vol. 83 | 2.9.2018 | p. 5861

1. ENERGY STAR
2. Enterprise Green Building Standard
3. LEED
4. ICC-700
5. EPA Indoor Air Plus
6. PR Green Permit

VIVIENDA

RECOVERY STATUS

HOUSING PORTFOLIO

	Program	Sub-Total
	Home Repair, Reconstruction, or Relocation	$2,175,570,050
	Title Clearance	$40,000,000
	Mortgage Catch-Up NOT APPROVED BY HUD	$0
	Social Interest Housing	$32,500,000
	Housing Counseling	$17,500,000
	CDBG-DR Gap to LIHTC	$400,000,000
	Rental Assistance	$10,000,000
	Community Energy & Water Resilience Installations F.K.A. Home Energy Resilience	$436,000,000
NEW	Multi-Family Reconstruction, Repair & Resilience Program	$300,000,000
NEW	Homebuyer Assistance Program	$350,000,000

*Subject to Change

$3,761,570,050

Sub-Total Allocation

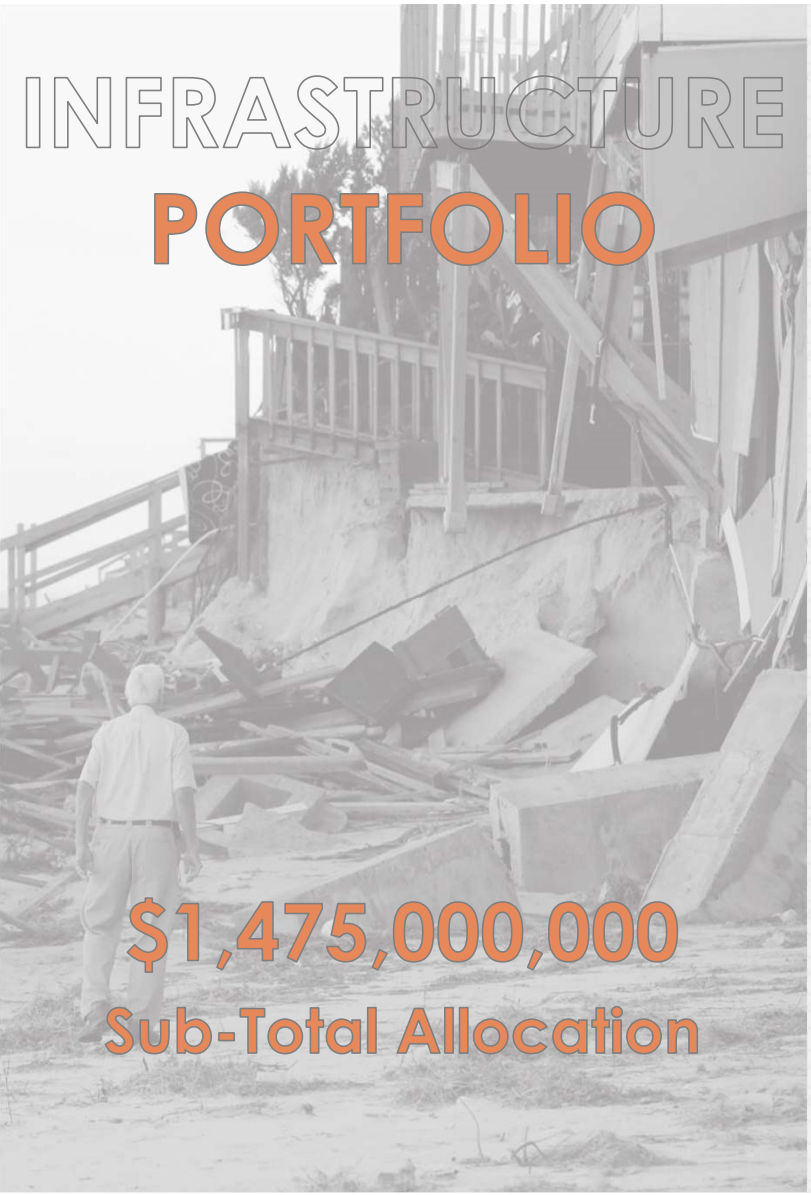
ECONOMIC DEVELOPMENT PORTFOLIO

	Program	Sub-Total
	Small Business Financing	$200,000,000
	Small Business Incubators and Accelerators	$35,000,000
	Workforce Training	$20,000,000
	Construction and Commercial Revolving Loan	$100,000,000
	Strategic Projects & Commercial Development	$150,000,000
	Tourism & Business Marketing	$25,000,000
NEW	Economic Development Investment Portfolio for Growth	$800,000,000
NEW	Re-Grow PR Urban – Rural Agriculture	$100,000,000

*Subject to Change

$1,430,000,000

Sub-Total Allocation



INFRASTRUCTURE PORTFOLIO

$1,475,000,000

Sub-Total Allocation

	Program	Sub-Total
	FEMA Coordination	$1,000,000,000
NEW	Critical Infrastructure Resilience	$400,000,000
NEW	Community Resilience Centers	$75,000,000

**Subject to Change*

MULTI-SECTOR PORTFOLIO

	Program	Sub-Total
NEW	City Revitalization	$1,200,000,000
NEW	Puerto Rico by Design	$700,000,000

$1,900,000,000

Sub-Total Allocation

**Subject to Change*

PLANNING PORTFOLIO

$484,993,850

Sub-Total Allocation

Program	Sub-Total
Whole Community Resilience Planning	$55,000,000
Agency Planning Initiatives	$50,000,000
Economic Recovery Planning	$22,500,000
Home Resilience Innovation Competition	$5,750,000
Programs Planning	$351,743,850

**Subject to Change*

Dennis González PE

Disaster Recovery Deputy Secretary

CDBG-DR Program

Puerto Rico Department of Housing

www.cdbg-dr.pr.gov

infoCDBG@vivienda.pr.gov

www.linkedin.com/in/dgonzalezpr

Thank You

Provide feedback on this session
in the Summit App!

Download the app to your mobile device or go to
event.crowdcompass.com/bbsummit19