New Jersey Energy Resilience Bank

Resiliency and Sustainability as Investment Strategies

Michael Winka
NJBPU Sr Policy Advisor

NASEO Annual Meeting

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Savannah GA

SOURCE: NASA GSFC

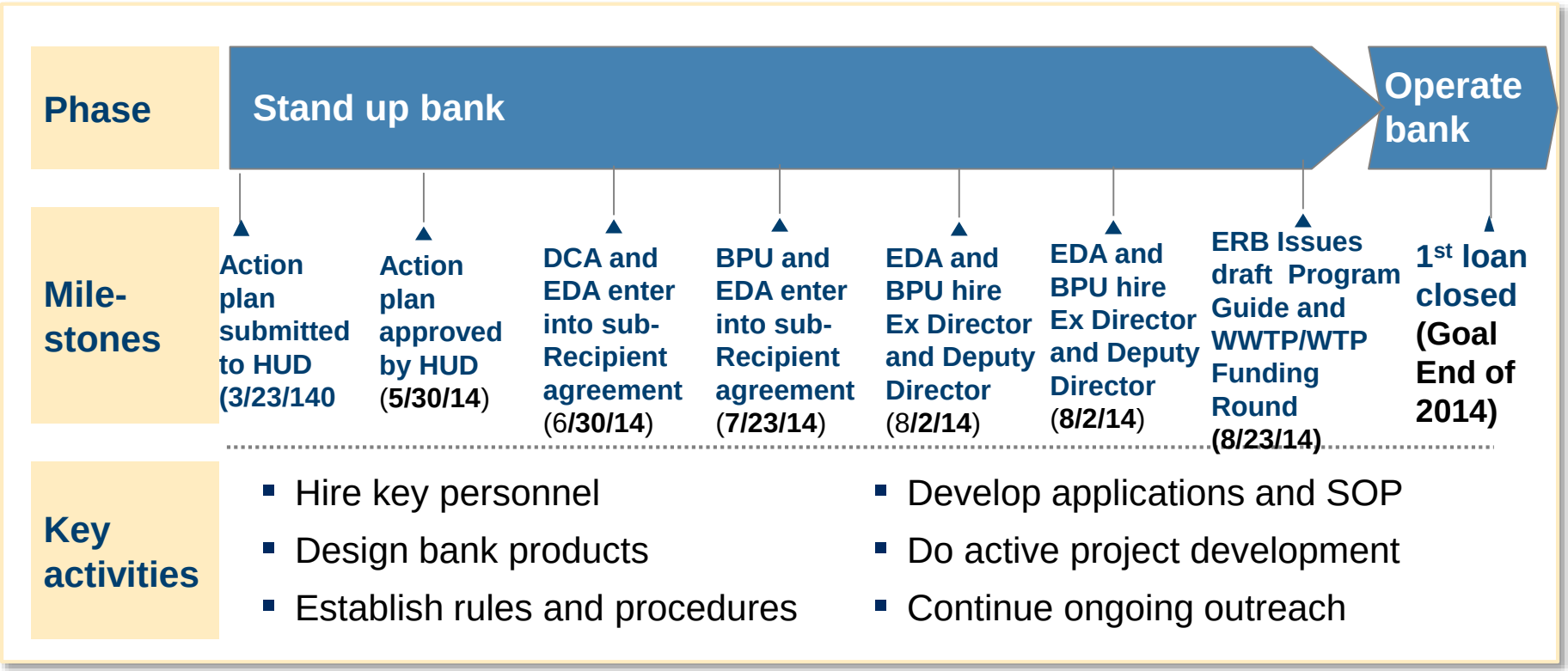
Poles down across the state – Grid down

Size of the NJ CHP Market

New Jersey current DER		
DER	Number of Systems	MW
CHP/FC total	219	2,900
CHP/FC DG	68	309
CHP/FC (renewable)	15	15
PV total	27,866	1,273
PV (grid supply)	115	245
PV behind the meter	27,751	1,028
Total DG	27,834	1,352

Total DG generates approx. 3,534,000 MWh of electricity annual or approx. 4.4% of NJ total electricity
No PV currently can operate in island mode and 78% of new CHP/FC are designed to be islandable.

The timing of the Energy Resilience Bank will be driven by the federal disaster recovery funding milestones



SOURCE: NJ Action Plan Amendment Number 7, working team discussions

The ERB will focus first on public critical facilities

NOT EXHAUSTIVE

Representative sectors that may be eligible for ERB

Water and wastewater

Hospitals and long term care facilities

State colleges and universities

Correctional Institutions

Transportation and Transit

Public housing

Other Tier 1 and Tier 2 Critical Facilities

Community shelters, e.g., schools or town centers

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SOURCE: Source for pictures – Google, Microsoft free images

HUD Requirements (Think ARRA times 3.5)

- No more than 20% can be used outside of the nine most impacted counties
- Most document that the facility was directly of indirectly impacted by Sandy or other qualifying disaster
- Most be HUD eligible facility
  - Public
  - Not for profit
  - For profit that meets the small business definition
- Cannot be used within the Coastal Barrier Resource Area
- Must be installed within two years with up to 2 6 month extension for cause
  - All CDBG-DR funds must be requested and disbursed by Sept 30, 2019
- DER equipment installation must above FEMA base flood elevation level
- Facility must be designed using NOAA Sea Level Rise tools
- Must meet all federal and state requirements as set forth in the subrecipient agreement including
  - Davis Bacon and state prevailing wage
  - Affirmative Action
  - National Environmental Protection Act (NEPA)
  - See general subrecipient agreement

ERB General Requirements

- Equipment must be new and permanently installed
- Separate meters are required for project that include renewable energy projects
- **System efficiency of 65% (LHV) for CHP and 50% (LHV) for fuel cells without heat recovery**
- All inclusive 10 year warranty
- **System must be islandable**
- **System must have blackstart capability**
- System must be designed to provide energy to **all critical loads for 7 days** without liquid fuel delivery to generators
- System must be sized to supply all **critical loads including any sheltering** needs for employees or residents
- **System must be designed with a minimum operating number of hours over the year to have a cost benefit greater than one using the Rutgers DER CBA model.**
- Systems can be sized larger than facility load provided there are sufficient customers for the additional energy.

ERB Scoring Criteria Need 55 points

• LMI National Objectives	20 points
• Readiness to Proceed	
• Ready within one year	10 points
• Ready within two years	5 points
• Most Impacted Communities	
• Serve 3 or more listed Municipalities	20 points
• Serves less than 3 Municipalities	10 point
• HUD Subtotal	55
• Technology Efficiency/Cost Effective	
• Cost Benefits ratio greater than 3	25 points
• Cost Benefit ratio between 2 and 3	15 points
• Cost Benefit ratio between 1 and 2	10 points
• Criticality	10 points
• Microgrid	10 points
• Facility Efficiency	10 points
Total	**110**

SOURCE: Team analysis

CEEEP Model Results – IRR and payback

Scenario Results - Federal Investment Tax Credit (ITC) Benefit for CHP Projects

Date: 06/04/2014

S.No.	Name of the Applicant	Project Capacity and Type	Federal Investment Tax Credit - Considered in CBA Model	IRR	B/C	Incentive ($/kW)	Rebate as a % of Capital Cost
New Applications							
1	MEPT Tower	1400 KW Fuel Cell	YES	3.14%	1.30	1,500	22%
			NO	1.32%	1.21	1,500	
			NO	3.14%	1.34	2,012	29%
2	Solvay	4600 kW Gas Turbine	YES	23.27%	2.41	535	18%
			NO	21.54%	2.32	535	
			NO	23.27%	2.51	719	24%
LS CHP/FC Round 2							
1	Marcal	13857 kW Gas Turbine	YES	16.76%	2.37	217	9%
			NO	15.41%	2.27	217	
			NO	16.76%	2.47	389	16%
2	CMMC	1498 kW Recip Engine	YES	18.06%	2.46	550	16%
			NO	16.61%	2.37	550	
			NO	18.06%	2.57	782	22%
3	Verizon	2000 kW Fuel Cell	YES	6.04%	1.20	1,500	20%
			NO	4.12%	1.11	1,500	
			NO	6.04%	1.23	2,065	27%

The ERB will fund resilient energy systems for critical facilities

NOT EXHAUSTIVE

Eligible DER Resilient technology is …

… distributed generation or other technologies …

Off grid inverter

Battery storage

… that is islandable and capable of blackstart

Eligible DER Resilient energy technology is not…

…emergency backup generators

Stand alone Solar PV Panels

Projects must be technically feasible and meet defined credit and economic criteria

SOURCE: DOE, NREL

Eligible Costs

Feasibility studies are eligible cost only if part of approved financing

Free energy audit provided through NJCEP

Eligible costs

New resilient systems

- Core equipment
- Piping & wiring
- Islanding equipment
- Interconnection
- Fuel pre-treatment (e.g., biogas treatment, or gas compression)
- Installation
- Site work
- Engineering and project management
- Hardening of resilient energy system (e.g. elevation)

Resilient retrofits

- Additional core equipment (e.g., battery storage for existing solar system)
- Islanding equipment
- Interconnection
- Installation
- Engineering, project management, and administration
- Hardening of resilient energy system (e.g. elevation)

Non-eligible costs

Backup generators

- Emergency backup generators
- Onsite fossil fuel storage for emergency generators
- Transfer switches to support backup emergency generators

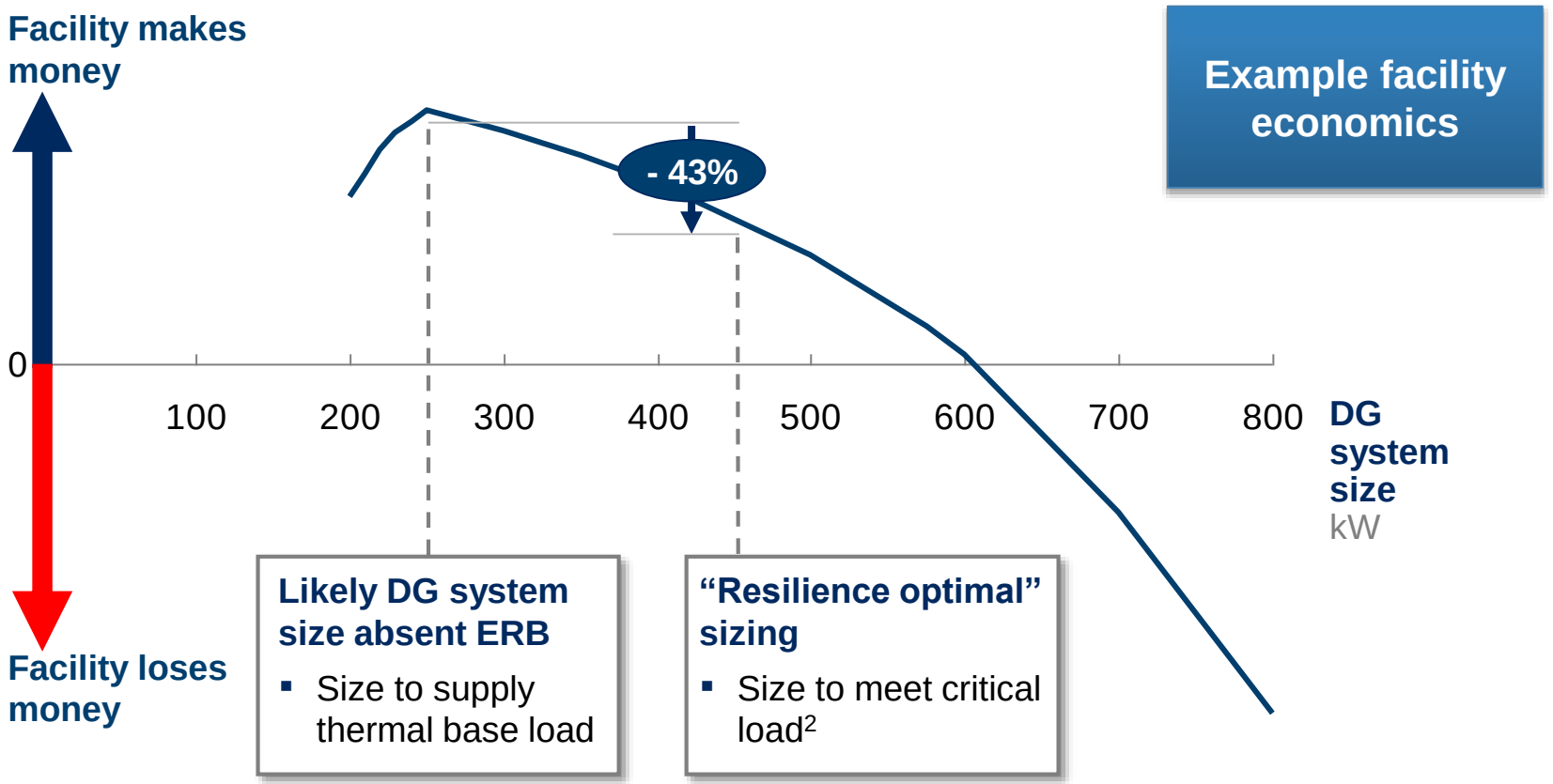
Other non-energy hardening

- Flood walls
- Elevation

Absent ERB participation, most facilities would focus on financing DG systems that are less than fully resilient

Relationship between DG system size and benefits to facility

Representative distributed generation economics at NJ critical facility

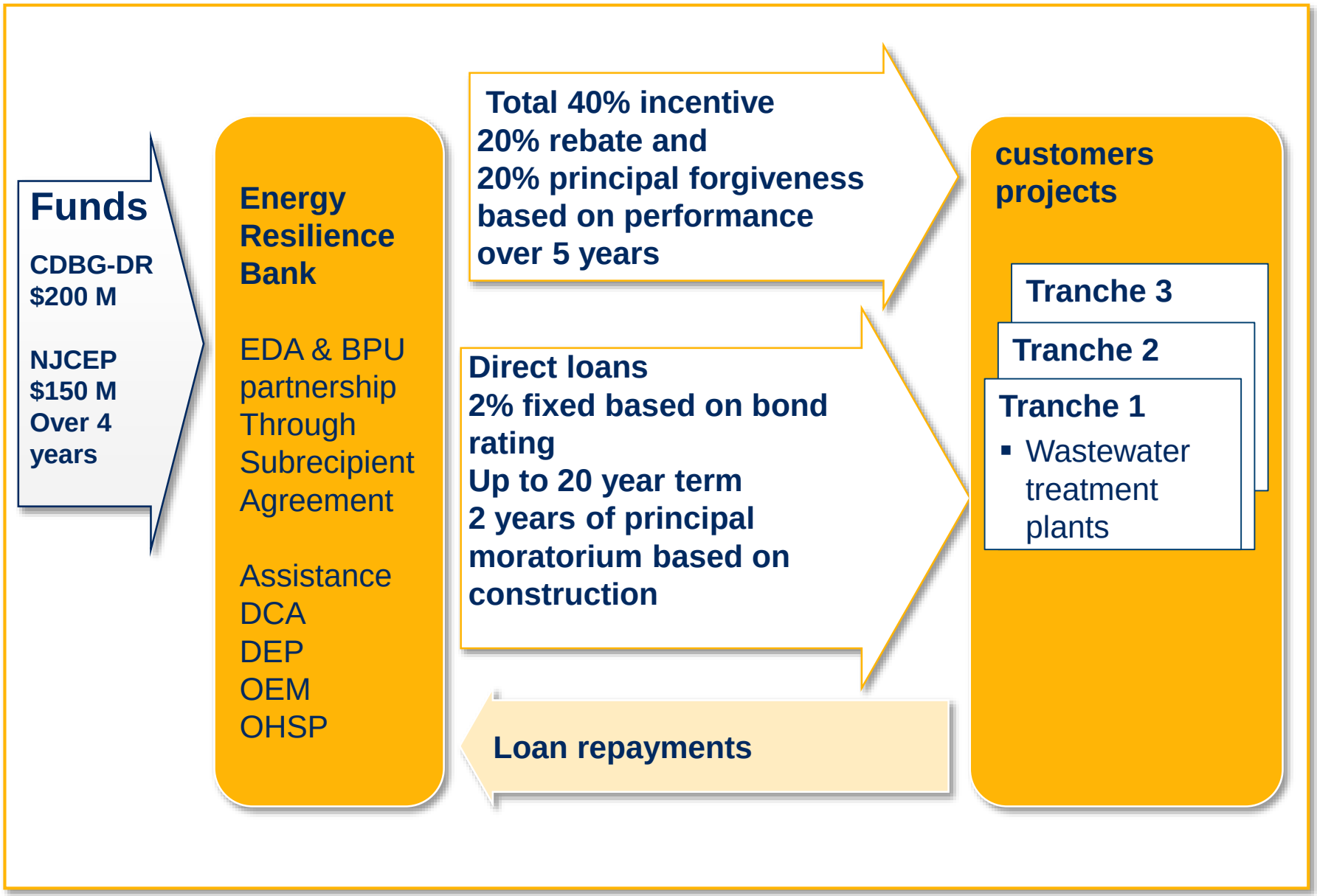


1 Defined as net present cost (NPC) of grid supplied system - NPC of DG system; key assumptions: $0.11/kWh electricity rate, $0.3/m3 natural gas rate, 85% availability, 15 year project life, 8% discount rate; includes existing state incentives, no federal incentives, no biogas RECs

2 The power needed to maintain mission critical operations in the event of a grid failure

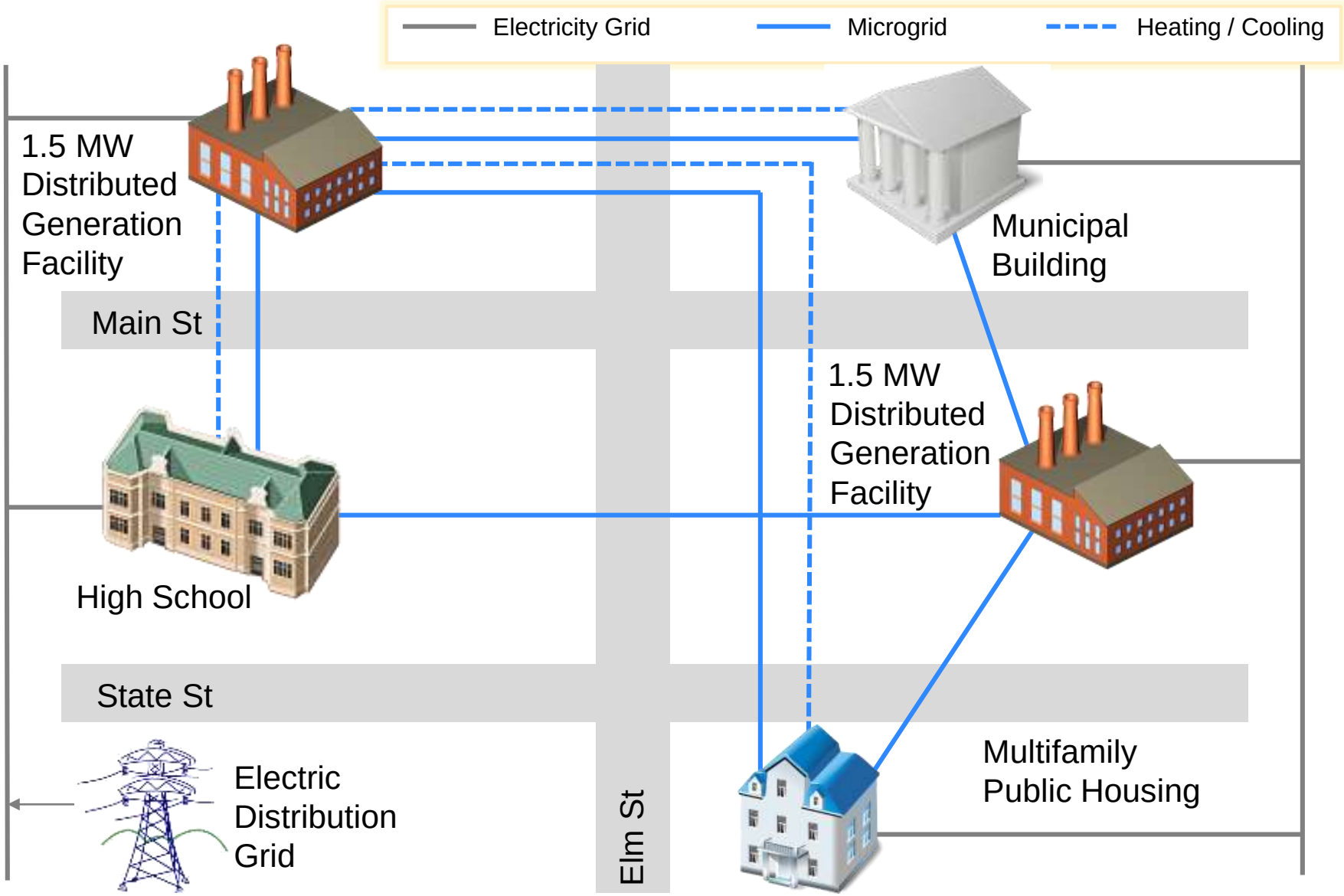
SOURCE: HOMER, OCUA, facility interviews, team analysis

Snapshot of preliminary bank design



SOURCE: NJ BPU and NJ EDA

Eligible DER Technology is a DER MICROGRID

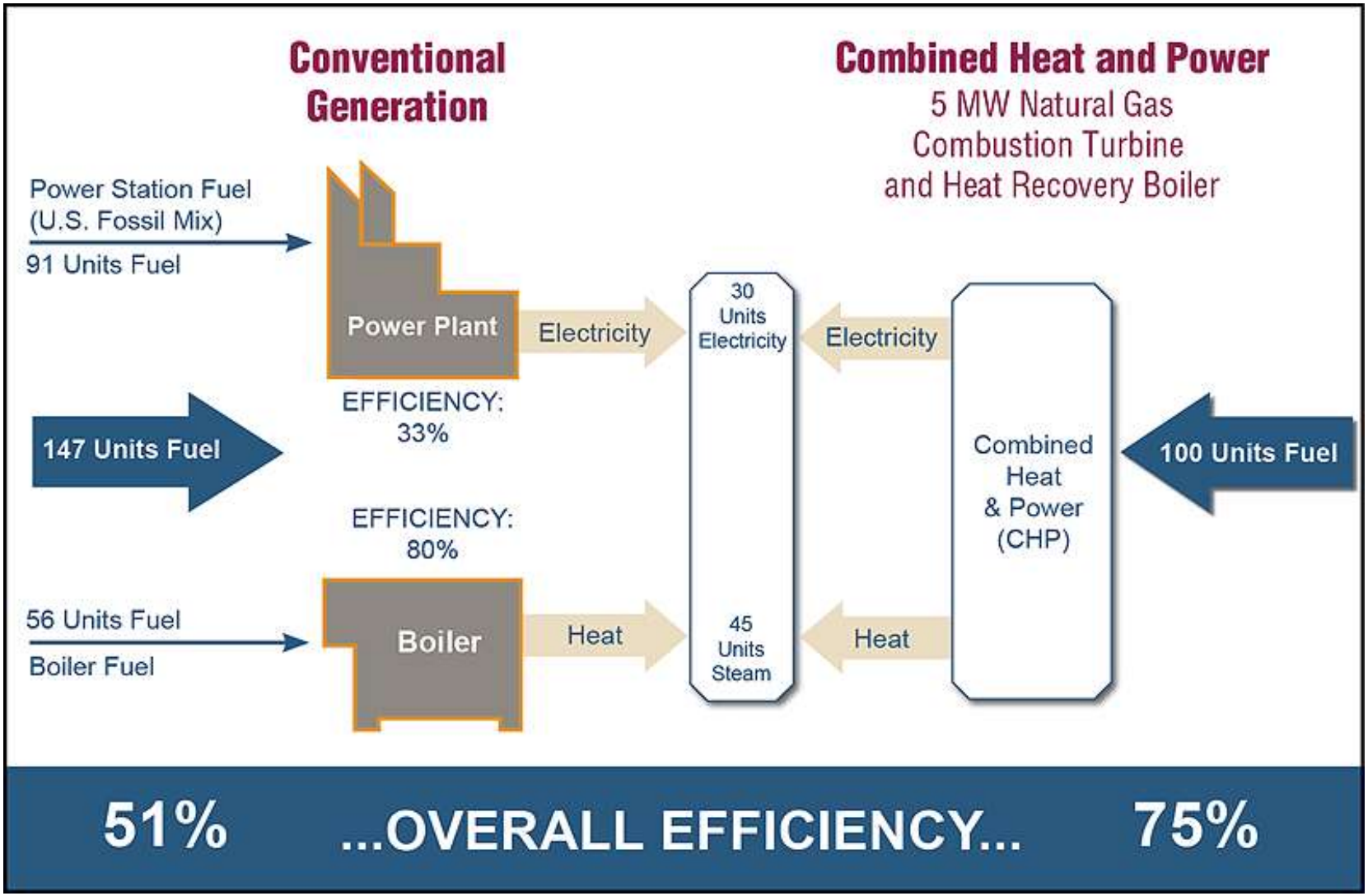


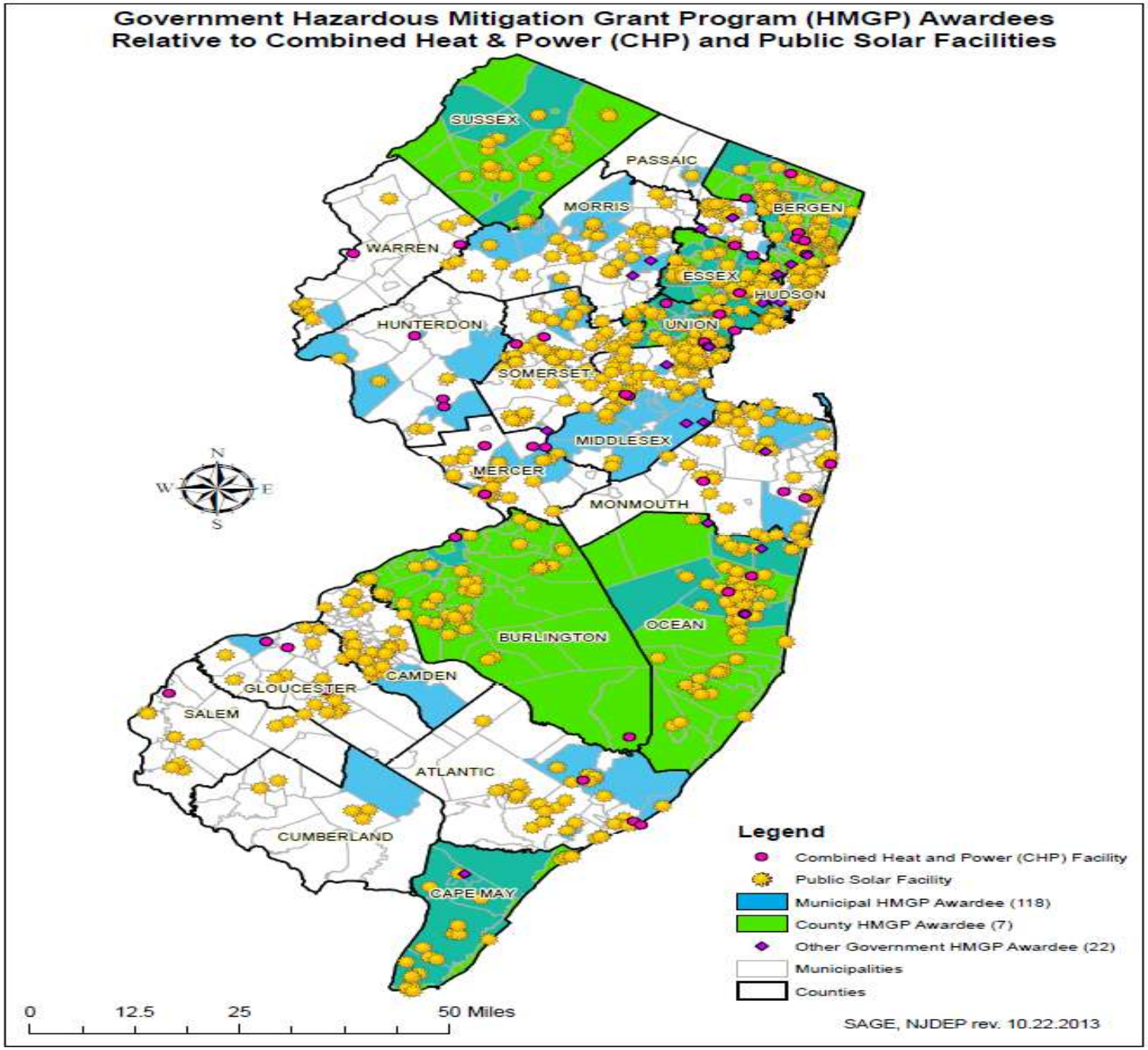
New Jersey Microgrid MOUs

New Jersey Transit Grid
USDOE - NJT – NJBPU
Status: phase 1 prelim report completed by Sandia
Phase 2 detailed technical/economic evaluation
NJT filed for a FTA competitive grant

Hoboken
USDOE - NJT – PSE&G - NJBPU
Status phase 1 feasibility report completed
by Sandia

Benefits of Distributed Combined Heat and Power





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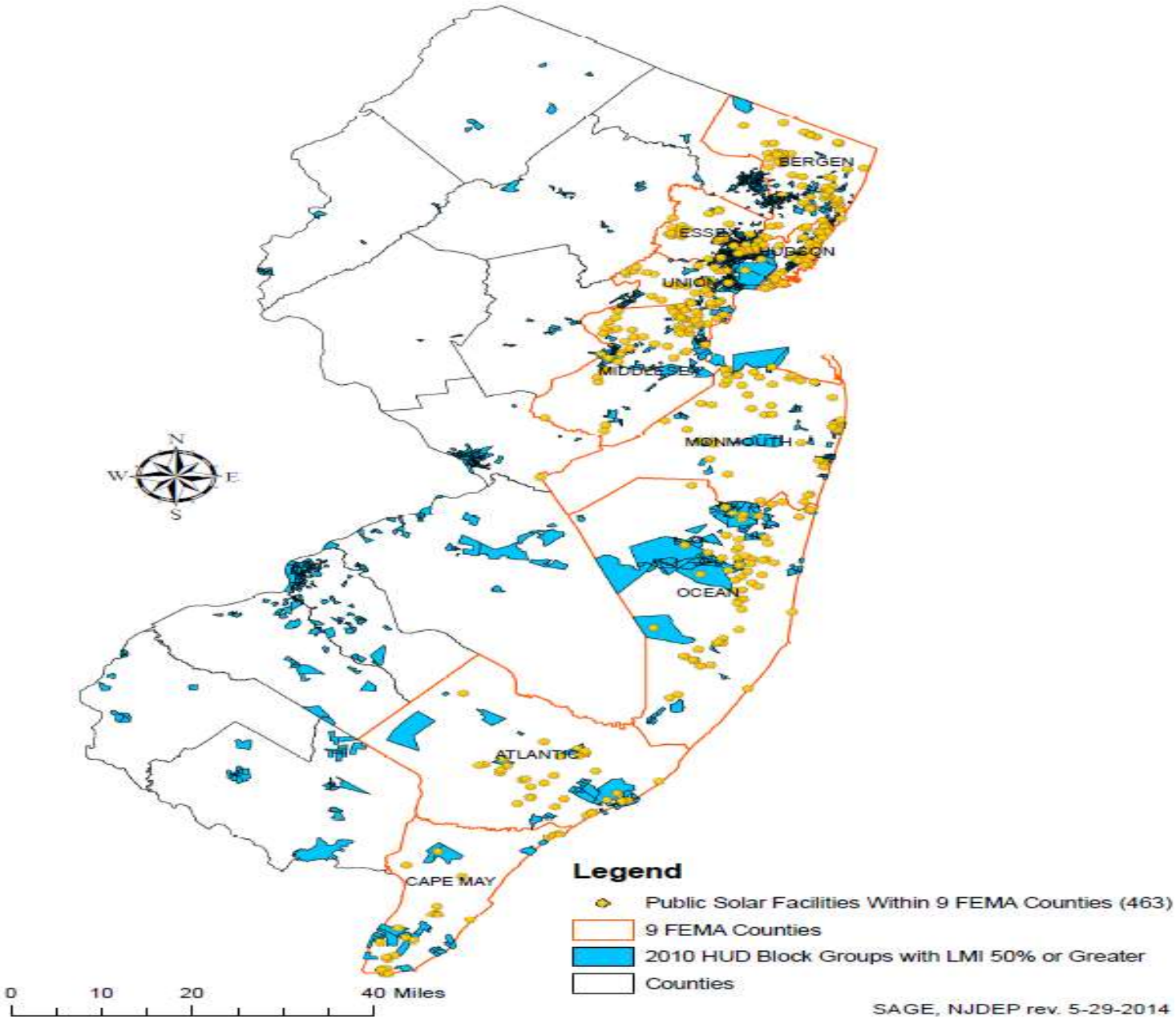

NASEO Guidance

STATE ENERGY PLANNING G U I D E L I N E S

A Guide to Develop a Comprehensive State Energy Plan
Plus Supplemental Policy and Program Options

State Energy Assurance Guidelines

Version 3.1
December 2009

Combined Heat and Power: A Resource Guide for State Energy Officials

2013

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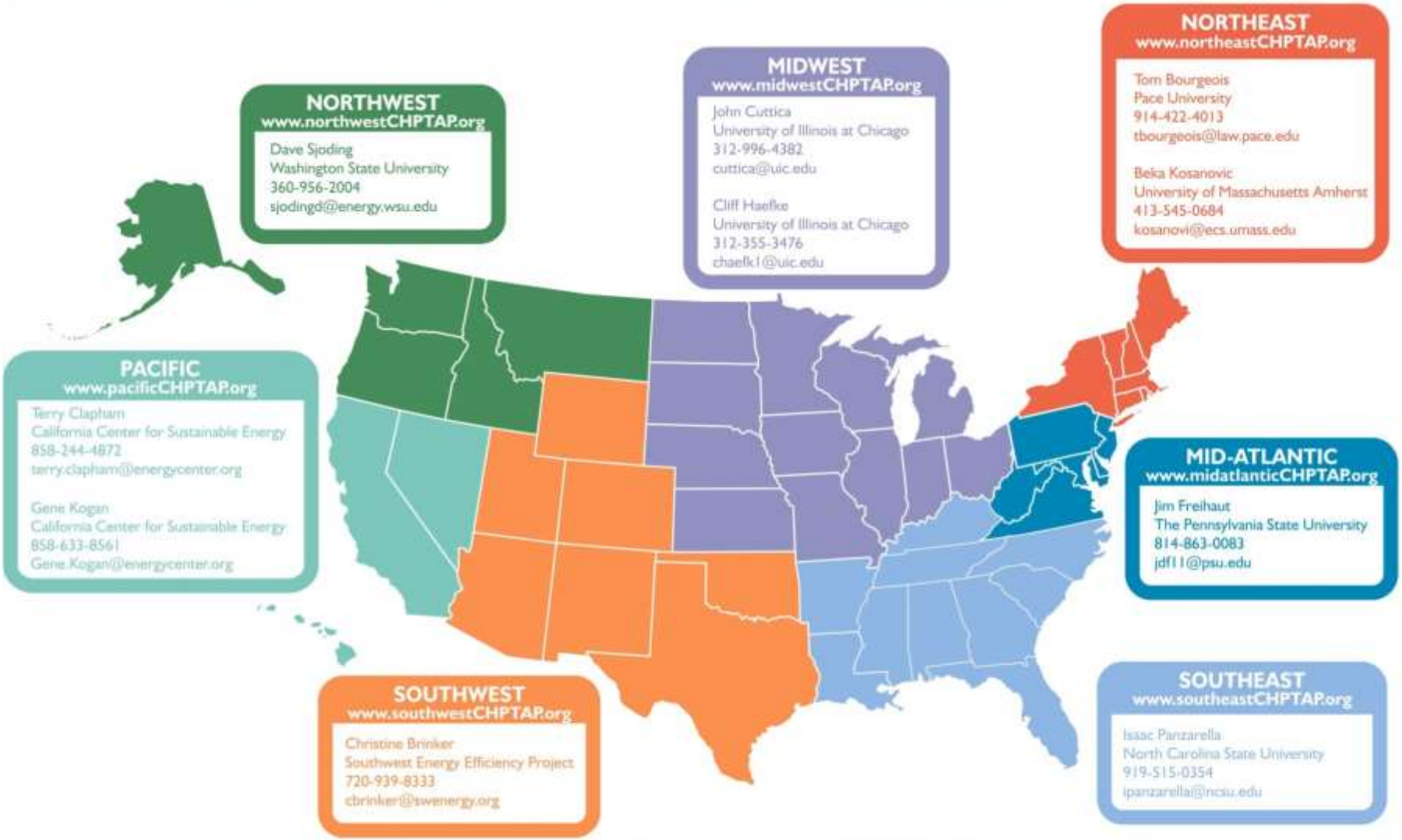
DOE CHP Technical Assistance Partnerships (CHP TAPs)



NORTHWEST
www.northwestCHPTAP.org

Dave Sjoding
Washington State University
360-956-2004
sjodingd@energy.wsu.edu

MIDWEST
www.midwestCHPTAP.org

John Cuttica
University of Illinois at Chicago
312-996-4382
cuttica@uic.edu

Cliff Haefke
University of Illinois at Chicago
312-355-3476
chaefk1@uic.edu

NORTHEAST
www.northeastCHPTAP.org

Tom Bourgeois
Pace University
914-422-4013
tbourgeois@law.pace.edu

Beka Kosanovic
University of Massachusetts Amherst
413-545-0684
kosanovi@ecs.umass.edu

PACIFIC
www.pacificCHPTAP.org

Terry Clapham
California Center for Sustainable Energy
858-244-4872
terry.clapham@energycenter.org

Gene Kogan
California Center for Sustainable Energy
858-633-8561
Gene.Kogan@energycenter.org

MID-ATLANTIC
www.midatlanticCHPTAP.org

Jim Freihaut
The Pennsylvania State University
814-863-0083
jdf11@psu.edu

SOUTHWEST
www.southwestCHPTAP.org

Christine Brinker
Southwest Energy Efficiency Project
720-939-8333
cbrinker@swenergy.org

SOUTHEAST
www.southeastCHPTAP.org

Isaac Panzarella
North Carolina State University
919-515-0354
ipanzarella@ncsu.edu

DOE CHP Technical Assistance Partnerships (TAPs): Program Contacts

Claudia Tighe
CHP Deployment Lead
Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy
Phone: 202-287-1899
E-mail: claudia.tighe@ee.doe.gov

Jamey Evans
Project Officer, Golden Field Office
Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy
Phone: 720-356-1536
E-mail: jamey.evans@go.doe.gov

Patti Welesko Garland
CHP Technical Support Coordinator
Oak Ridge National Laboratory
Supporting, Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy
Phone: 202-586-3753
E-mail: garlandpw@ornl.gov

Ted Bronson
DOE CHP TAPs Coordinator
Power Equipment Associates
Supporting, Office of Energy Efficiency and Renewable Energy
Phone: 630-248-8778
E-mail: tlbronsonpea@aol.com

Federal Labs Modeling tools

HOMER
Evaluate design options for both off-grid and grid-connected power systems for remote, stand-alone, and distributed generation applications. HOMER is licensed to and maintained by Homer Energy.

Was NREL

LBL

The **Distributed Energy Resources Customer Adoption Model (DER-CAM)** is an economic and environmental model of customer DER adoption. The objective of the model is to minimize the cost of operating on-site generation and combined heat and power (CHP) systems

NJBPU – Rutgers

Center for Energy Economic and Environment Policy
DER Cost Benefit Model
Includes the value of loss load

Sandia Labs News Releases

SPIDERS microgrid project secures military installations

Super Storm Sandy October 29, 2012

Any Questions ??

Michael.Winka @bpu.state.nj.us

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