

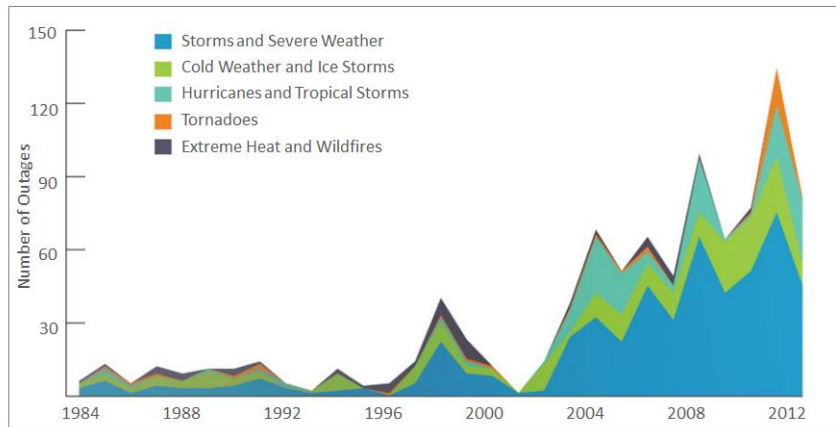
Key Sections of the Report

- ▶ **Resiliency and Microgrids in Maryland**
 - ▶ Introduction to microgrids and resiliency in Maryland
- ▶ **Technical and Financial Opportunities**
 - ▶ Benefits, opportunities of microgrids and distributed energy resources (DER)
 - ▶ Recommendations: regulatory review, incentives
- ▶ **Legal and Regulatory Framework**
 - ▶ What kinds of microgrids should Maryland pursue?
 - ▶ Do our laws allow us to deploy these types of systems?
 - ▶ What is an appropriate legal framework for deployment?

▶ 2

Resiliency and Microgrids in Maryland

Outages of More than 50,000 Customers Caused by Extreme Weather

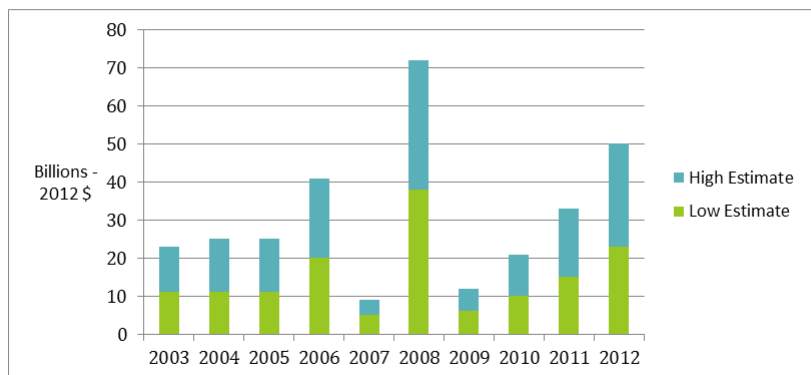


Source: <http://www.climatecentral.org/news/weather-related-blackouts-doubled-since-2003-report-17281>

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Resiliency and Microgrids in Maryland

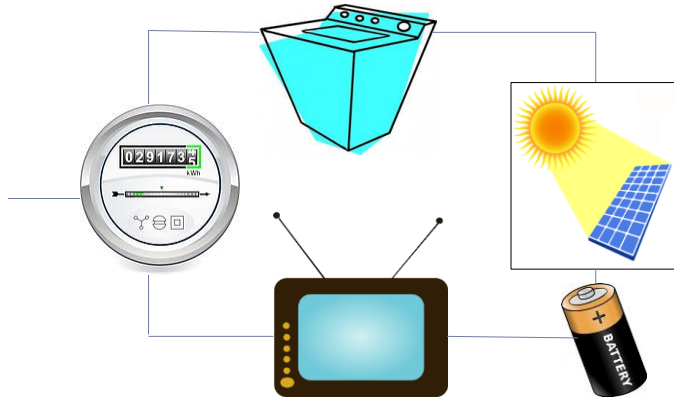
Estimated Cost of US Weather Related Outages (Billions – 2012 \$)



Source: http://energy.gov/sites/prod/files/2013/08/f2/Grid%20Resiliency%20Report_FINAL.pdf

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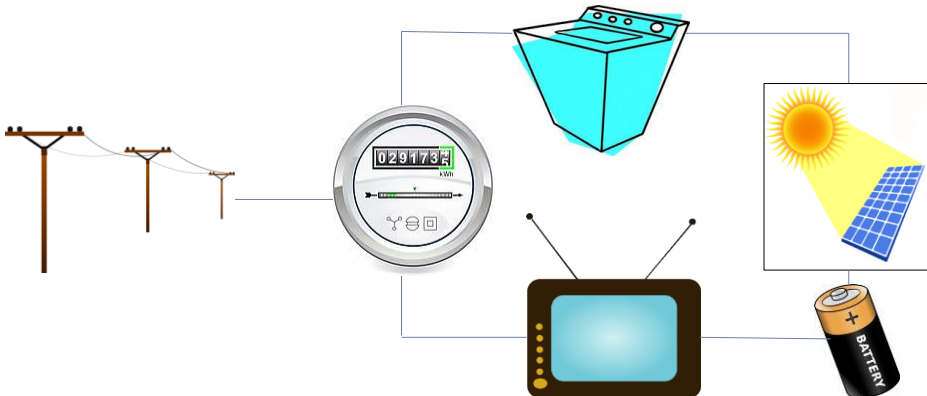
What is a microgrid?



“A collection of interconnected loads and distributed generation within a clearly defined electrical boundary...”

▶ 5

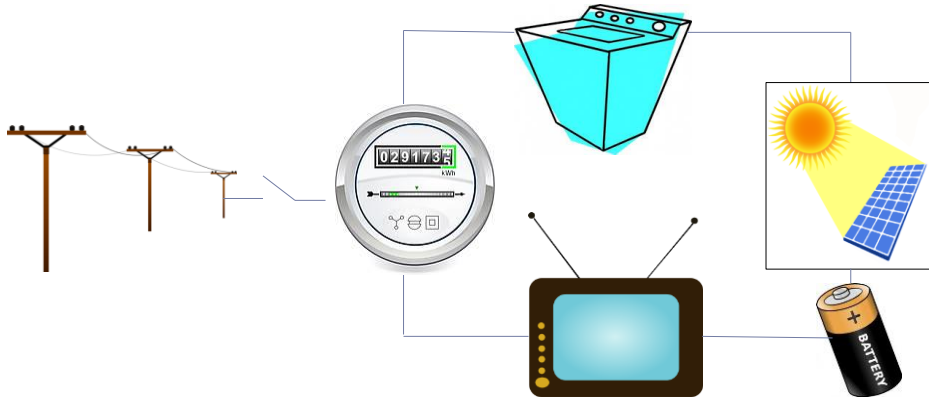
What is a microgrid?



▶ *“A collection of interconnected loads and distributed generation within a clearly defined electrical boundary that can act as a single controllable entity with respect to the grid...”*

▶ 6

What is a microgrid?

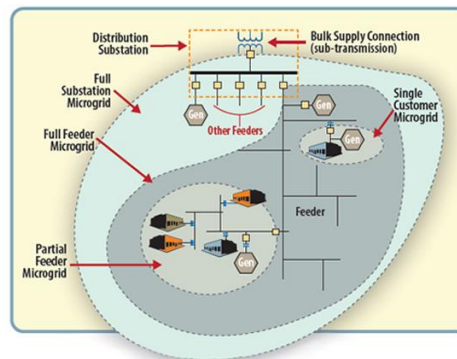


“...and disconnect from the grid to enable it to operate in both grid-connected or island mode”

▶ 7

The Next Step: Multiple Customers and Properties

- ▶ From a technical and regulatory standpoint, microgrids servicing single customers on single properties are feasible – and exist – in Maryland today.
- ▶ The Task Force looked to the next step in deployment: systems that cross public rights of way to serve multiple customers.



▶ 8

What's New: Energy System Controls



- ▶ Micro EMS, smart inverters, intelligent distributed controllers, etc.
 - ▶ Open energy markets to MGs, maximize value
 - ▶ Ensure reliable, high-quality energy (voltage, freq, etc)

▶ 9

What's New: Energy Storage

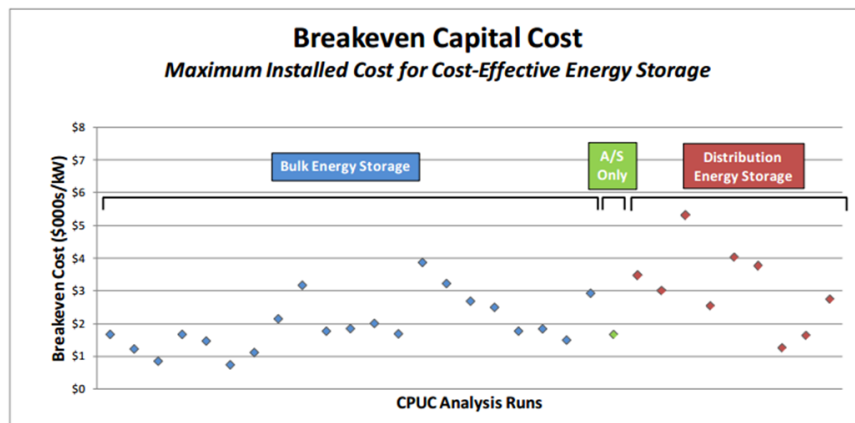


Figure ES-3
Energy Storage Breakeven Capital Cost of All Analysis Runs

Source: http://www.cpuc.ca.gov/NR/rdonlyres/1110403D-85B2-4FDB-B927-5F2EE9507FCA/0/Storage_CostEffectivenessReport_EPRI.pdf

▶ 10

Public Purpose Microgrids

Metrorail
Bus station
NOAA



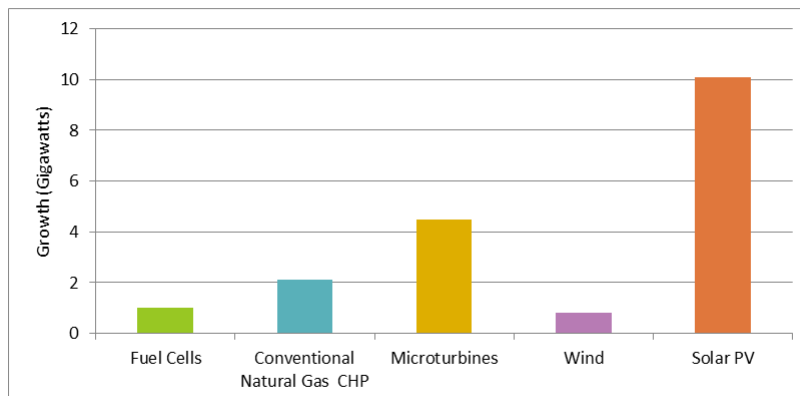
Grocery store
MoCo government
Hardware store
Restaurants
Movie theater

- Serve critical community assets across multiple properties
- Community centers, commercial hubs, and emergency services

▶ 11

Challenges of Renewable Deployment

Commercial Sector Additions to Distributed Generation Capacity (2011 – 2040)



Source: http://www.eia.gov/forecasts/aeo/MT_commercialdemand.cfm

▶ 12

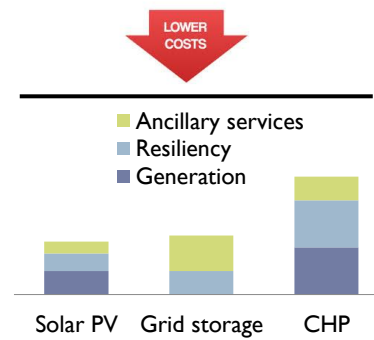
Distributed Energy Resources: A Tool for the Utility Grid

- ▶ Emergency islanding
- ▶ Public purpose MGs
- ▶ Consumer choice
- ▶ Efficiency
- ▶ Dispatchable capacity
- ▶ Line loss
- ▶ RE integration
- ▶ Improved utility response to outage
- ▶ Demand response
- ▶ Frequency regulation
- ▶ Ramping
- ▶ Deferred upgrades of transmission and distribution infrastructure

▶ 13

Strategies for Deployment of DER

- ▶ Lower cost/barriers to Distributed Energy Resources
- ▶ Fairly compensate DER for next generation of energy service (stackable benefits)
- ▶ Safely and affordably integrate DER into the grid



▶ 14

Lower Cost Barriers to DER

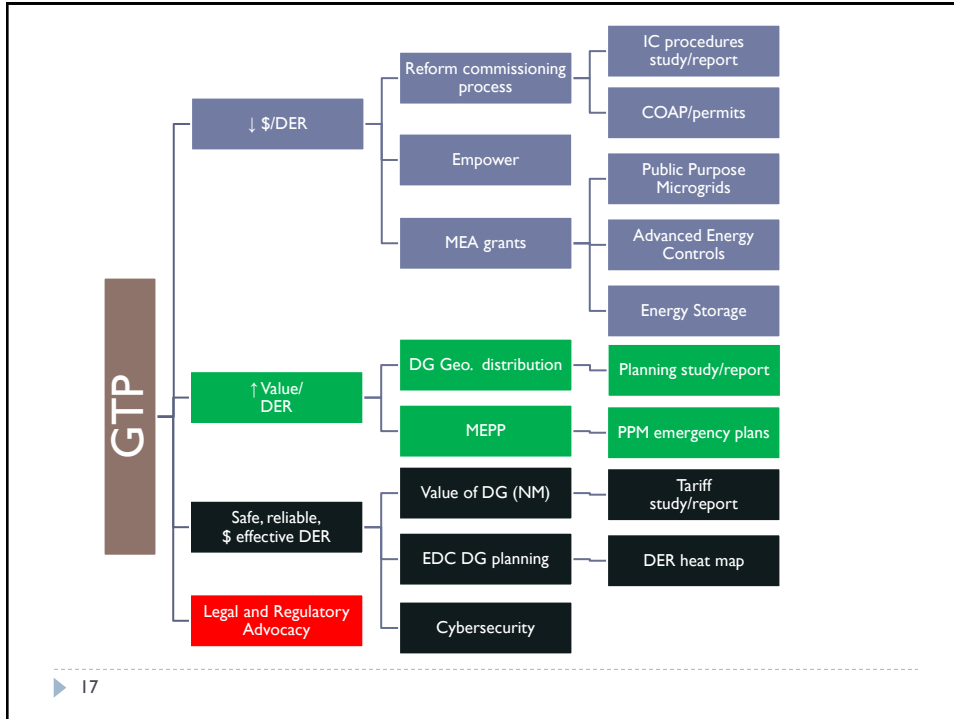
- ▶ Review the process of interconnection, permitting, and commissioning
- ▶ Help developers to identify the most valuable locations for DER on the grid
- ▶ Investigate the value of DER to the grid and how it is compensated (net metering)
- ▶ Help EDCs incorporate DER into planning process
- ▶ Incentives:
 - ▶ Energy system controls
 - ▶ Storage

▶ 15

Stacking Benefits of DER

- ▶ **Public Purpose Microgrids**
 - ▶ How can they best serve the most people?
- ▶ **Maximum leverage of energy markets**
 - ▶ How can DER work within FERC rulings and PJM?
- ▶ **Engagement: Regulatory and market admin.**
 - ▶ How does the grid and energy markets need to change to fully leverage DER

▶ 16



↓ Cost of DER: Reform of Commissioning Process

▶ Interconnection

- ▶ As penetration of DER increases, substations must be upgraded to absorb that intermittent power
- ▶ Costs to upgrade substations are left to the last customer
- ▶ Upgrades can cost millions, preventing projects from happening at a certain point
- ▶ How can we fairly distribute these costs?



↑ Value of DER: Incorporate MGs into MEPP

▶ Maryland Emergency Preparedness Program

- ▶ Plans local governments set up in case of emergencies
- ▶ As we become more dependent on electronics, how to use DER as assets?
- ▶ How can planning improve our resilience?
- ▶ Where should Marylanders go in an emergency?
- ▶ How can they be deployed in intelligent ways?



▶ 19

Get involved!

- ▶ Stakeholder feedback on the report:
 - ▶ Comprehensive review week of 7/21/14
- ▶ Engagement with PSC, other State entities
- ▶ Comprehensive policy and regulatory review
 - ▶ How to better align the interests of utilities and ratepayers?
 - ▶ How can we enable these projects to be economic?
- ▶ Collaboration with local governments
 - ▶ How to leverage public purpose microgrids in an emergency?
 - ▶ **How can we streamline permitting/installation?**

▶ 20



Maryland

RESILIENCY THROUGH
MICROGRIDS TASK FORCE

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Thank you!
