



Anbaric Distribution

Introducing the Project Finance model to
Microgrids and Power Distribution

Presentation to NESEA

Building Energy 2014

Anbaric: Since 1999

Transmission

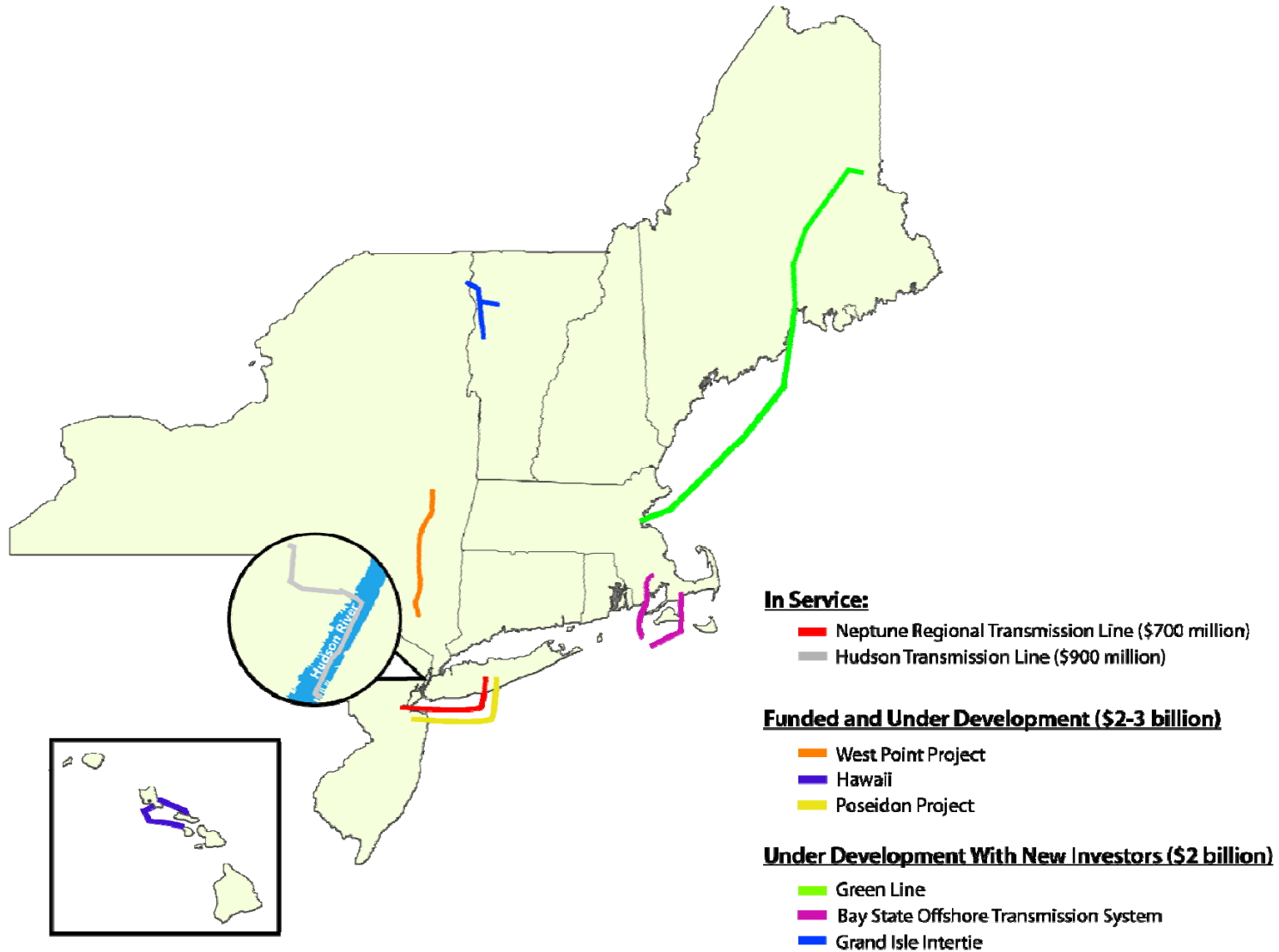
- Incubate and develop innovative transmission projects that integrate markets, reduce congestion, and bring renewables to load.
- Specialize in HVDC and subsea applications.
- Rationalize the infrastructure investment process
- 2 lines developed, 2 more funded, 5 in US pipeline.

Distribution

- Cofounded Viridity Energy in 2008
- Developing independent, economic Microgrids and distributed energy systems in the United States

In both transmission and Microgrids, Anbaric applies innovative investment paradigms to create “annuity-like” returns for direct and patient investors.

Anbaric Transmission Portfolio




Summary

- Independent project finance revolutionized the development of generating plants, then power transmission projects, and now the electric distribution space via project development of distributed generation, CHP, and microgrids.
 - Project finance can bring a new source of integrated investment to *Distribution Automation, Distributed Generation, and Building Efficiency*
 - Independent project development can create synergies across markets and regulatory, ownership, and metering boundaries
 - Anbaric Distribution is organizing several financial and industrial consortia to develop large microgrid projects in the \$50-\$500M range
 - Examples of such projects are urban distribution projects in the NYC area, one in Boston, and a data center project in Colorado

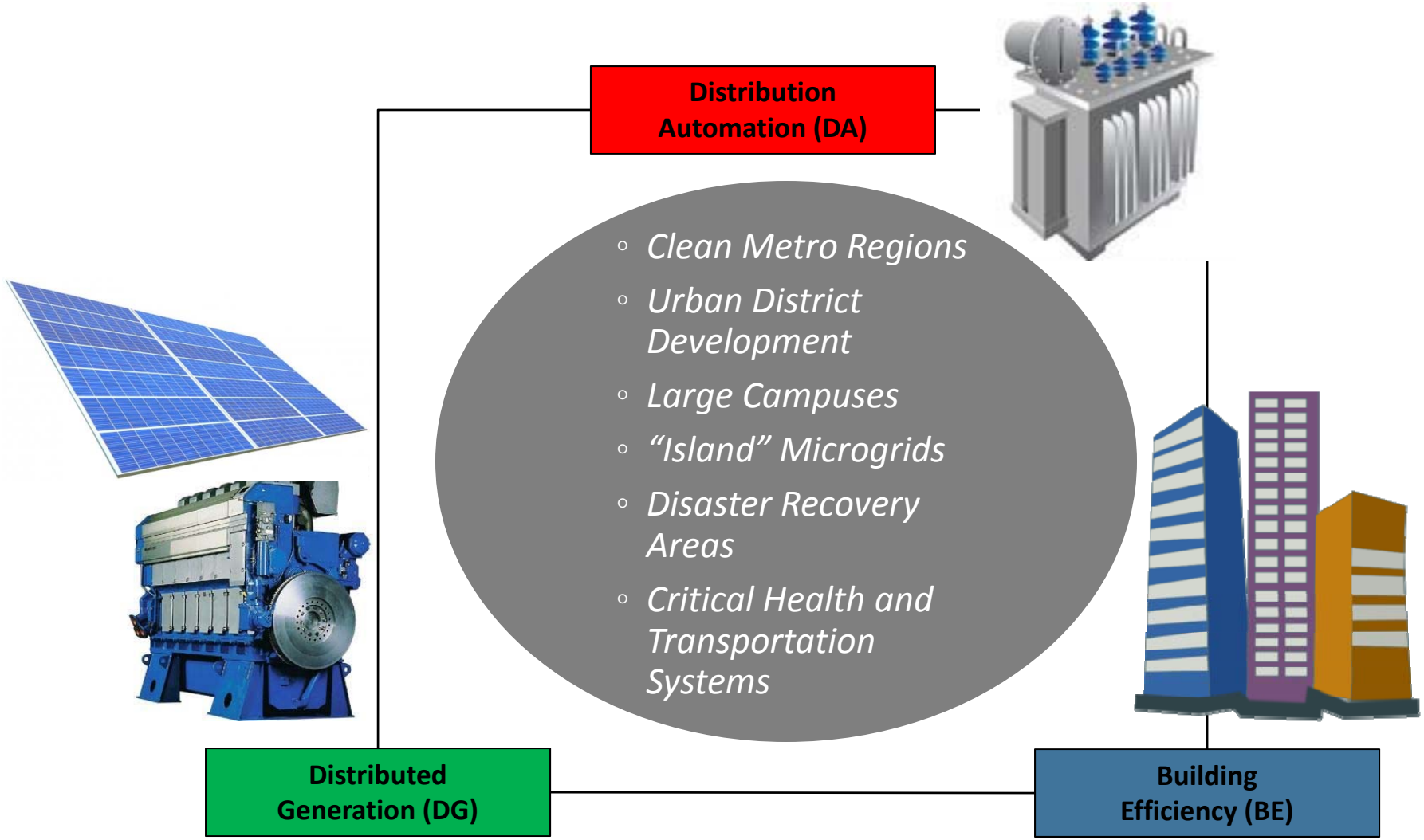
Independent Project Development in the Distribution Sector

	GENERATION	TRANSMISSION	DISTRIBUTION
<u>Start of Period</u>	◦ 1980s / 1990s →	◦ 2000s →	◦ 2010s
<u>New Category</u>	◦ Independent Power Producers (IPPs)	◦ Independent Transmission Companies (ITCs)	◦ “New Distribution-Level Infrastructure” (NDLI)
<u>New FERC Regulations</u>	◦ PURPA ('78) ◦ Order 888/890 ('96)	◦ Order 1000 ◦ (removal of ROFR)	◦ Order 383 (CHP) ◦ Order 719/745 (DR)
<u>New Companies</u>	◦ Calpine ◦ Reliant ◦ Dynegy ◦ Constellation ◦ Many others	◦ Anbaric Transmission ◦ LS Power ◦ ITC ◦ TransBay Cable ◦ Many others	◦ Anbaric Distribution ◦ Microgrid Developers ◦ Solar Financiers ◦ Building/DG ESCOs (Siemens)

Three new, large markets in electric distribution require substantial infrastructure investment

	Distribution Automation (DA)	Distributed Generation (DG)	Building Efficiency (BE)
US Market Size 2010-2020	<ul style="list-style-type: none"> ◦ \$18 Bn. p/a (IMS Research, 2011) 	<ul style="list-style-type: none"> ◦ \$22 Bn. p/a (BCC Research, 2011) 	<ul style="list-style-type: none"> ◦ \$29 Bn. p/a (Deutsche Bank, 2012)
Sub-categories	<ul style="list-style-type: none"> ◦ Substation Automation ◦ Sensors & Controls ◦ Grid Communications ◦ Smart Metering ◦ Data Analysis 	<ul style="list-style-type: none"> ◦ Combined Heat and Power ◦ Solar and Wind ◦ Biomass ◦ Battery Storage ◦ Stand-by generation 	<ul style="list-style-type: none"> ◦ Building Controls ◦ Mechanical ◦ HVAC ◦ Lighting
Market Drivers	<ul style="list-style-type: none"> ◦ Resiliency ◦ Cost reduction ◦ Power quality requirements ◦ DG integration 	<ul style="list-style-type: none"> ◦ Low natural gas prices ◦ Environmental performance ◦ Autonomy / Control ◦ Policy and regulations 	<ul style="list-style-type: none"> ◦ Efficient technologies ◦ New operational models (demand response, microgrid) ◦ Cost reduction
	 <p style="text-align: center;">← In front of the utility meter Behind the utility meter →</p>		

New Distribution-Level Infrastructure (NDLI) will be most valuable where distribution markets converge



Isolated Distribution Development Creates Inefficiencies

- Supply (Distributed Generation), Demand (Building Controls and Efficiency), and Distribution (mainly Automation of substations) are currently developed in isolation at the medium- and low-voltage level
- The current design and economics for each of the three components is determined by the high-voltage generation, transmission, and system operation markets and regulations
- Abundant inefficiencies result due to missed synergies at the distribution level. Examples:
 - When Automated Demand Response systems and building lighting and HVAC controls are designed to interact with the ISO markets, synergies in the integration of CHP and solar and improvement of distribution capacity and performance are missed
 - When new solar and CHP are built to feed into overall supply, important benefits for, and risks to, the distribution grid are ignored, and have to be adjusted by subsequent incremental regulations
 - When utilities implement distribution automation measures, installing communications systems as well as sensors and controls and Volt/Var optimizers in substations and transformers, the needs as well as the benefits from DG and BE are ignored
- All customer stakeholders (consumers, businesses, local government, utilities) would benefit from *integrated* development of these resources

Utility investment in this space is held back by numerous obstacles

1. Lack of a clear mandate

- The utility model does not customize behind the meter or design service levels for specific customer groups
- Many utilities have lost the right to build generation

2. Limited access to innovative resources

- Some distribution utilities have difficulties attracting and retaining innovative talent

3. Slow regulatory approval

- Disagreements concerning the rate base and performance criteria re-appear at each new rate adjustment application
- Regulators are often ill-equipped to assess and determine new technologies

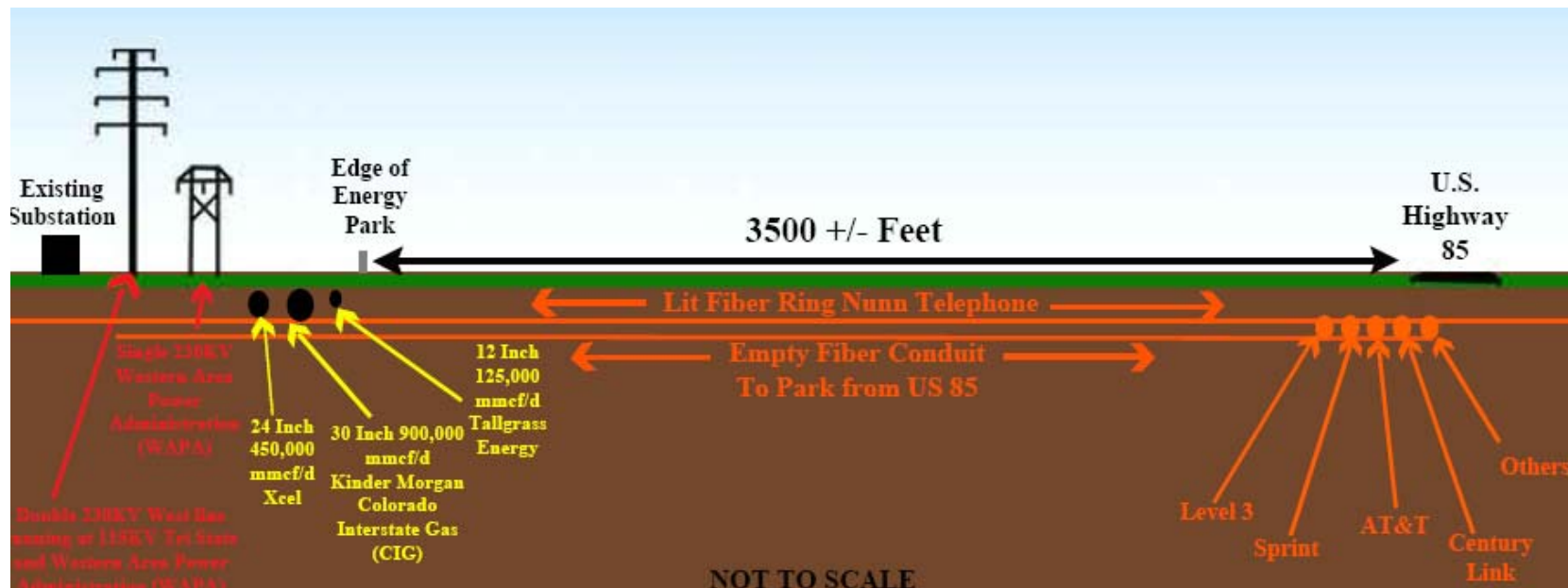
4. Capital constraints

- Many US distribution utilities face a declining rate base and rising costs
- Capital is used for maintenance of an aged grid infrastructure rather than integration of new markets

Anbaric's New Distribution Consortia

- Anbaric *Distribution* brings the model of independent development of “bespoke” energy infrastructure to the electric distribution space
 - We are forming development consortia with financial and industrial partners who are looking to develop a substantial amount of infrastructure projects in the distribution space in the coming 5 years. Three early potential projects include:
 1. **The Niobrara Microgrid and Data Center:** a world-class, **250MW**, \$450 million Microgrid providing up to “five nines (99.999%)” reliability to a group of large scale data centers on the same site.
 2. **The Far Rockaway Microgrid:** development of a large **100MW** coastal distribution development in Queens that would be part of a local economic and environmental restoration effort post superstorm Sandy.
 3. **The Boston Waterfront Ecodistrict:** The City of Boston desires to create an “Ecodistrict” (see <http://ecodistricts.org/> for more about this urban development concept).... a greenfield microgrid should be part of that development. Expected size is approximately **100MW**

The Niobrara Site Offers Unrivaled Access to Electricity, Natural Gas, Fiber Lines, and Water



Existing Electricity

- Existing substation for ramping data center until microgrid comes online
- One double and two single 230 kV transmission lines

Natural Gas

- Three existing gas lines onsite
- 5 miles from Cheyenne gas hub (transports 5% of all US gas)

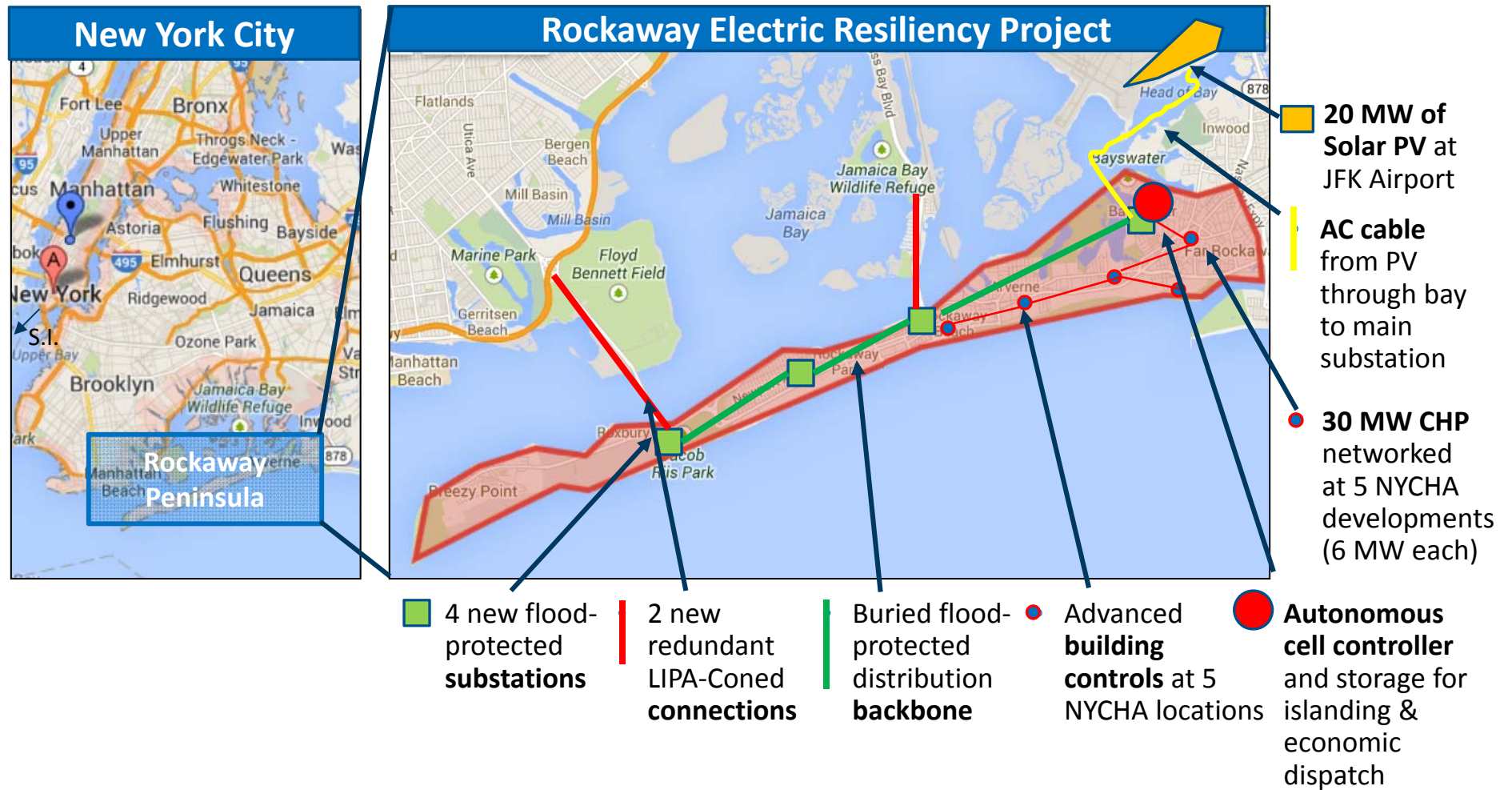
Fiber-Optic

- Redundant connections to 4 main US-85 fiber lines

Water

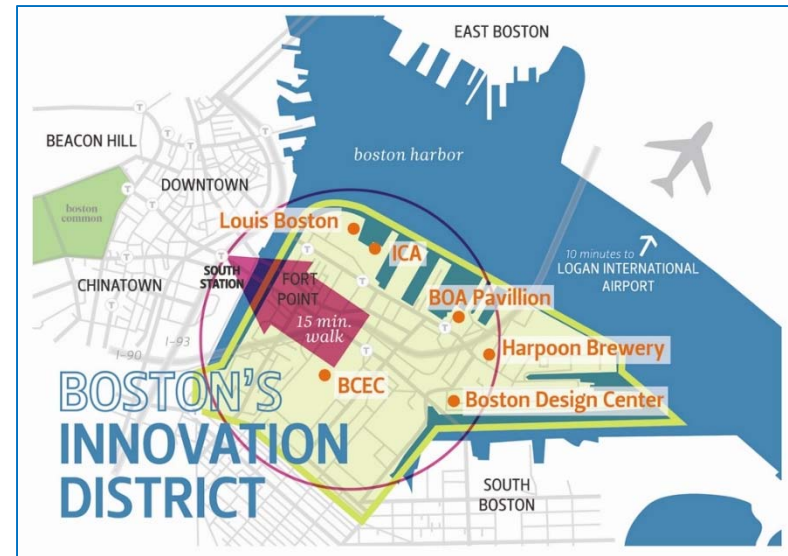
- Non-tributary water permits secured

Rockaway Electric Resiliency (RER) in NYC



The Boston Innovation District

- The Innovation District is former Mayor Thomas M. Menino's initiative to transform 1,000 acres of the South Boston waterfront into an urban environment that fosters innovation, collaboration, and entrepreneurship. From a tech meetup at a coworking space to an art exhibition opening, to the launch of a new start-up or a special chef's event at a local restaurant, the Innovation District is expanding quickly.
- The Innovation District is nestled between Boston's transportation gateways: abutting historic Boston Harbor, adjacent to Logan International Airport, and at the nexus of two major interstate highways. It also contains the largest tract of underdeveloped land in the city of Boston, and is an area with opportunity for growth, a strong existing knowledge base, and the ideal location for producing new ideas, new services and new products.
- In the three years since the initiative began, the area has grown rapidly. The growth is spread across a diverse range of companies in different sectors and at different scales.



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