Large Urban Microgrids
The Case for Joint Development by Utilities and Independent Developers

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Rensselaer Polytechnic Institute, Troy, NY
Why are they not growing like mushrooms?

Microgrids + Resiliency =
Microgrids and Resiliency Market

- **Distribution Automation**
  - $18 billion (IMS Research)

- **Distributed Generation**
  - $22 billion (BCC Research)

- **Building Automation**
  - $29 billion (Deutsche Bank)
Who will integrate?

- **Fuel**
  - CAPEX
  - OPEX

- **Generation**
  - CAPEX
  - OPEX

- **Transmission**
  - CAPEX
  - OPEX

- **Distribution**
  - CAPEX
  - OPEX

- **Load**
  - CAPEX
  - OPEX

- **Trading / Sales**
  - CAPEX
  - OPEX

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- **EMS**
- **EMS / SCADA**
- **SCADA**
- **DMS**
- **EMS / MDM / BMS / HEM**

SOFTWARE
Anbaric is looking to deploy the IPP-model in Distribution

<table>
<thead>
<tr>
<th>GENERATION</th>
<th>TRANSMISSION</th>
<th>DISTRIBUTION</th>
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</thead>
<tbody>
<tr>
<td><strong>Start of Period</strong></td>
<td><strong>2000s</strong></td>
<td><strong>2010s</strong></td>
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<tr>
<td>1980s / 1990s</td>
<td>Independent Transmission Companies (ITCs)</td>
<td>Large Urban Microgrids</td>
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<td>Independent Power Producers (IPPs)</td>
<td>Order 1000 (removal of ROFR)</td>
<td>Order 383 (CHP)</td>
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<td>PURPA (‘78)</td>
<td>Calpine, Reliant, Dynegy, Constellation, Many others</td>
<td>Order719/745 (DR)</td>
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New Category
- Independent Power Producers (IPPs)
- Large Urban Microgrids

New FERC Regulations
- PURPA (‘78)
- Order 888/890 (‘96)
- Order 1000 (removal of ROFR)

New Companies
- 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)

5/10/2013 CONFIDENTIAL
How this might work: The **Rockaway Resiliency Hub** in NYC

- **20 MW of Solar PV** at JFK Airport
- **AC cable** from PV through bay to main substation
- **30 MW CHP** networked at 5 NYCHA developments (6 MW each)
- **4 new flood-protected substations**
- **Gas link** to new Transco Rockaway lateral
- **2 new redundant LIPA-Coned connections**
- **Buried flood-protected distribution backbone with automated switching**
- **Advanced building controls** at 5 NYCHA locations
- **Autonomous cell controller** and storage for islanding & dispatch