

# **Combined Heat & Power & The Urban Energy Revolution**

NYIT -- Sept 28, 2012

# Agenda

- Distributed Generation Overview
- Interconnection - Technical
- Interconnection – Process and Rates
- Recent Developments and Future Opportunities

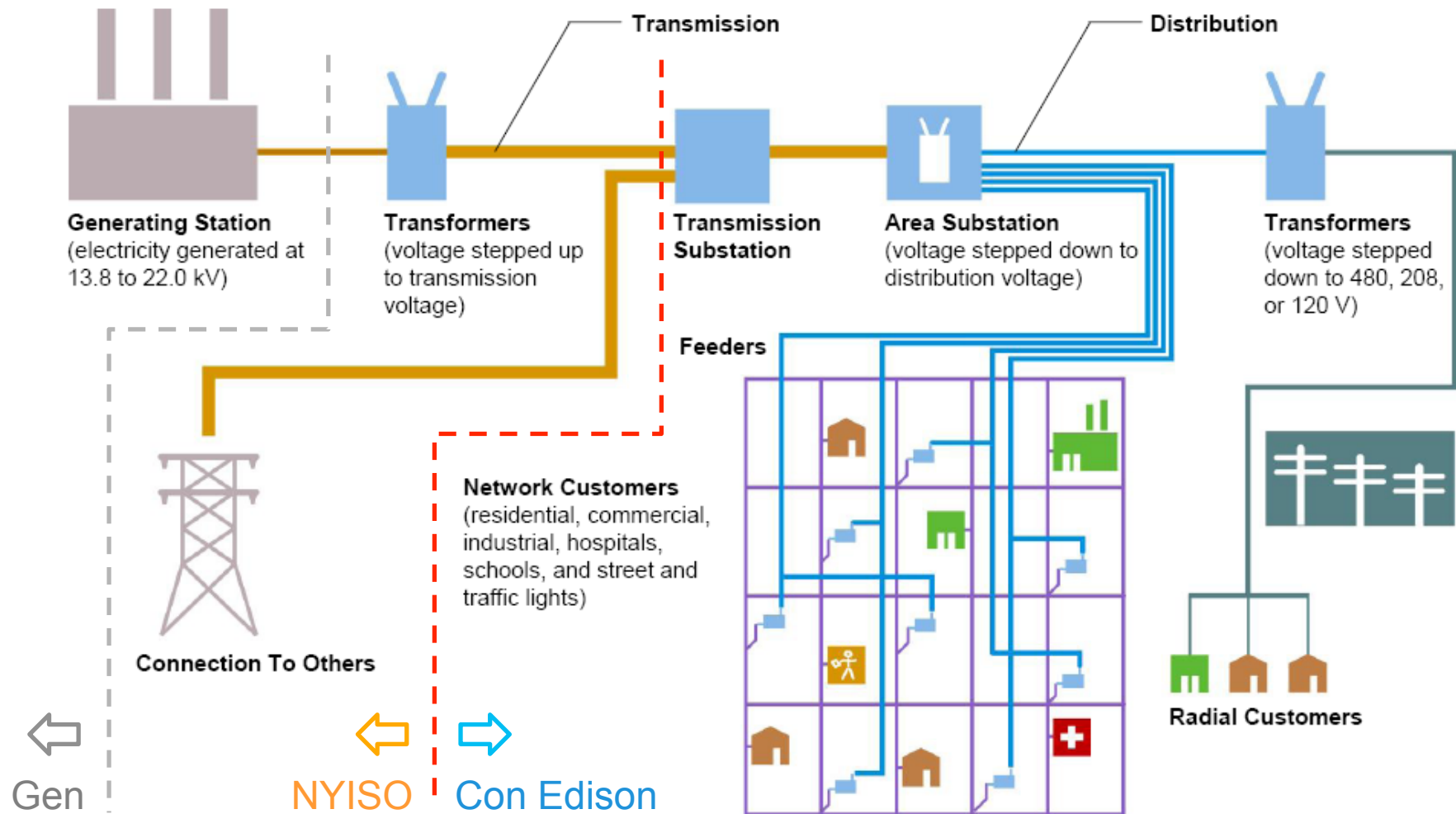
# What is Con Edison?

## Public Utility Energy Provider

	Customers	Infrastructure	Service Territory
<b>Electric</b>	3.3 million	One of the largest underground systems in the world	All 5 boroughs and Westchester County
<b>Gas</b>	1.1 million	4,333 miles of gas mains and services	3 out of the 5 boroughs and Westchester County
<b>Steam</b>	1,760	Largest district steam system in the world	Manhattan below 96 <sup>th</sup> Street

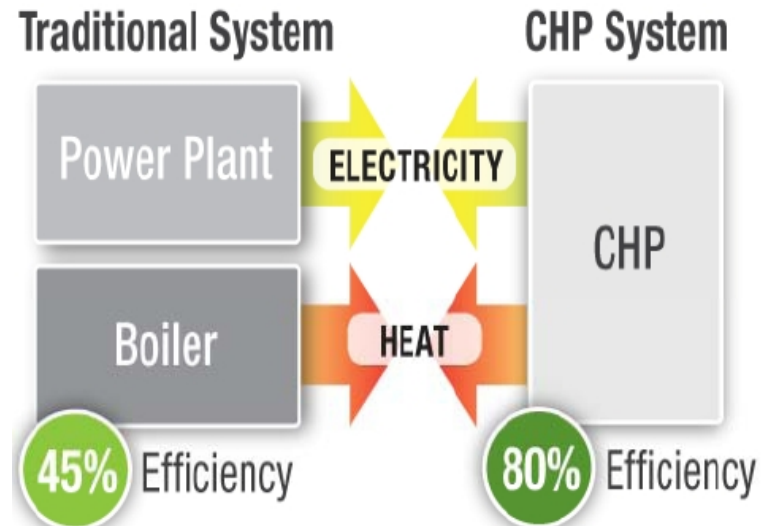


# The Electric System - Restructured



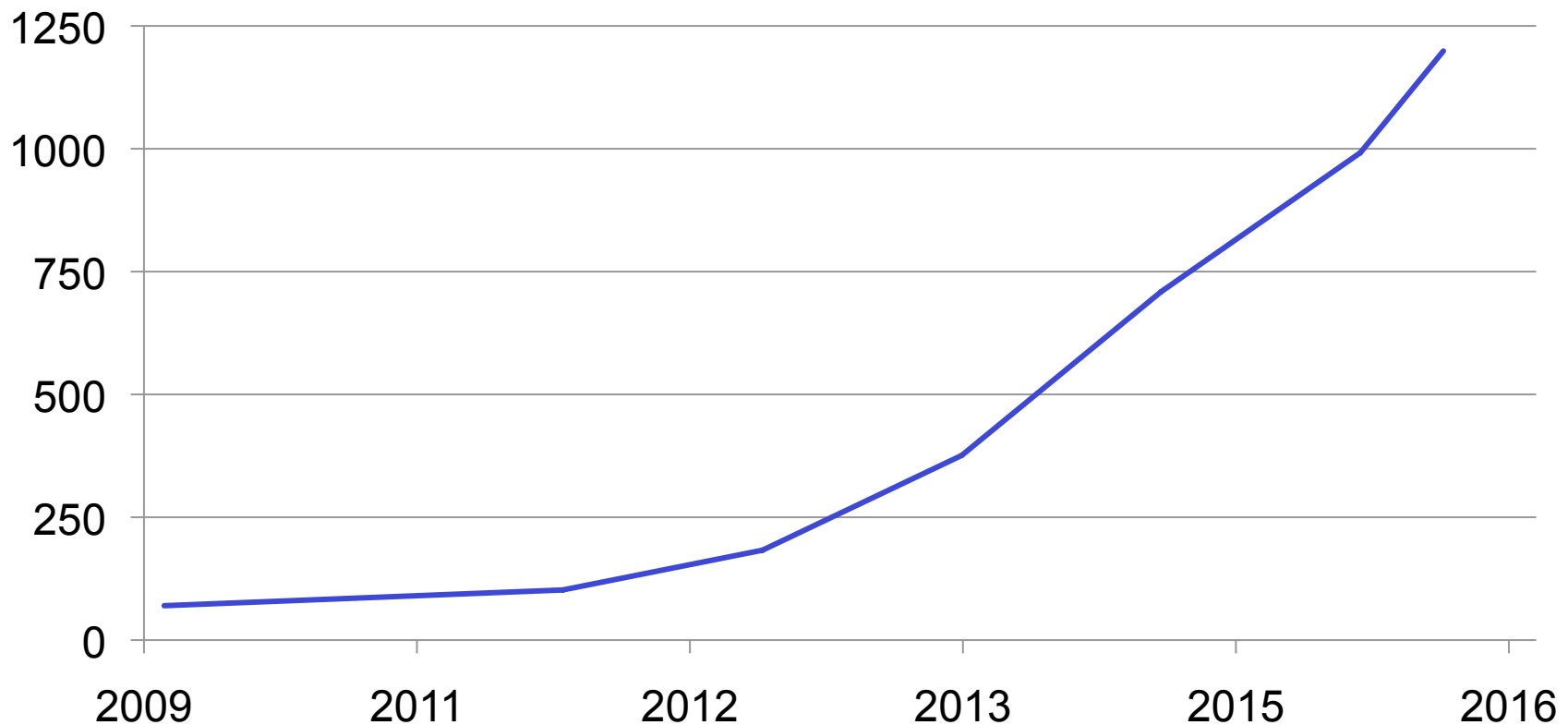
## Distributed Generation Overview

# What is distributed generation (DG?)



## Technology trends

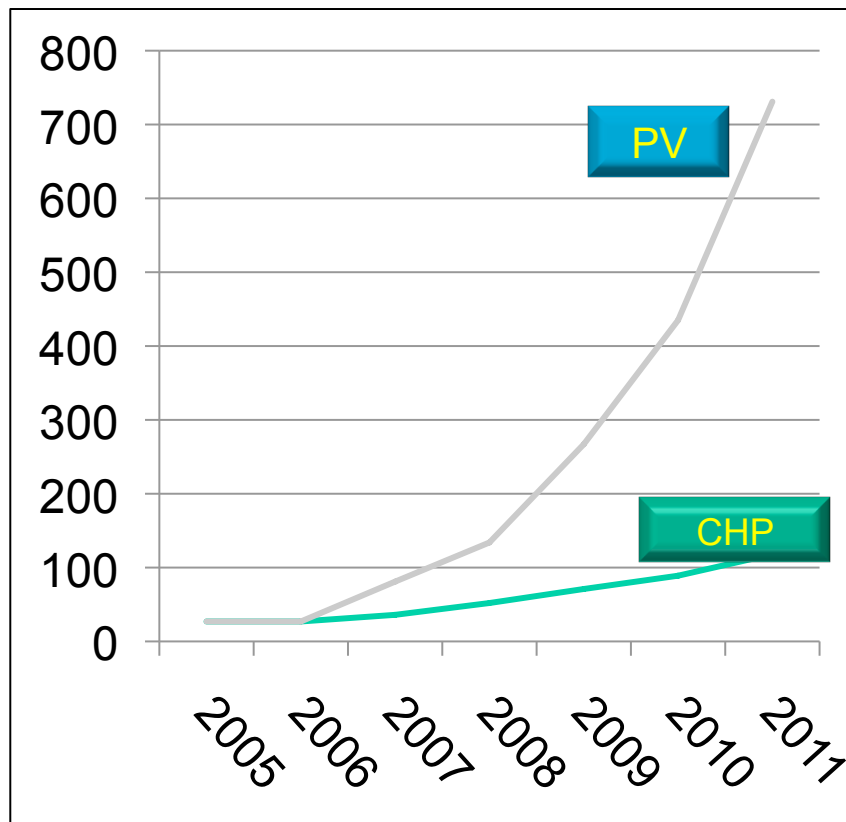
### Cumulative Number of DG applications



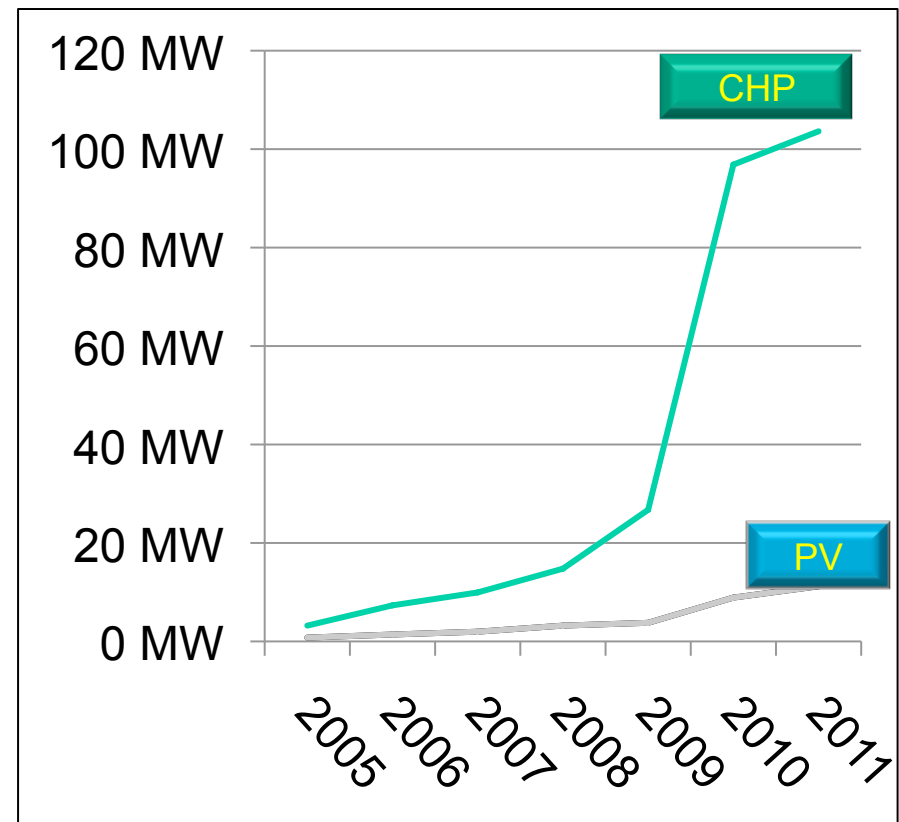
## Distributed Generation Overview

### Technology trends

Total Customers by Technology

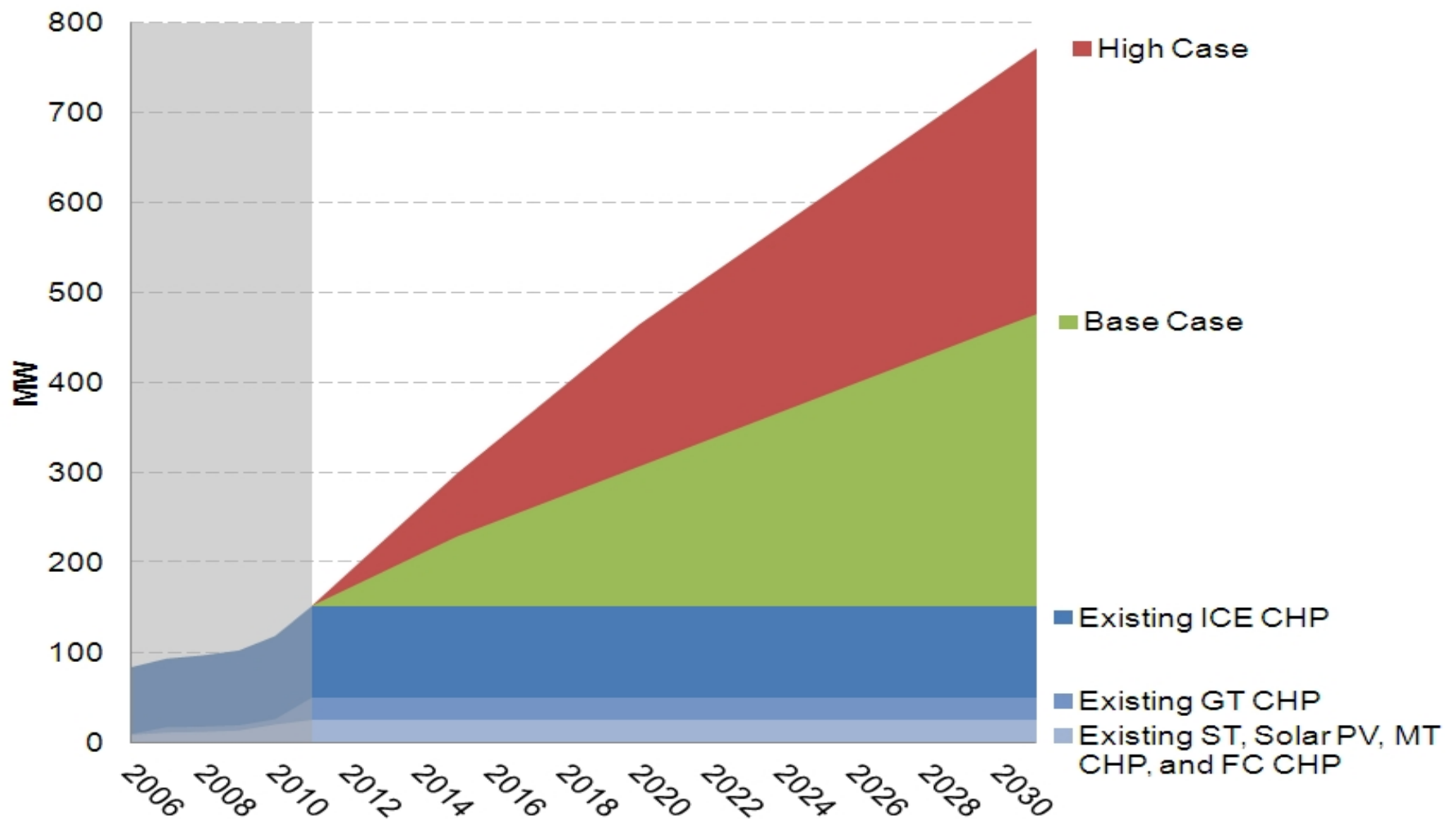


Total Installed Capacity



## Recent Developments and Future Opportunities

# Long-range plan projections





## Distributed Generation Overview

# Technology overview

	Reciprocating Engines (NG)	Gas Turbines	Microturbines	Fuel Cells	Solar PV
Capacity	10kW - 5+ MW	500kW – 20MW	30kW – 250kW	5kW – 2MW	< kW-20 MW
Electrical Efficiency	69% – 78%	49% – 66%	47% – 59%	54% – 82%	20% – 45%
Capital Cost [\$1000/kW]	1.2 – 2.3	1.5 – 5.5	2.6 – 3.15	5.6 – 10.0	6.0 –7.5
O&M Cost [\$ /MWh]	12 – 29	5 – 14	16 – 35	43 – 51	22 – 25
Nox [lb/MWh]*	0.05-2.17	0.07-2.4	0.06-0.54	0.02-0.06	--
CO2 [lb/MWh]**	1,145-1,359	1,024-1,877	1,377-1,736	773-1,440	--

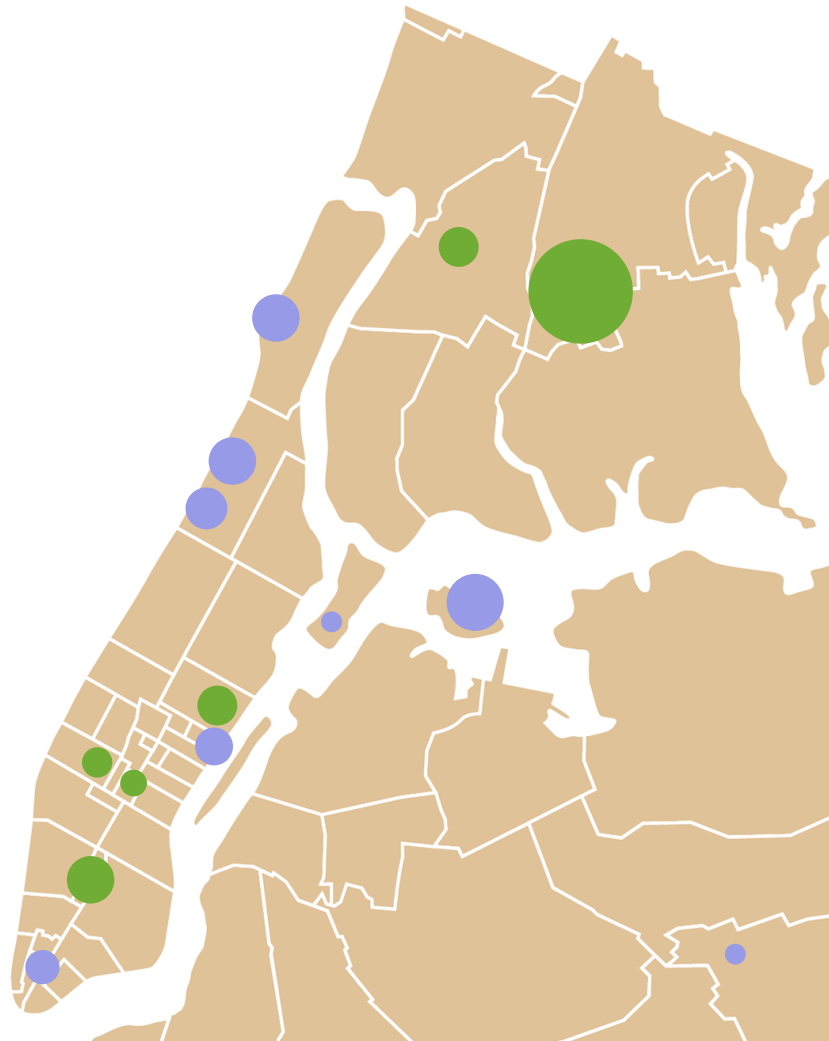
\*New York State: 0.48. East River 1 and 2: 0.04-0.08. NYS 'Clean DG' Standard 1.6. California: 0.07

\*\*New York State: 705. East River 1 and 2: 626.

## Distributed Generation Overview

# Current and expected large-scale CHP

- Forecast CHP (2012 – 2018)
- Existing large scale CHP



## **Factors affecting CHP adoption**

### **Economic**

- Large upfront cash
- Fuel price risk
- Payback period
- Incentives

### **Technical & Operational**

- Retrofit difficulty
- Not core business
- O&M costs
- Commissioning
- Space constraints

### **Environmental**

- LEED Scoring & Green Branding
- Uncertain environmental regulation

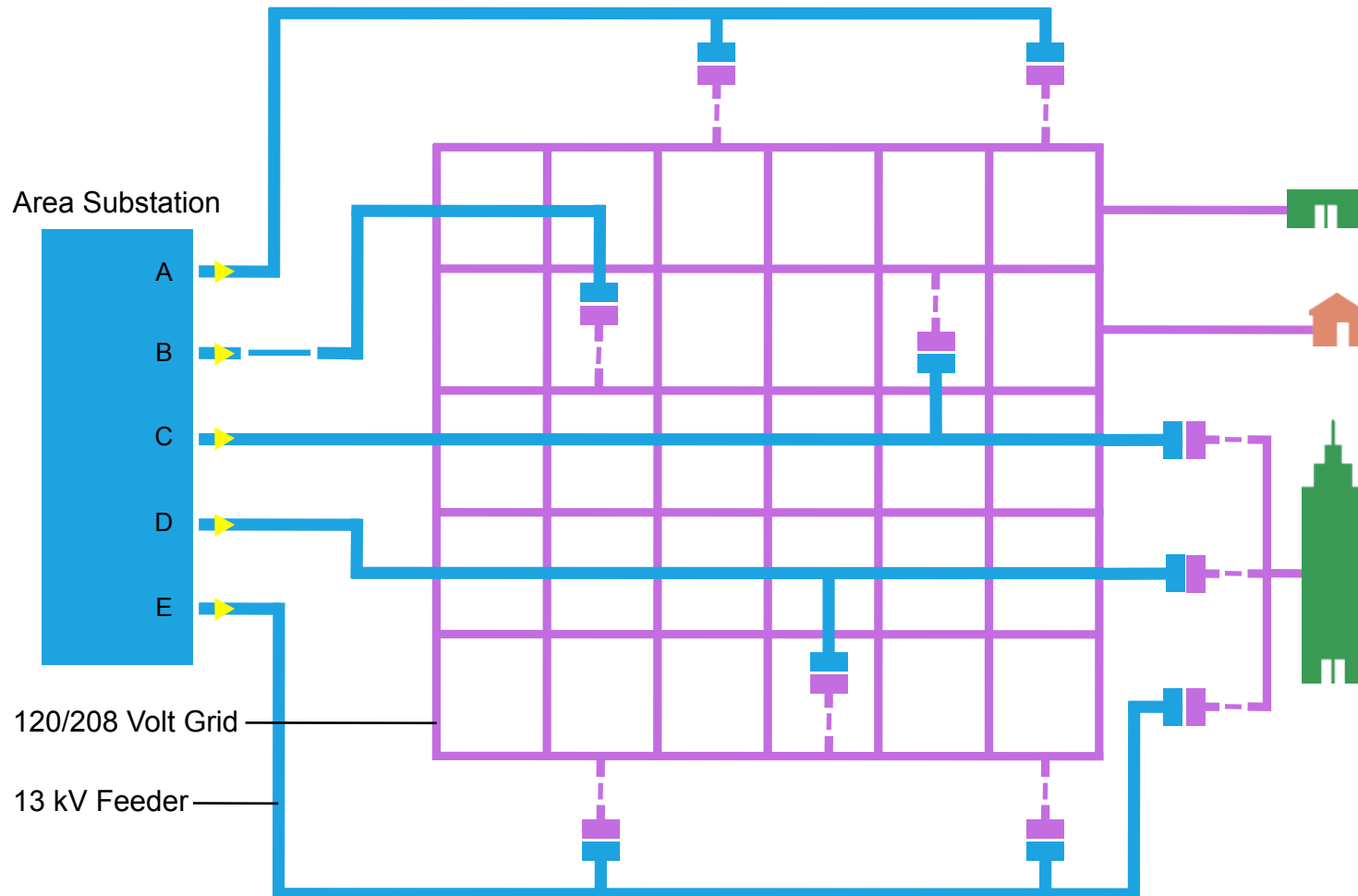
## Distributed Generation Overview

# Potential impacts on our distribution system

- Increased fault duty on company circuit breakers
    - Customer side solutions available
  - Impact on network protectors
    - Smart Grid Pilots
  - Islanding
  - Harmonic distortion contributions
  - Voltage flicker
- 
- Potential high gas main extension costs
  - Customer-side high-pressure gas DoB/FDNY concerns

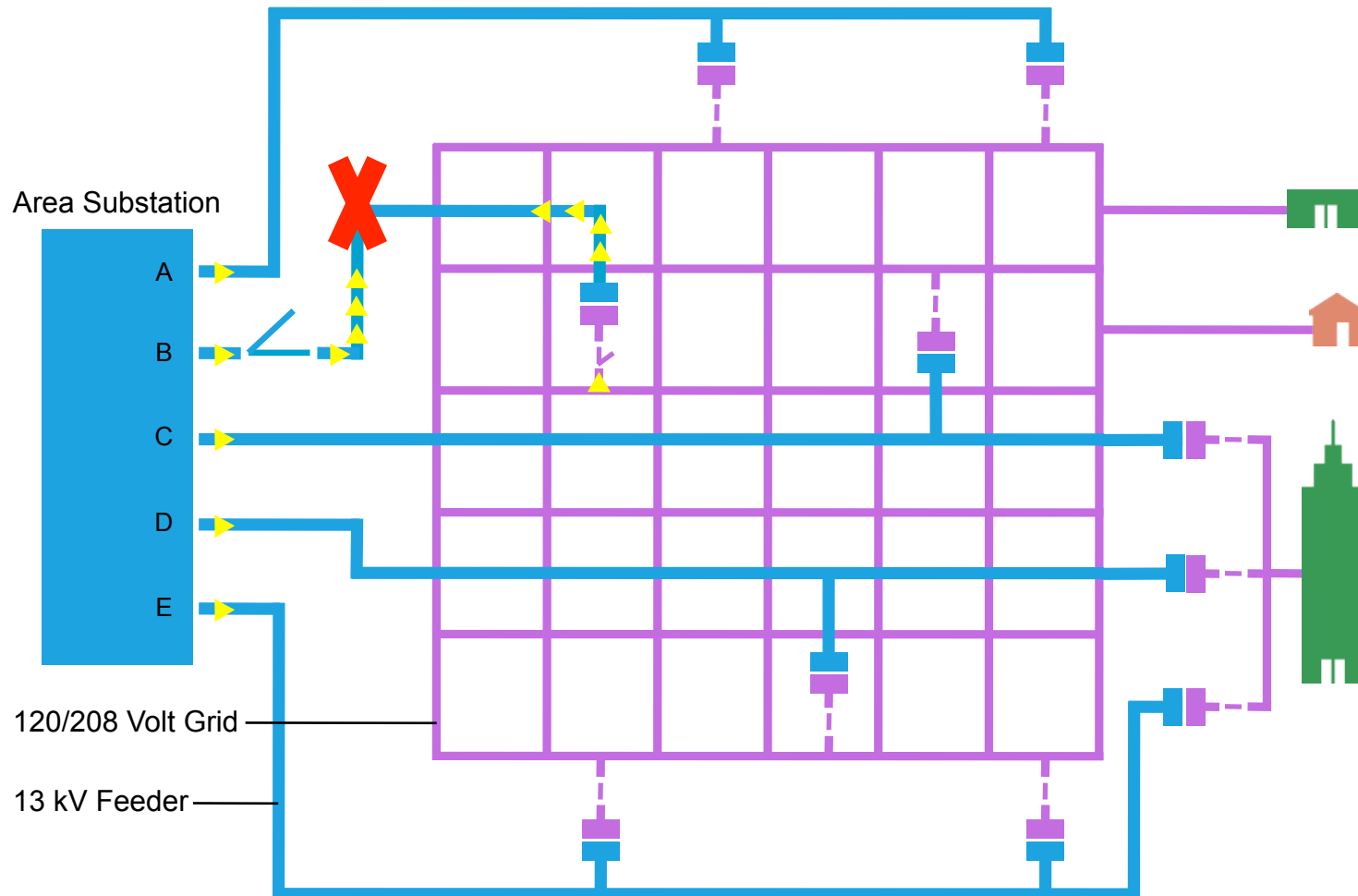
## Distributed Generation Overview

# Service considerations



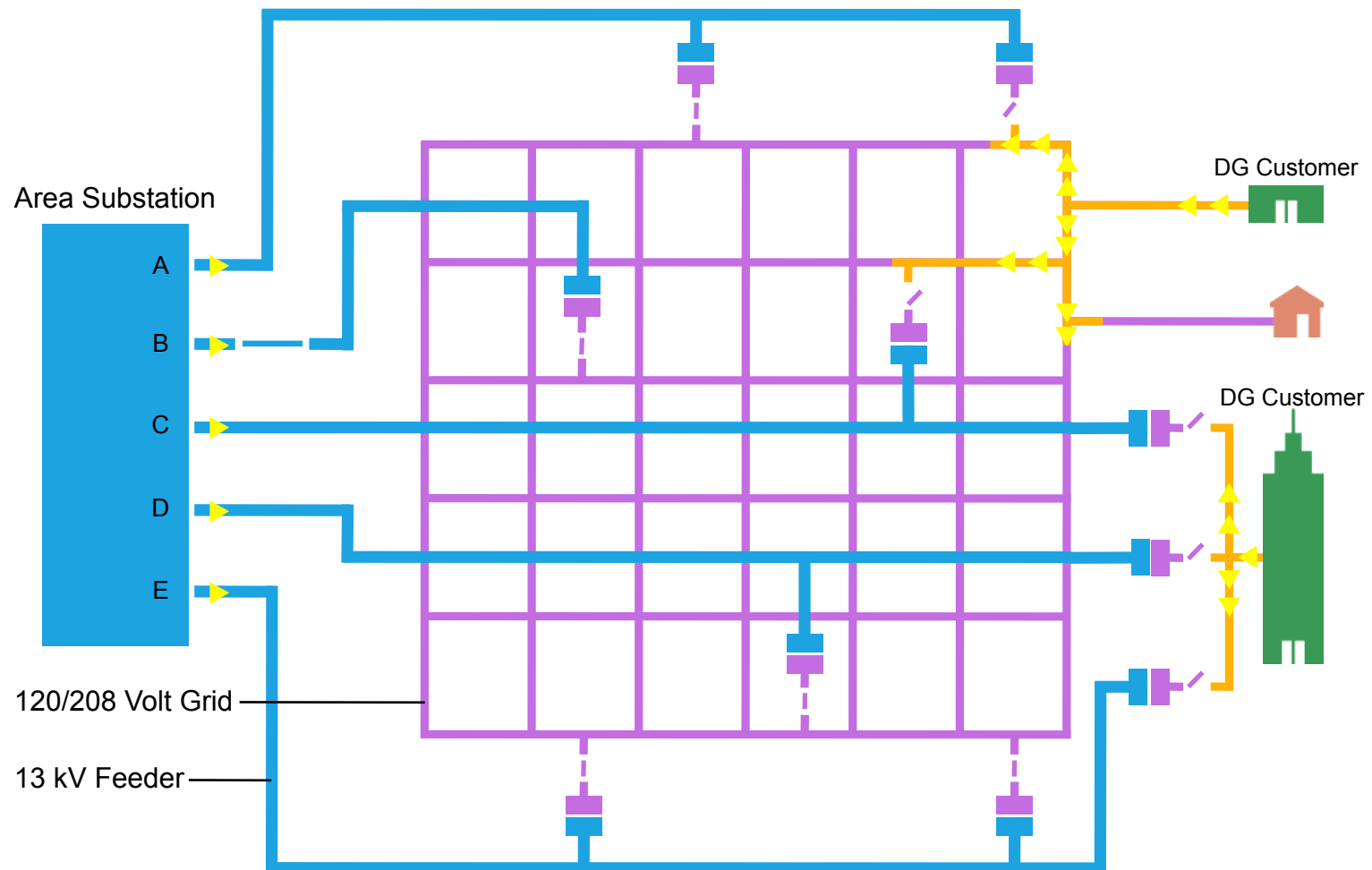
## Distributed Generation Overview

# Purpose of network protectors



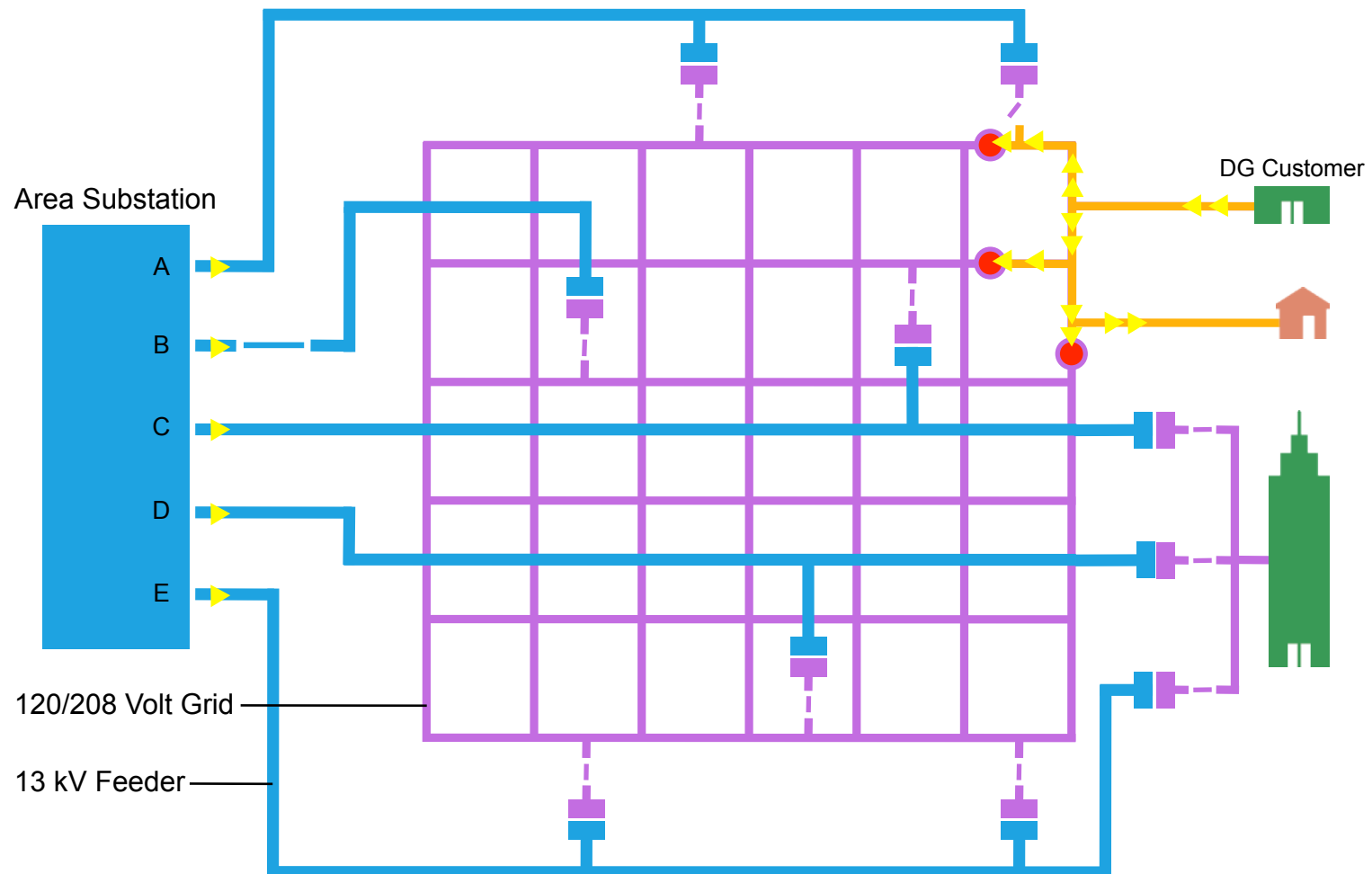
## Distributed Generation Overview

# Network protector considerations: *reliability*



## Distributed Generation Overview

# Network protector considerations: *islanding*





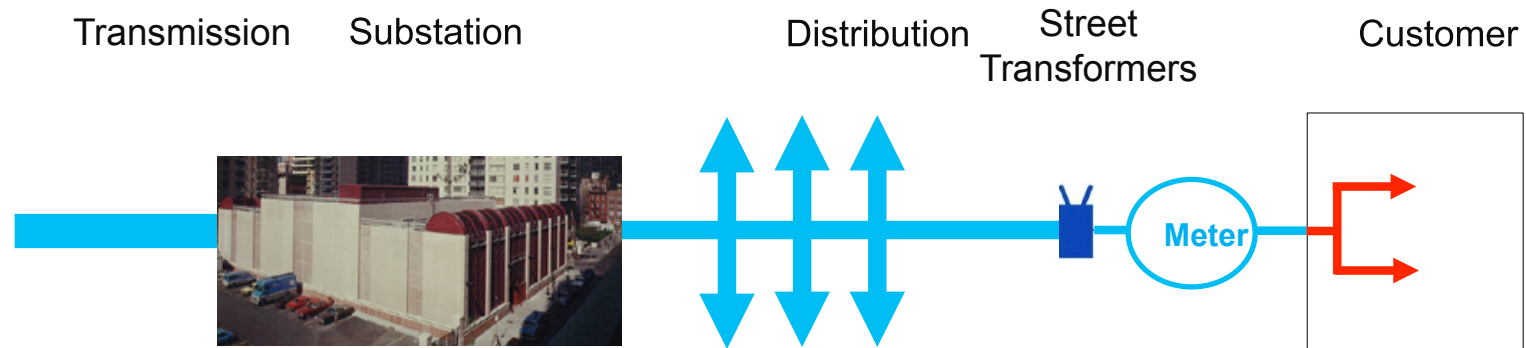
## Distributed Generation Overview

# Interconnection process

- Interconnection application – electric, gas, or steam
- Design reviews
- Contract/agreements and engineering specifications
- Interconnection/installation
- Testing
- DG rates – Electric and Steam standby, Gas Delivery
  - Rider H Gas/Cross Commodity Support
- Incorporate into load forecasting and planning

## Recent Developments and Future Opportunities

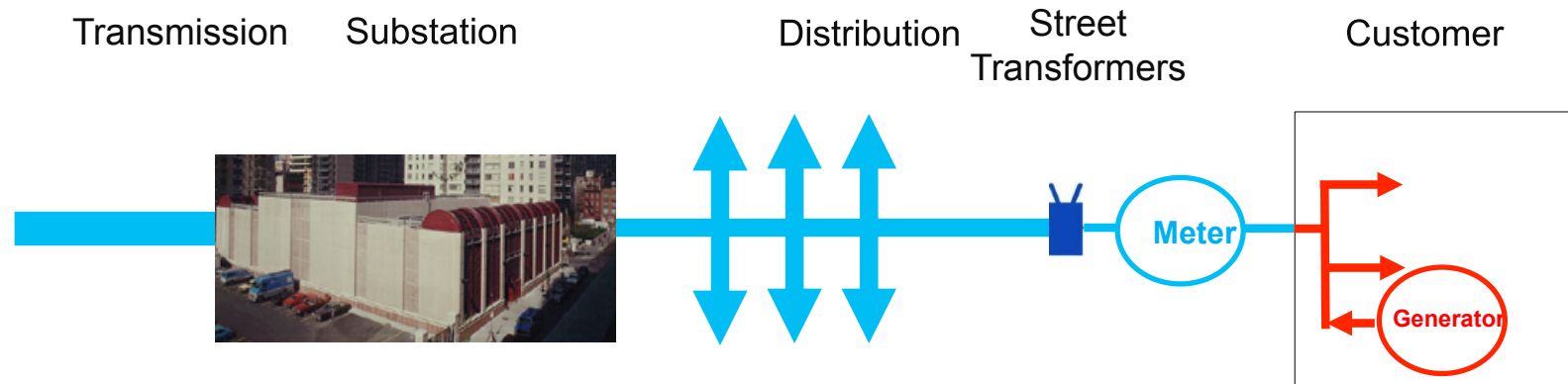
# Rate Design Considerations



Standard non-DG Interconnection – costs recovered through kW and kWh charges

## Recent Developments and Future Opportunities

# Rate Design Considerations

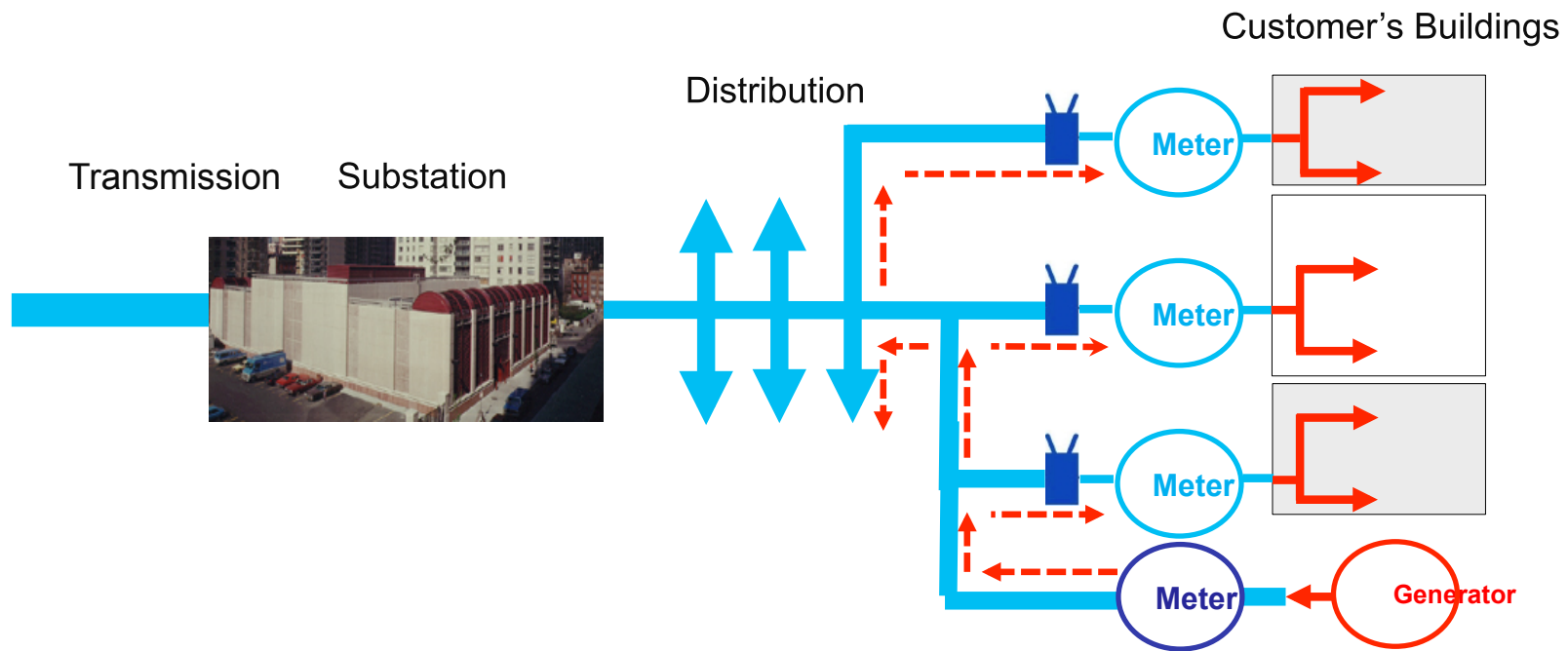


Standard DG Interconnection – costs recovered through kW charges

- Contract Demand and Daily As-Used Demand

## Recent Developments and Future Opportunities

# Rate Design Considerations



Offset (or Campus) DG Interconnection - Costs recovered through kW charges

- Contract Demand and Allocated Daily As-Used Demand

## Recent Developments and Future Opportunities

# **DG opportunities and challenges (utility perspective)**

- Opportunities
  - Large potential load reductions
  - Target substation and distribution projects
  - Cross commodity impacts
  - Demand response and customer load control
- Challenges
  - Reliability, timing, and control of demand reductions
  - High penetration
  - Customer fit and economics
  - Environmental impacts

## Recent Developments and Future Opportunities

# From energy consumers to energy partners

- Systems
  - Interconnection, demand-side markets, monitoring, modeling
- Technology
  - Communications
  - Industry standards
- Future: Customers active part of energy equations
  - Energy resources, control room systems, building management systems, remote dispatch



# Recent Developments and Future Opportunities

## Utility response to increased adoption

[coned.com/dg](http://coned.com/dg)

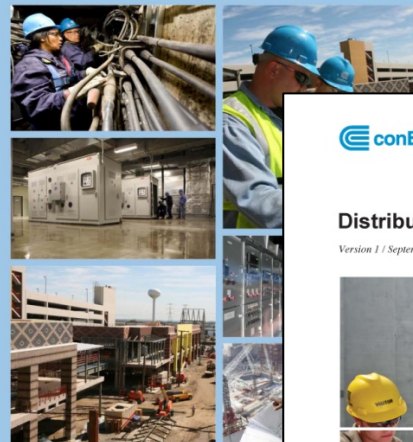
The screenshot shows the conEdison Distributed Generation website on the left and the Energy Services Project Center interface on the right. The website features a navigation menu with links like 'distributed generation', 'con Edison's distributed generation home', 'Welcome', 'DG Basics', and 'Our Policy'. The Project Center interface displays 'Case #3150' for 'Steven Tyler' at '23 EAST HOUSTON ST NEW YORK, NY 10009'. It includes a progress bar with steps: Request Received Electronically, Application Filed, Design Review, Project Installation, and Verification, Testing and Project Completion. Below this is a table of milestones.

Milestone	Responsible	Completion Date
Request Received Electronically <a href="#">Description [1]</a>	Contractor/Customer	06/21/2009
Application Filed <a href="#">Description [1]</a>	Contractor/Customer	06/21/2009
Design Review <a href="#">Description [1]</a>	Contractor/Customer	06/21/2009
Project Installation <a href="#">Description [1]</a>	Con Edison	06/21/2009
Verification, Testing and Project Completion <a href="#">Description [1]</a>	Con Edison	In Progress

[coned.com/es](http://coned.com/es)

conEdison

### Information Guide for Customers Installing High Tension Service



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### Distributed Generation Guide

Version 1 / September 2011



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ON IT

# Thank you!

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[www.coned.com/DG](http://www.coned.com/DG)