

Third Generation System of the Future

Reza Ghafurian

Consolidated Edison Company of New York

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Company Overview

Electric, gas, and steam regulated utility
Supplying New York City and Westchester County

Customers	3,100,000
Area	660 mi ²
Peak Demand	13,141 MW (August 2006)
System Density	19.8 MW/mi ²

Urban Territory	Manhattan
Urban Area	23 mi ²
Urban Demand	5,437 MW (July 2005)
Urban Density	221 MW/mi ² up to 2,000 MW/mi ²

Service Territory



Entire System: 660 mi²

New York City &
Westchester Country



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Company Overview

Substations

Transmission	37
Sub-Transmission (Area)	57
Distribution Transformer Vaults	78,700

System Voltages

Transmission	345kV, 500kV (1 circuit)
Sub-Transmission	138kV, 69kV
Primary Distribution	33kV, 27kV, 13kV, 4kV
Secondary Distribution	120/208V, 460V

Distribution Design Criteria

- N-2 in high density
- N-1 minimum throughout entire system
- Low voltage distributed grid and spot networks



138kV-13kV Manhattan Area Substation

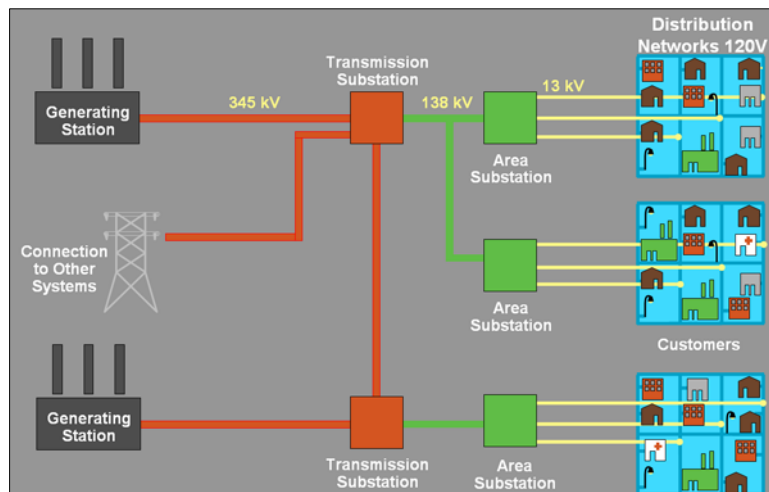


Transformer Louvers 3



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Today's System Design

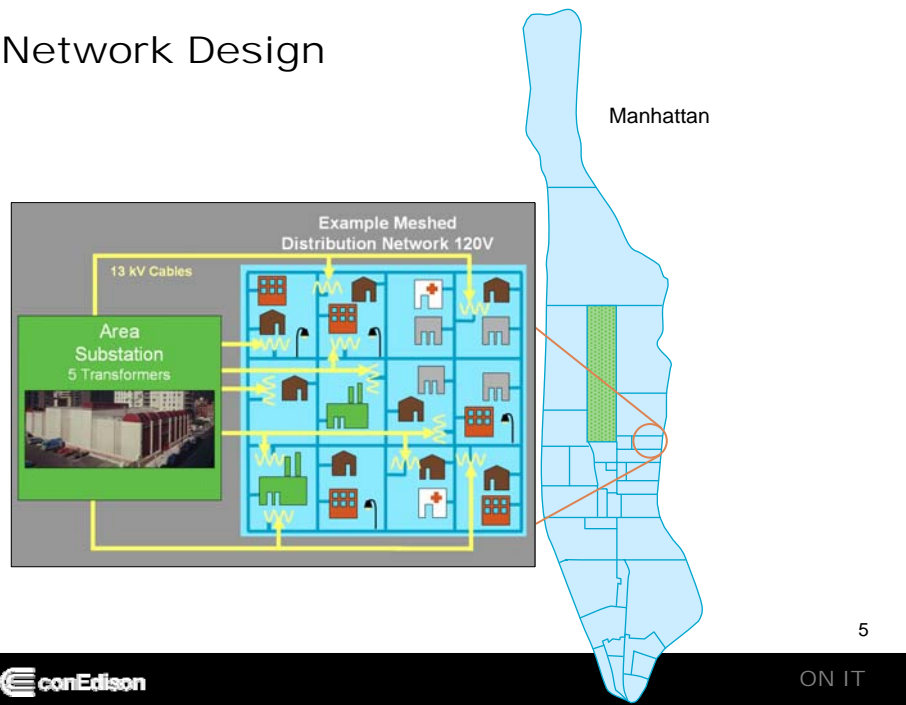


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Network Design



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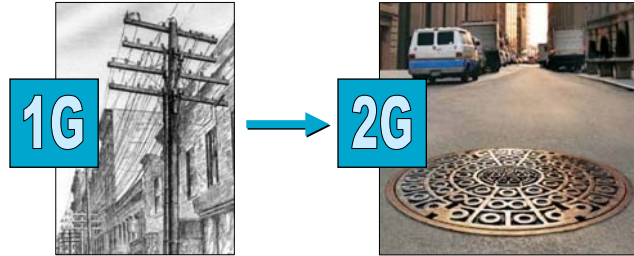
Demand Growth & Construction

- Steady projected annual growth in demand
- Extensive construction of new transmission and area substations required to meet demand



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System Progression



2G System Challenges

- High cost of building and maintaining
- Low equipment utilization
- Real estate scarcity and price
- Increasing fault current

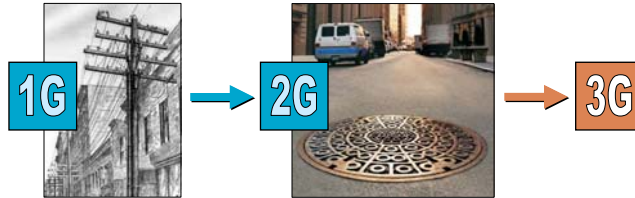
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Under the Streets



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3G System of the Future Objectives



- Maintain reliability and customer service
- Increase asset utilization
- Reduce street congestion
- Increase operating flexibility
- Utilize new technologies
- Cost reduction, avoidance, and deferral

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3G System of the Future Plan



International Benchmarking



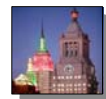
Concept Development



Technology Development



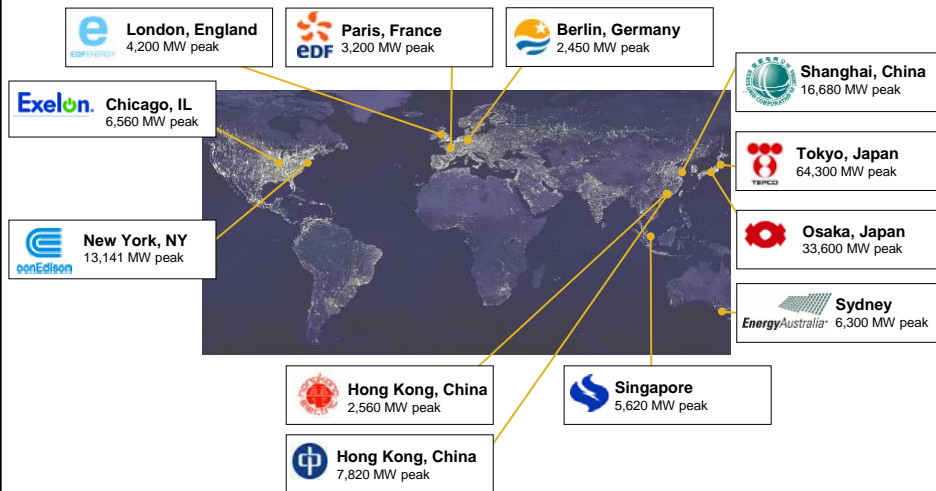
Field Demonstrations



Implementation

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International Benchmarking



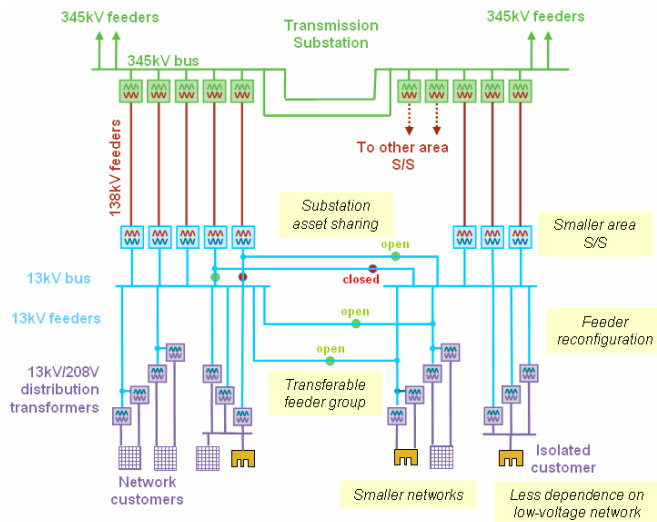
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International Benchmarking Highlights



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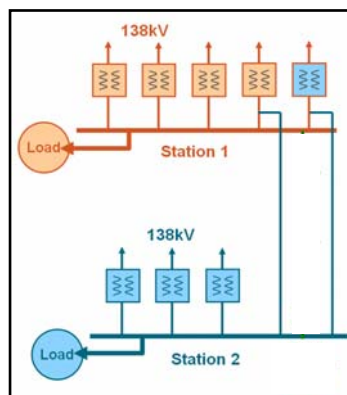
3G System of the Future Concepts



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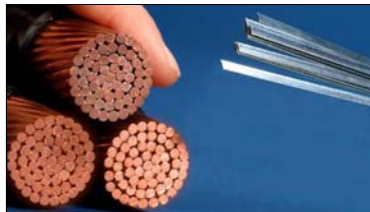
Substation Asset Sharing

- Maintain reliability with fewer assets
- Connect two area substations together, supplied by different transmission sources
- Minimize the number of new transformers required to meet demand growth



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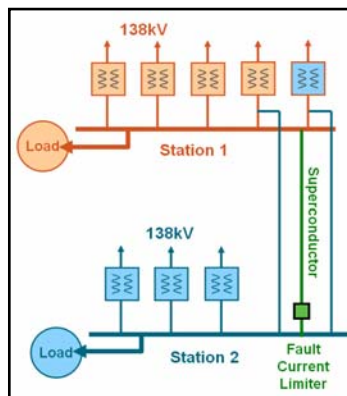
Implementing New Technology



Superconducting cable for inter-substation ties



Medium voltage fast switch to transfer distribution load



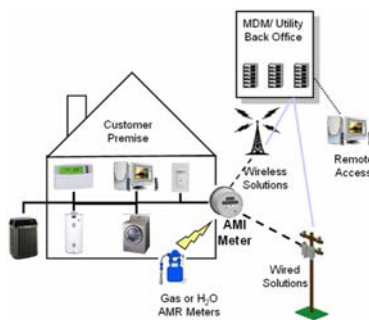
Fault current limiter to maintain superconductor availability during a fault

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Real time monitoring & control of distribution system

To automatically reconfigure system during contingencies...

- Expand use of AMI
- Diagnose network conditions to prevent failures
- Control secondary switches for load transfer
- Locate faults and isolate faulted feeder portions
- Optimize power flow to minimize losses



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AMI / Communication Challenges in Dense Urban Area

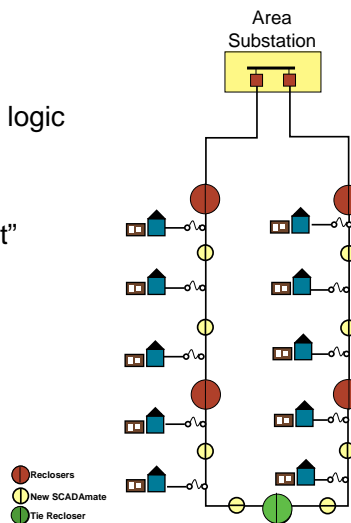


- Wide range of customer density
- Diverse meter locations
 - “Vertical Urban” meters on upper floors
 - “Horizontal Urban” meters in basements or sub basements
 - “Suburban” meters outdoors geographically dispersed
- Complex electric delivery system
 - underground networks & overhead radial
- AMI feasibility in meshed low voltage network system not yet fully proven

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13kV Auto-loop

- Coordinate auto-loop switching with logic control
- Implement greater sectionalizing capability with programmable “smart” SCADAmate switches
- Improve restoration time
- Reduce momentary outages
- Improve customer reliability



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Outlook on the System of the Future

Growing demand in NYC...



3G System of the Future...

Continuing to **benchmark** with other utilities to share best practices

Sharing assets to defer investment without compromising reliability

Implementing **new technology & communication systems** to enhance system control and operational flexibility

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