

# **“Break the Gridlock:”**

**New Technologies and New Policies  
to Promote True Power Grid Competition**

**DOE Workshop:  
Analysis and Concepts to Address Electric  
Infrastructure Needs**

**Washington, DC  
August 3, 2001**

**John B. Howe  
Vice President, Electric Industry Affairs**

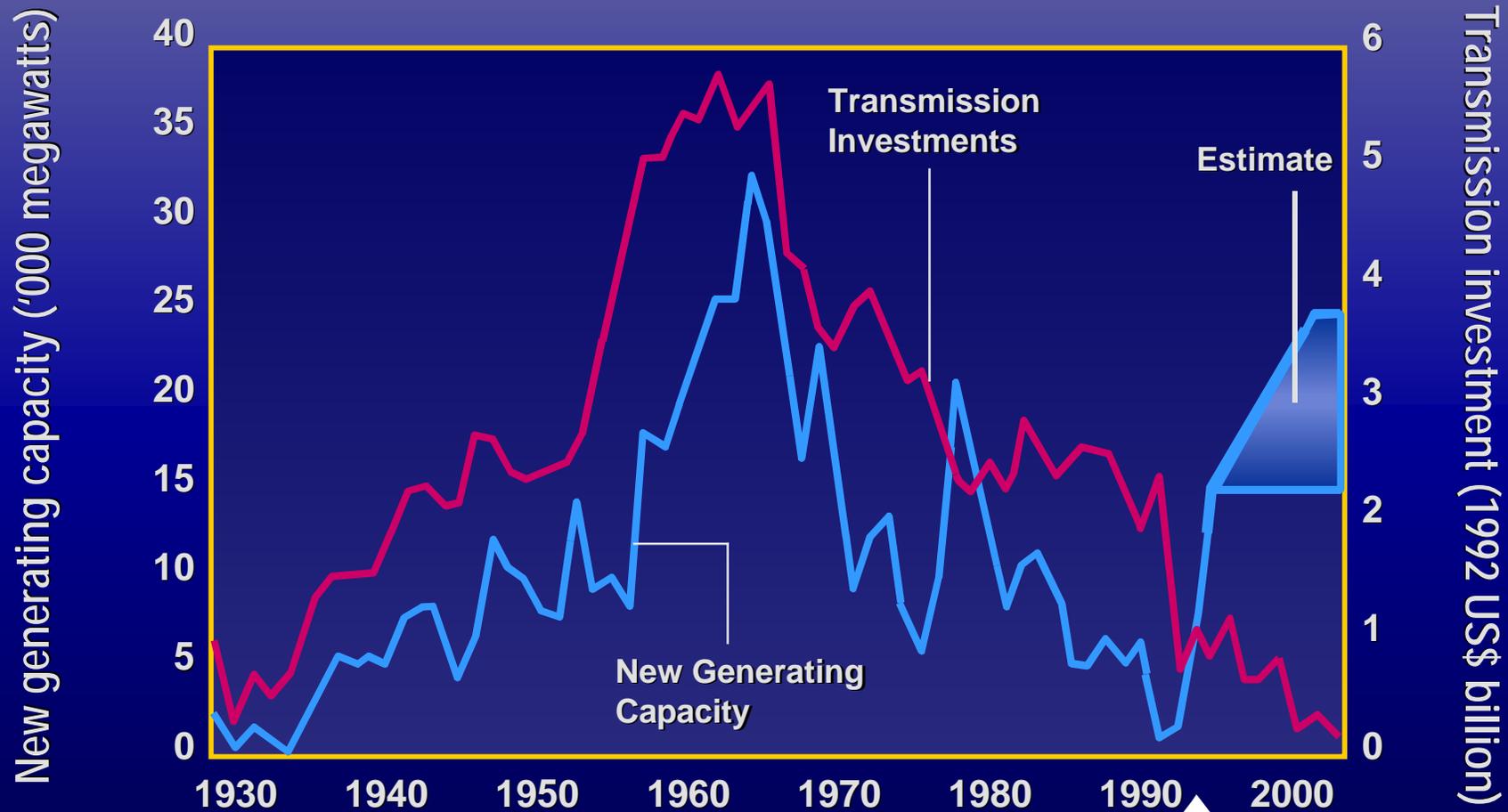
Then and Now.

## Early 1990s / Early 2000s

- Depressed Level of Investment Despite Need
- Slow, Costly, Highly Politicized Planning Process
- Opposition to New Investment Premised on (or Under Guise of) Environmental Grounds
- Failure to Invest in New Technology Only Serves to Reinforce the Market Power Position of Incumbents!

***Transmission Today is Exactly Where  
Generation Was a Decade Ago!***

# Transmission Investments Lagging in the U.S.



Source: CERA

1992 EPAct  
Creates "EWGs"

## NETWORK INVESTMENT.

# The Key to Healthy Competition

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- **Telecom, 1977: Bell Claimed that “No one Will Replicate the Existing Communications Network”  
(1980s-90s: Fiber Optic, Wireless Networks)**
- **Natural Gas, early 1980s: a “Sunset Industry”  
(1990s: New Pipelines, Compression, Infotech)**
- **Airlines: New Airports, Runways, and Landing Gates are Key to Mitigating Incumbent Market Power**

***Competition in Commodities Spurred by  
Competition in the Building of Network Facilities***

# **“But Electric Power is Different”**

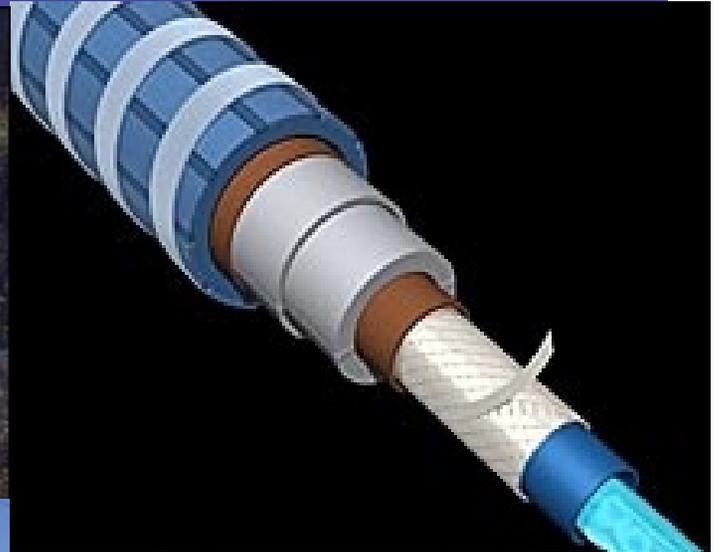
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- **Interactivity of AC Power Flows**
- **Economies of Scale**
- **Environmental and Land Use Impacts of Conventional Transmission**
- **Capital Intensity of Major Overhead Lines**



# Technology: The X Factor

- FACTS
- HVDC Light
- D-SMES
- HTS Cable



# Electric Power Need Not be Different

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- *“First, Do No Harm”*
  - DC, FACTS can Segregate Power Flows
  - D-SMES Only Benefits Flow Patterns
- HVDC Light, D-SMES Exemplify Modular Approach
- Undergrounding, Coaxial Design, and Inside-the-Substation Technologies Virtually Eliminate Impacts
- Small Scale of Investments, and Mobility of Assets like D-SMES, Moot Claims of “Natural Monopoly”

# Superconductor Technologies Can:

- Raise Energy Efficiency
- Increase Capacity
- Improve Reliability and Power Quality
- Reduce Environmental Impacts
- Put Scarce Real Estate to Higher Value Uses

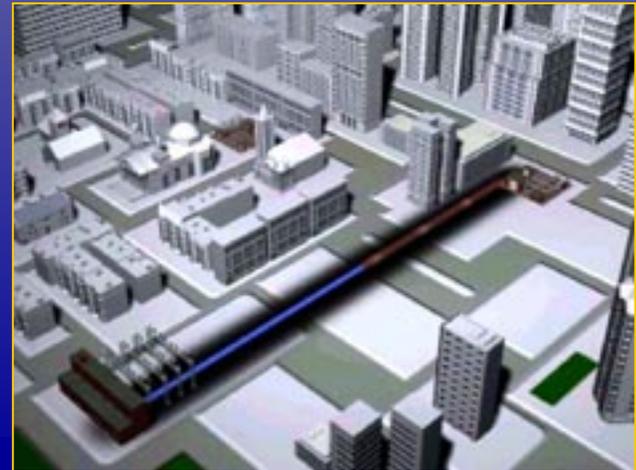
*...Component Benefits of Superconductivity Are Leveraged into Even Larger System-Level Benefits*

# Urban Re-Electrification: “Virtual Bus”

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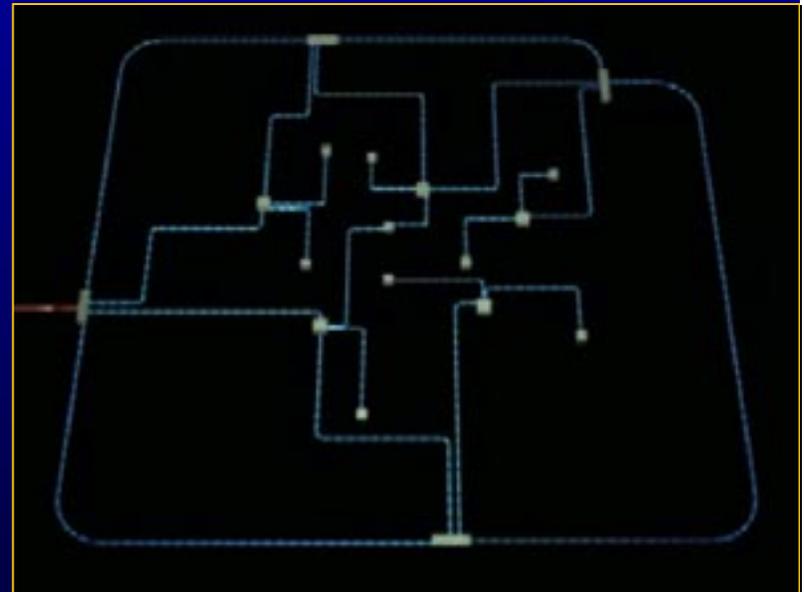
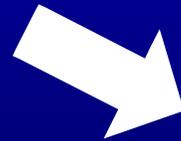
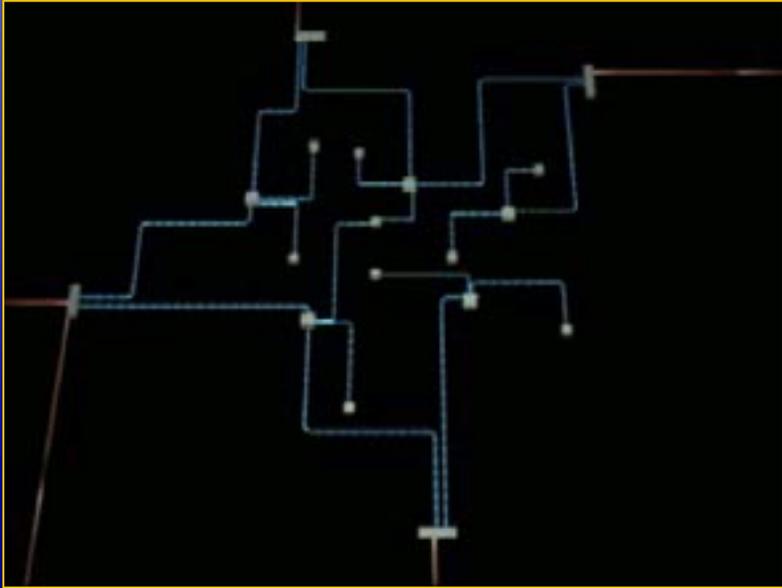
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# Urban Re-Electrification: “Urban Ring”



# Undergrounding Suburban Transmission



## **HFS DC Cable:**

# **Technical and Market Synergies**

- **Superior Power Flow Control**
  - - **An Advantage Generic to All DC Cable**
  
- **Losslessness of Superconductors in DC**
  - - **Increases System Efficiency**
  - - **Simplifies Cooling Requirements**
  - - **Sidesteps Obstacle of AC Losses**
  
- **Higher Current at Lower Voltages**
  - - **Unlike HVDC, Low-Voltage Inversion Technology is Cheap and Rapidly Improving**

**HTS DC Cable.**

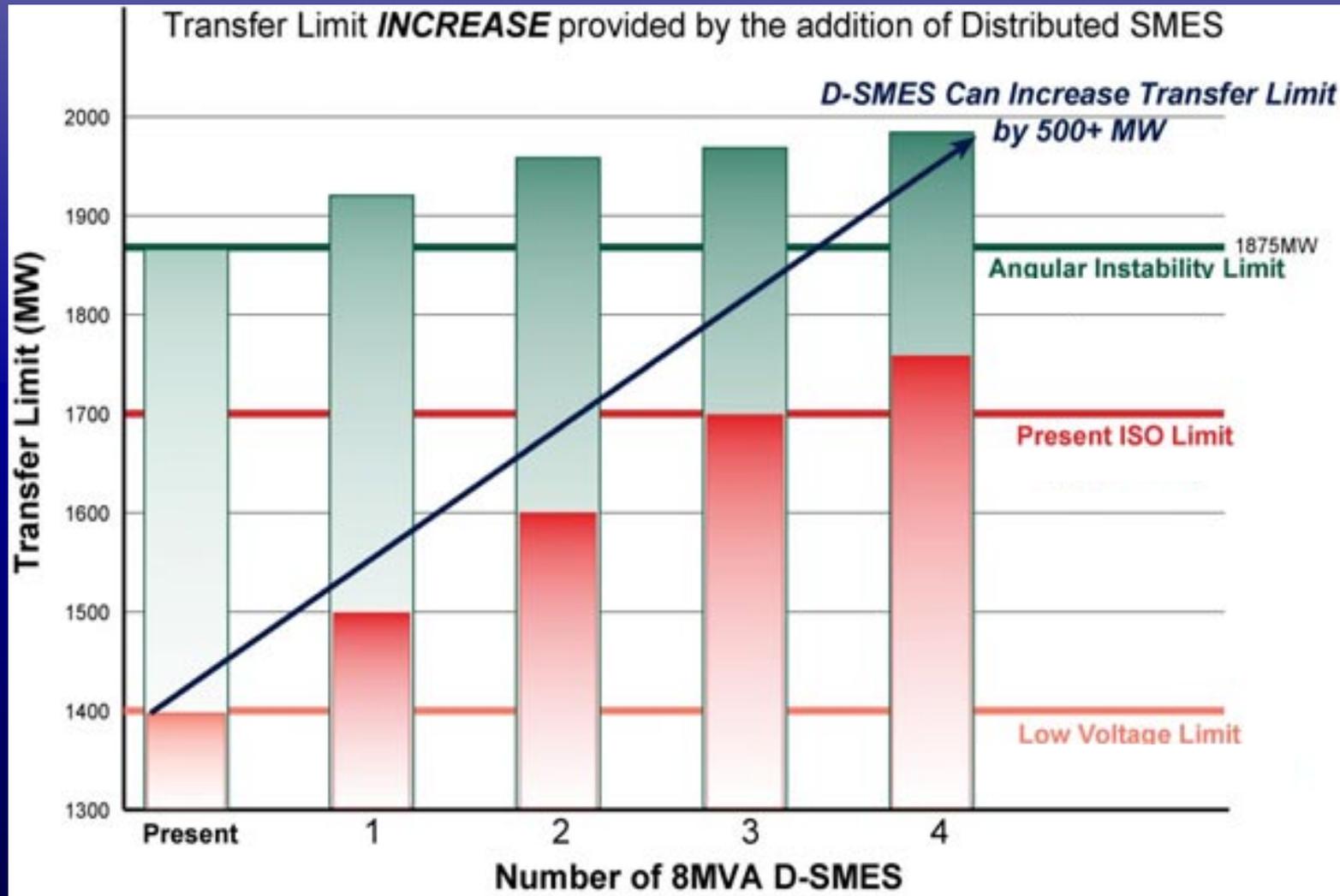
## **Possible Uses and Benefits**

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- **Tap the Interregional Price Disparities Exposed by Deregulation**
- **Supply Ancillary Services (e.g., VARs, reserves)**
- **Serve Congested Urban Load Pockets with “Virtual Power Plant”**
- **Sidestep Loop Flow, Parallel Path Issues**
- **Avoid AC Line Siting, EMF Issues**

# D-SMES.

## Tap Existing, Unused "Bandwidth"



# Adoption of Superconductor Technology

- **Transmission Regulatory Reform: Congestion Management -- or Congestion Relief!!**
- **Performance-based Regulation**
- **Mandatory Reliability Standards**
- **“Exempt Transmission Facilities”**
- **Robust Funding of DOE SPI**
- **Coordinate Support of Power, Other Infrastructures**

# Stimulating New Grid Investment. “Exempt Transmission Facilities”

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- **Applies Only to New Facilities**
- **Technologies With Low Environmental Impact, e.g.,**
  - **Underground**
  - **Existing Corridors**
  - **Within Existing Substations**
- **Controllable Current (Avoid Impact on Underlying AC Power Flows)**
- **No Recourse to Eminent Domain**
- **Absence of Market Power (Based On Size, Ownership)**

# **Benefits of ETF Status**

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- **ETFs Should Be Altogether Exempt from FERC, PUC Rate Regulation**
- **ETFs Should Be Eligible for a Streamlined / Federalized Siting Process Modeled on Gas Pipelines**
- **ETFs Are Not “Essential Facilities” -- Ergo, Should Be Exempt from Open Access Requirements**

**“Break the Gridlock!”**

**Questions?**

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