

ELECTRICITY SECTOR FRAMEWORK FOR THE FUTURE



On behalf of the EPRI Board

<http://www.epri.com/corporate/ESFF>

Electricity Sector Framework for the Future

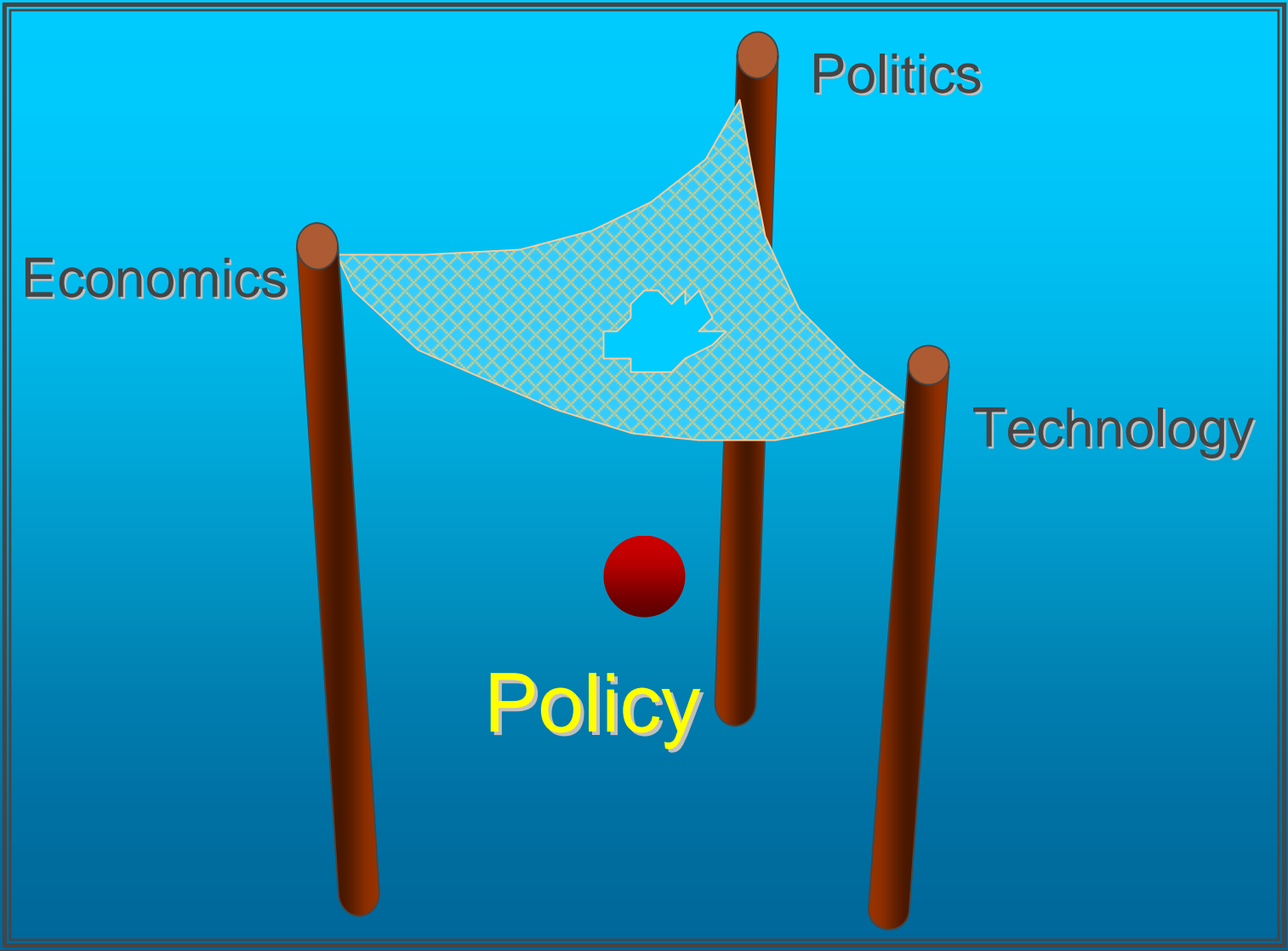


“The EPRI Board encouraged EPRI to help develop an Electricity Sector “Framework for the Future””

Current circumstances threaten the electricity enterprise and the nation:

EPRI engaged a broad cross-section of stakeholders to define a more vital, robust, and secure industry and to develop a leadership framework for achieving this future

Restructuring Trilemma



Pacing Issues to be Resolved

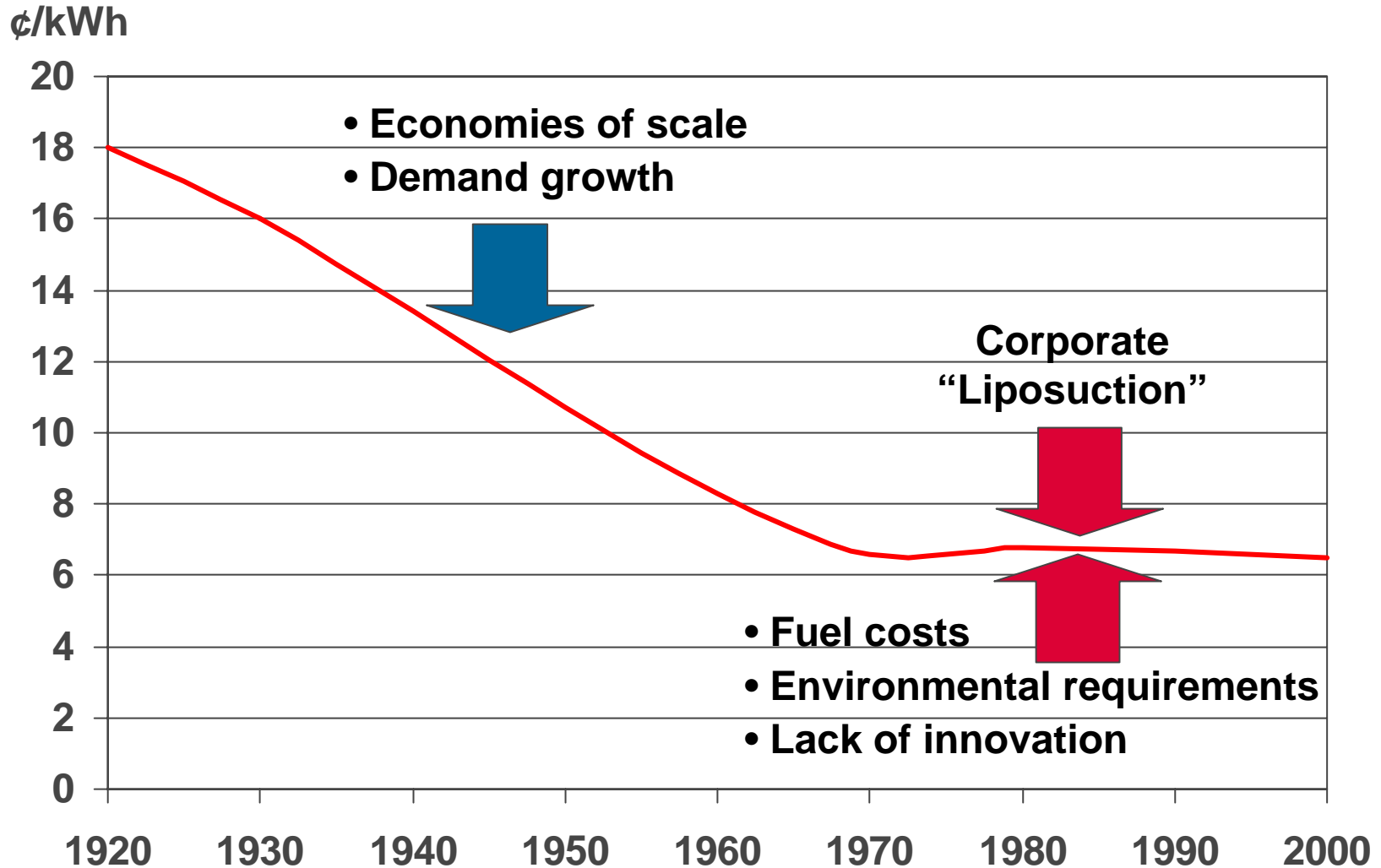
1. **Depressed financial health reinforced by regulatory confusion**
2. **Ineffective commingling of regulation and competition**
3. **Lack of clear accountability and incentives for system development & investment**
4. **Growing tension between electricity sector & national well-being**



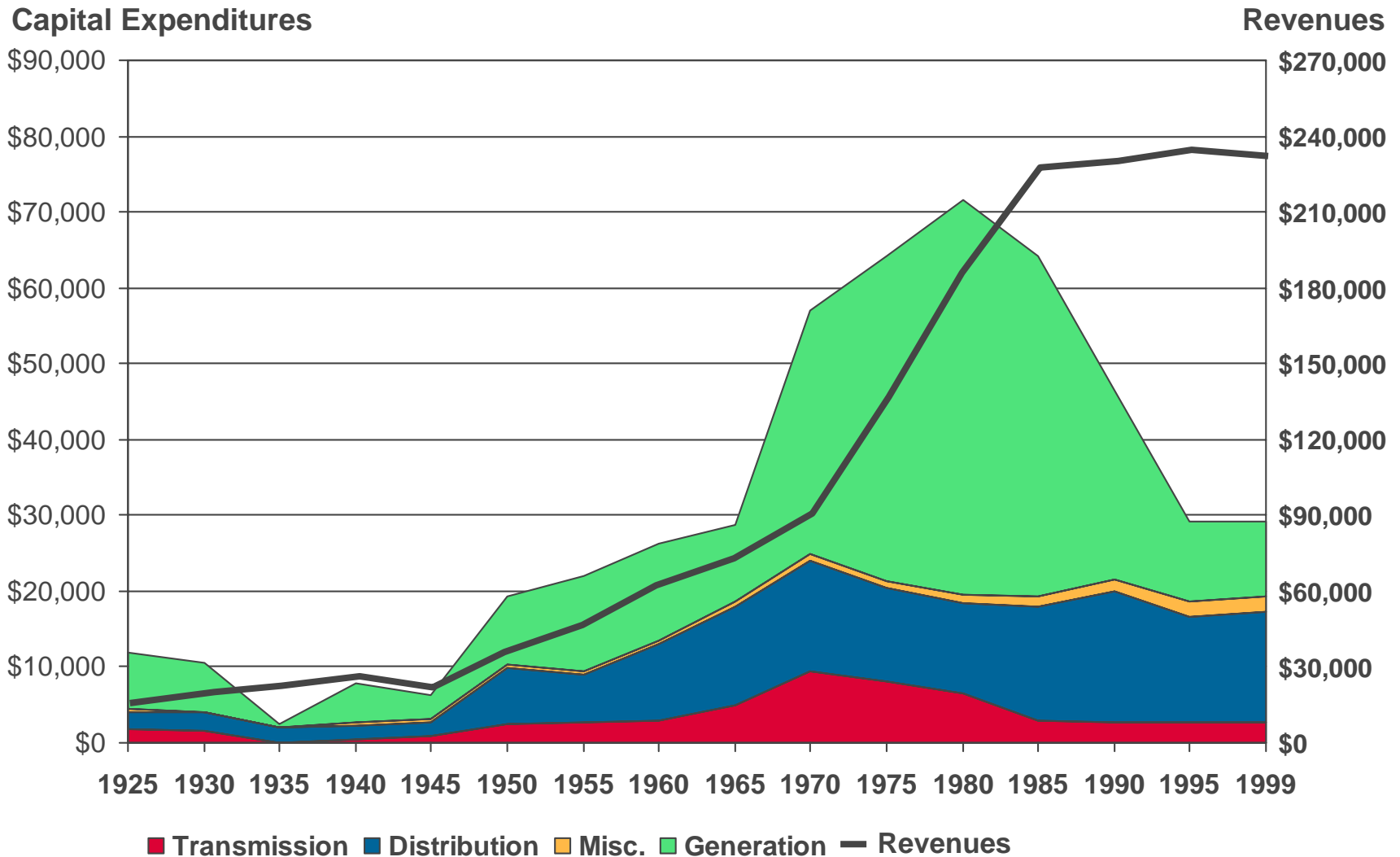


What is the root cause?

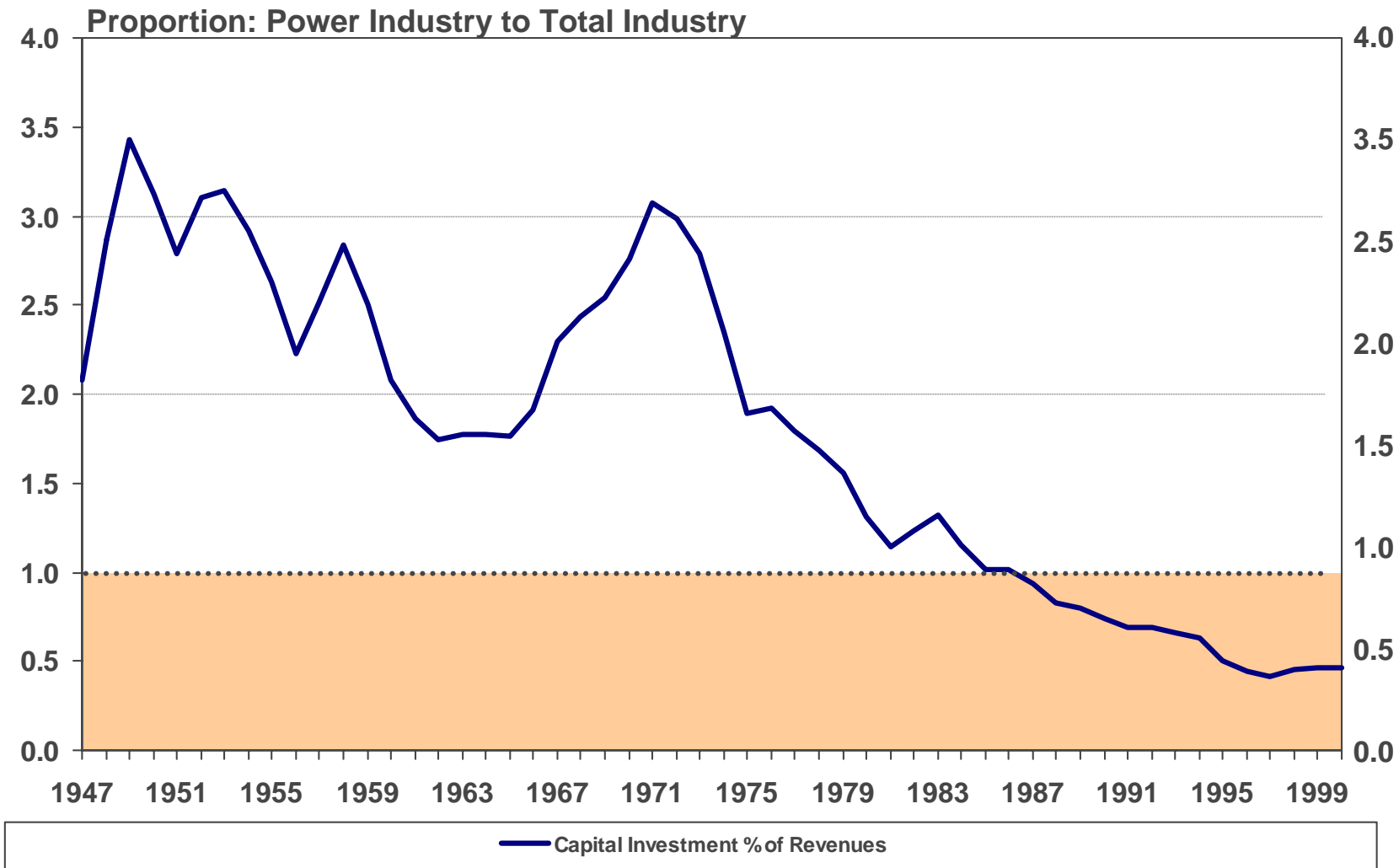
Average U.S. Price of Residential Electricity Service (1984 \$)



Electric Utility Revenues & Capital Expenditures in Real 2003 \$m, 1925-1999

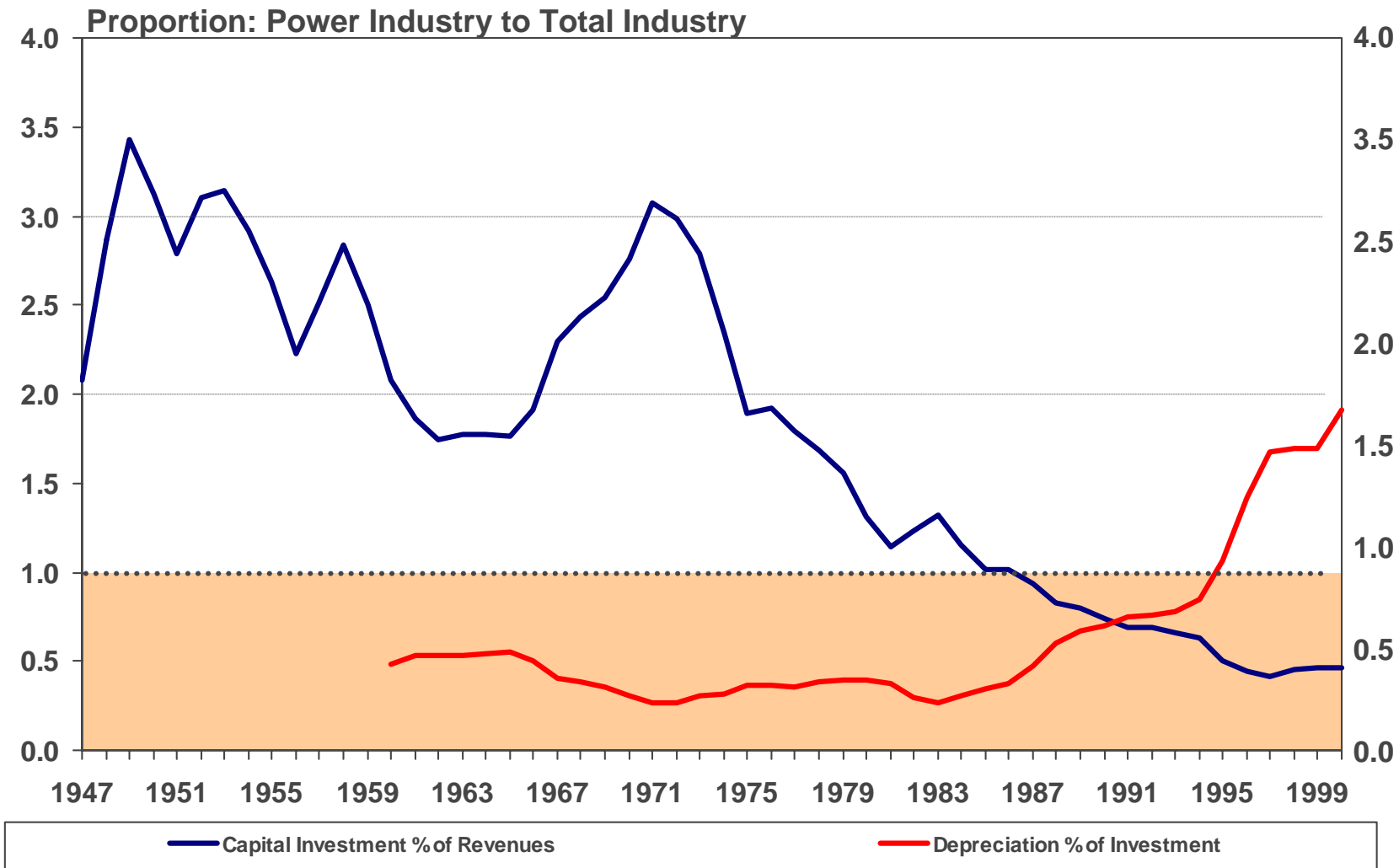


Vital Signs: Electric Power vs. Total Industry



Source:EEI, EIA, NSF

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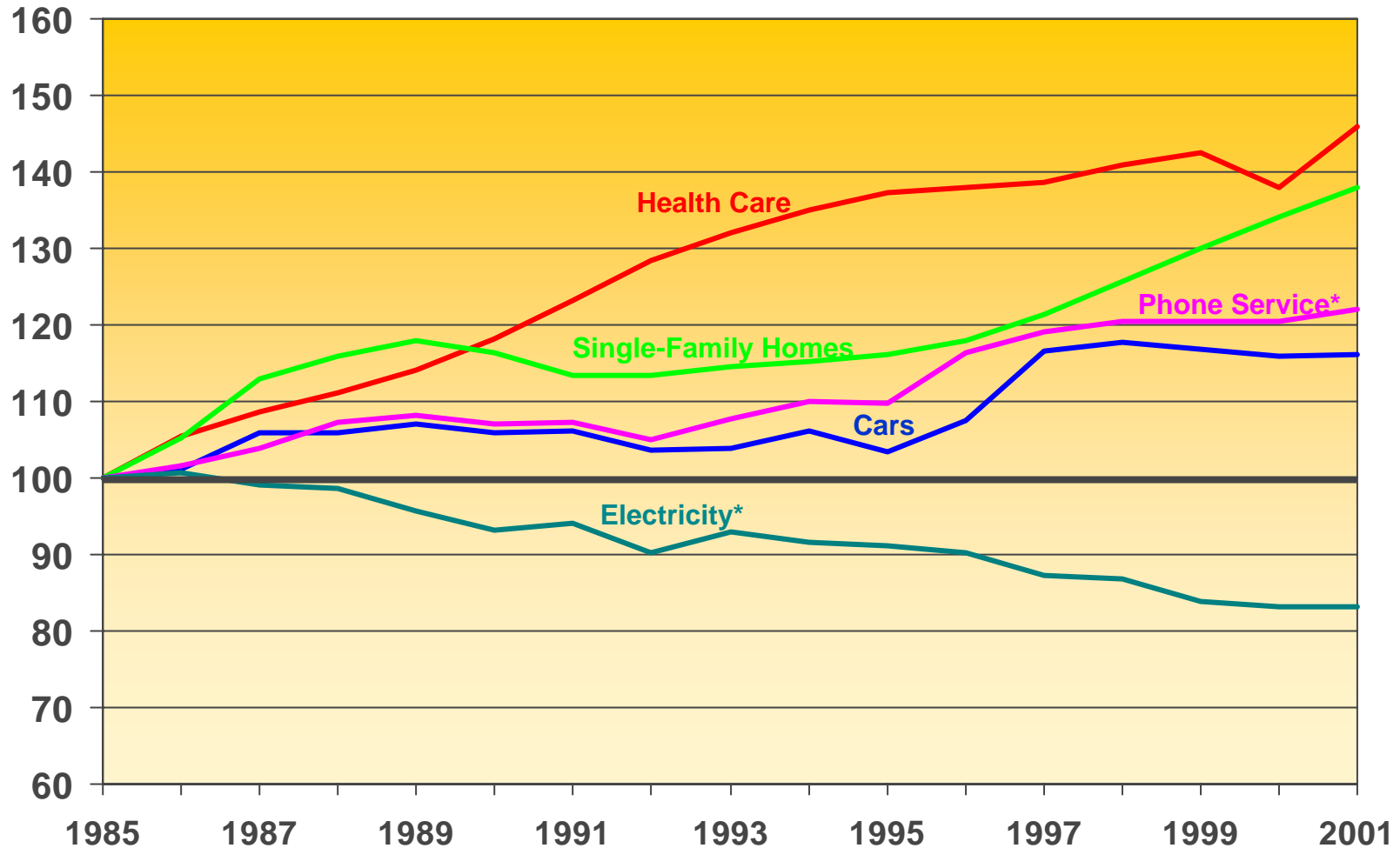
Key Issue to be Resolved



Will the bulk electricity system evolve to become the critical infrastructure supporting the digital society of the 21st century, or be left behind as an industrial relic of the 20th century?

Relative Consumer Prices, 1985-2001

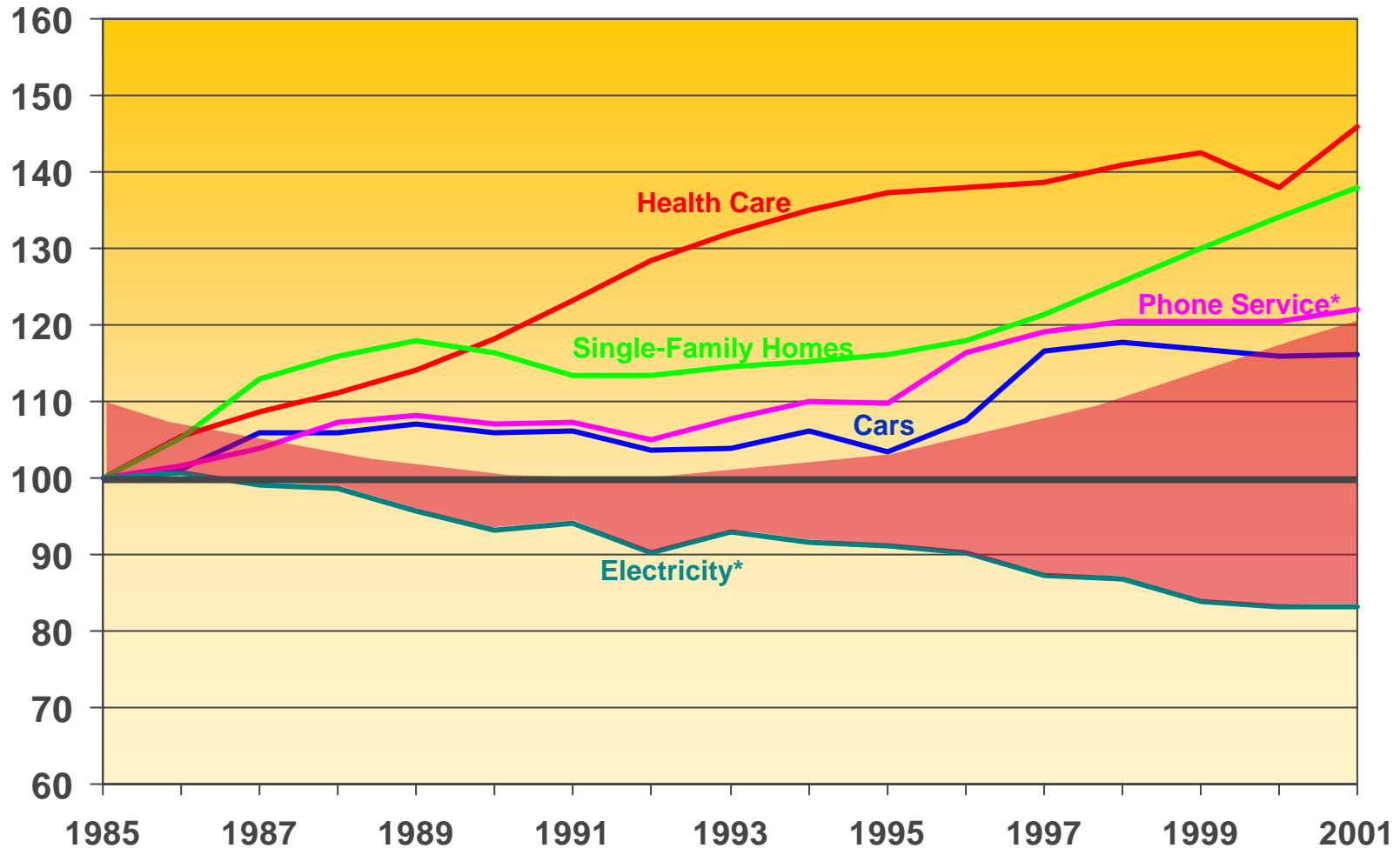
(Prices calculated in 2001\$, 1985=100)



* Average Household Monthly Bill

Relative Consumer Prices, 1985-2001

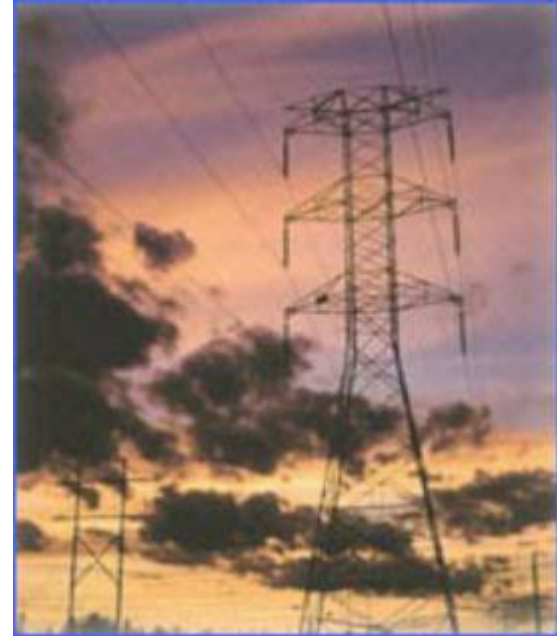
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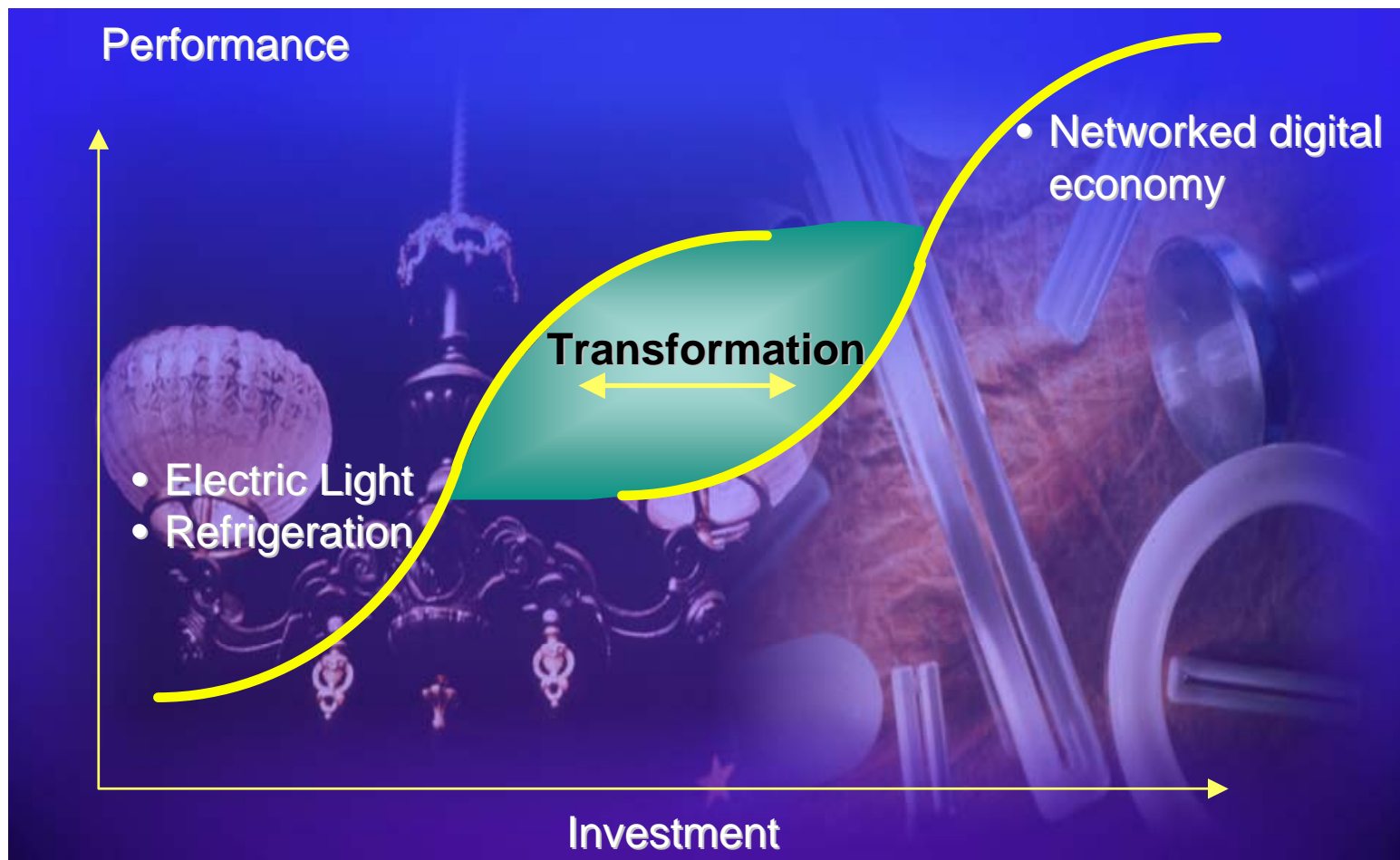
20th Century Grid Under Stress

- Increasing TLRs
- Electromechanical switches
- Little load flow control
- Limited computerization



- DG integration difficult
- Communications not integrated
- Power disturbances cost \$100B/year
- Grid congestion \$100'sM/year

Solution - Breaking the Limits on Electricity Value



Whither PUHCA Repeal?

Value Transformation

Or

More Corporate Liposuction

Forward to Fundamentals

- Electricity is the engine of prosperity and quality of life
- Electricity is a consumer service- based enterprise and no longer a declining cost commodity
- Technology can relieve cost pressures through elevation and differentiation of electricity service value
- Realizing these opportunities requires transformation of the electricity infrastructure



The Transformed Electricity Enterprise for the 21st Century

- Digitally control the power system
- Integrate electricity and communications
- Transform meter into a two-way consumer services portal
- Integrate distributed resources
- Enable a robust advanced generation portfolio



Framework for Action



**Stabilize
Electricity
Markets**



**Provide for the
Public Good**



**Protect the
Environment**



**Educate and
Empower the
Consumer**

**Unleash
Innovation**



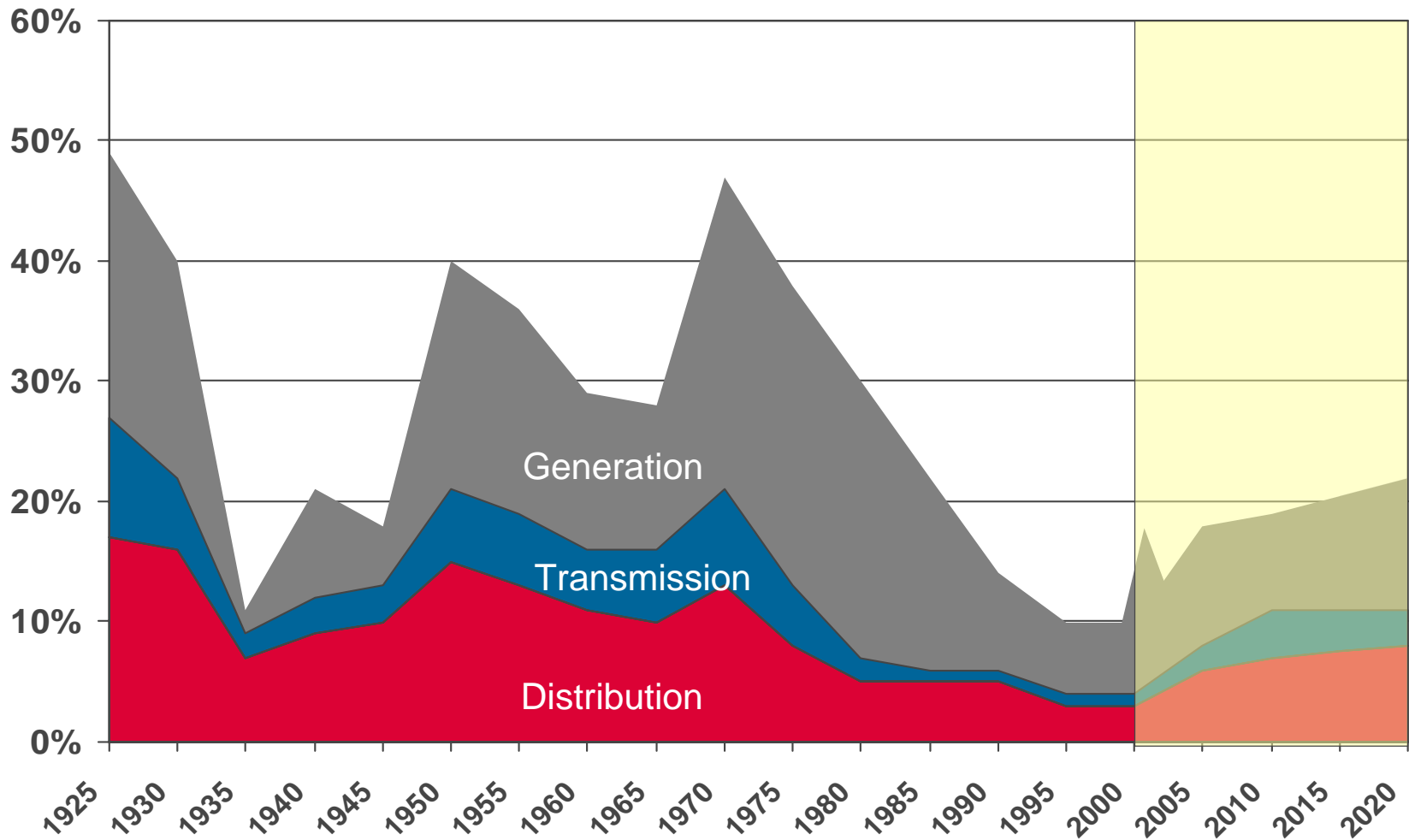
Value of the 21st Century Transformation



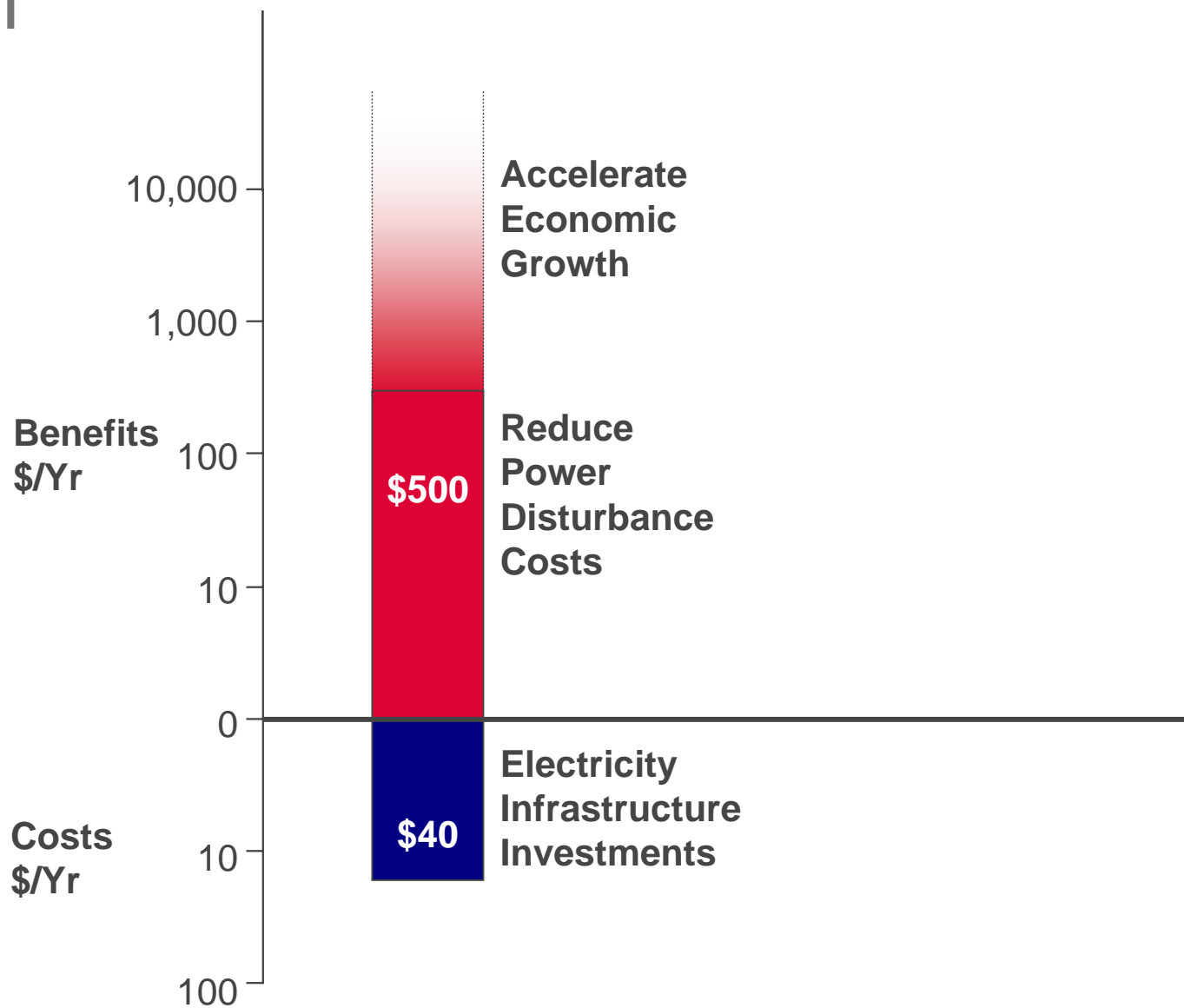
Delivering benefits that far outweigh the cost...

- Increased rates of productivity and GDP growth
- Improved energy efficiency and electricity intensity
- Accelerated reduction in carbon emissions, and
- Improved power system security and functionality

Capital Invested as % of Electricity Revenues

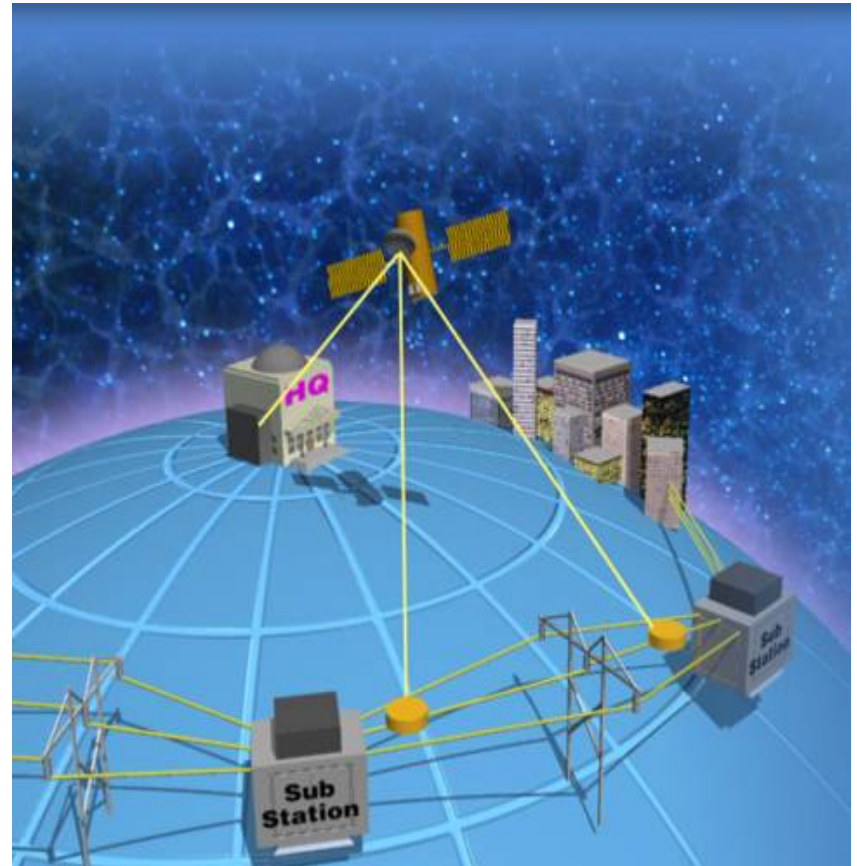


Transformation Cost/Benefits (Avg Residential Customer)



The CEIDS Priority: The Self-Healing, Digital Quality Electricity Superhighway (or “Smart Grid”)

- Enable the grid to possess multi-level distributed intelligence and adaptive control
- Overall system architecture for data communications networks and intelligent equipment to support the self-healing grid and integrated consumer communications interface
- Distributed resource device communication object models to enable their strategic use in distribution automation



The Energy Web

“The best minds in electricity R&D have a plan: Every node in the power network of the future will be awake, responsive, adaptive, price-smart, eco-sensitive, real-time, flexible, and interconnected with everything else.”

-- Wired Magazine, July 2001

<http://www.wired.com/wired/archive/9.07/juice.html>

