



# Electricity for the 21<sup>st</sup> Century

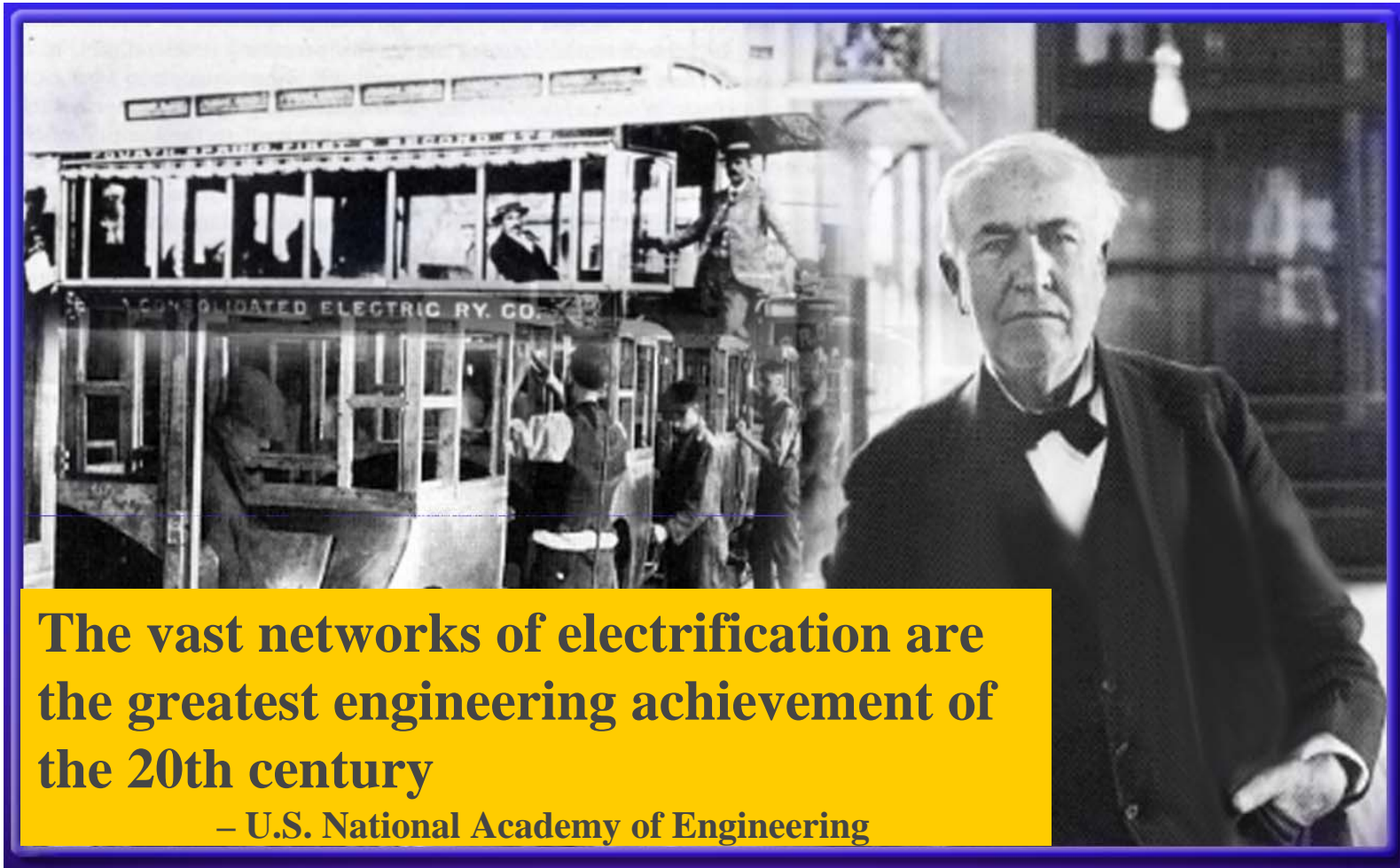
Creating a Smart, Efficient  
Power System

Wellington, New Zealand  
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[www.galvinpower.org](http://www.galvinpower.org)

# Transforming Society



**The vast networks of electrification are  
the greatest engineering achievement of  
the 20th century**

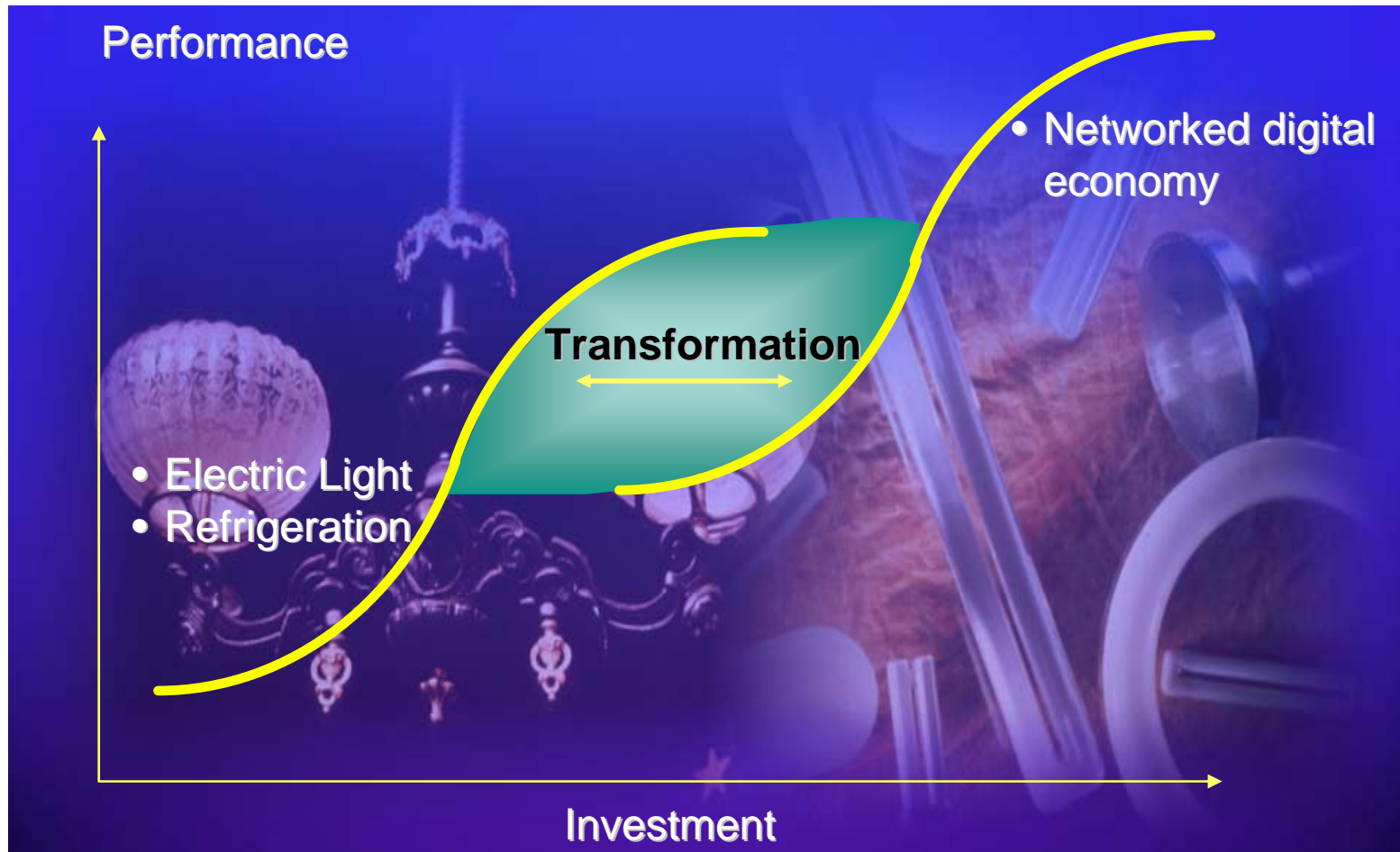
**– U.S. National Academy of Engineering**

# 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?**

# Breaking the Limits on Electricity Value



# GOAL

“The perfect power system will ensure absolute and universal availability of energy in the quantity and quality necessary to meet every consumer’s needs. It is a system that never fails the consumer.”

Bob Galvin  
2005

# Perfection for Today's Digital "On-Line" Generations Means:

- **Universal Connectivity**
- **Absolute Power Quality**
- **Maximum Portability**
- **Smart, Self-Correcting Infrastructure**
- **Control of Service Terms & Conditions**
- **Value-Based Cost**

# The Transformed Electricity Grid for the 21<sup>st</sup> Century

**Electronically control the power system**

**Integrate electricity & communications**

**Transform meter into a two-way consumer services gateway**

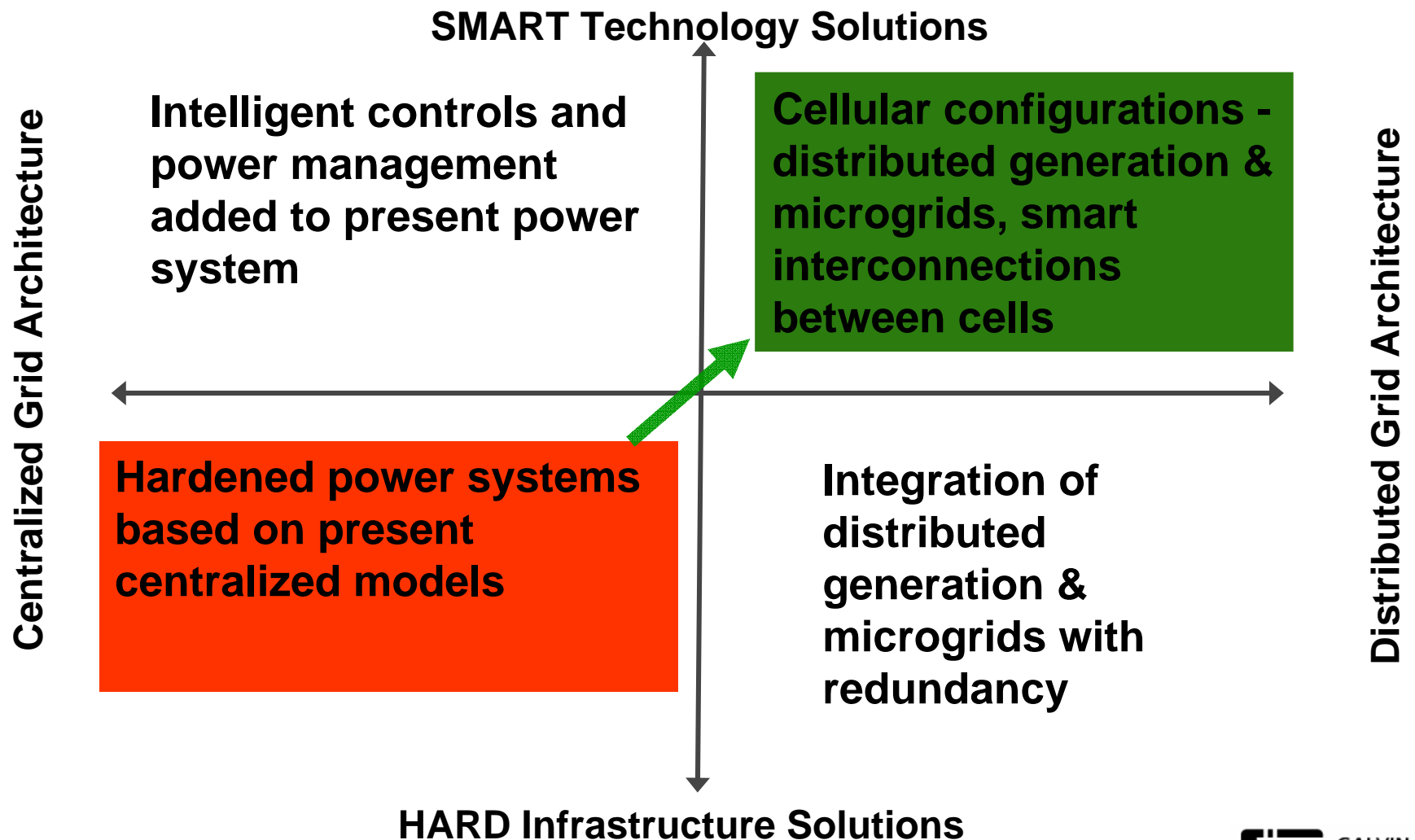
**Incorporate CHP & Distributed Resources**

**Reintroduce Direct Current (DC) Circuits/Microgrids**

**Enable smart, efficient end uses**

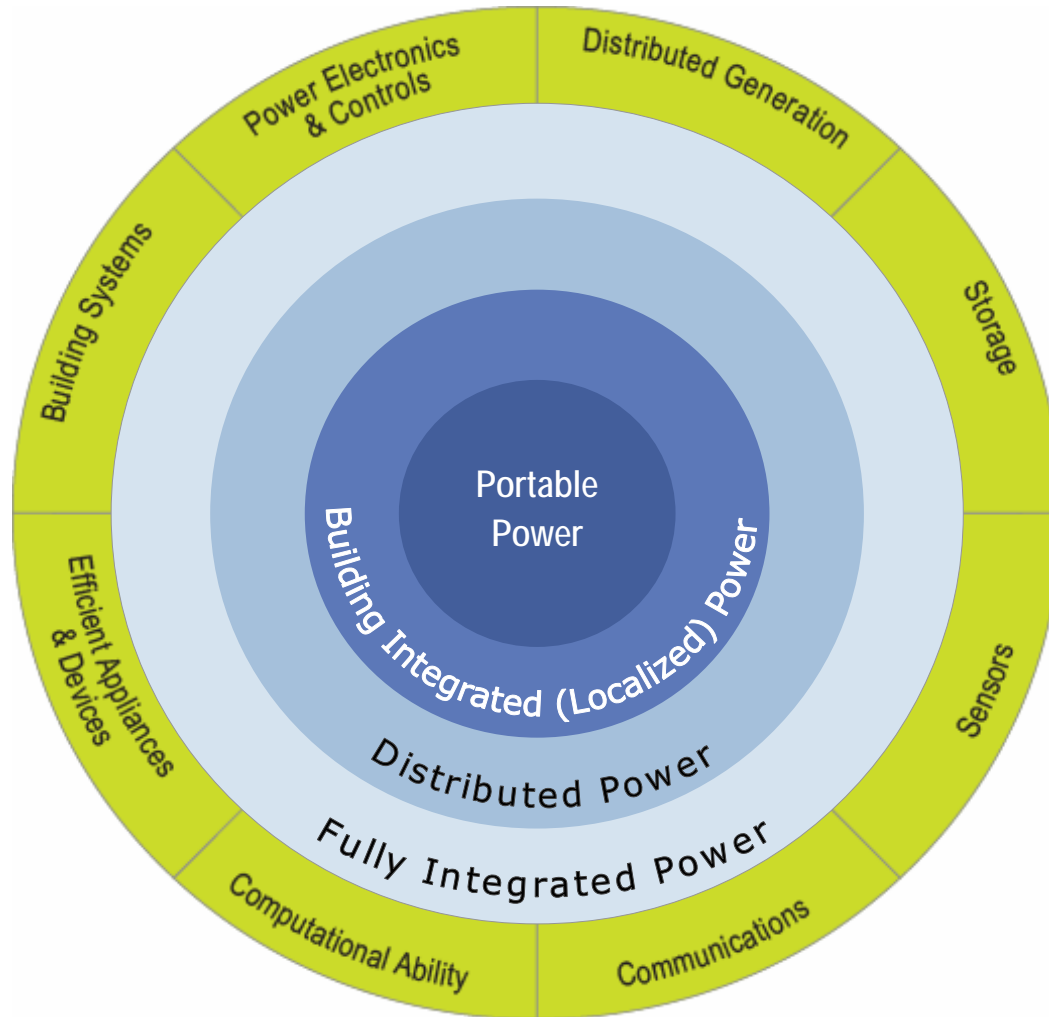


# Conceptual Framework for Alternatives



# The Perfect Electric Energy System

## *System Configurations and Nodes of Innovation*



# Critical Nodes of Innovation

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	<u>Development Stage</u>
•Power Electronic Controls	7
•Integrated Communications	7
•Sensors	6
•Building Systems	5
•Smart Appliances & Devices	5
•Distributed Generation	4
•Computational Ability	4
•Energy Storage	3

# Value of the 21<sup>st</sup> Century Transformation



*Increasing the functionality and value of electricity through consumer benefits that far outweigh the cost*

**Transformed power system security & functionality**

**Increased productivity & GDP growth rates**

**Substantially improved energy efficiency & electricity intensity**

**Accelerated reduction in carbon emissions**

**Reduced cost of infrastructure upgrades & expansion**

# Results

**PHASE I** of the **Galvin Electricity Initiative** established an architectural foundation for the *Perfect Power System*.

**PHASE II** develops a three dimensional blueprint for building the *system* on this foundation.

- **Technical** – Complete engineering designs and roadmaps
- **Commercial** – Define business opportunity templates & form consortia of key implementation players
- **Operational** – **Quality management procedures & training programs**

PHASE III will commercially implement the distributed utility path to the perfect power system using limit breaking innovative technology

## COMMUNICATE - EDUCATE

# A Message of Enduring Truth

“Often, the counter-intuitive leads us to the solution . . . I am not concerned about being the minority . . . Things don’t get changed unless the leaders of the minority view take charge.”

Bob Galvin