CHP Roadmap Workshop
Five Years into the Challenge

September 20, 2004 Austin, Texas

NEW ENERGY CAPITAL

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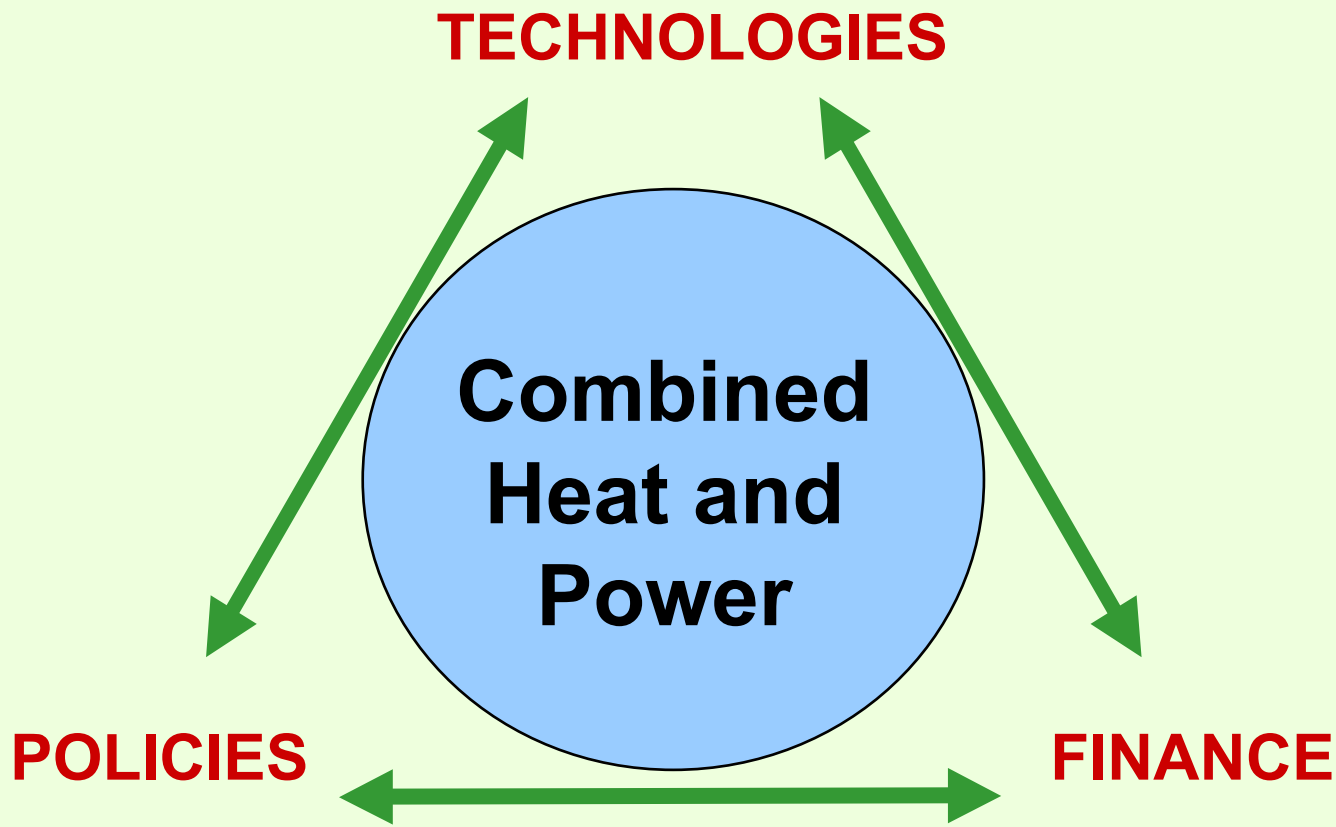
New Energy Capital: Open for Business

- Energy asset acquisition, financing, and management company
- Partnering with developers, technology providers, host companies, and government agencies
- Building a portfolio of renewable energy and distributed generation projects through equity investments
- NEC fills equity gap at the project level
  - Market knowledge
  - Quick response time
  - Relationships with debt and public incentive providers
- Focus on:
  - CHP and Renewables
  - Projects with total capital costs less than $30 million

The Elements of Success



CHP: A Classic Market Cycle

- **Exuberance**: many players with wide range of capabilities and resources; great expectations; inadequate understanding of customer needs and market dynamics
- **Shakeout**: reality sets in – performance problems lead to failure of some industry players; those with strong skills and/or balance sheets survive
- **Maturity**: consolidation occurs; goals reset and tools refined to meet real customer needs; creates opportunity for stable growth and increasing profitability

An Exuberant Launch

- “CHP Challenge” in 1998 = double US CHP Capacity by 2010 – 46,000 MW
- “Making Connections” Report in 2000
- “National CHP Roadmap” in 2001
- Increase in technology investments
- New start-up companies
- Several states commit to encourage CHP growth, e.g. NY and CA

Real Progress to Date

- 31,000 MW added to date
- Avoided utility generation of 171 million Mwh/yr
- Fuel savings of almost 1 trillion Btu per year
- Avoided 13 MMT carbon emissions
- IEEE interconnection standards and NARUC guidelines
- EIA CHP tracking
- Various state CHP incentives and regulatory measures
- FERC support and proposed federal tax credit

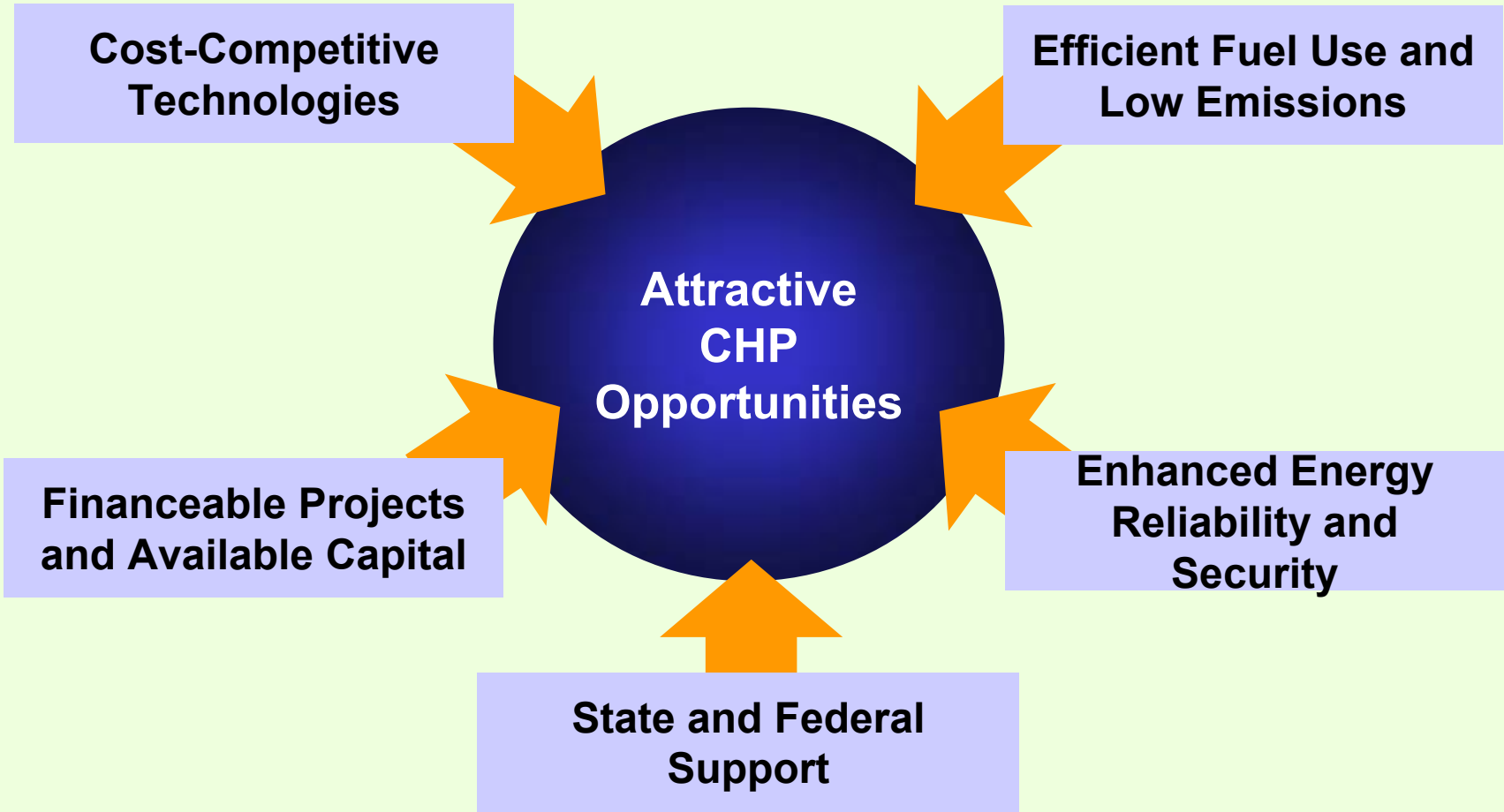
Shakeout - Reality Sets In

- Utilities Push Back – Interconnection, Standby Charges
- Various technologies have problems
- Some Developers Stumble over Project Economics, Technical Performance
- Industry consolidates
- Natural Gas Prices Rise

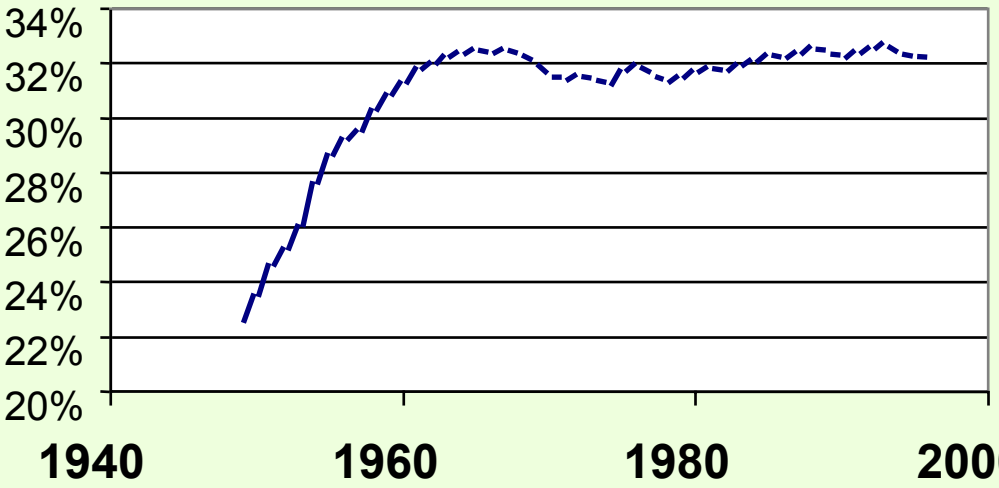
CHP: A Maturing Industry

- Strong Fundamentals
- Manageable Challenges
- Good Prospect for Reasonable Growth and Profitability

CHP: Strong Fundamentals



Stagnant Efficiency of U.S. Electric System

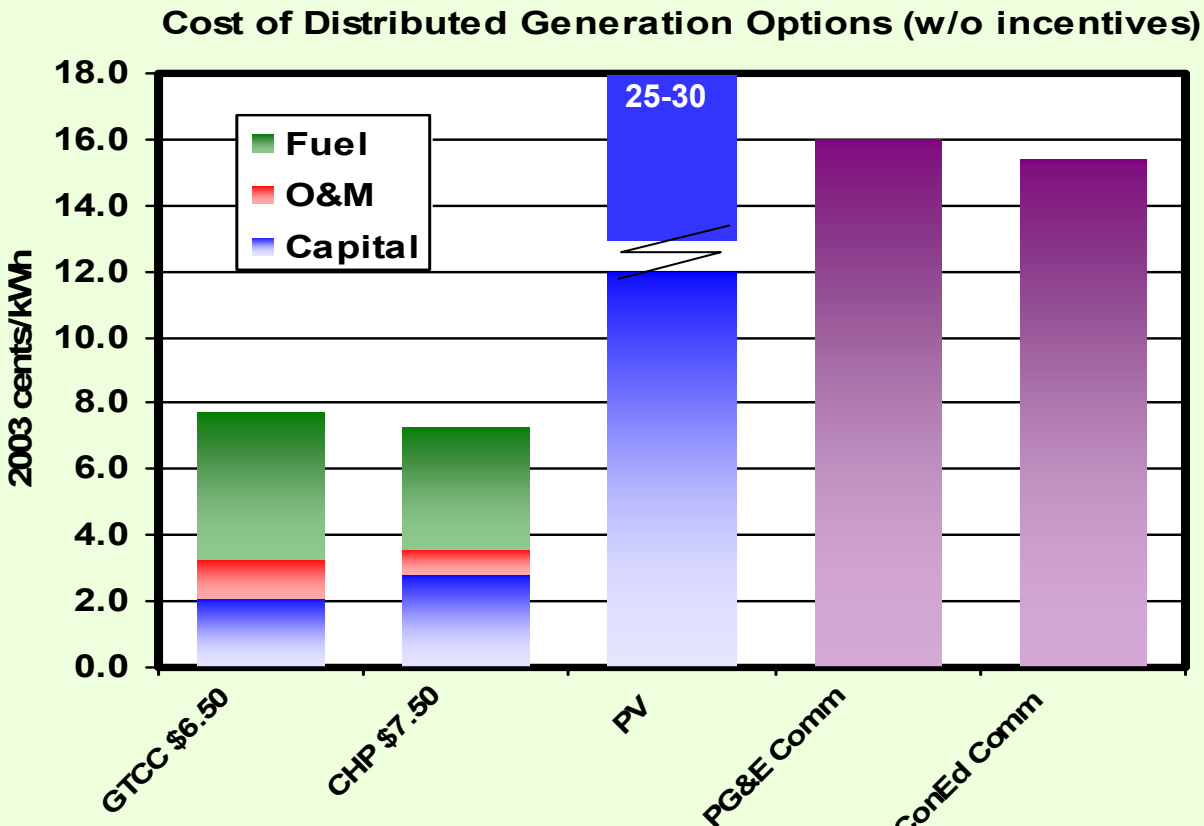


Fossil Electric Generation Efficiency (at plant, W/O T&D)

Source: EIA, Annual Energy Review 1996

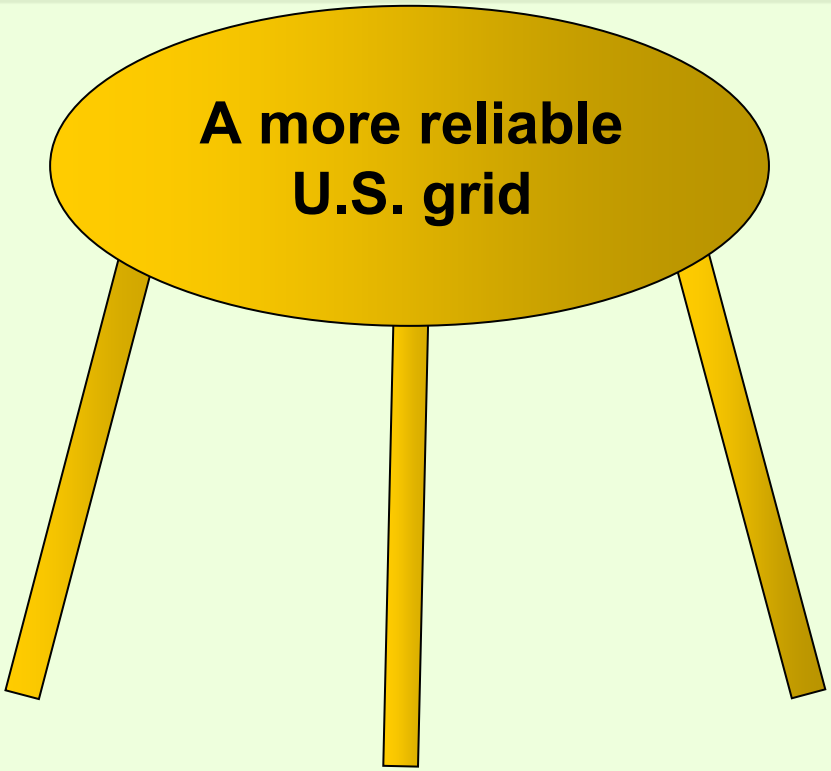
U.S. electricity conversion losses totaled 23.4 quads in 1998, enough energy to fuel Japan.

Competitive Economics – Distributed Generation



Note:
1. GTCC: Gas Turbine Combined Cycle ($ figures are gas prices in 2003 $/MMBtu).
2. CHP: Combined Heat and Power using reciprocating engine as prime mover.
3. PV: Commercial scale photovoltaic project.
4. PG&E Comm: Pacific Gas & Electric Commercial tariff, Oct, 2003.
5. ConEd Comm: ConEd NY commercial tariff, Oct, 2003.
6. Source of data: Cambridge Energy Research Associates.

Energy Security: Responding to the Blackout

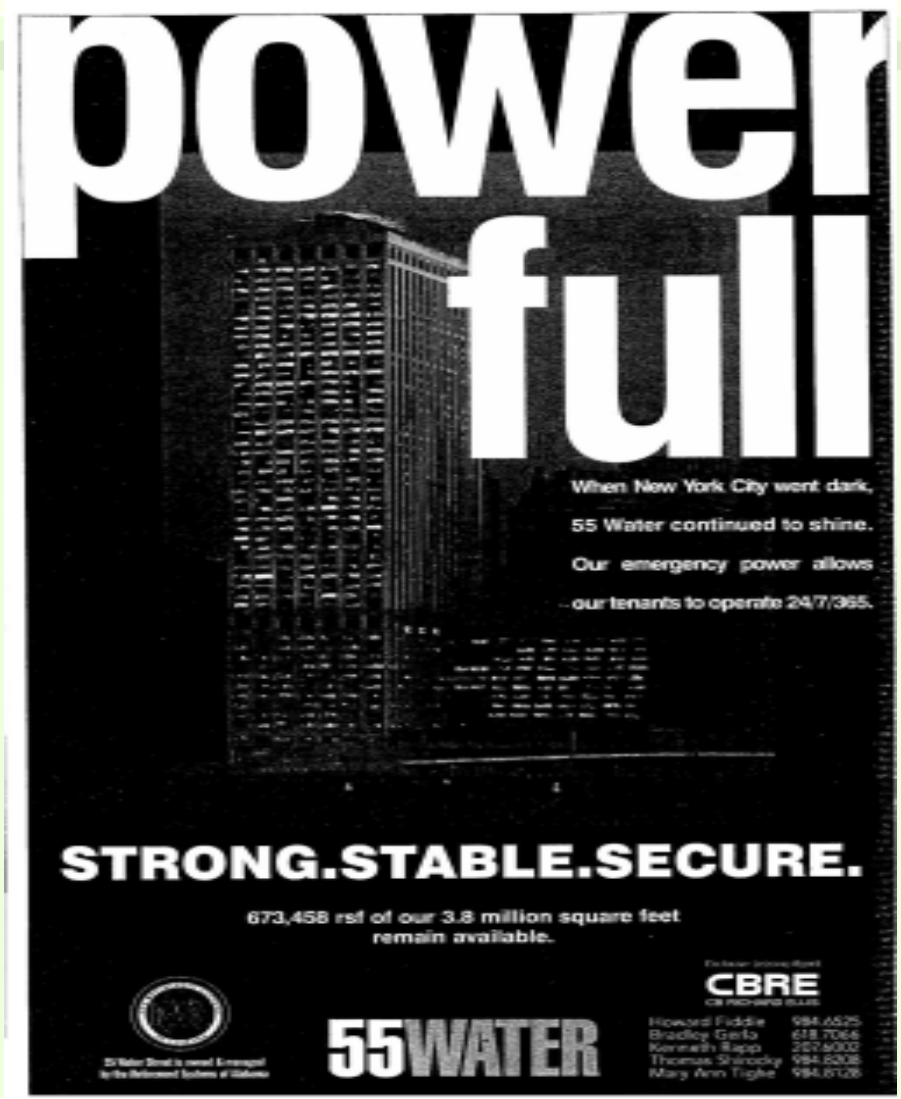


Upgrade transmission & distribution

Reduce electricity demand

Increase Distributed Generation and CHP

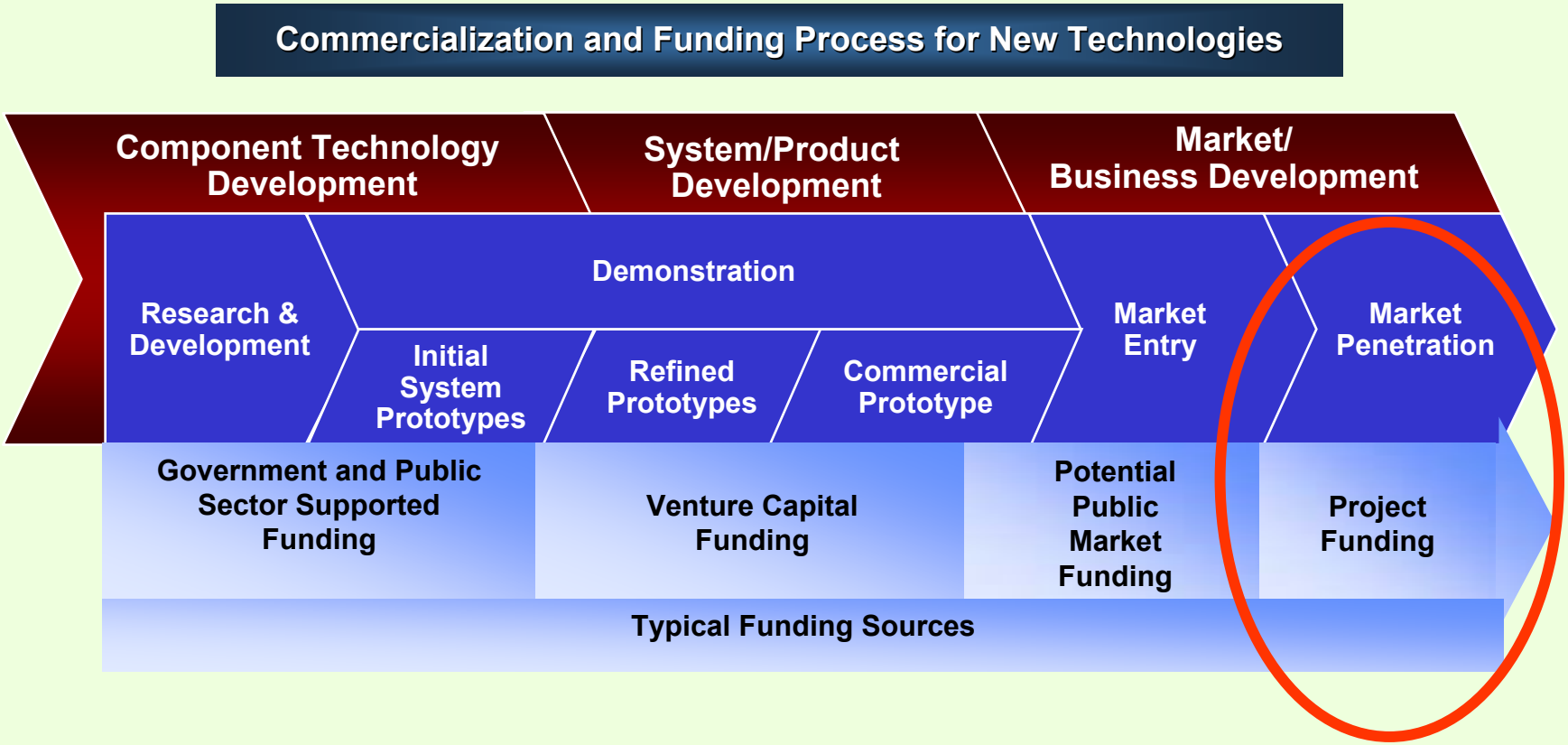
Reliability – A Key Element of the CHP Case



Reliability – A Key Element of the CHP Case

Consumers Do Care

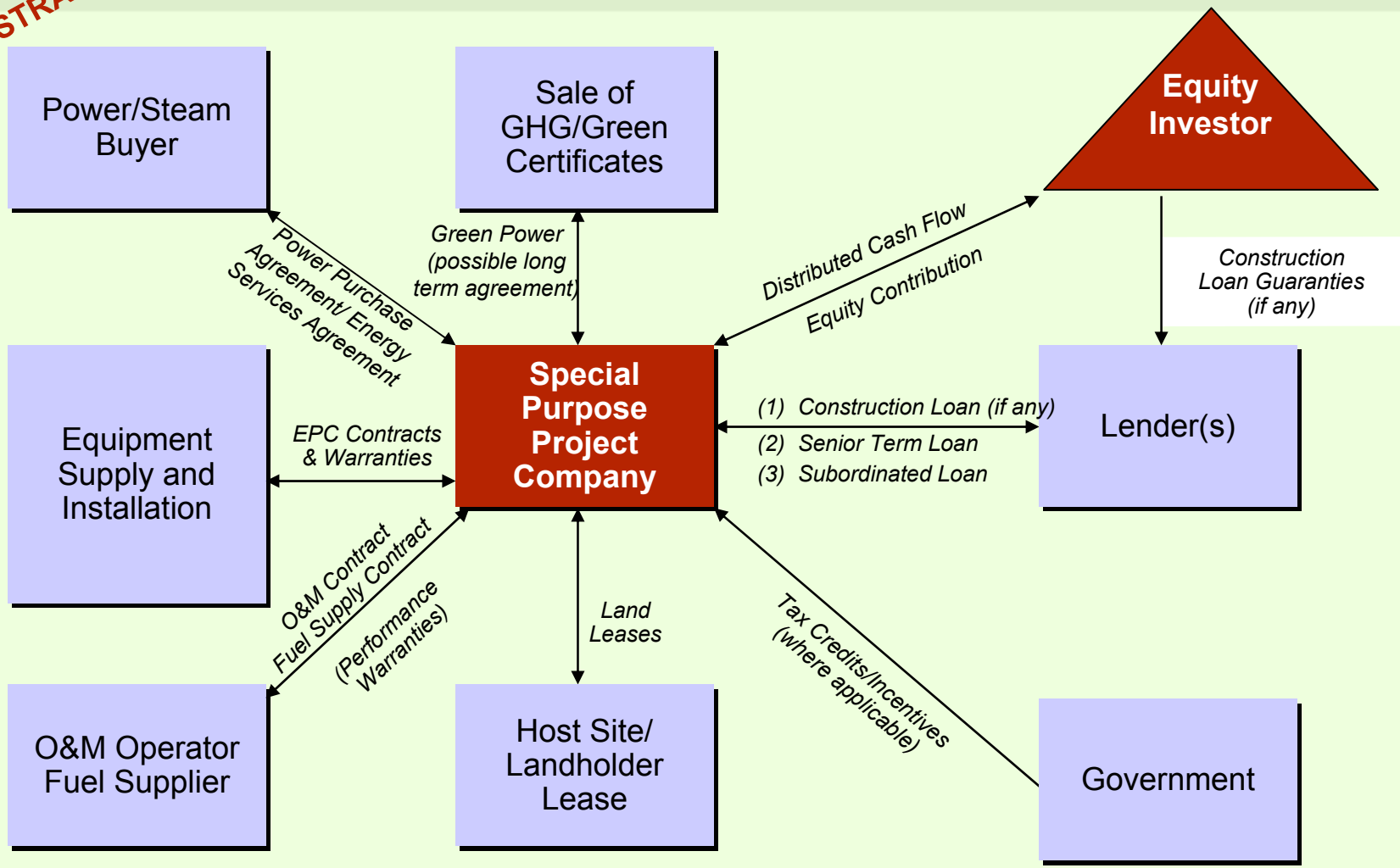
Capital at all Stages is Key



Source: Adopted from Arthur D. Little.

Building a Financeable Structure

ILLUSTRATIVE



Major New Capital Sources

- **State Pension Funds** – e.g. CA, NY
- **Major Banks** – e.g. Citigroup
- **Large Venture Capital Firms**
- **Private Equity Firms**

Managing the Challenges

- Advancing the technologies
- Confronting higher natural gas prices
- Ensuring system performance
- Overcoming regulatory and institutional barriers

Advancing the Technologies

Reciprocating Engines

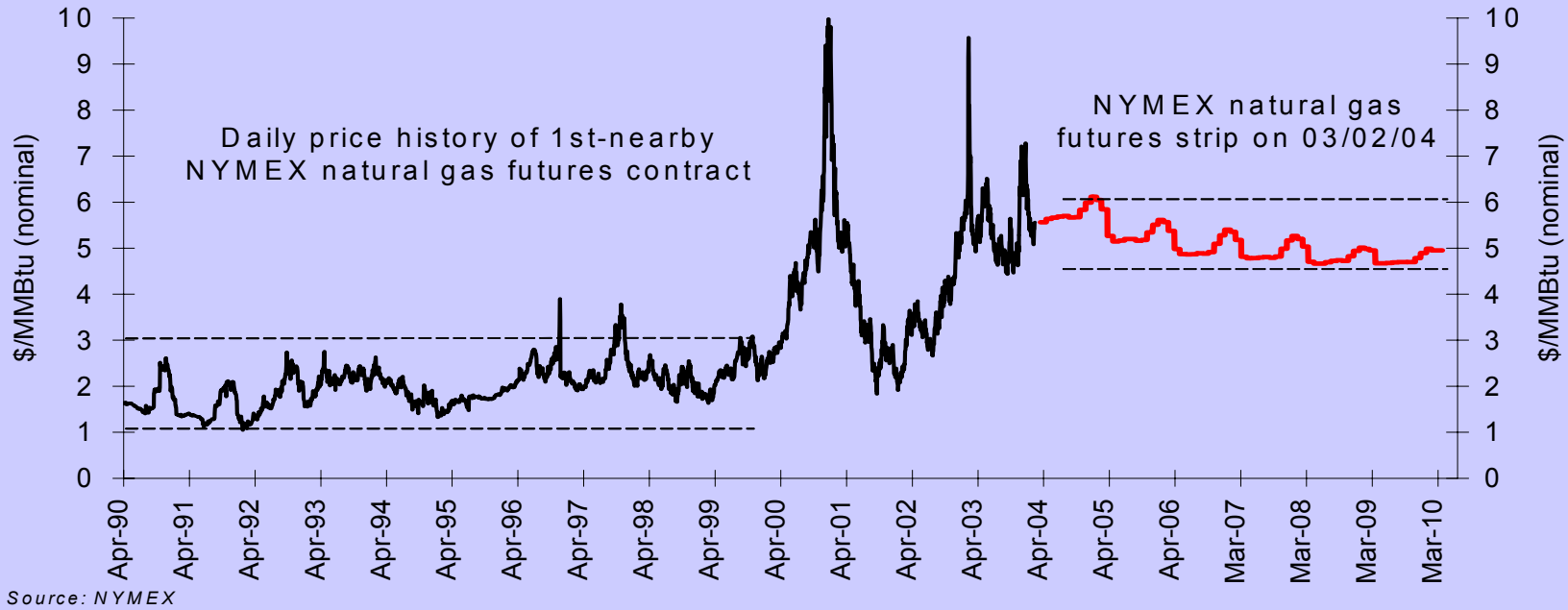
Photo courtesy of Capstone Microturbines

Microturbines

Gas Turbines

H2 Systems

Confronting Higher Gas Prices



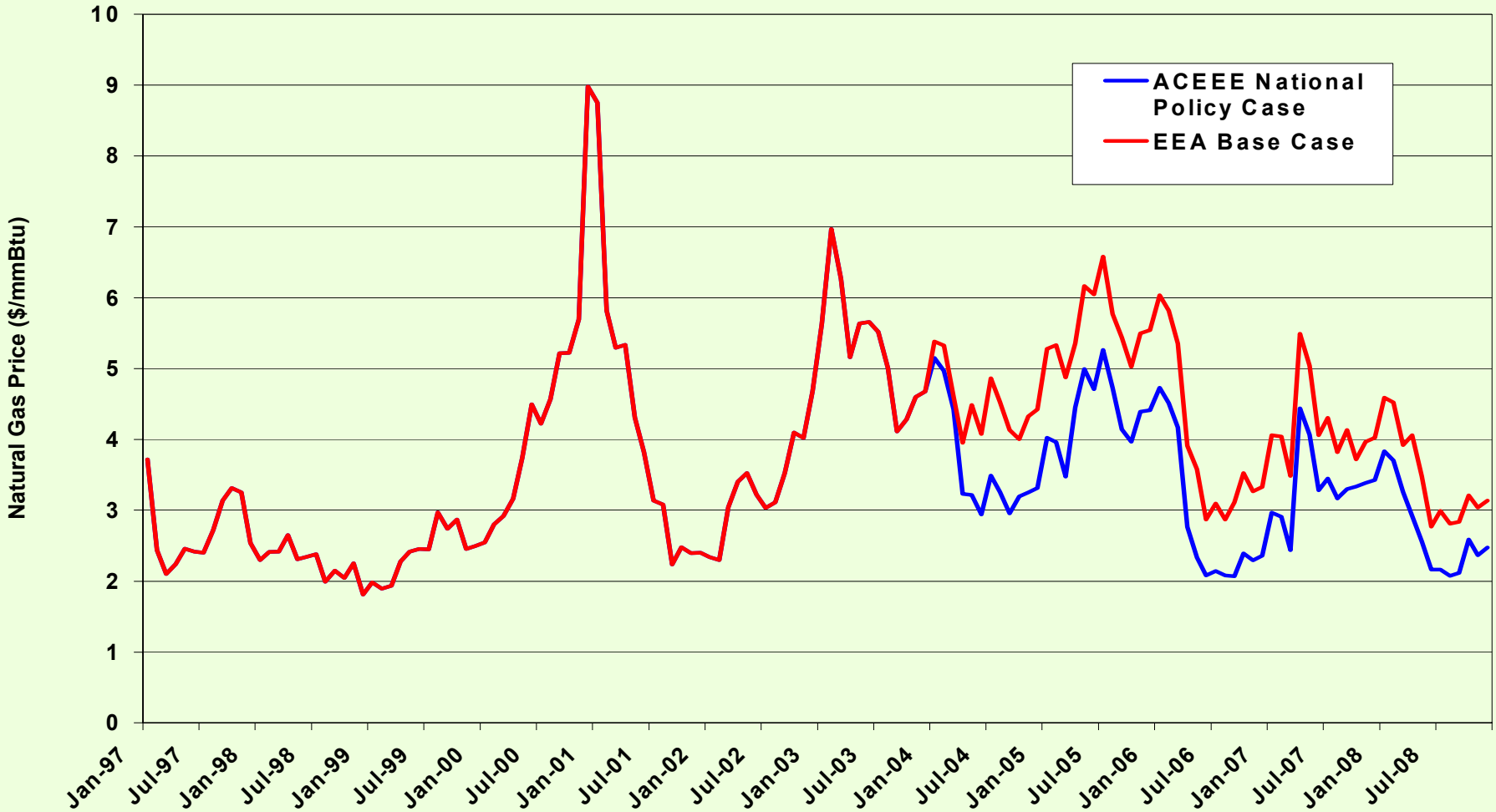
Source: NYMEX

"[Cambridge Energy Research Associates] believes that prices will remain in the $4 to $6 range for much of the decade. It appears likely that gas prices have moved to a higher plateau…compared with the 1990s…."

Higher Gas Prices: The Silver Lining

- Gas-based utilities raising electricity rates
- Lower gas distribution rates for on-site CHP in certain areas, e.g. CA and NY
- 2X CHP efficiency attractive as gas rates rise
- CHP, end-use efficiency and renewables can cut gas use and marginal prices
- Alternatives like landfill gas can be attractive

Impact of EE & RE on Natural Gas Pricing



CHP and LFG: Major Opportunity

Northern Power Systems

SC Johnson

Racine, Wisconsin

- *3.5 MW gas turbine with heat recovery steam generator*
- *Turbine burns methane gas from neighboring landfill*
- *50% reduction in Green House Gas emissions*

Ensuring System Performance

- Proven technology with strong vendor
- Capable and bondable EPC
- Performance guarantees
- Vendor or EPC O&M

Ensuring System Performance: EPC Is Key

Northern Power Systems

Equity Office Properties

One Market Plaza, San Fran

- *3 500kW gas fired engine generators with heat recovery for steam generation*
- *1st commercial office building to qualify for 30% state incentive program*
- *1st on-site power system approved by PGE to parallel with the downtown network grid*

Overcoming Barriers

- Interconnection standards
- Utility policies and practices
- Emission standards
- Siting and permitting
- Tax treatment

"The Future is Not What It Used to Be."

Paul Valery
French Writer
(1871-1944)

“ The Best Way to Predict the Future is to Invent it.…”

Alan Kay

Computer Entrepreneur

"The Best Way to Predict the Future is to Invent It"
Alan Kay, Computer Entrepreneur

US CHPA
UNITED STATES COMBINED HEAT & POWER ASSOCIATION

CHP & EPA COMBINED HEAT AND POWER PARTNERSHIP

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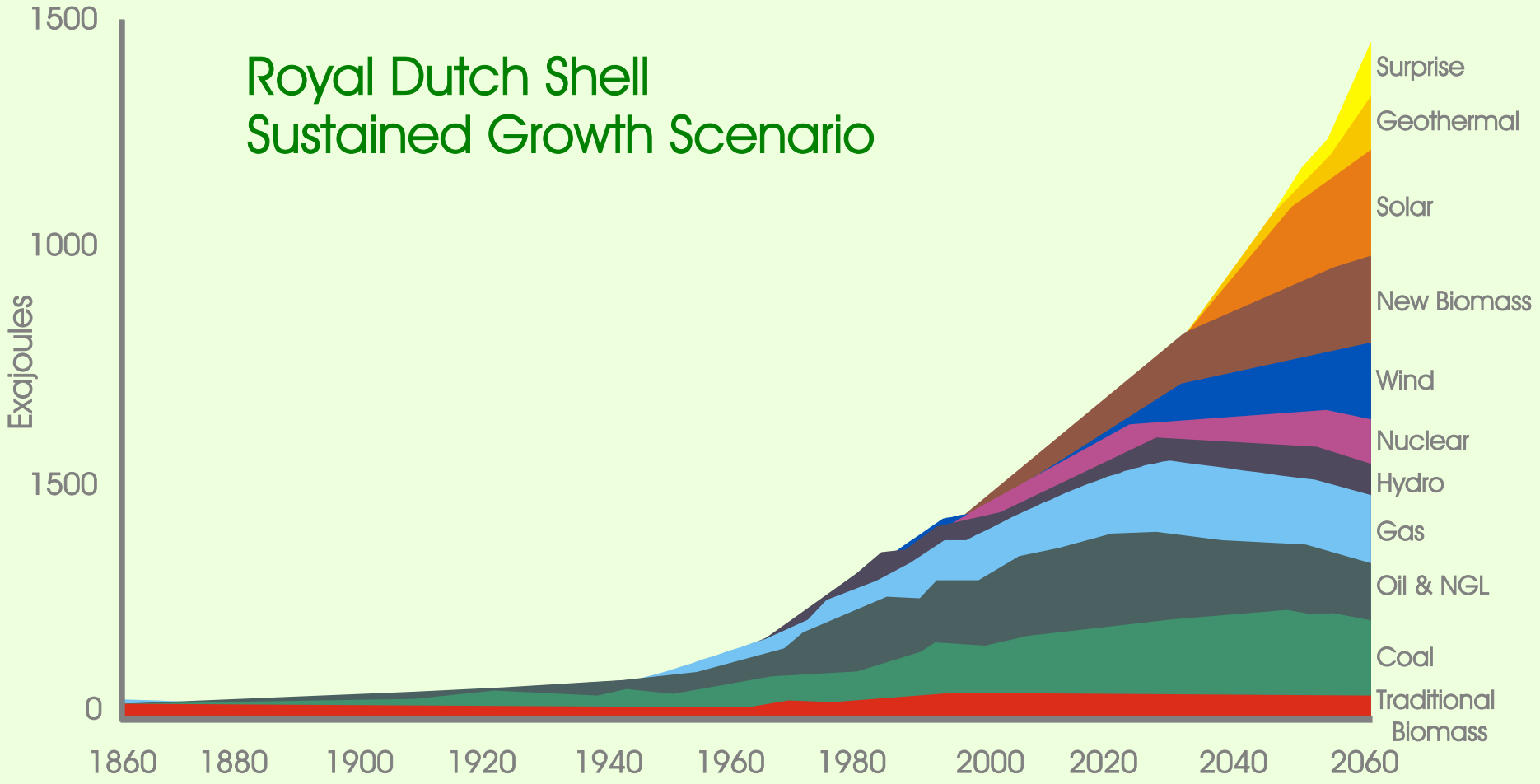
“The best way to predict the future is to invent it” -Alan Kay



LS-CD-b136501

Source: Royal Dutch Shell, 1995.

For More Information

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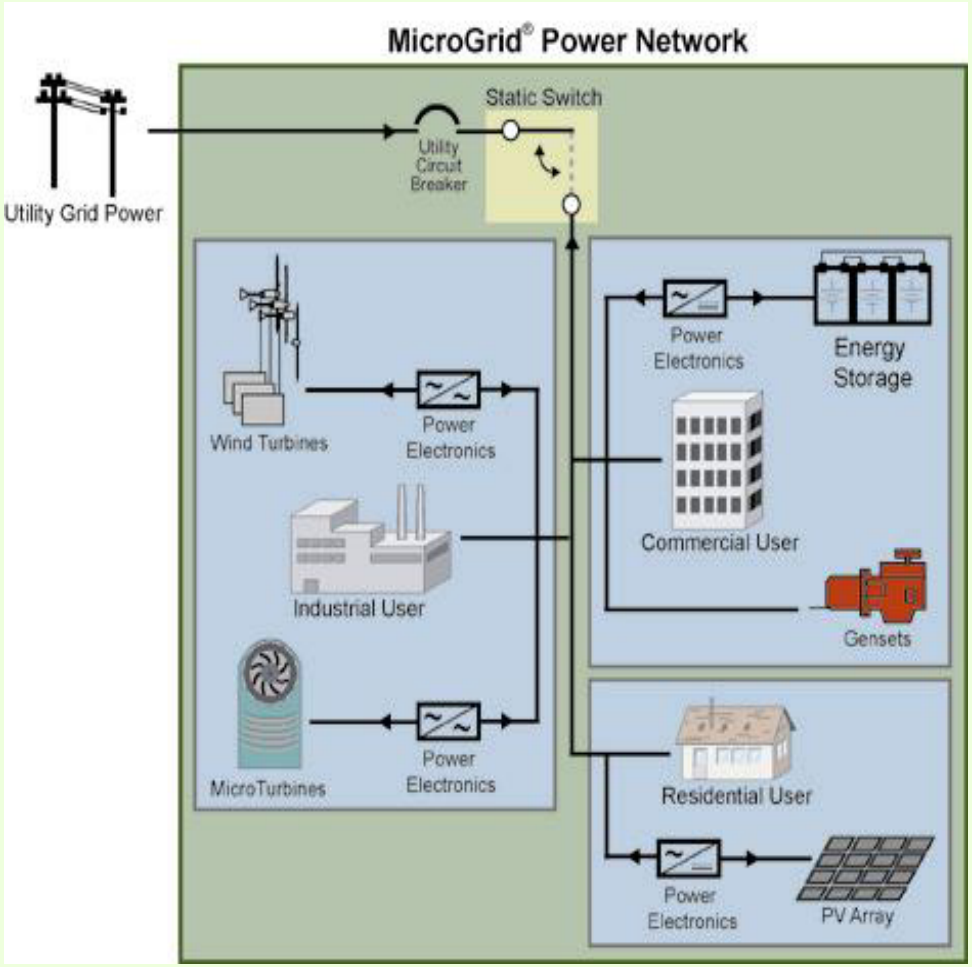
Take More of a Systems Approach to CHP



Northern's MicroGrid system architecture combines:

- System-networkable power technology
- Advanced control capabilities
- Comprehensive energy management and communication

Combined Heat and Power

Cost Savings for Commercial Customers

Equity Office Properties

One Market Plaza, San Francisco

- *3 500kW gas fired engine generators with heat recovery for steam generation*
- *1st commercial office building to qualify for 30% state incentive program*
- *1st on-site power system approved by PGE to parallel with the downtown network grid*

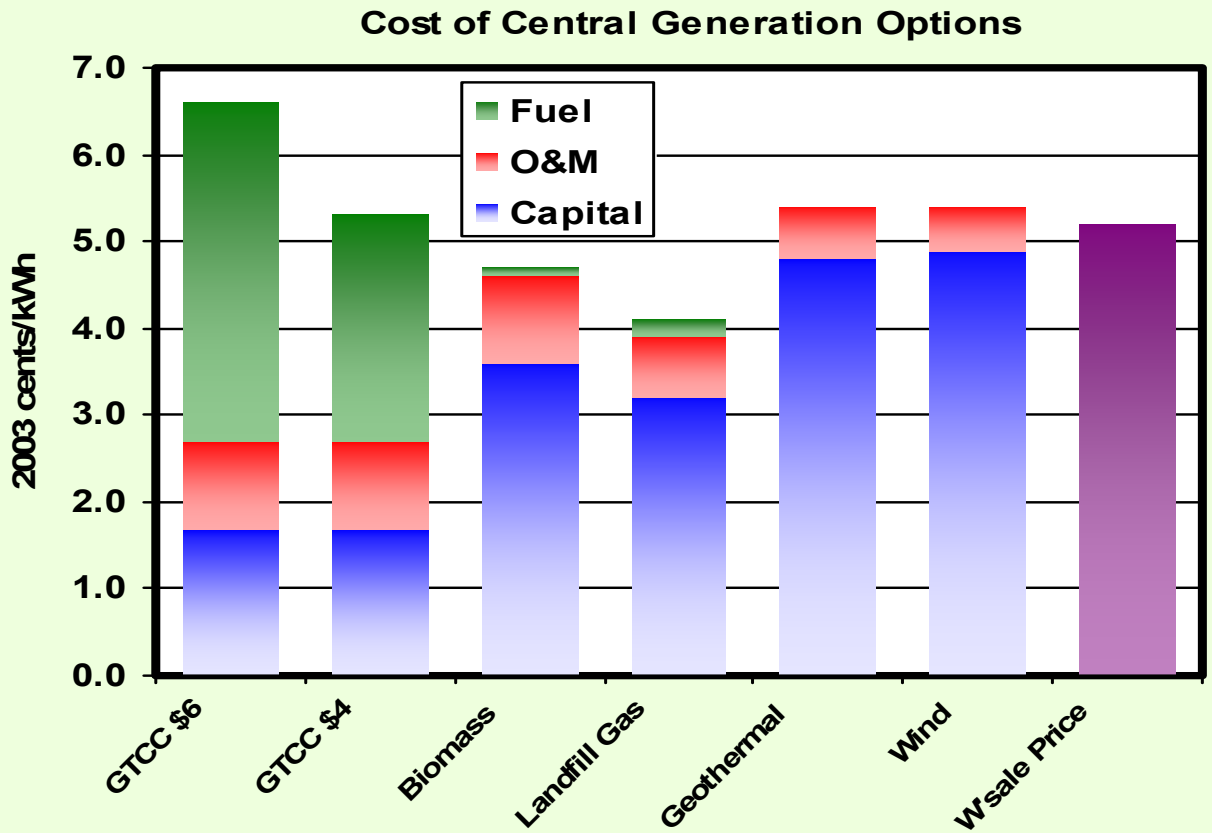
CHP Applications

Reliability and Cost Savings for Industrial Customers

Pokka Beverage (division of Coca Cola North America)
American Canyon, CA

- 1 MW gas fired engine generator provides continuous power to production facility in parallel with the utility grid
- Fast switch isolates critical loads from utility outages within 3 cycles

Competitive Economics – Central Generation (w/o Incentives)



Note:
1. GTCC: Gas Turbine Combined Cycle ($ figures are gas prices in 2003 $/MMBtu).
2. Biomass and Landfill Gas with reciprocating engines as prime mover.
3. Wind: 50 MW project with 35% net capacity factor.
4. W'sale price: Merrill Lynch average 2004 price ISO-New England.
5. Source of data: Cambridge Energy Research Associates.

Energy Efficiency First!

"All people want is cold beer and hot showers."

- Amory Lovins

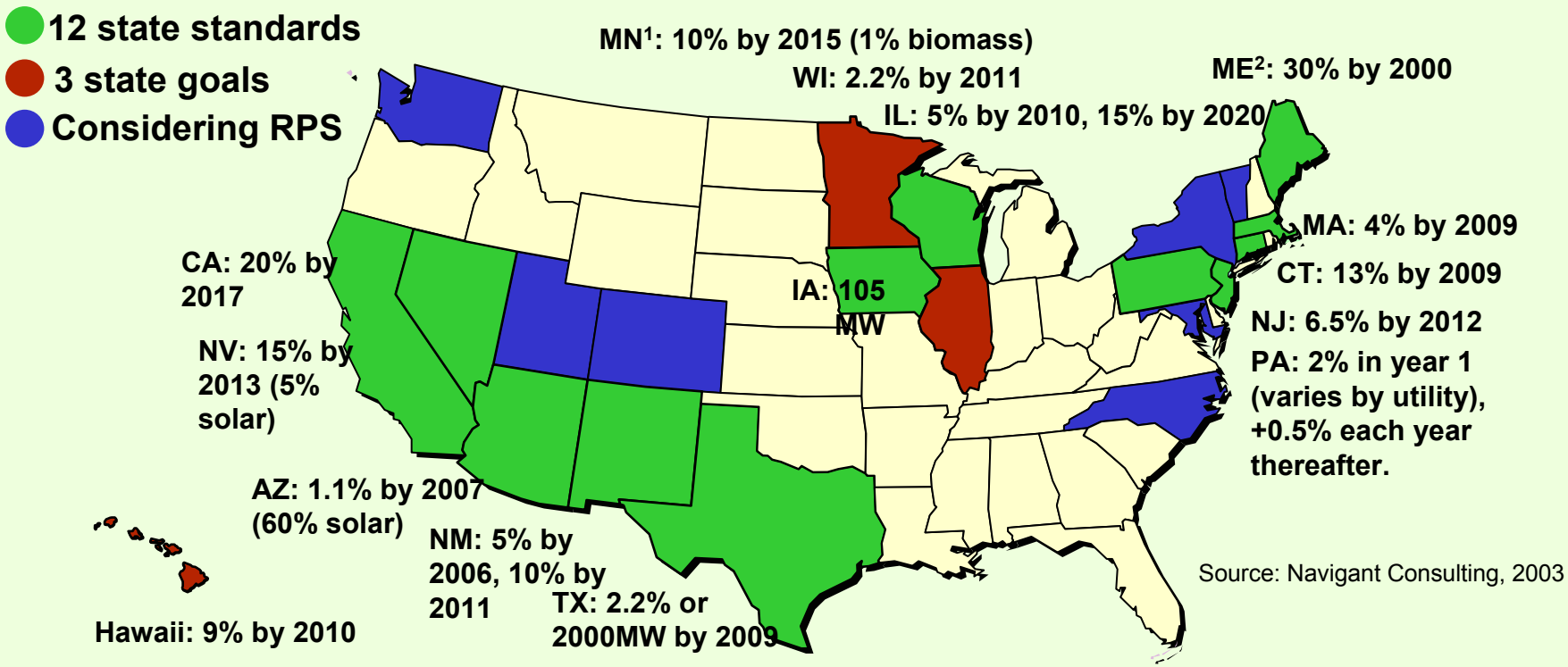
We are interested in the results of energy use, not the energy itself. How much energy we use to cool the beer and heat the water is a choice we make.

What Is Attractive About This Market Segment?

- **Commercial energy technologies have difficulty getting deployed**
  - **Limited investor understanding and attention**
  - **Secure assets**
  - **Strong contractual structures**
- **Attractive market fundamentals**
- **Supportive policies/incentives**

Demand-Driven Growth

U.S. Renewable Portfolio Standards (as of Q4 2003)
Existing RPS Requirements Will Add 17,000 MW of Renewables by 2010



CalPERS Green Wave Initiative

- First pension plan to make major commitment to clean energy and environment
  - $1 bn from CalPERS/STRS pension plans
  - Strong backing from Treasurer
  - Environmental metrics for public companies

Clean Energy Technology Investing

- **Financing of clean energy technology companies: A rising trend?**

	2002 ($M)	2003 ($M)
Cleantech	1,085	1,300
Overall	21,039	16,891
% of Total	5.15%	7.69%

- **2004 Forecast: $2 bn in clean energy technology investments**

- **Clean Energy Market Forecast: $0.5 bn (2002) → $8.9 bn. (2012)**

- **Mainstream VCs/Alternative Private Equity Entering Cleantech Sector**

Advent International
Benchmark Capital
Kleiner Perkins
Thomas Wiesel Partners
U.S. Venture Partners
Braemar Capital
Warburg Pincus
Carlyle
VantagePoint

- **External Drivers: Government Sponsorship, Grid Fears**

Sources: Cleantech Venture Monitor and Clean Edge, Inc.

Challenge and Opportunity

- Northeast Blackout
- Iraq War
- September 11
- Enron Collapse
- California Electricity Crisis
- Kyoto Stalled
- Energy Price Volatility