Dynamics Transforming the Demand for Wind Power

20% Wind Webinar

March 12, 2009

Presentation Overview

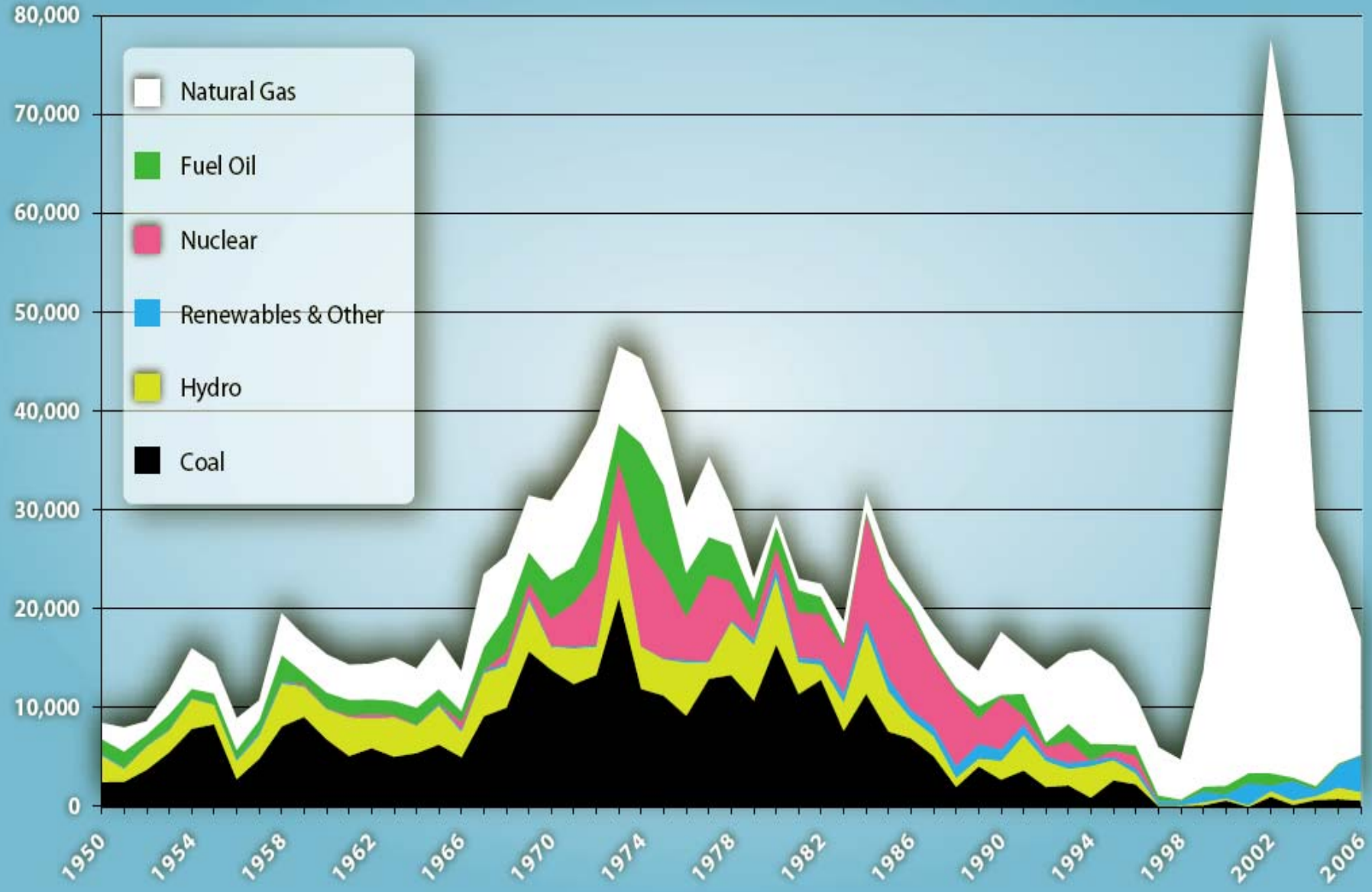
Factors Transforming Wind Power Demand:

- Technology Improvement
- Integration Practices
- National Transmission Grid
- Mega-Projects
- Utility Ownership
- Energy Security
- Community Wind
- Carbon Constraints
- Energy-First Planning

Technology Improvement

- Gas turbines, 1980s-1990s:
  - More efficient, lower cost models every 3-5 years
  - 3.5 GW 1999 grew to 63 GW in 2002
- Wind technology now like gas in 1980s
  - More efficient models every 3-5 years
  - Larger volumes, manufacturing experience drive relative cost reduction

Figure 6-11: North American Electricity Capacity Additions Since 1950 in Megawatts



Source: 2007 Energy Information Administration Data.

Integration Practices

Concerns: variable output; complicates system operation; off-peak/min load constraints

Emerging practices:

- Balancing Area consolidation
- RTO functionality
- Better forecasting
- Dispersed siting smoothes delivered output
- Electric transportation charged off-peak

National Transmission Grid

- Interconnection-wide planning
- Costs spread widely
- Consolidated permitting
- Designated development zones
- Designs optimized to deliver renewables, dampen variability
- Supports large-scale energy supply

Mega-Projects

- 3,000 MW^{+}; bring wind from best resources, unpopulated areas to load
- Economies in development, permitting, financing, sourcing, construction, power sales, operation
- Developers, manufacturers, investors, LSEs take 300 MW-500 MW shares
  - Gives LSEs stake in renewables growth
- Projects can afford dedicated transmission

Utility Ownership

- Most utilities acquire wind under PPAs
  - Negative effect on balance sheets; no financial stake in expanding wind generation
- Ownership builds utility ratebase
- Lower utility cost of capital reduces wind power cost
- Make wind a mainstream utility business

Energy Security

- Real and growing concern, popular and bi-partisan support
- Imports increasingly expensive; exchange rate risk if energy priced in euros
- Indigenous renewables keep dollars at home, build US economy
- Decentralized, inexhaustible sources most secure

Community Wind

- Drives rural economic development; provides price stability; reduces environmental impacts of fossil-fueled generation; acts on local desire to control own destiny
- Growth of community wind in every state builds support for large-scale wind expansion

Carbon Constraints

- CO_2 price drives low-carbon generation
- Renewables, Energy Efficiency most effective reduction tools
- Reduction goals likely require >20% wind (~300,000 MW) by 2030
  - WCI 2020 goals >45,000 MW in western US
- PHEVs bring transportation emissions to electric sector
  - Utilize off-peak wind; provide storage

Energy-First Planning

Today: planning focuses on capacity

- Capacity resources supply most energy

Carbon constraints focus on energy

- Emissions a function of energy, not capacity

Huge amounts of low marginal cost, no-carbon energy resources available

→Plan electric system to maximize their use

Build capacity strategically, to keep system balanced, fill in around energy resources