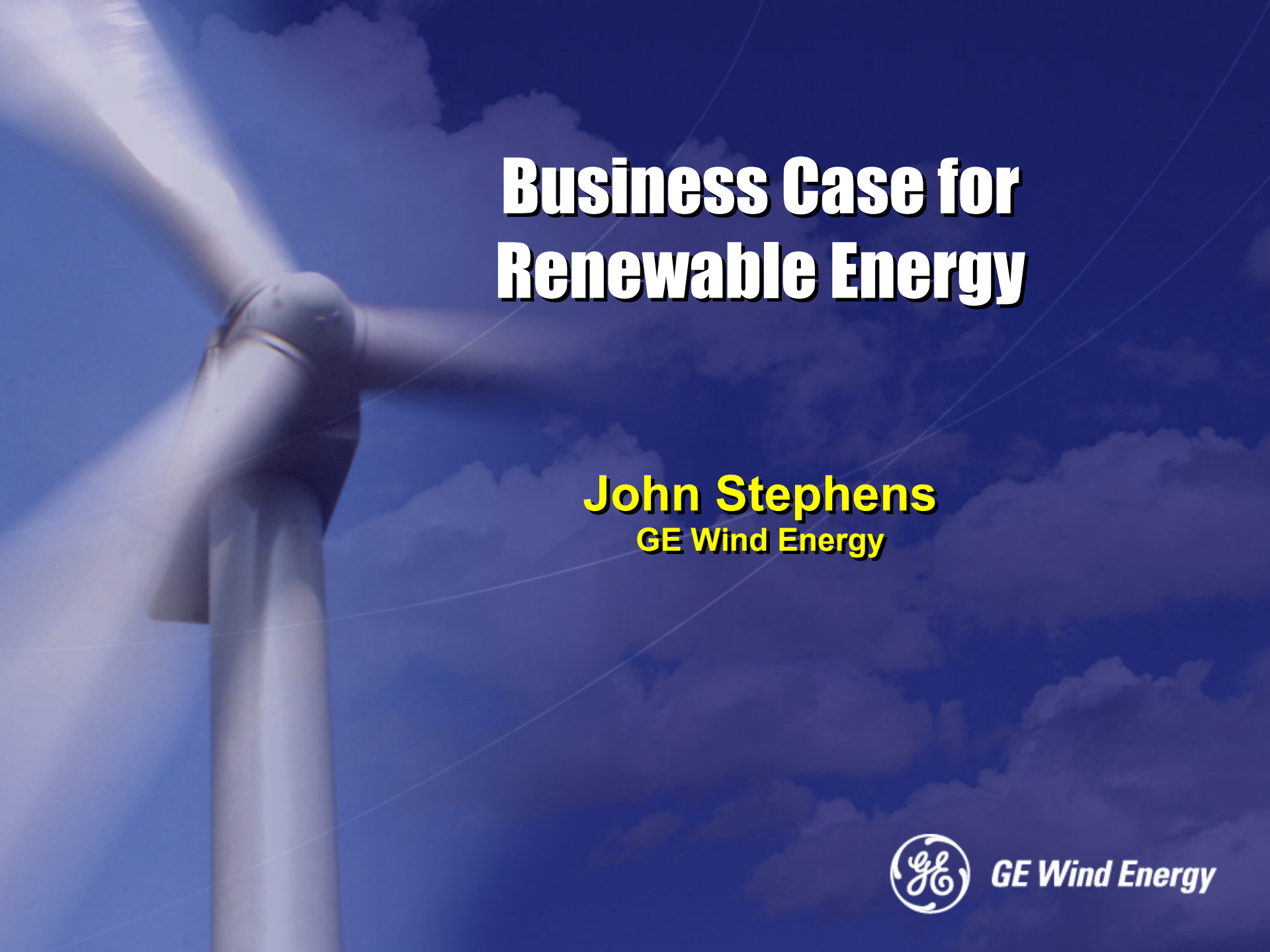

Business Case for Renewable Energy

John Stephens
GE Wind Energy

GE Wind Energy

Why Wind ?

Growth Opportunity

- $5-6B Industry … 15% AAGR
- Most Viable Renewable
- Cost Approaching 4¢/kWh
- Global Customer Base
- Favorable Regulatory Support
- Great Franchise
- Synergy With GE Businesses

Part Of Future Energy Portfolios

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Deal / Financials

- Bankruptcy / Auction
- Closed …. May 10,
- Asset Purchase… $200M
- >20% Return On Capital
- 1700 Employees
  Germany, US, Spain
- 2X Engineers … 4X R&D
- > $2B Orders & Commits

Economics … Exceeding Expectations

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Market Drivers

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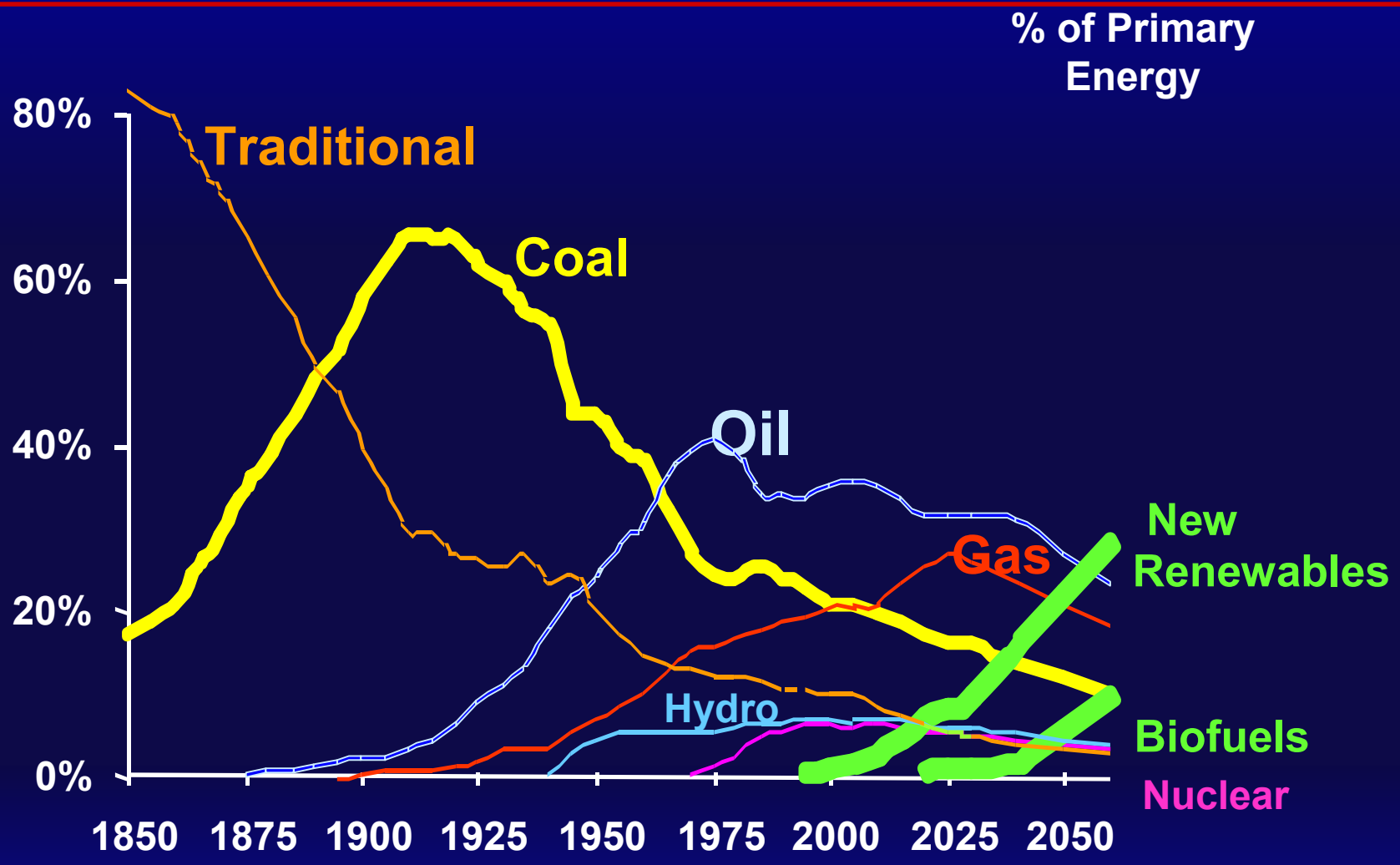
Fuel Mix



Direction Is Very Clear

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Source : Shell Global Scenarios

Market Drivers…

- Environmental
- Kyoto / Targets / RPS
- Energy Security
- Energy Poverty
- Off Grid Solutions
- Global Demand
- Fossil Fuel Prices

Pressures to Evolve Energy Portfolios

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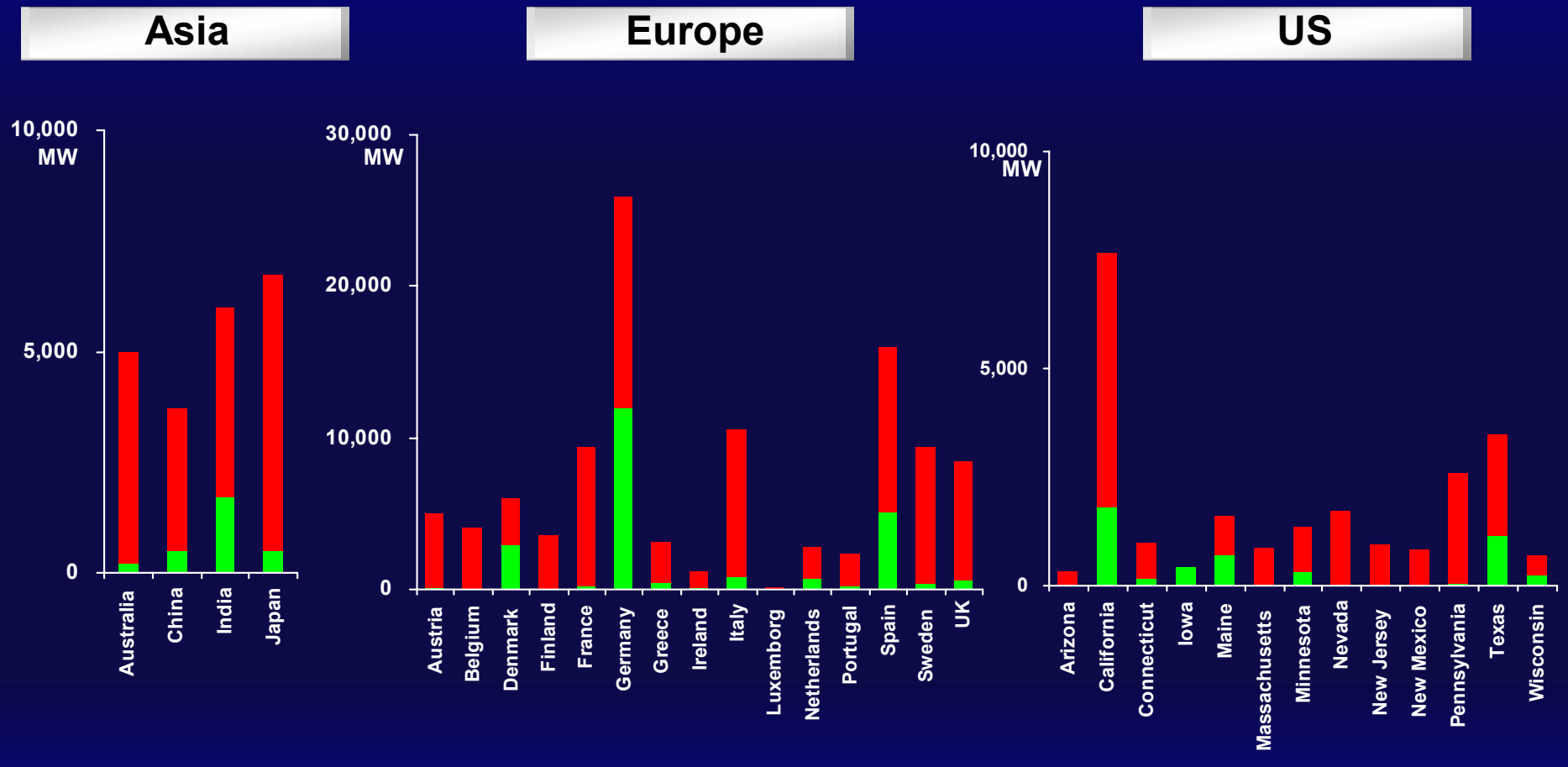
Renewable Stated Target By 2010



25% Penetrated To 2010 Goals … 87 GW To Go

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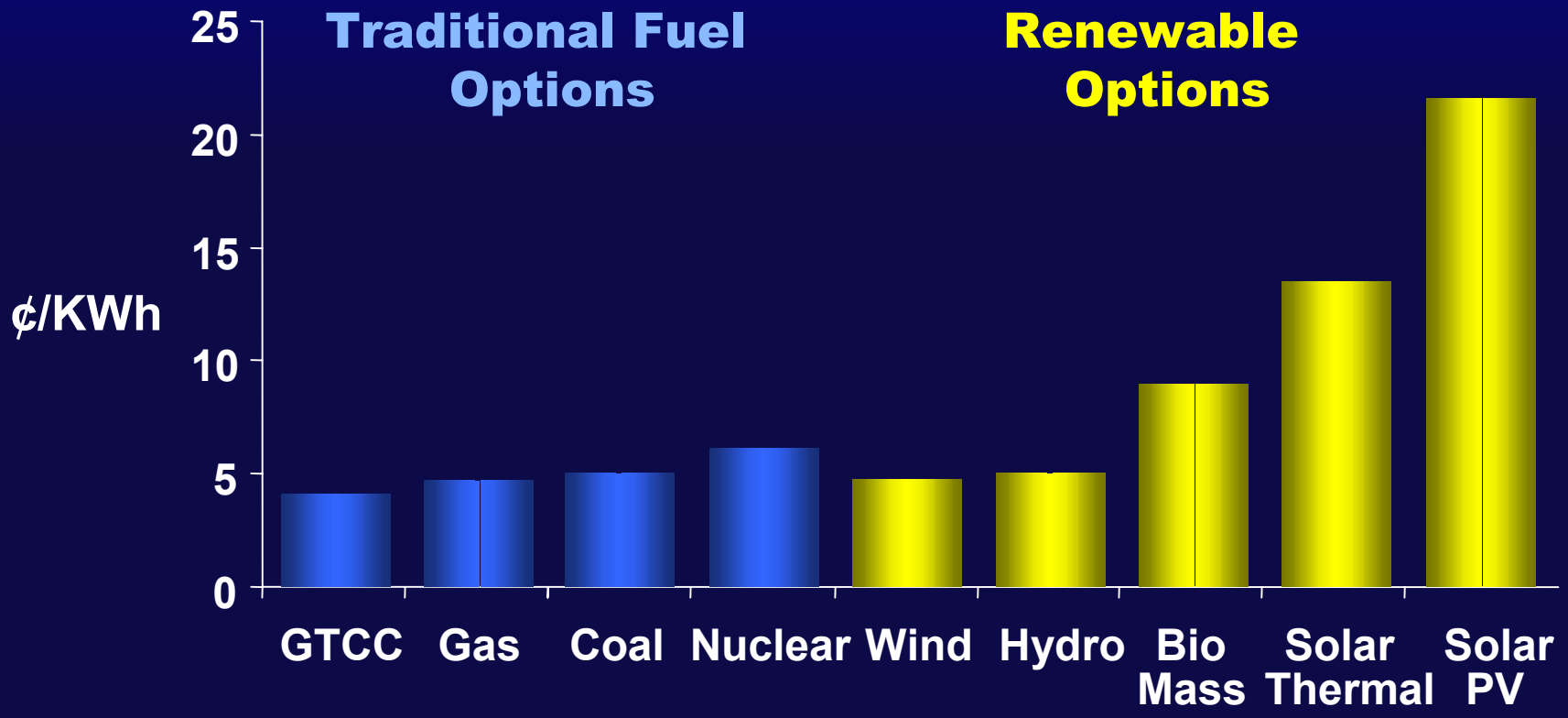
Shift to Cleaner, More Efficient Technology



Source: Lawrence Berkeley Lab
Biomass : Direct fueled

Viable Alternatives

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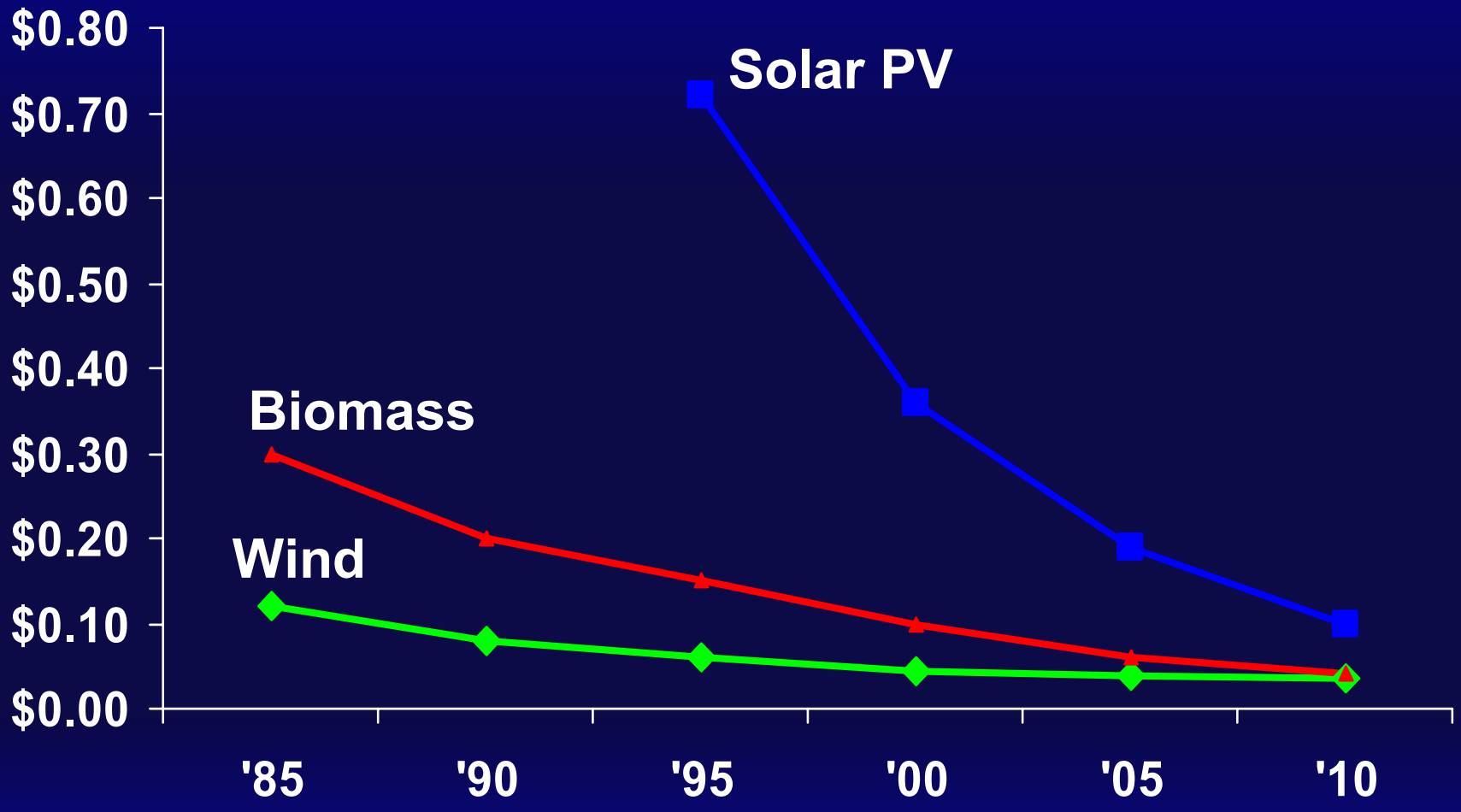
Fuel Economics



More Economical Every Year

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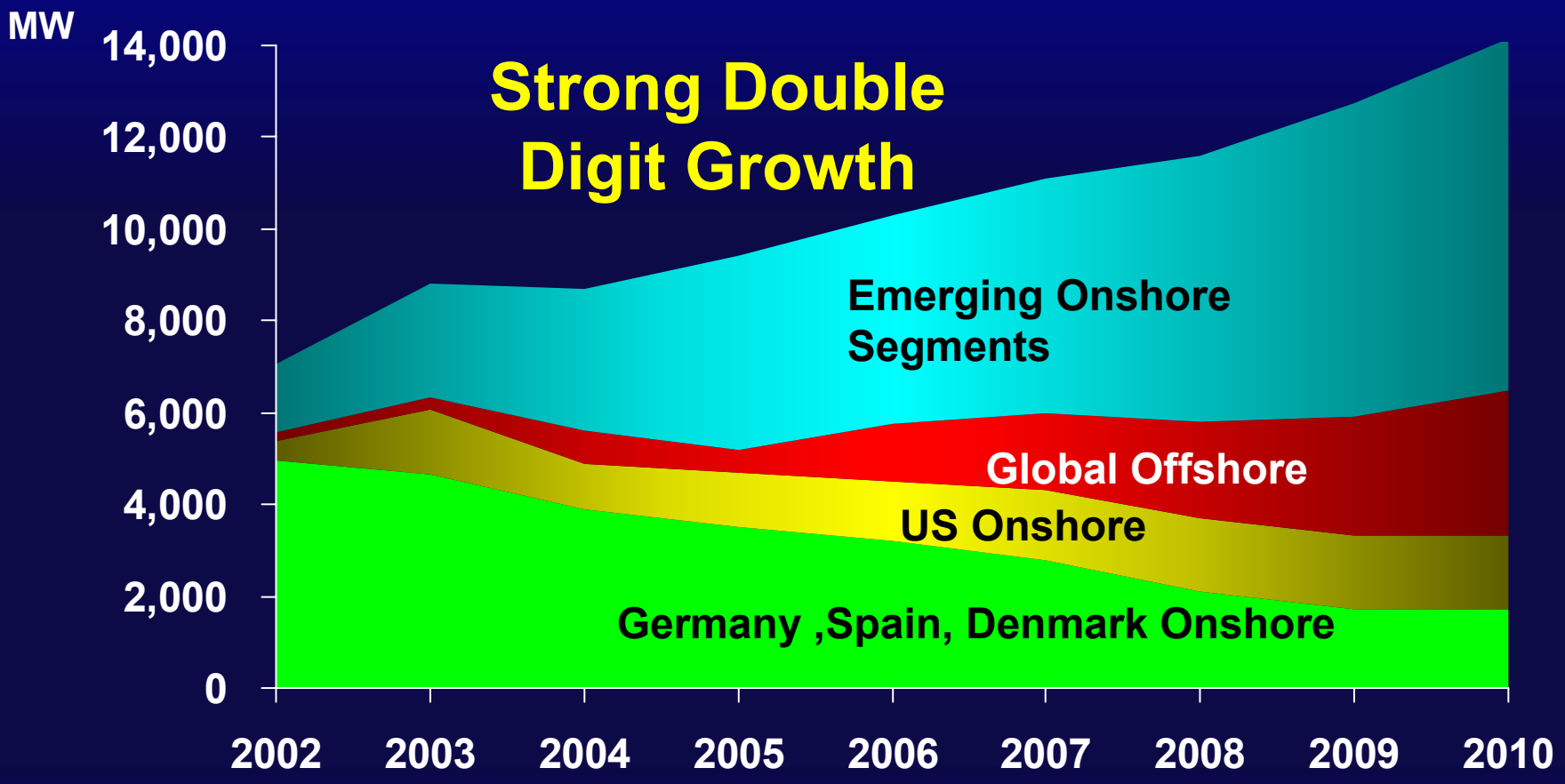
Wind Growth Dynamics



Source: BTM/Carnegie/DEWI, GEWE

Shifting to Global Industry

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Arklow 25MW Offshore Wind Power Plant

- Developed by Airtricity and GE
- Constructed and Owned by GE Wind Energy as a Demo Site
- First Offshore Wind Project with Turbines Rated Above 3MW
- 10 KM Off of Arklow, Ireland
- Seven GE 3.6MW Turbines
- Electricity for ~16,000 Homes
- Turbine Height: 125M (~30 Stories) at Blade Tip
- Turbine Weight: 290 Tons

Technology Evolution

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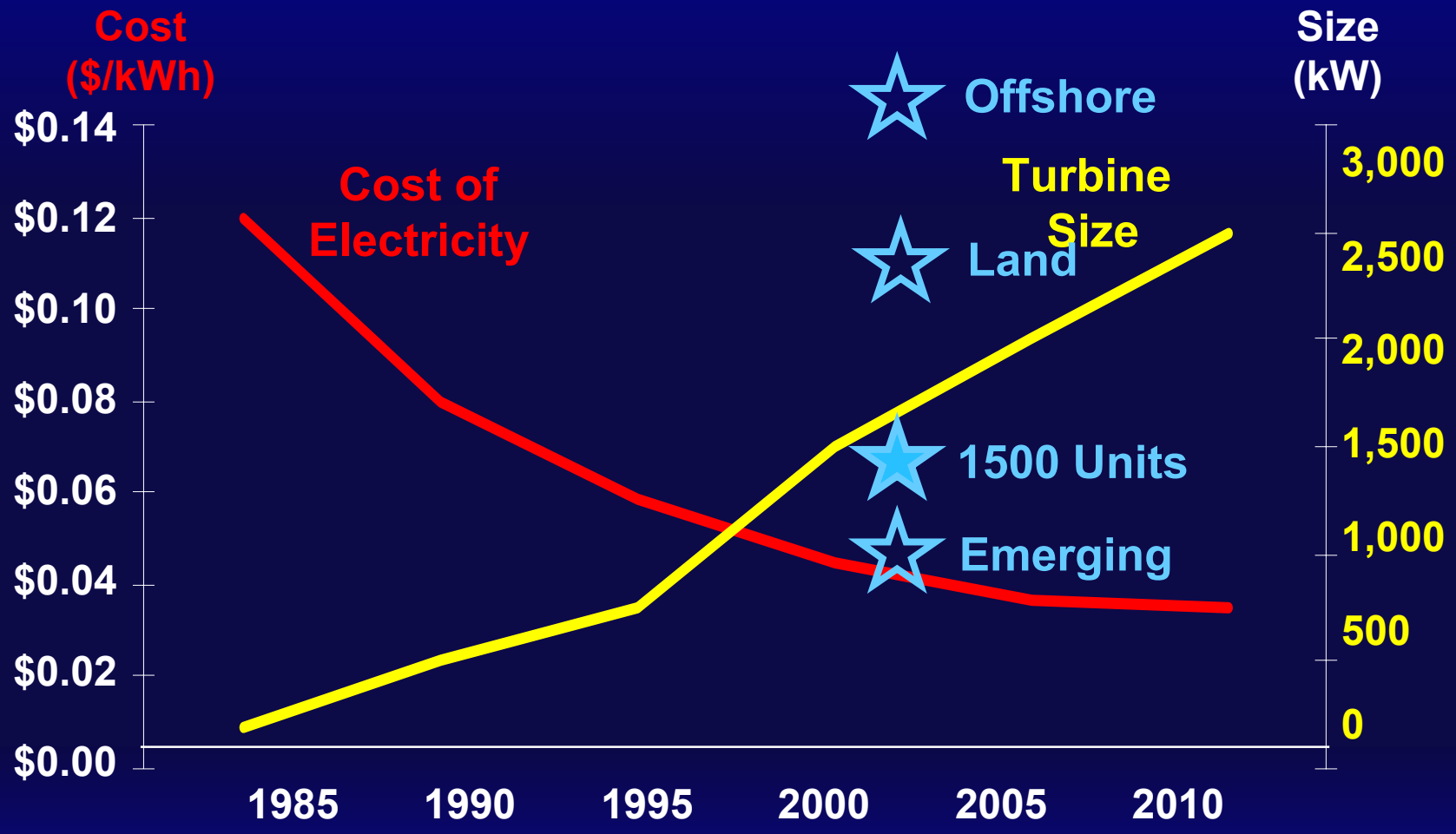
Wind Economics … Driven By Size



Race to Larger Units … Will Challenge Industry

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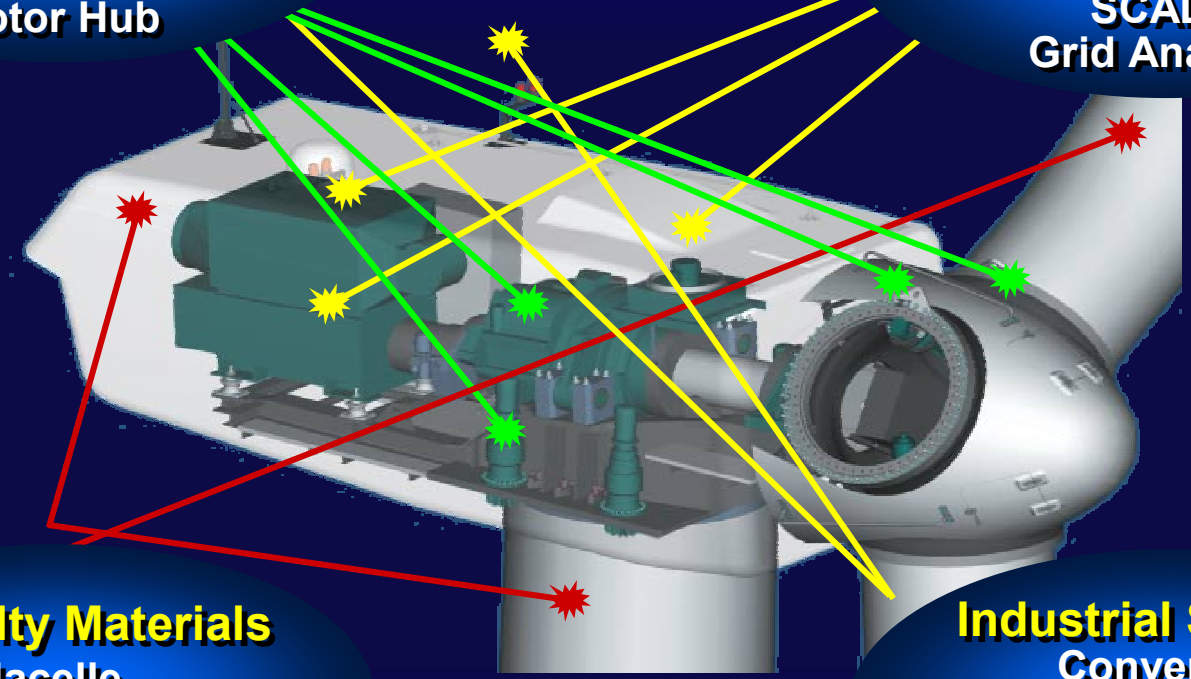
GE Synergies

Transportation
- Gear Box
- Yaw Drive
- Pitch Drive
- Rotor Hub

Power Systems
- Generators
- Heat Exchangers
- SCADA
- Grid Analysis



Specialty Materials
- Nacelle
- Blades
- Towers

Industrial Systems
- Converters
- Control Systems
- Motors/Generators
- Monitors/Anemometry

Investing 4x … Long Term Value Add

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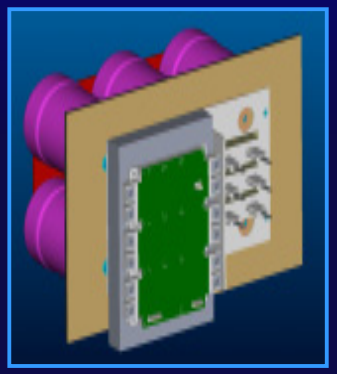
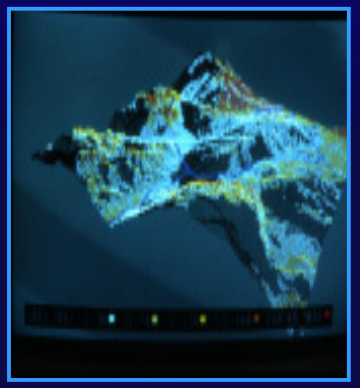
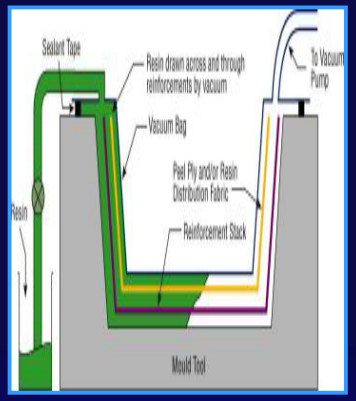
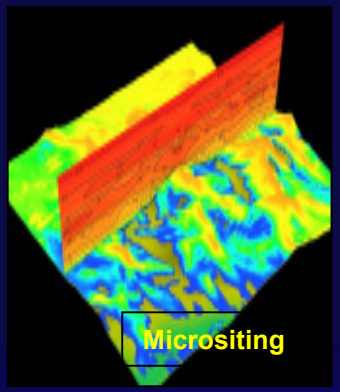
Technology Building Blocks

Components **Platforms** **Site / Systems**









Technology Will Be Long Term Differentiator

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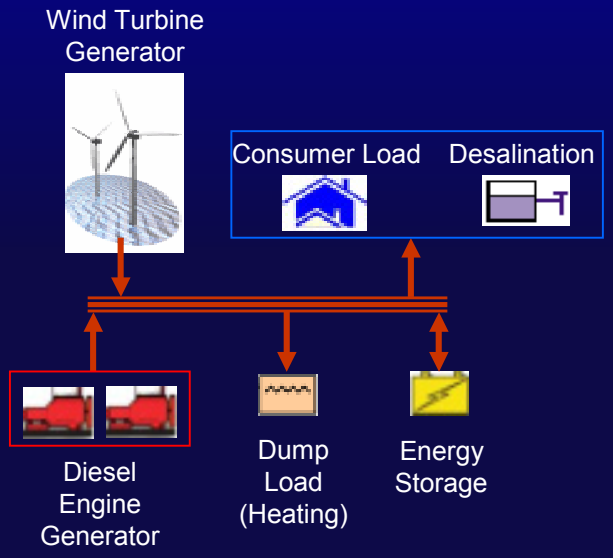
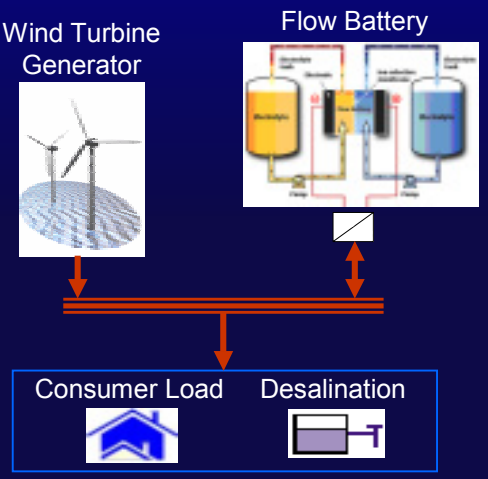
Longer Term … Hybrid Systems

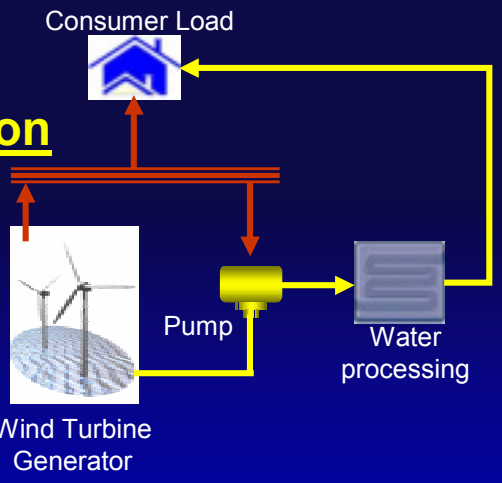
Wind Diesel



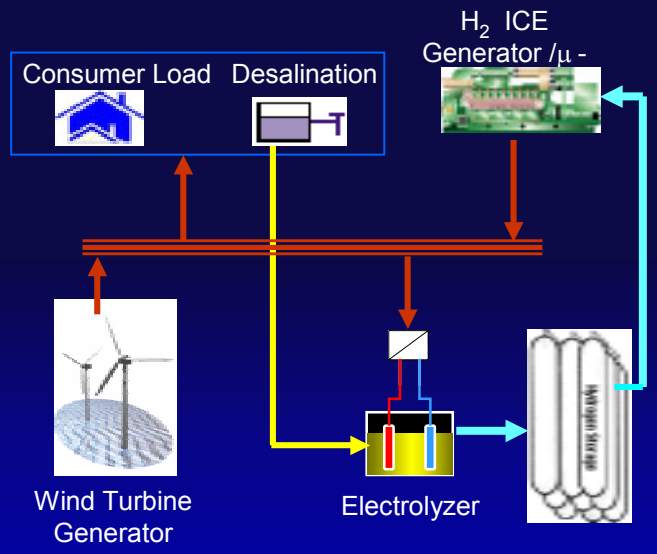
Wind-Flow Battery System



Wind Desalination System



Wind Hydrogen



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Shaping The Project Landscape

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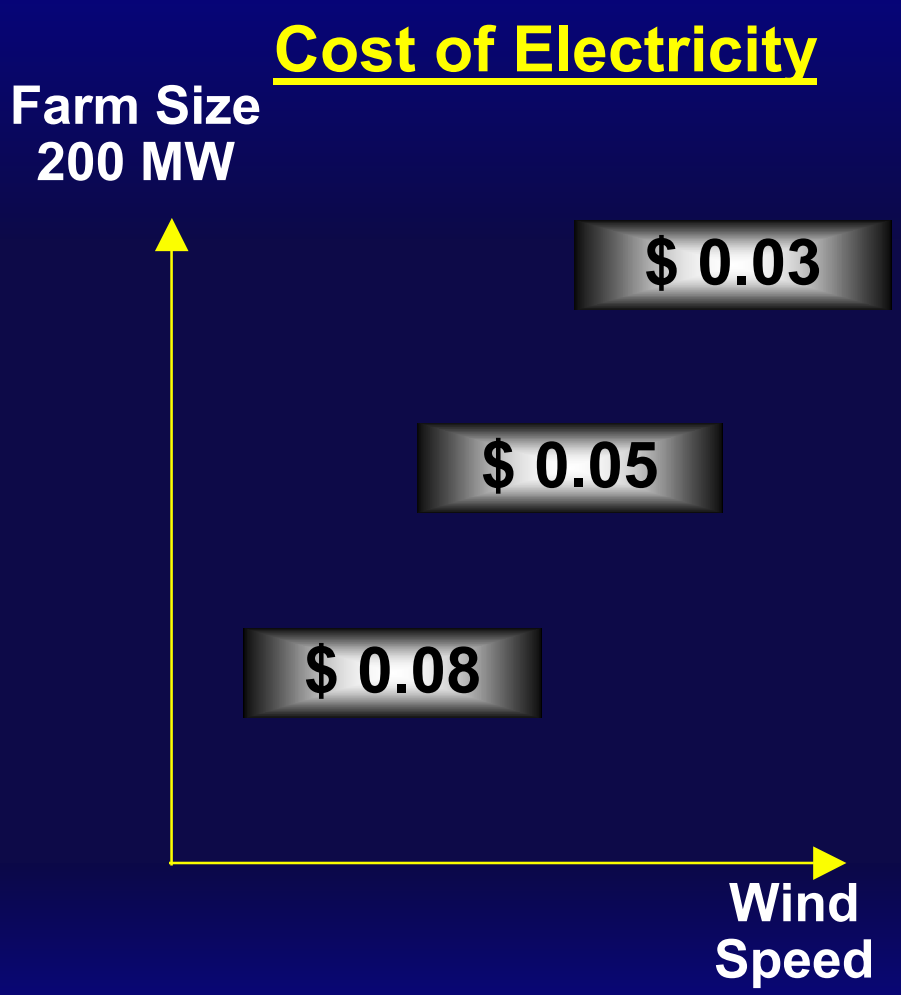
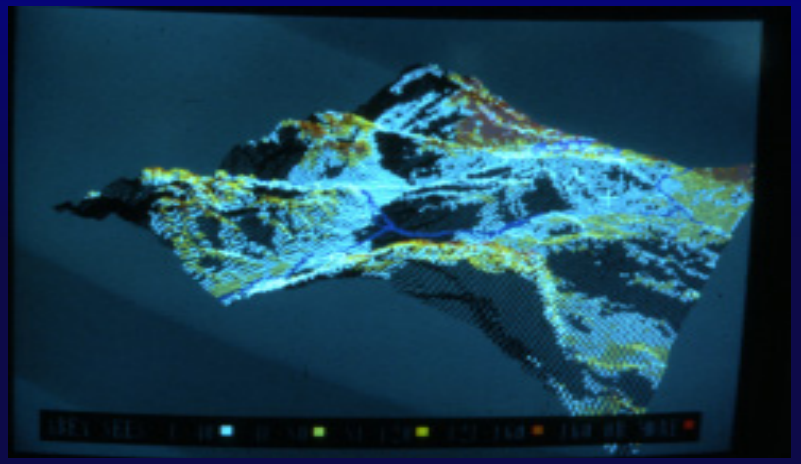
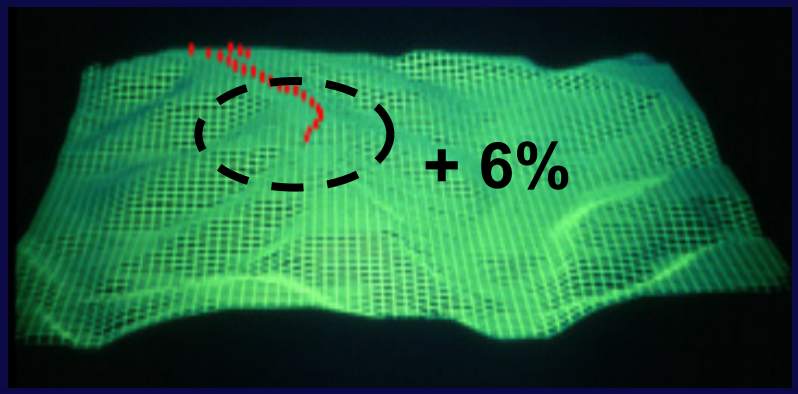
Typical Land-Based Project







Many Factors Drive Wind Project Economics

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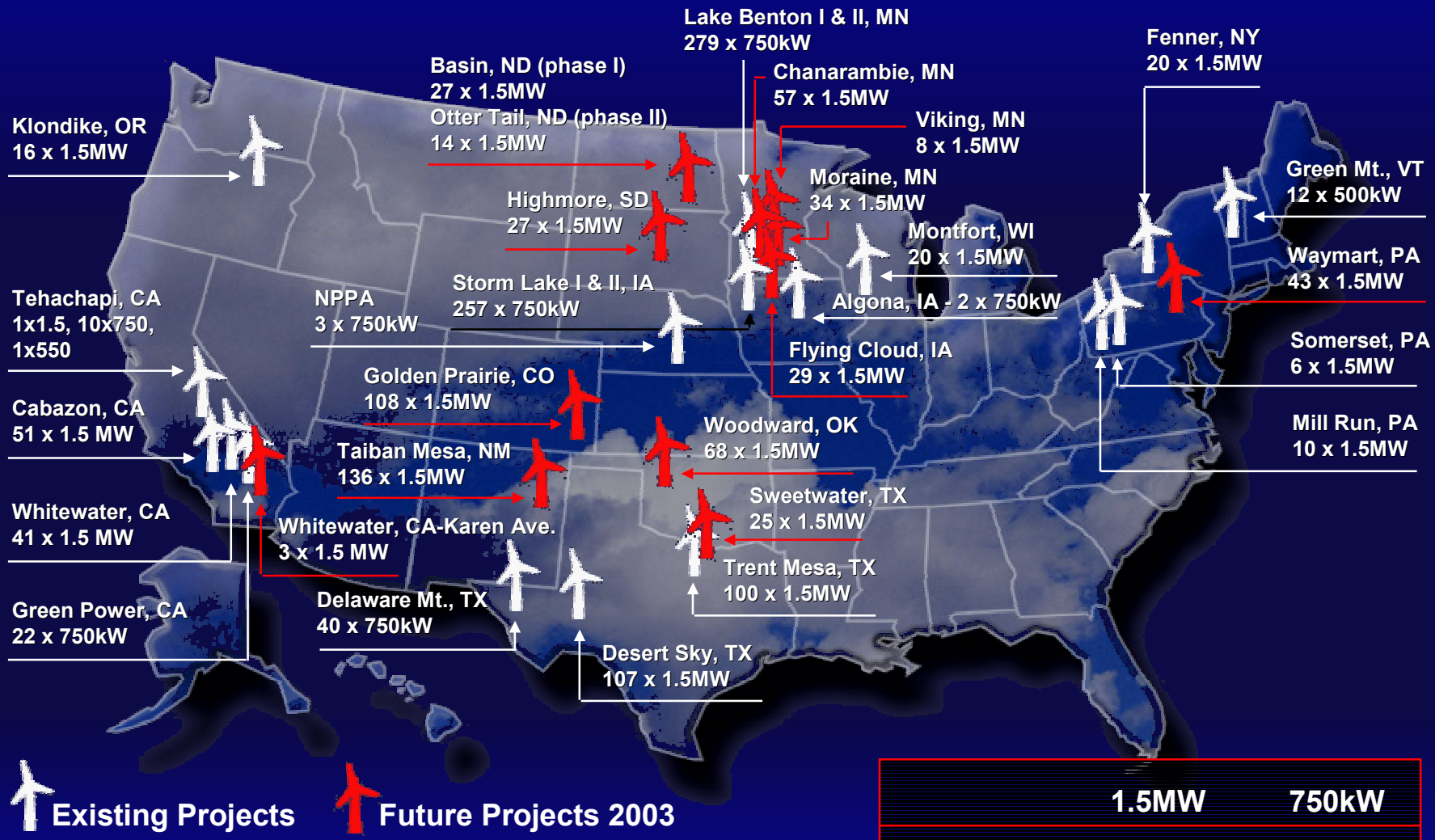
GE Wind – U.S. Wind Power Projects



	1.5MW	750kW
Operating	372	613
Future 2003	579	

5/31/03 = 1,580 Unit Installed Base

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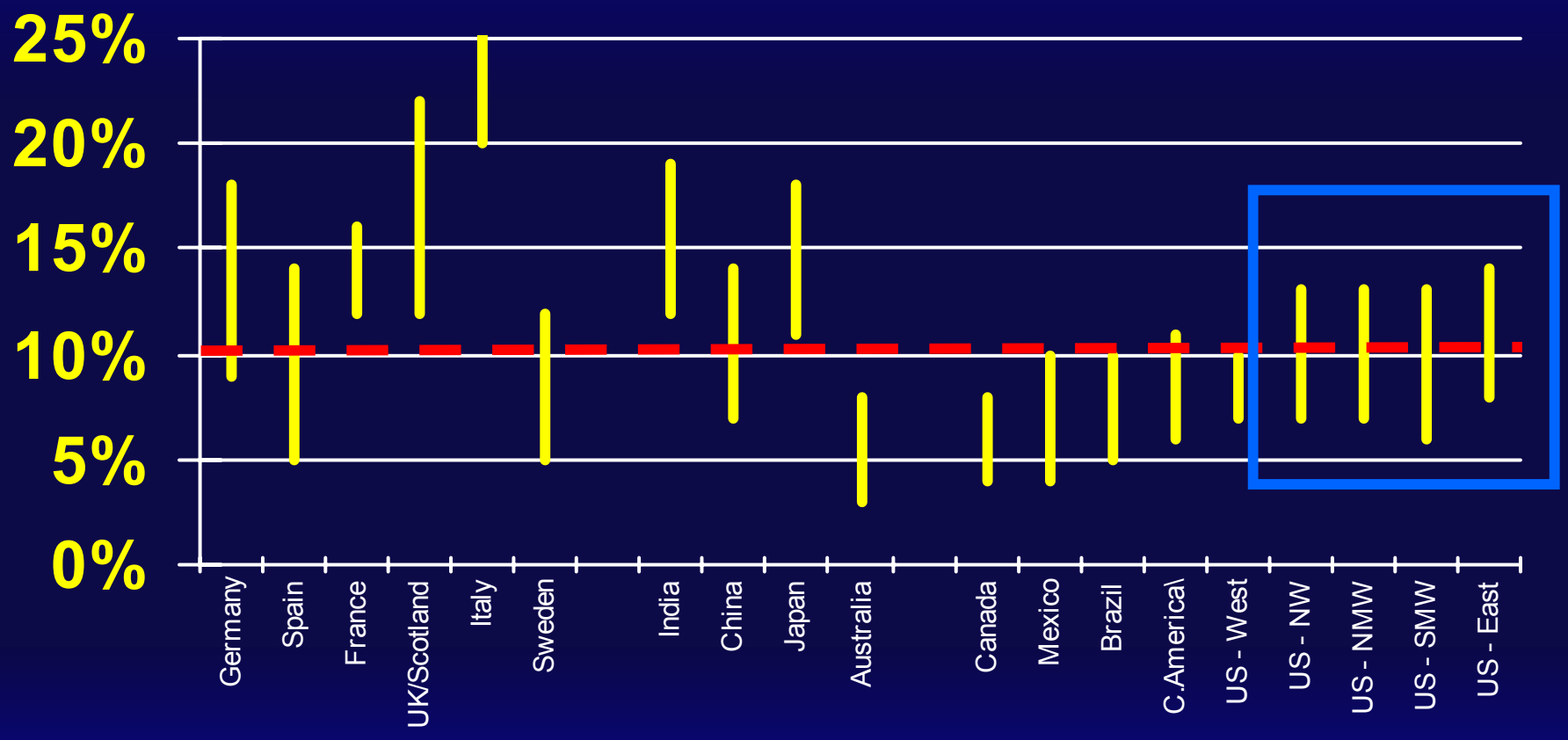
GEWE – Worldwide Presence

IRR by Country



With PTC … US Middle Of The Pack

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Potential Barriers…

- Renewable Policy
- Project Returns
- Grid Connection
- Public / Permits
- Reliability / Availability
- Forecasting
- Logistics
- Financing / Insurance

Complex … But Manageable With Leadership

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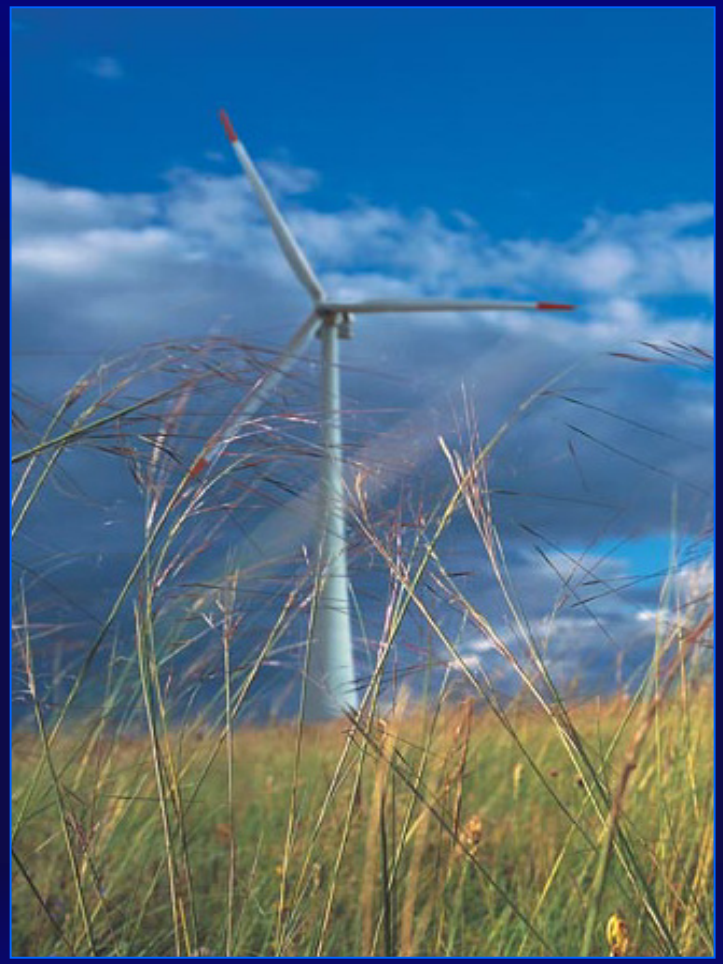
Government



- Active Involvement
- Education of Benefits
- Enabling Progress
  - Grid / Transmission
  - Tariff / Tax Incentives
  - RPS + Green Credits
  - Offshore Streamlining
  - Local, State, Federal

Stable Support Structure #1 For Industry

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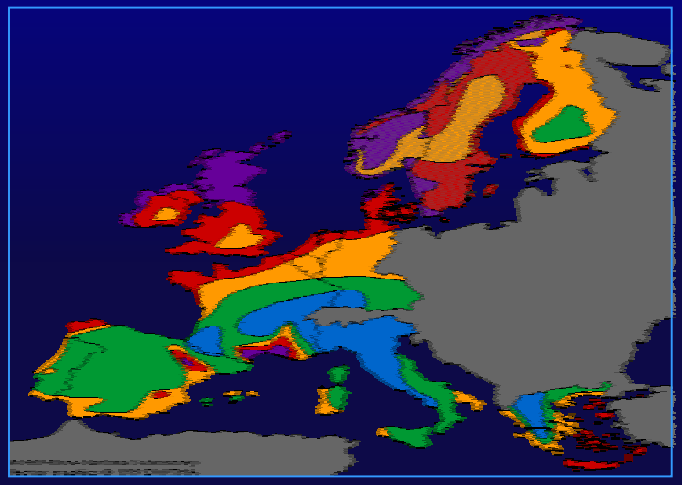
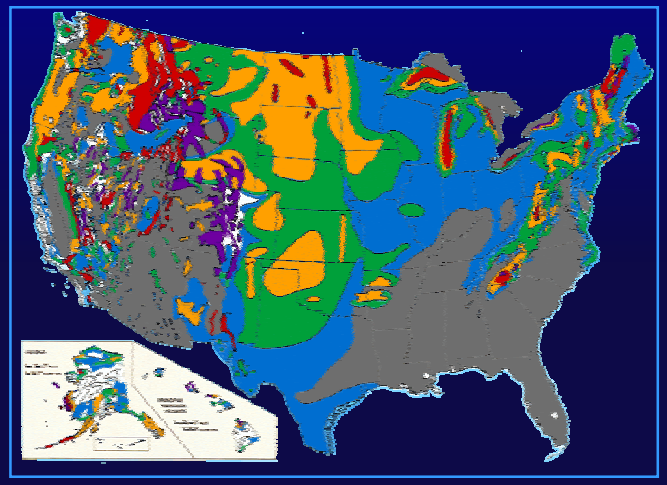
Dynamics

Wind Speed
met/sec

- > 8
- 7
- 6
- 5
- <4





Incentive	Tariff	Tax – Sporadic
RPS	Pan-European	State
Customers	Developers	Utilities / Energy
Installed	80%	20%
Public	Positive	Mixed

Europe Growth … Incentives & Acceptance

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Public

- Environmental Benefits
- Vision for Future Generations
- Proven Renewable Solution
- Energy Independence
- Broad Awareness Local + National

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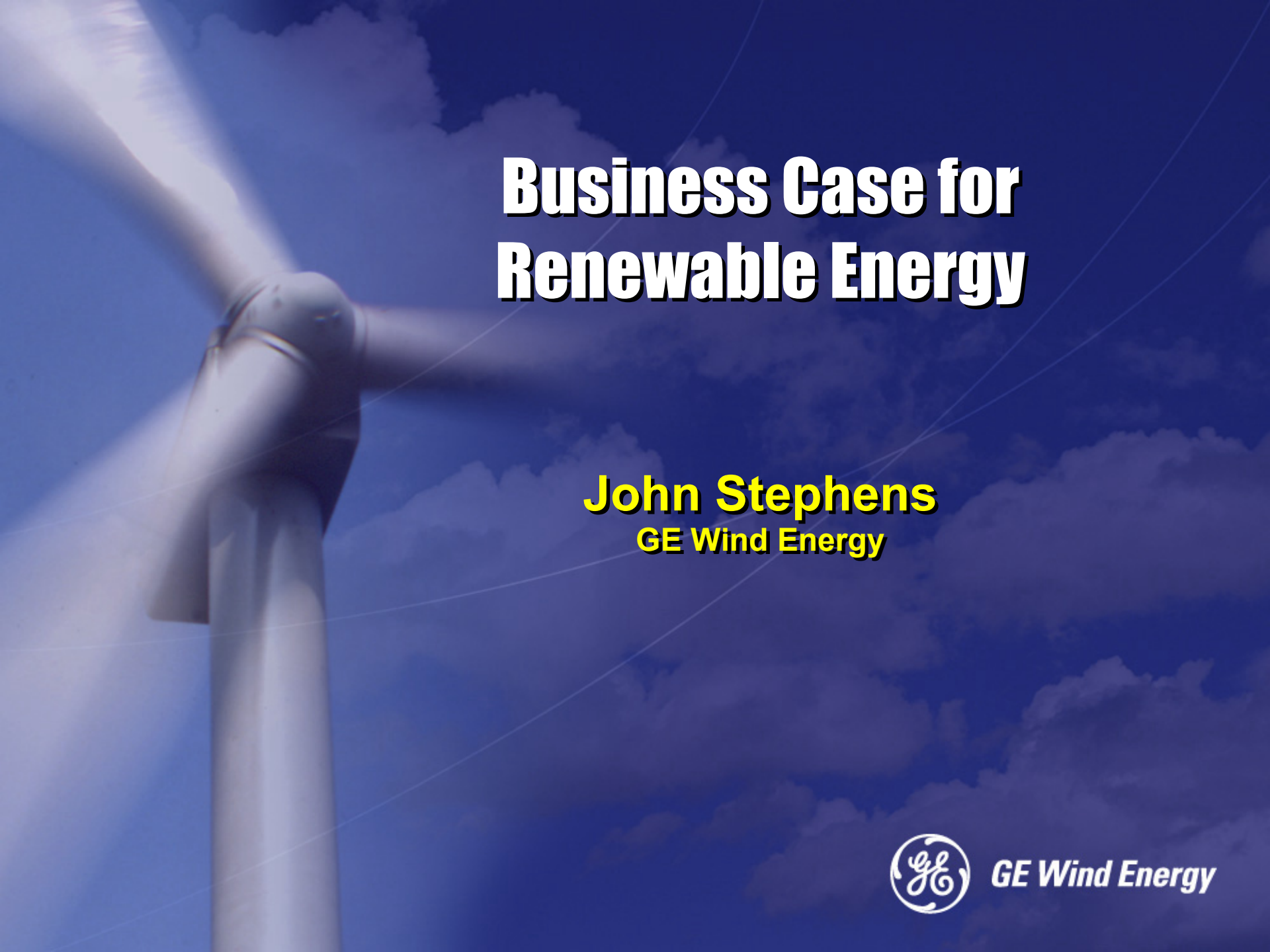

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