Disclaimer: The views expressed are those of Paul Gipe and are not necessarily those of the sponsor.

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Wind Rush of 2005-2007

The North American Market is Like a Bucking Bronco at a Texas Rodeo

"Yee Ha! Ride Em Cowboys!"

Paul Gipe, wind-works.org
World Wind Generating Capacity
2006

Megawatts (Thousands)

Europe
North America
Asia

Year

Paul Gipe, wind-works.org
World Wind Capacity 2006
~70,000 MW

Europe 66%
Asia 16%
North America 17%
South America 1%
Africa 0%

Paul Gipe, wind-works.org
World Major Wind Markets

Germany
Spain
USA
India

Paul Gipe, wind-works.org
World Wind 2,000 MW Club

Megawatts in 2006

- Denmark
- Italy
- China
- Britain

Paul Gipe, wind-works.org
Major Wind Markets Growth Rate 2002-2006

- Germany
- Spain
- USA
- India
- China

Average 5-Year Growth Rate MW/Year

Paul Gipe, wind-works.org
2006 US Major Markets

Paul Gipe, wind-works.org
North America Major Players

• USA
  Florida Power & Light
  (50% of Market
  1,600 MW in Texas)
  Scottish Power
  Électricité de France

• Canada
  Trans Alta (Utility)
  Suncor (Oil, Tar Sands)
  Enbridge (Gas)
North American Market
Major Suppliers
USA

- GE!
- Vestas
- Siemans (Bonus)
- Gamesa
- Suzlon (India)
- Deutsch? Nein Danke!

Paul Gipe, wind-works.org
North American Market
Major Suppliers
Canada

- GE
- Vestas
- Enercon
- Other (Vensys)
- Deutsch? Ja Bitte!

Paul Gipe, wind-works.org
North American Market
Array Size

- **Central Station Plants**
  Huge: 80-750 MW
- **Distributed Generation**
  10-30 MW

Paul Gipe, wind-works.org
North American Market Issues

• US Subsidy Policy (On-Off)
  PTC: “No Way to Run a Business”
  Open Only to “Major” Players

• Canada--Provincial Policy
  Cheap “Hydro” (Electricity)

• Anti-Wind (NIMBY-NIABY)
  Right Wing and Pro-Nuclear Groups
Swept Area per Household

Wind Turbine Area (m2)/Household (~6.4 m/s)

Texas
Ontario
California
Germany

Paul Gipe, wind-works.org
Birds & Bats

- Serious Problem
  Tarifa?
  Altamont Pass (900-1,300 Raptors/yr)
- A Concern Elsewhere
- No Quick Fixes--No Panaceas
  Stripes & Whistles Don’t Work
Distributed Wind Energy in North America

- Niche Market?
- Major Potential?
- Upper Midwest
  Minnesota & Iowa
- Southern Plains
  Texas--Yes, Texas!
- Canada
  Nova Scotia
  Ontario--Slow Start
- John Deere

Paul Gipe, wind-works.org
Advanced Renewable Tariffs
New Policy Option for North America

Paul Gipe, wind-works.org
Renewable Tariffs in North America . . Unthinkable?

- Yes--Just 2 years ago
- Today? No
- Now Possible
- Growing Trend in both USA & Canada
Advanced Renewable Tariffs
North American Endorsements

- **Ontario**
  - Liberal Party, 2004
  - Green Party, 2006
- **Manitoba**
  - Liberal Party, 2006
  - KAP, Chamber of Commerce
- **Canada’s Federal NDP 2006**
- **Many NGOs**
  - But Not EDF, NRDC, & UCS

Ferndale, Ontario
Paul Gipe, wind-works.org
California’s Original Wind Tariff
Interim Standard Offer Contract #4

- 1983: ISO4
- Commercial Wind Industry Begins
- 1985: ISO4 Suspended
  No New Contracts
- 1984-1990: ~1,500 MW of Wind Installed
- Wind Generates ~1% of Supply

Paul Gipe, wind-works.org
San Gorgonio Pass circa 1990
Emerging ARTs Markets 2007

- **Ontario**
  - 240 Applicants
  - ~2,400 MW Potential
  - Mostly Wind

- **Canada**
  - Manitoba,
  - Saskatchewan,
  - British Columbia

- **USA**
  - Minnesota,
  - Wisconsin?

Paul Gipe, wind-works.org
Southern Ontario

- More Like Germany than Alberta
  - Population Density
  - Farm Size
  - Settlement Patterns

- Projects More Like Germany & Denmark?
  - Smaller Projects
  - Clusters of Turbines
  - Single Turbines

Skibsted Fjord, Denmark

Paul Gipe, wind-works.org
Ontario’s SOC/ARTs

- Wind, Hydro, & Biomass: $0.11/kWh
- Hydro & Biomass
  $0.0352/kWh on peak
- Solar PV: $0.42/kWh
- Inflation Adjustment: 20%,
  Except Solar PV
- Term: 20 years
Ontario’s SOCs: What’s Wrong?

• Tariffs Too Low
  PV: 50% of What’s Needed
  Wind: Only Windy Sites (6.4 m/s)
  Biomass: $0.17 CAD/kWh MoAF

• Inflation Adjustment Too Low
  20% vs 50%: -2.5% ROI
  Set on “Portion of O&M” Influenced by Inflation

• WPPI 50% Claw Back (1/2 cent)
Ontario’s SOCs: What’s Wrong?

• **Wind Tariff Differentiation**
  Not Enough at Less Windy Sites
  Too Much at Windy Sites

• **Fundamental Philosophical Shift**
  Cost vs Value Debate Continues
  Minister of Energy--Yes
  OPA--Absolutely, Positively No!

Paul Gipe, wind-works.org
Ontario Solar Tariff
North American Comparison

$ CAD/kWh Over 20 Years

- California Buy-Down
- California Solar Tariff
- Washington State
- New Jersey RPS
- Ontario Solar Tariff
Prices Paid for Wind Energy in Europe

Feed Law-Germany
Feed Law-France
Feed Law-Spain
Quota-Italy
Quota-Britain
Feed Law-Ontario

Euro Cents/kWh

0 2 4 6 8 10 12 14
Prices Paid for Solar PV in Europe

Euro Cents/kWh

Feed Law-Germany
Feed Law-France
Feed Law-Spain
Feed Law-Italy
Quota-Britain
Feed Law-Austria
Feed Law-Ontario

0 10 20 30 40 50 60 70
Advanced Renewable Tariffs
A Question of Equity

• Feed Laws are Fair
• Nearly All Can Play
  Farmers, Ranchers, First Nations, & Co-ops

Paul Gipe, wind-works.org
Buffalo Ridge, MN
Wind Turbines

. . . Sell Beer, Bier, Biere, Birra, Cerveza

Paul Gipe, wind-works.org
. . . Pave the Sidewalk
And the Way to the Future

Paul Gipe, wind-works.org
Wellington (Brooklyn), NZ
Wind Energy . . . For Today and for Tomorrow
Technology for Life*

*from N.F.S. Grundtvig
The Renewables Revolution Has Begun!

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Manawatu Gorge, New Zealand