

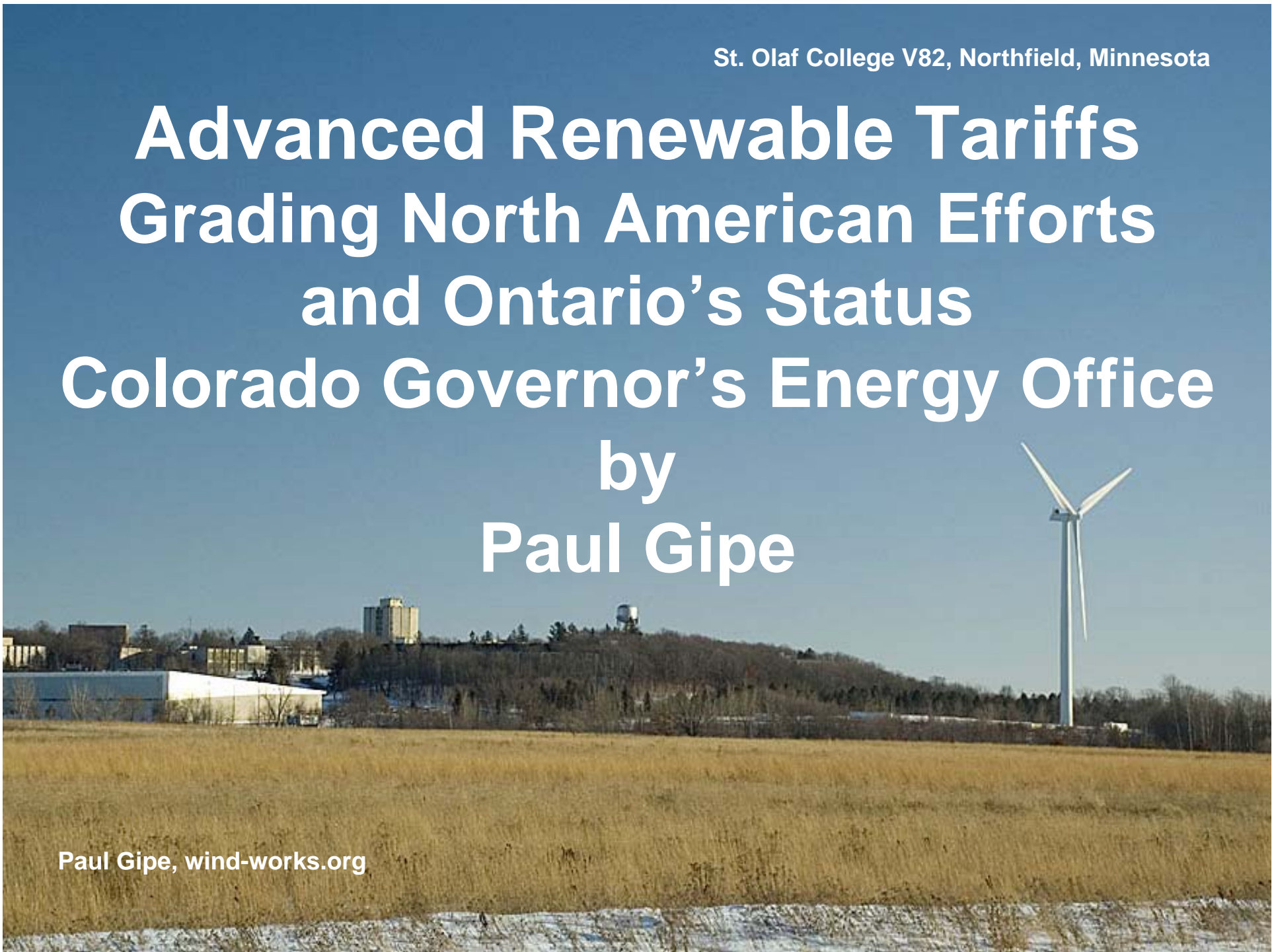
Disclaimer: The views expressed are those of Paul Gipe and are not necessarily those of the sponsor.

Disclosure: Paul Gipe has worked with Aerovironment, ANZSES, An Environmental Trust, APROMA, ASES, AusWEA, AWEA, David Blittersdorf, Jan & David Blittersdorf Foundation, BWEA, BWE, CanWEA, Canadian Co-operative Assoc., CAW, CEERT, Deutsche Bank, DGW, DSF, EECA, ES&T, GEO, GPI Atlantic, IREQ, KWEA, MADE, Microsoft, ManSEA, MSU, NRCan, NRG Systems, NASA, NREL, NZWEA, ORWWG, OSEA, Pembina, PG&E, SeaWest, SEI, TREC, USDOE, WAWWG, WE Energies, the Folkecenter, the Izaak Walton League, the Minnesota Project, the Sierra Club, World Future Council, and Zond Systems, and written for magazines in the USA, Canada, France, Denmark, and Germany.

St. Olaf College V82, Northfield, Minnesota

Advanced Renewable Tariffs Grading North American Efforts and Ontario's Status Colorado Governor's Energy Office by Paul Gipe

Paul Gipe, wind-works.org



Advanced Renewable Tariffs

- **What Are They?**

Payment for Generation (Feed-in Tariffs)

Political Price, Not Political Quota

- **How Do They Work?**

Price Differentiation

Paying for Solar, Paying for Wind

- **Where?**

Germany, France,

Spain . . .

. . . 18 EU countries

Paul Gipe, wind-works.org



Grading North American FITs

10 Criteria

- **Program Caps**
- **Project Size Caps**
- **Contract Term**
- **Technologies Included**
- **Tariffs Based on Cost of Generation**
- **Tariffs Differentiated by Technology**
- **Tariffs Differentiated within Technology**
- **Wind Tariffs Differentiated by Resource**
- **Inflation Indexing**
- **Bonus Payments or Adders**

Grading North American FITs

The Gold Standard

	Score	Grade
Germany	90	A
France	90	A
Spain (Fixed Tariff)	80	A-

Grading North American FITs

Existing FITs

	Score	Grade
Ontario (2009)	84	A-
Vermont	54	D
Maine	43	F
Wisconsin IOUs	36	F
California	28	F
Oregon	16	F

Grading North American FITs

Proposed FITs

	Score	Grade
Michigan	82	A-
Indiana HB1190	82	A-
California AB 1106	54	D

Making the Grade: What's Needed

Criteria

Program Caps

Project Size Caps

Contract Term

Multiple Technologies

Cost-Based Tariffs

Technology Differentiation

Technology Banding

Resource Differentiation

Best Practice

None or >20%

None or 20 MW

>20 years

Wind, Solar PV, Solar
DHW, Geothermal, CSP

For All Classes

Tariffs for Each Class

By Application & Size

Wind & Solar PV

Making the Grade: What 's Needed

- **Open to All for All**

**Homeowners, Farmers, Business & Industry,
Communities, Native Americans**

Regardless of Tax Status

Tariffs with & without Tax Credits

Ontario Moved First

First Modern System of Advanced Renewable Tariffs in North America



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Montfort, Wisconsin

Ontario “Gets It”

- Closing Coal Plants
 - Delaying Nuclear Build
 - Putting Renewables First
- Groundbreaking in North America



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Goderich, Ontario

Ontario's Green Energy Act

The Most Progressive Renewable Energy Policy in North America in ~~Two~~ Three Decades



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Goderich, Ontario

Ontario's Green Energy Act

- **Changes Public Policy on Electricity**
Includes Industrial & Environmental Policy
- **Gives Renewables Priority**
In Utility Procurement & System Design
- **Targets Industrial Development & Job Creation**
50,000 Jobs in Three Years

Ontario's Feed-in Tariffs

- Differentiated by Size & Technology
- Differentiated by Application
- Tariffs Based on Cost of Generation
Plus Reasonable Profit
- No Program Cap (Bring It On!)

Sarnia, Ontario



Ontario's Feed-in Tariffs

- **First Offshore Wind Tariffs in NA**
- **First Aboriginal Bonus in NA**
First NA Policy for First Nations
- **First Differentiated Solar PV Tariffs**
6 Tranches or Classes
- **Most Differentiated Biogas Tariffs**
5 Tranches or Classes
- **Best Wind, Solar, & Biogas Tariffs in NA**
Competitive Internationally

Ontario's Feed-in Tariffs

- **No Subsidies or Grants**
- **Costs Borne by Ratepayers**
Not Taxpayers--More Egalitarian
- **Community Wind Bonus**
Individual Farmers Qualify
\$0.01 CAD/kWh Bonus
\$0.145 CAD/kWh (€0.10/kWh)



Ontario Program Status

- **19,000 MicroFIT Applications**
 - ~190 MW Potential
 - 6,000 Contracts Offered (~60 MW)
 - 800 Systems on Line in 1 year
- **8,000 MW of FIT Applications**
 - Requires Substantial Deposit
- **\$9 Billion in Likely Private Investment**

Ferndale, Ontario

Ontario Program Status

- **2,500 MW Awarded Contracts**
1,500 MW to Come with Line Completion
- **460 MW Community & Aboriginal**
~20% of Total

Ontario Program Status

- **650 MW Solar PV**
with 500 MW of SOC PV ~1,000 MW Contracted
- **1,200 MW Onshore Wind**
- **300 MW Offshore Wind**



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Kingston, Ontario

Ontario Tariff Status

- **MicroFIT Revision August 2010**
Split into Two Tranches
Rooftop PV & Ground
- **2011 Program Review**

Toronto, Ontario

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North American Solar PV Market

Ontario Moves into Top Three

Rank		MW 2009
1	California	212
2	New Jersey	57
3	Ontario	46
4	Florida	36
5	Colorado	23

Ontario 2010: ~100-200 MW

Clear Sky Partners: ~800 MW/yr

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North American Solar PV Market

Ontario to Move into Top Three

Rank		Total Installed MW 2009
1	California	768
2	New Jersey	128
3	Colorado	59
4	Ontario	48
5	Arizona	46

Clear Sky Partners: ~700 MW in 2011; ~3,000 MW by 2015!

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Feed-in Tariffs Deliver Results

- >50% of Wind Worldwide
- >75% of Solar PV Worldwide
- >90% of Farm Biogas Worldwide



Ydby, Denmark

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2009 Solar PV Capacity

- 20,000 MW Worldwide
- 7,000+ MW/yr
- \$20+ Billion
- Major Markets

Germany--3,800 MW*

Italy--700 MW/yr*

Japan--500 MW

USA--450 MW/yr

California--200 MW/yr

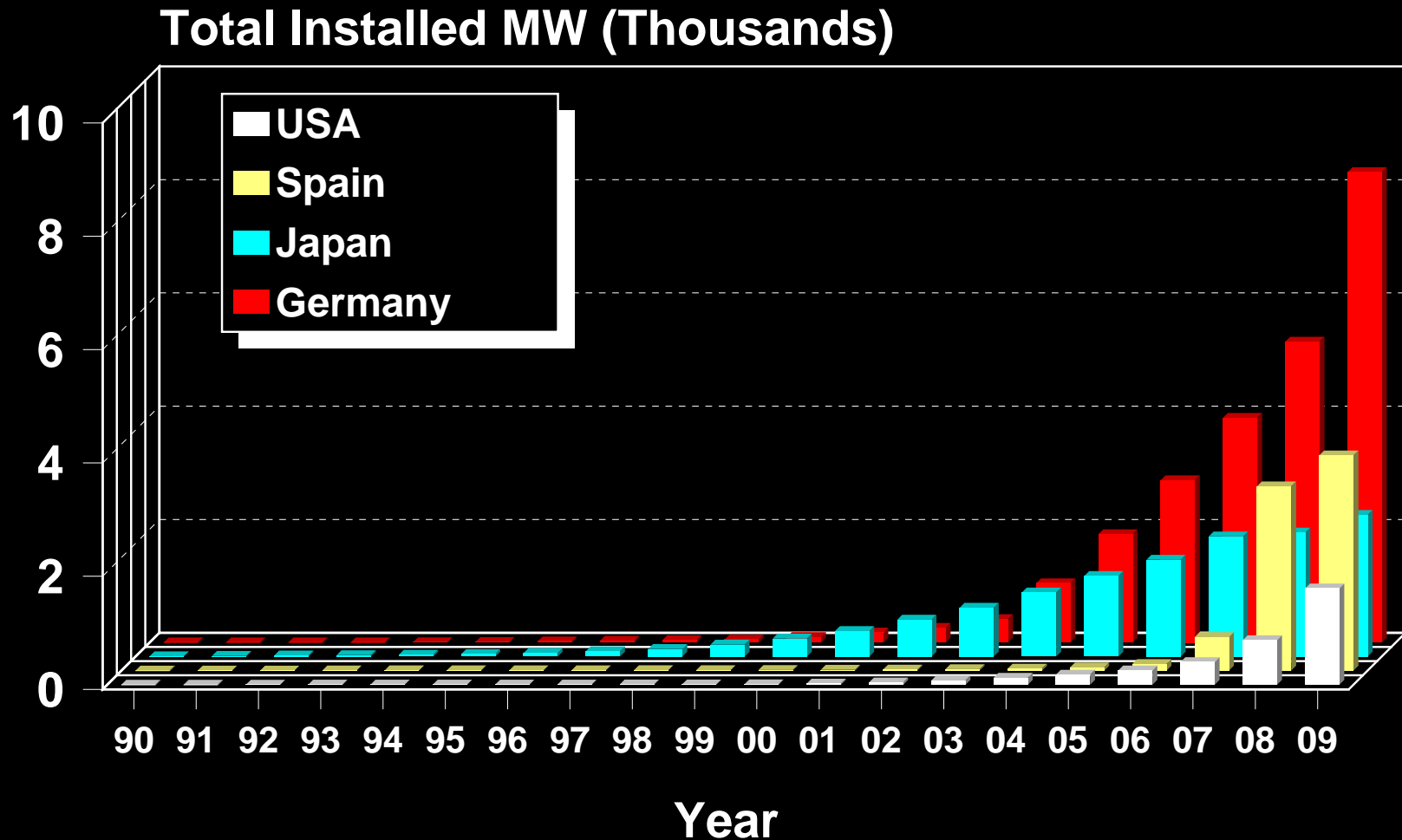
Colorado--25 MW/yr

*Feed-in Tariff Market

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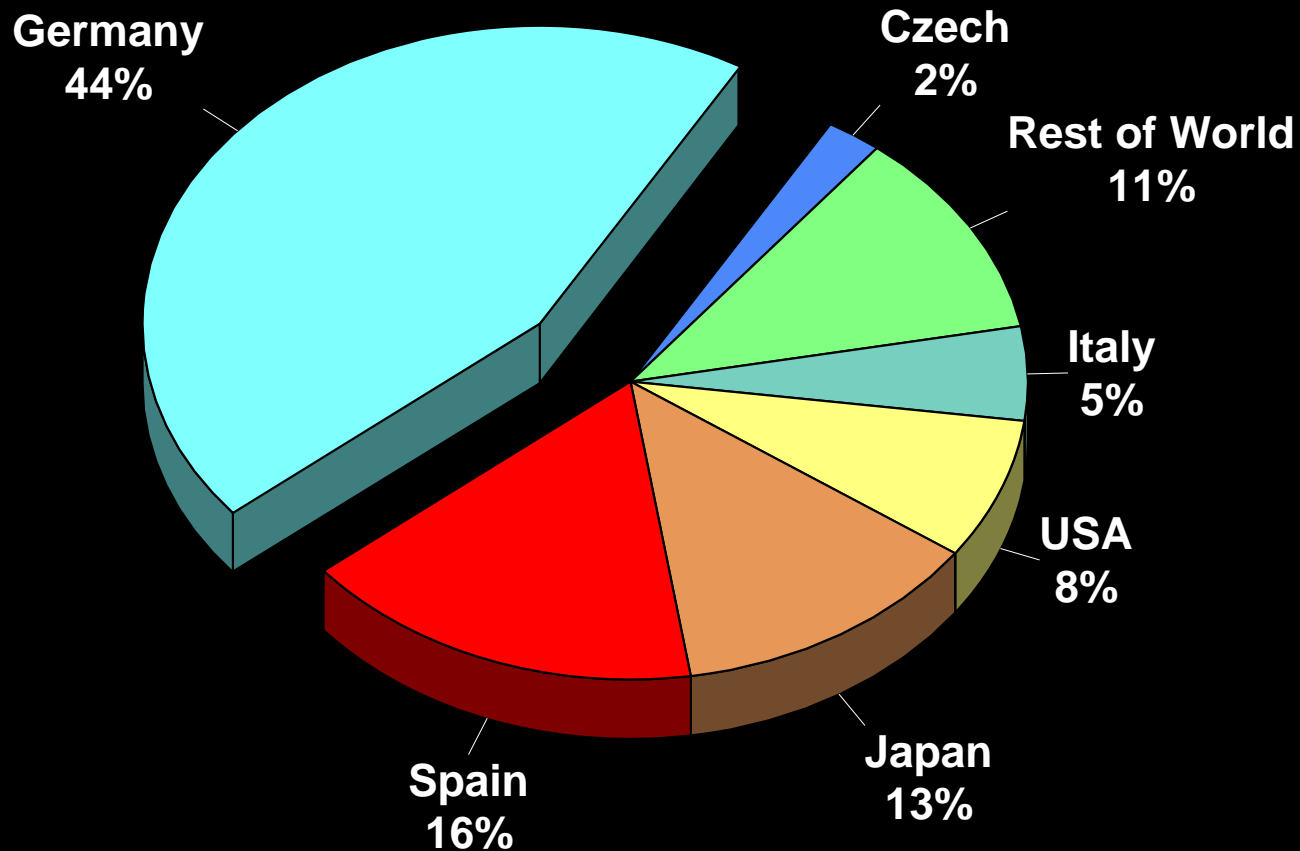
Rancho Seco, California

Solar Photovoltaics Development



World Solar PV Capacity 2009

~20,000 MW



More than 3/4 from Feed-in Tariffs

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Renewable Tariff Design Price Regulation

- **Most Efficient**
- **Least Costly**
- **Simpler**
- **Is Compatible with Market Economies**

From Bernard Chabot, ADEME

Renewable Tariff Design

Price Differentiation

- For Different Technologies
- For Different Applications
- For Different Sizes
- For Different Resource Intensities

For Wind (Germany, France, & China!)

For Solar (France, Oregon)



Differentiated Tariffs for Wind

- **Distributed Benefits**

Only Accrue From Distributed Generation

Differentiated Tariffs = Distributed Wind

- **Reduces Pressure on Windiest Sites**

Profitability Still Higher at Windy Sites

- **Reduces NIMBYism**

By Enabling Greater Participation

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San Geronio Pass, California

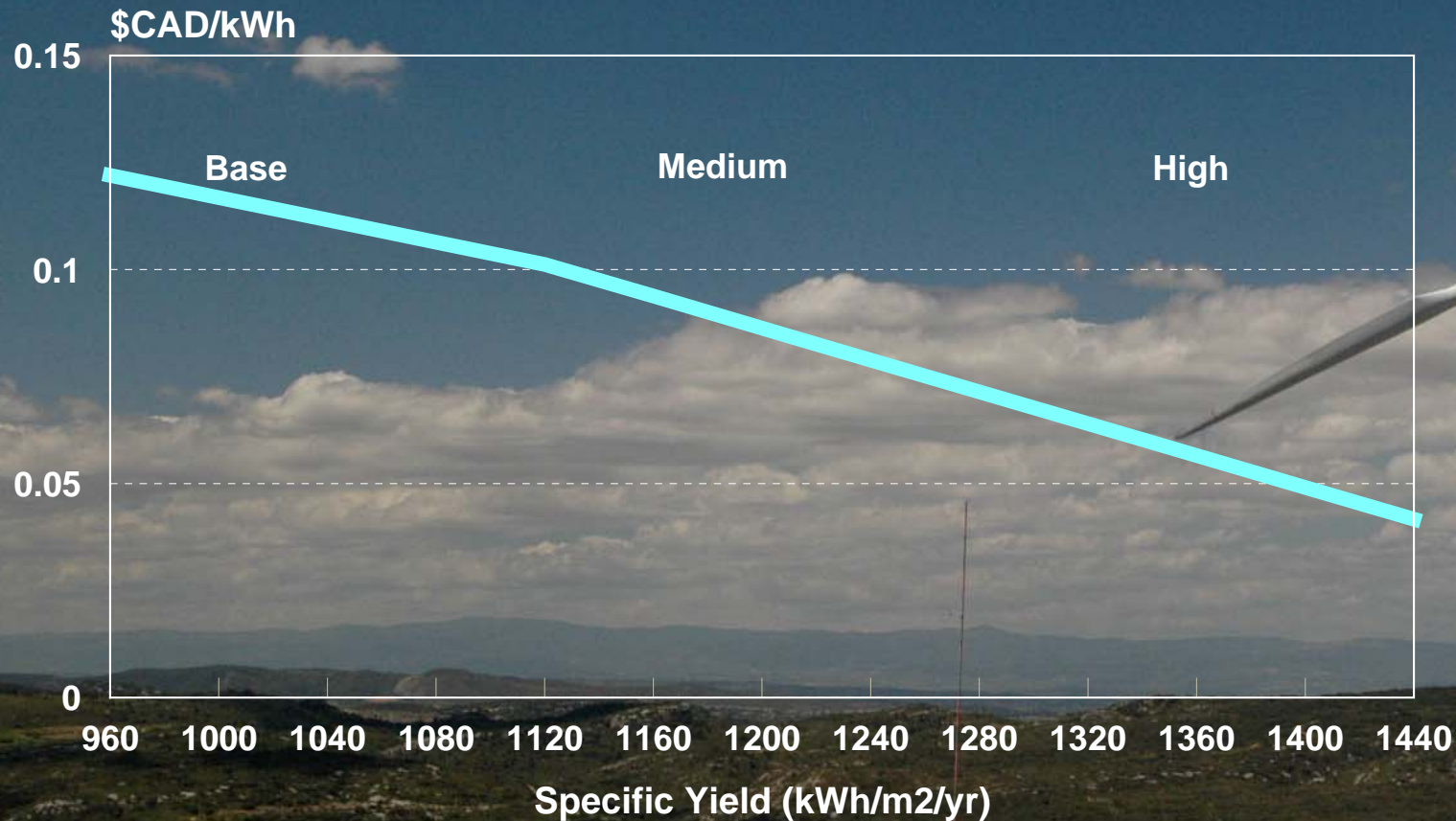


French Wind Tariffs

Resource Productivity Method

- Fair Profits at Medium Wind Sites
- Not “Undue” Profits at Windy Sites
- Profitability Index Method (Chabot)
Not Discounted Cash Flow Model

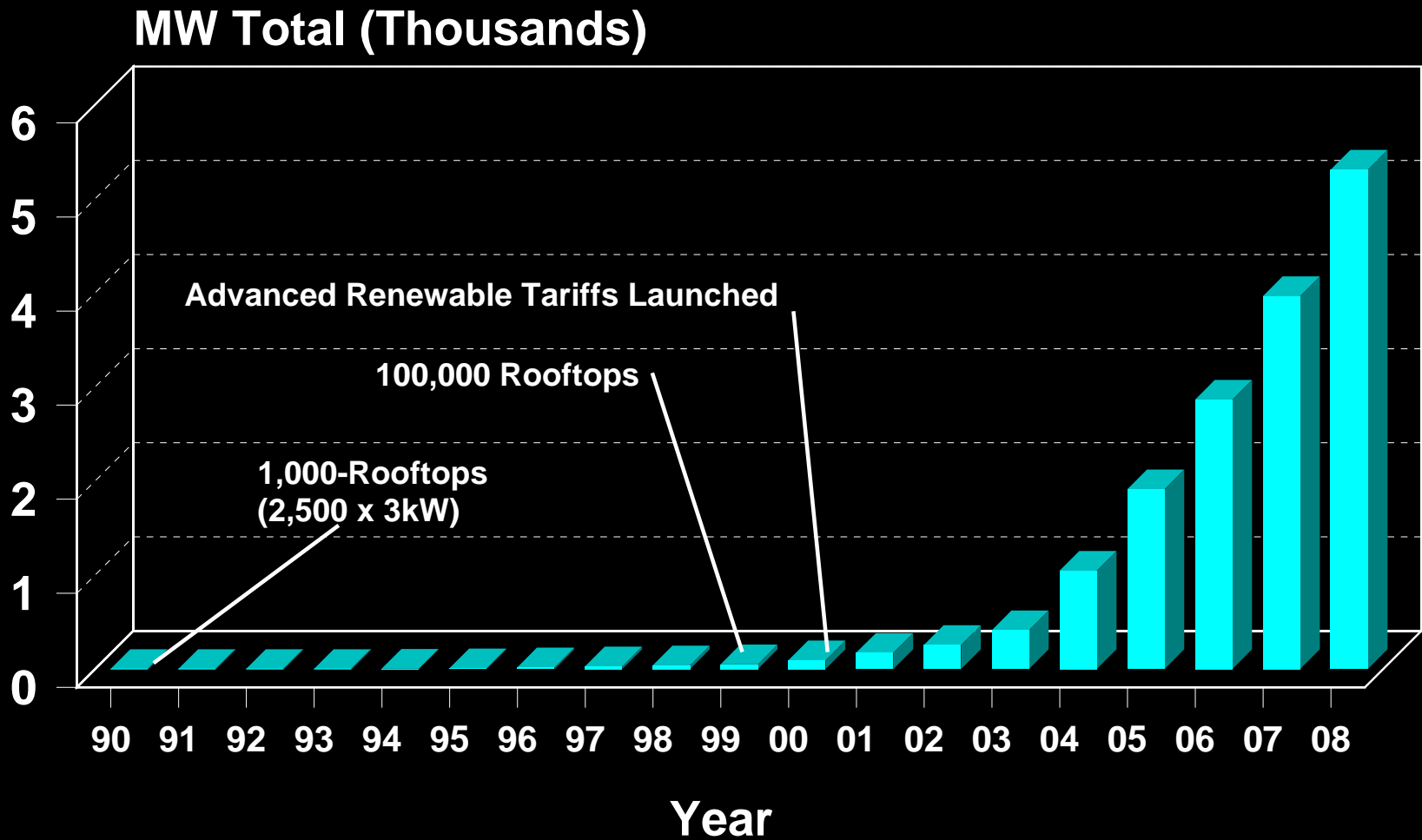
French Wind Tariffs by Specific Yield



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Chateau de Lastours, France

Renewable Tariffs & Solar Photovoltaics in Germany



Germany's Renewable Tariffs The Results (2009)

- 16% of Electricity
- 10% of Primary Energy
- Jobs

Wind: 90,000

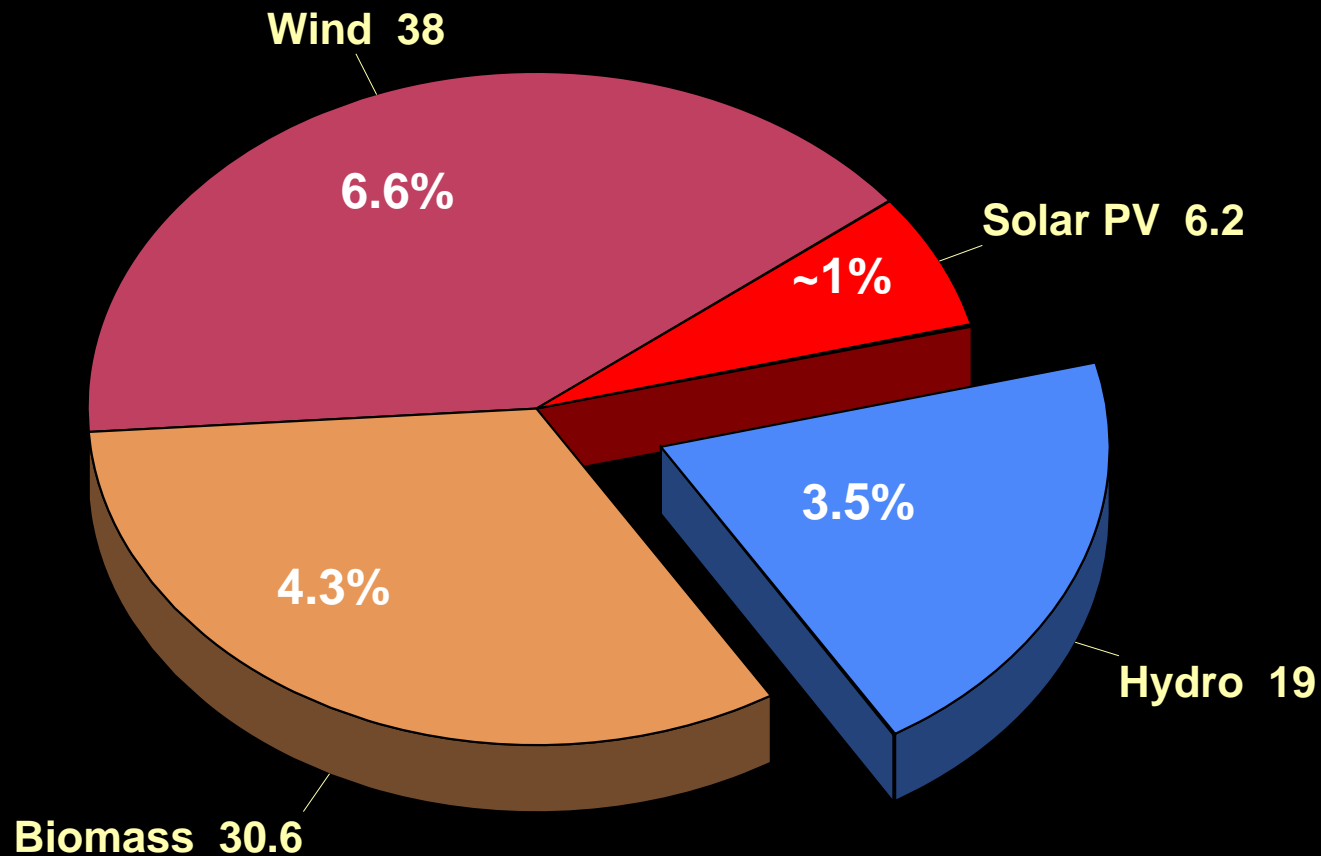
Solar PV: 50,000

Biogas: 8,000

Total: 300,000

German Renewables 2009

~93 TWh (16%)

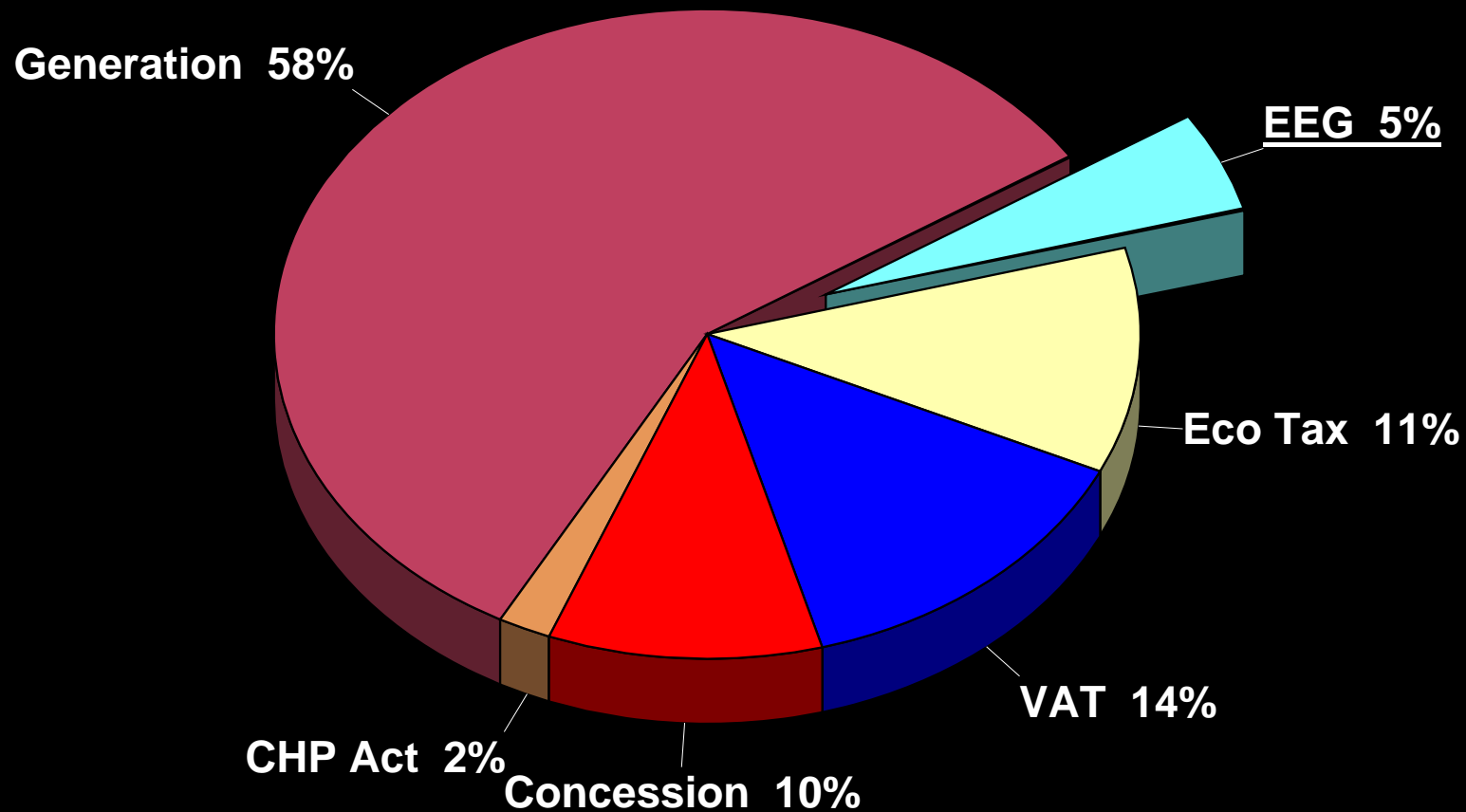


Source: BMU

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Cost of German EEG (2008)

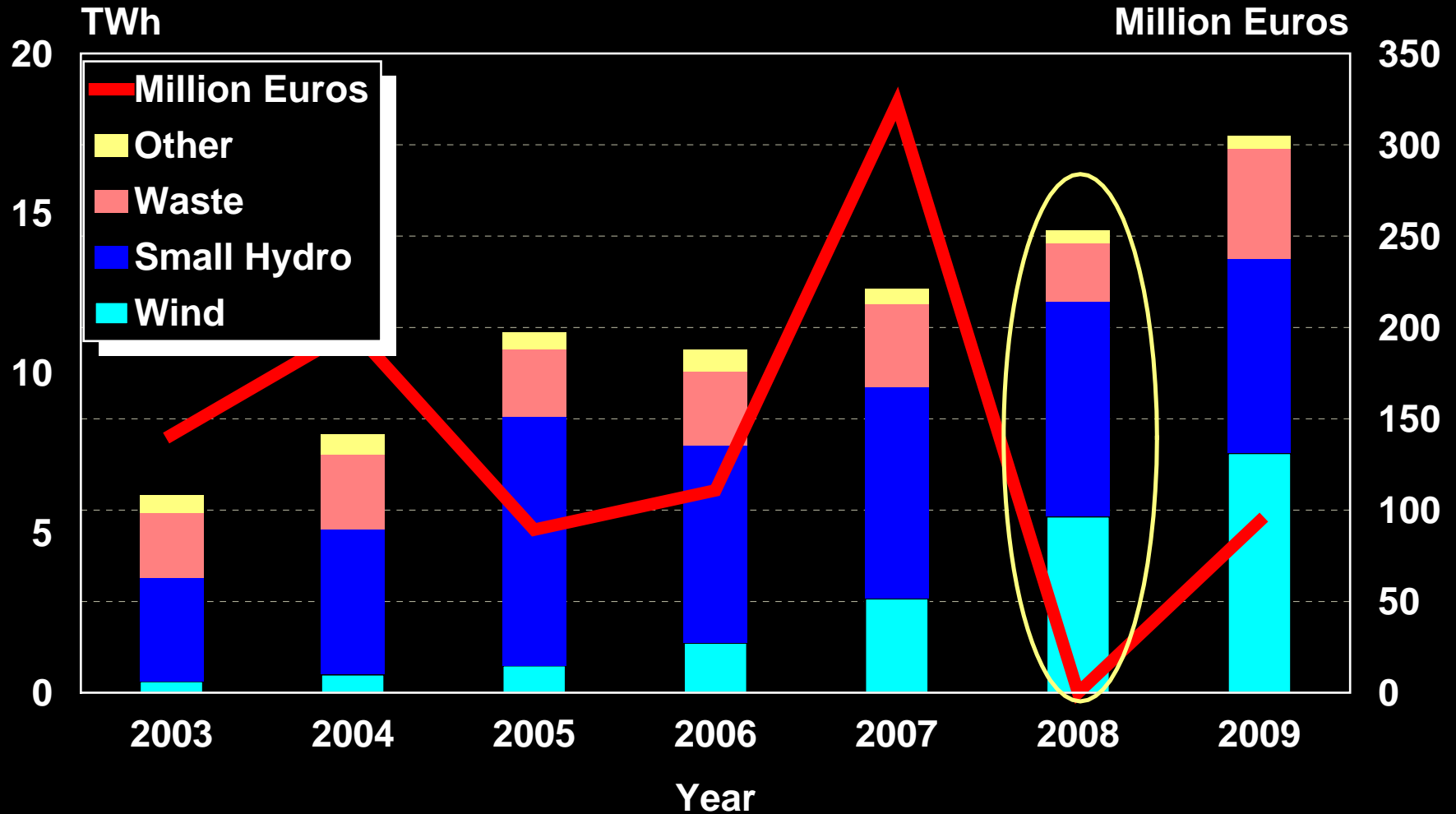
~\$50/yr/household



BMU: EEG Costs <5%, ~€0.01/kWh, 2008.

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Over Cost of French Renewable Tariffs

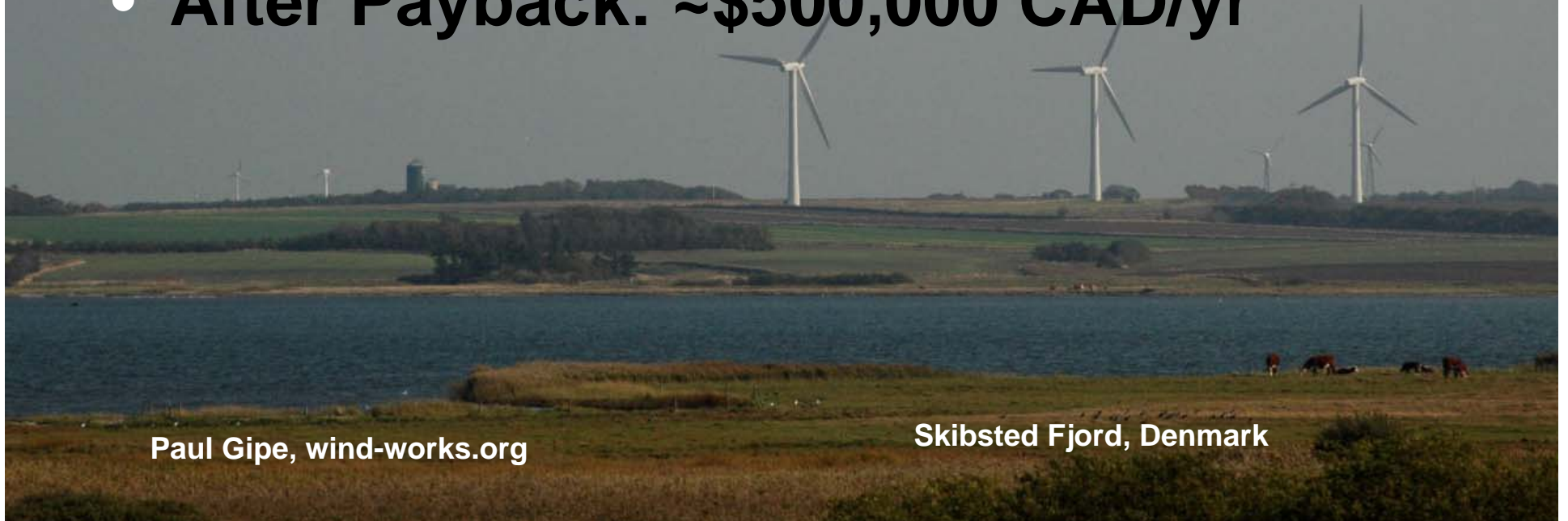


Source: www.cre.fr

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Potential per Ontario Farm

- 2MW Turbine, 80 m Ø, 80 m Tower
- ~\$5 million CAD Installed
- ~4 million kWh/Year (~6.5 m/s)
- ~\$500,000 CAD/yr @ \$0.145/kWh
- Simple Payback: ~10 Years
- After Payback: ~\$500,000 CAD/yr



Solar PV

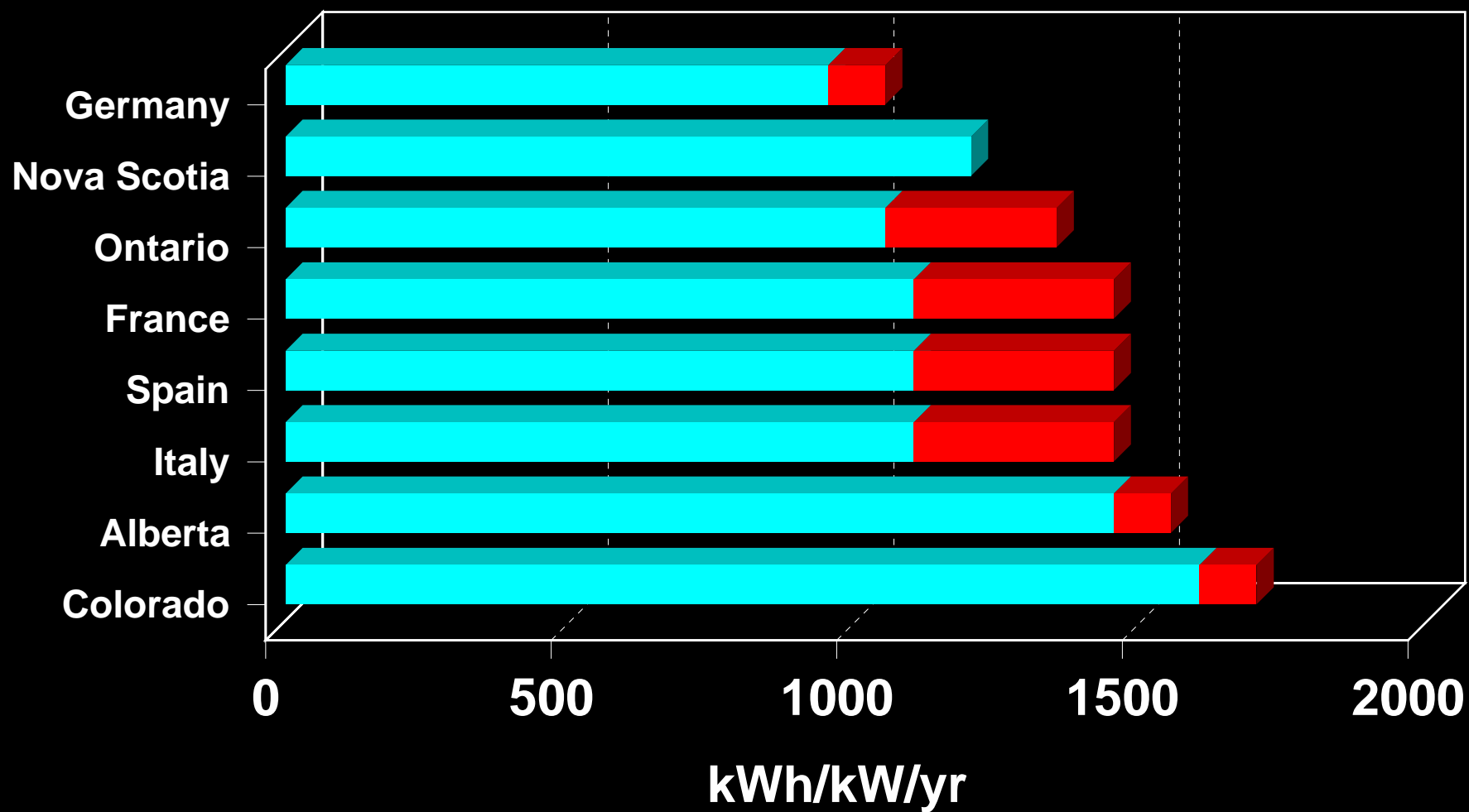
Ontario Barn Roof

- 30 kW; ~\$275,000
- 30,000 kWh/yr
- \$21,000/yr
- **Simple Payback ~13 years**

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Edison, California

Solar PV Yields



Source: RetScreen

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The Farmers of Nordfriesland

- **0.7% the Size of Colorado**
2,000 km²
- **560 MW of Wind**
Community-Owned, <1% of Land Area
- **1.3 TWh/yr**
2% of Colorado's Total Generation
€100 million (\$150 million)/yr

European Projected Development 2010 with Feed-in Tariffs

	Wind	Solar PV
Germany	2,500	6,000
Spain	2,500	50-100
France	1,000	200
Italy	Quota	1,500

European 2010 Feed-in Tariffs

	Wind	Solar PV
Germany	Stable	2010 Cuts in Two Steps: New 3,000 MW Target
Spain	Possible Cuts	Further Cuts
France	Stable	Raised Tariffs: New Resource Differentiated Tariffs
Italy	Quota	2011 Cuts: New Target; 3,000 MW 2011-13

FIT Programs in Development

Finland

Great Britain

Malaysia

Philippines

Japan

Nova Scotia

Wind & Biomass

Renewable Heat

All Resources

All Resources

All Resources

ComFIT, no Solar PV

Feed-in Tariffs

“Turn farms, homes, and businesses into entrepreneurs”

--Terry Tamminen, Former Chief Policy Advisor to Governor Arnold Schwarzenegger

Paul Gipe, wind-works.org

Goderich, Ontario

