

**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, APROMA, ASES, AusWEA, AWEA, BWEA, BWE, CanWEA, CAW, CEERT, DGW, DSF, EECA, ES&T, GEO, GPI Atlantic, IREQ, KWEA, MADE, Microsoft, ManSEA, MSU, NRCan, NRG Systems, NASA, NREL, NZWEA, ORWWG, OSEA, PG&E, SeaWest, SEI, TREC, USDOE, WAWWG, WE Energies, the Folkecenter, the Izaak Walton League, the Minnesota Project, the Sierra Club, and Zond Systems, and written for magazines in the USA, Canada, France, Denmark, and Germany.**

# Advanced Renewable Tariffs New Policy Option for North America



Paul Gipe, [wind-works.org](http://wind-works.org)

Noordoost polder, the Netherlands

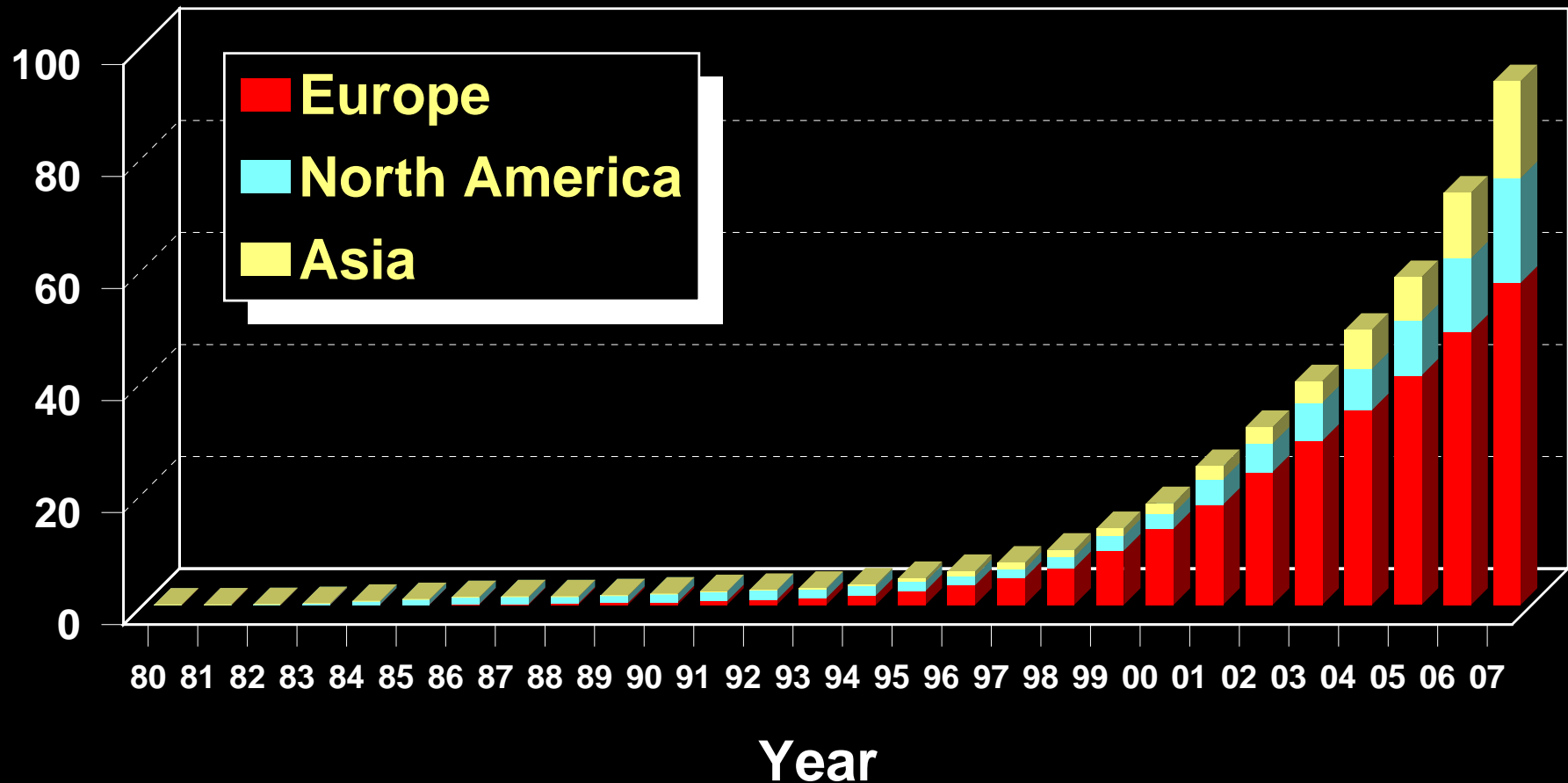
# Renewable Energy Has Come of Age

Paul Gipe, [wind-works.org](http://wind-works.org)

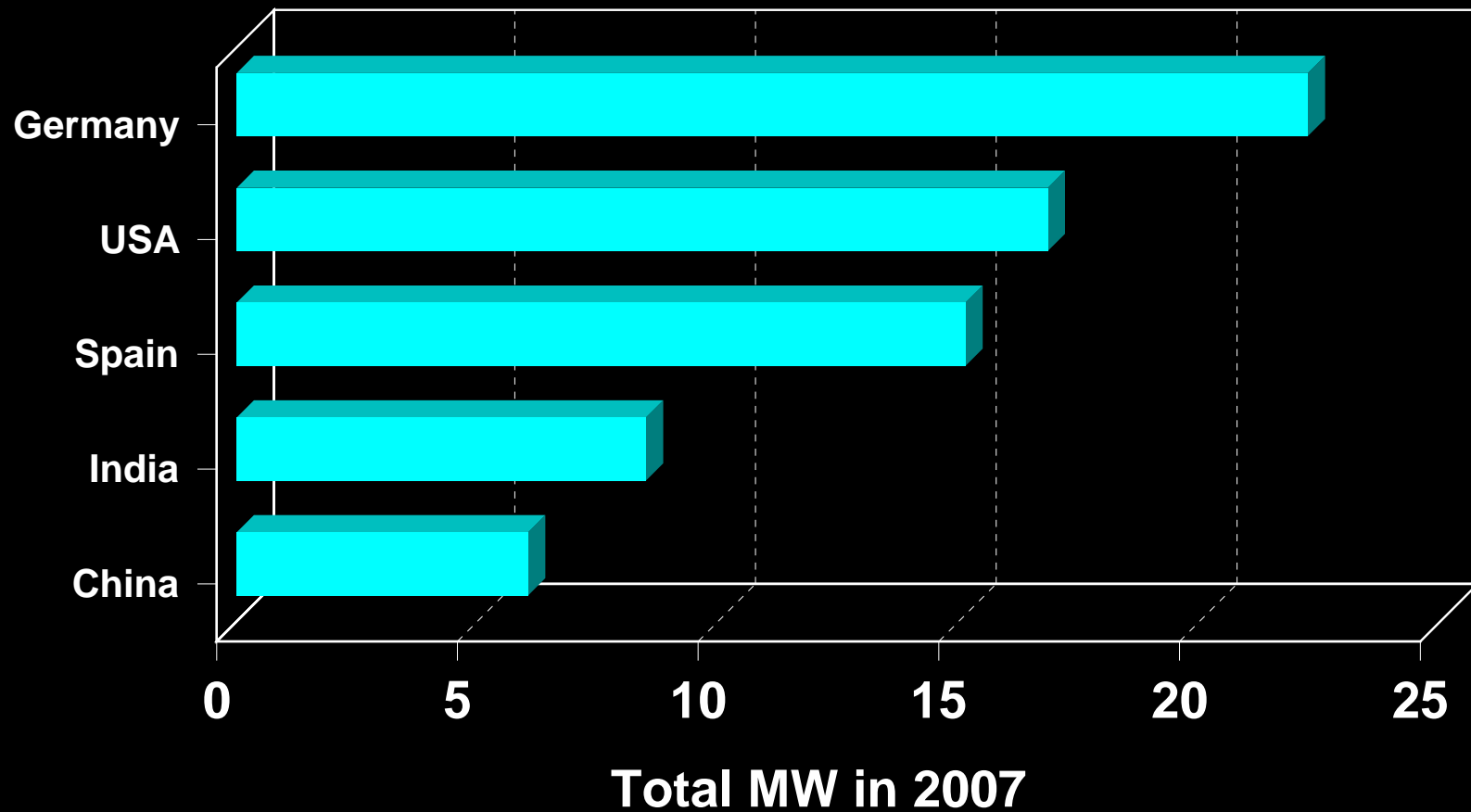


# World Wind Generating Capacity

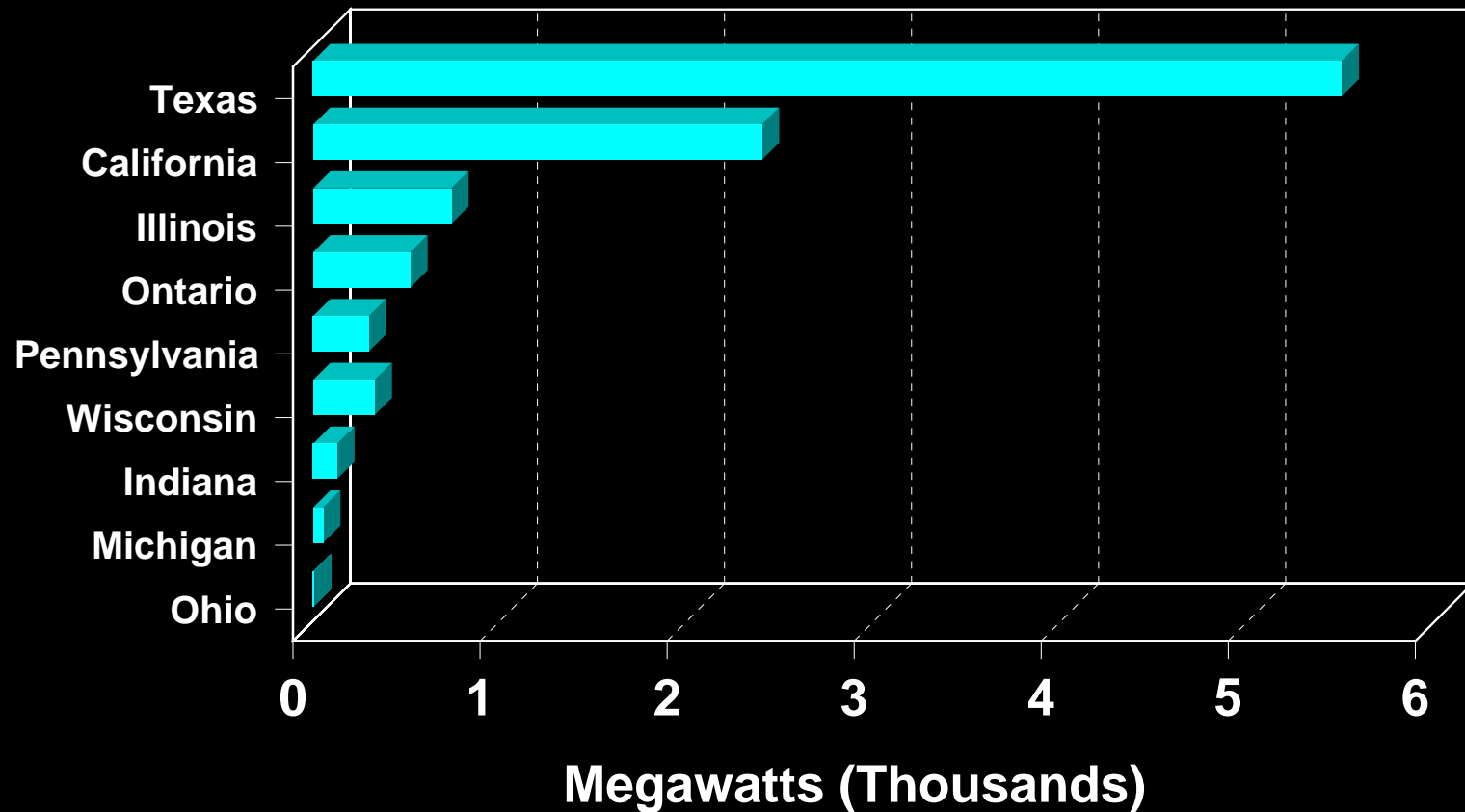
Megawatts (Thousands)



# World Major Wind Markets

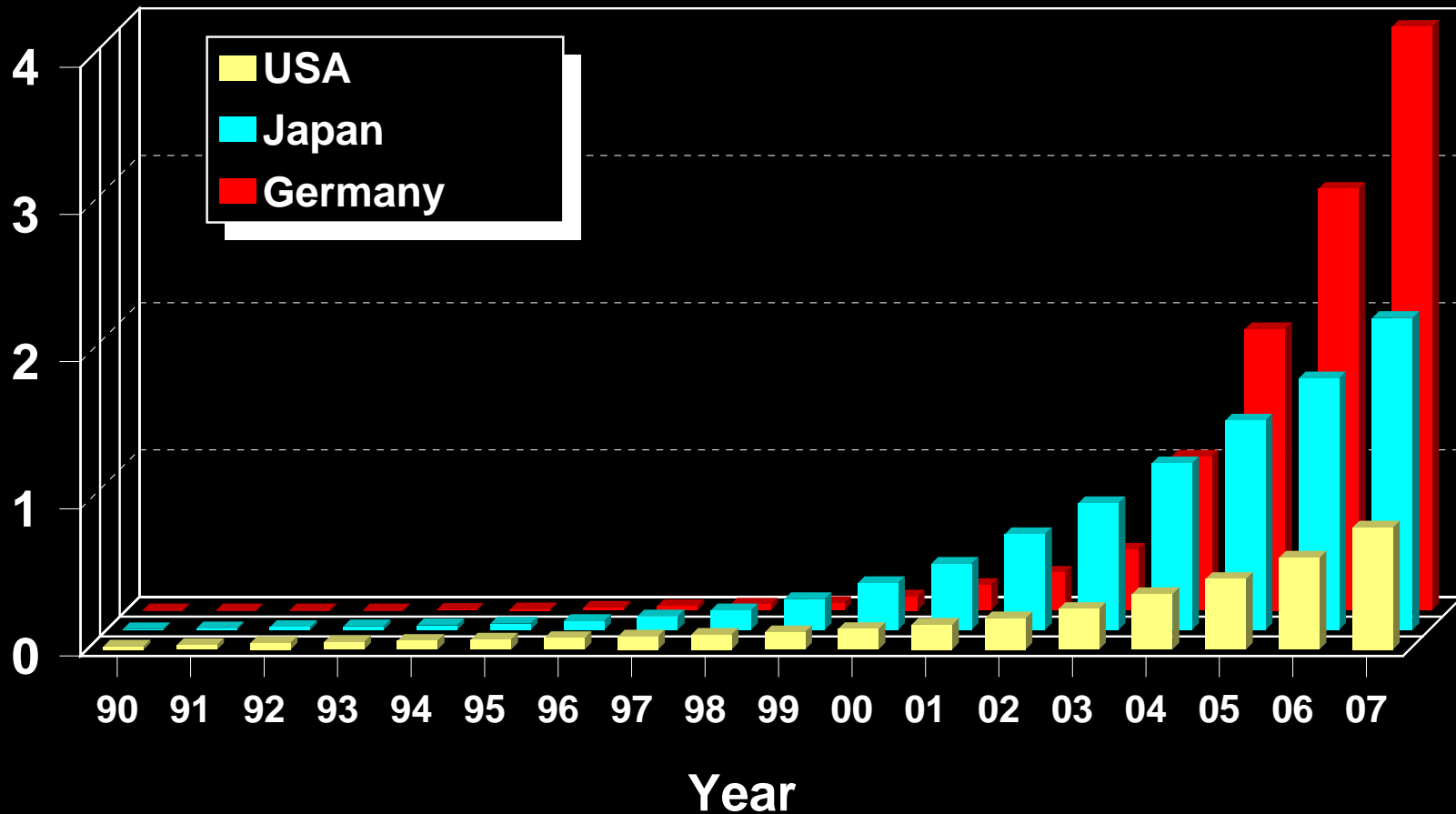


# 2007 Wind Capacity Indiana & Michigan Rank



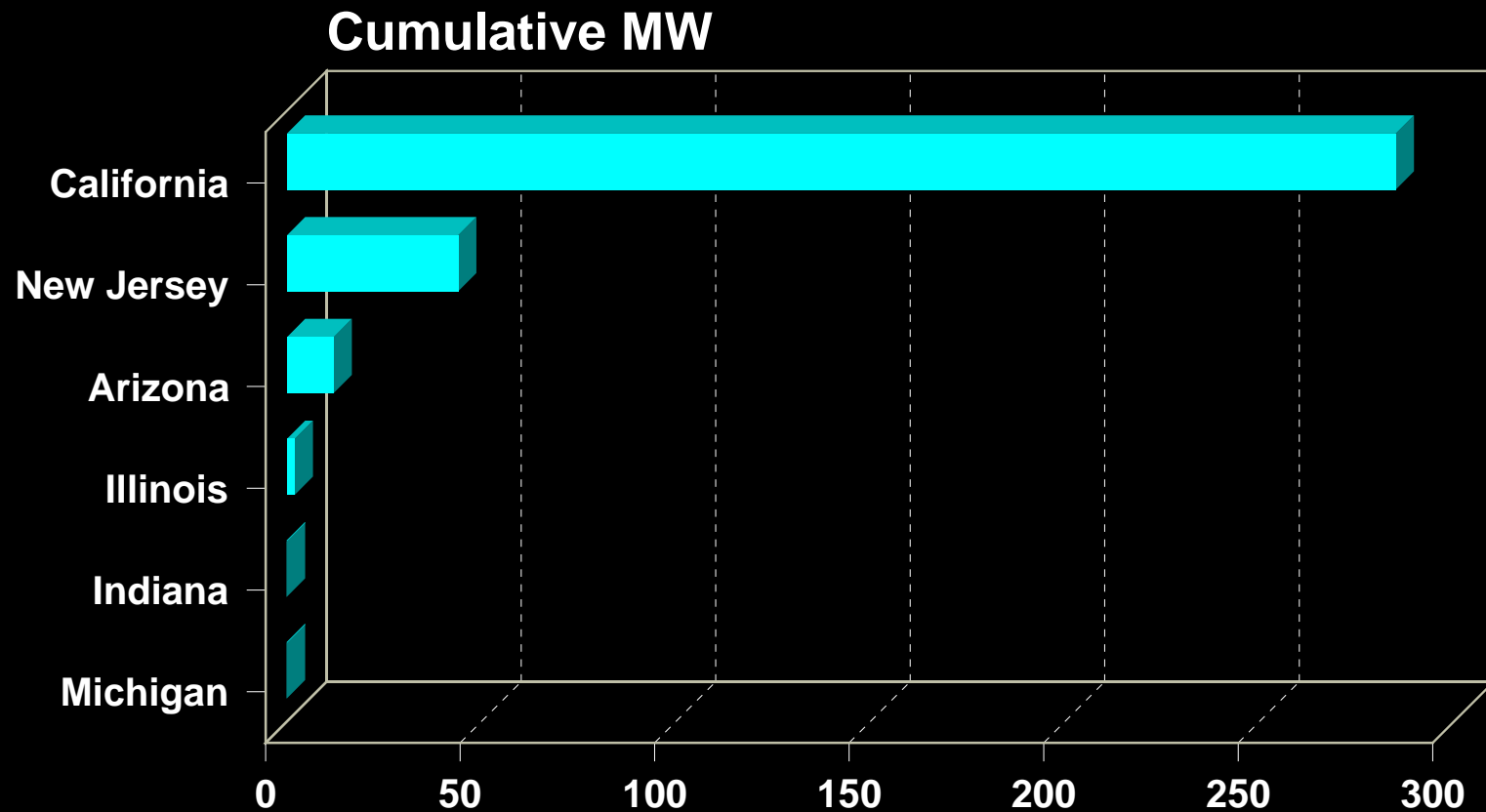
# Solar Photovoltaic Development

Total Installed MW (Thousands)



# Installed Solar PV Capacity 2007

## Indiana & Michigan Rank





# Solar PV Growing Rapidly

- 2007: 8,000 MW Worldwide
- 2,500+ MW/yr
- \$20+ Billion
- Major Markets

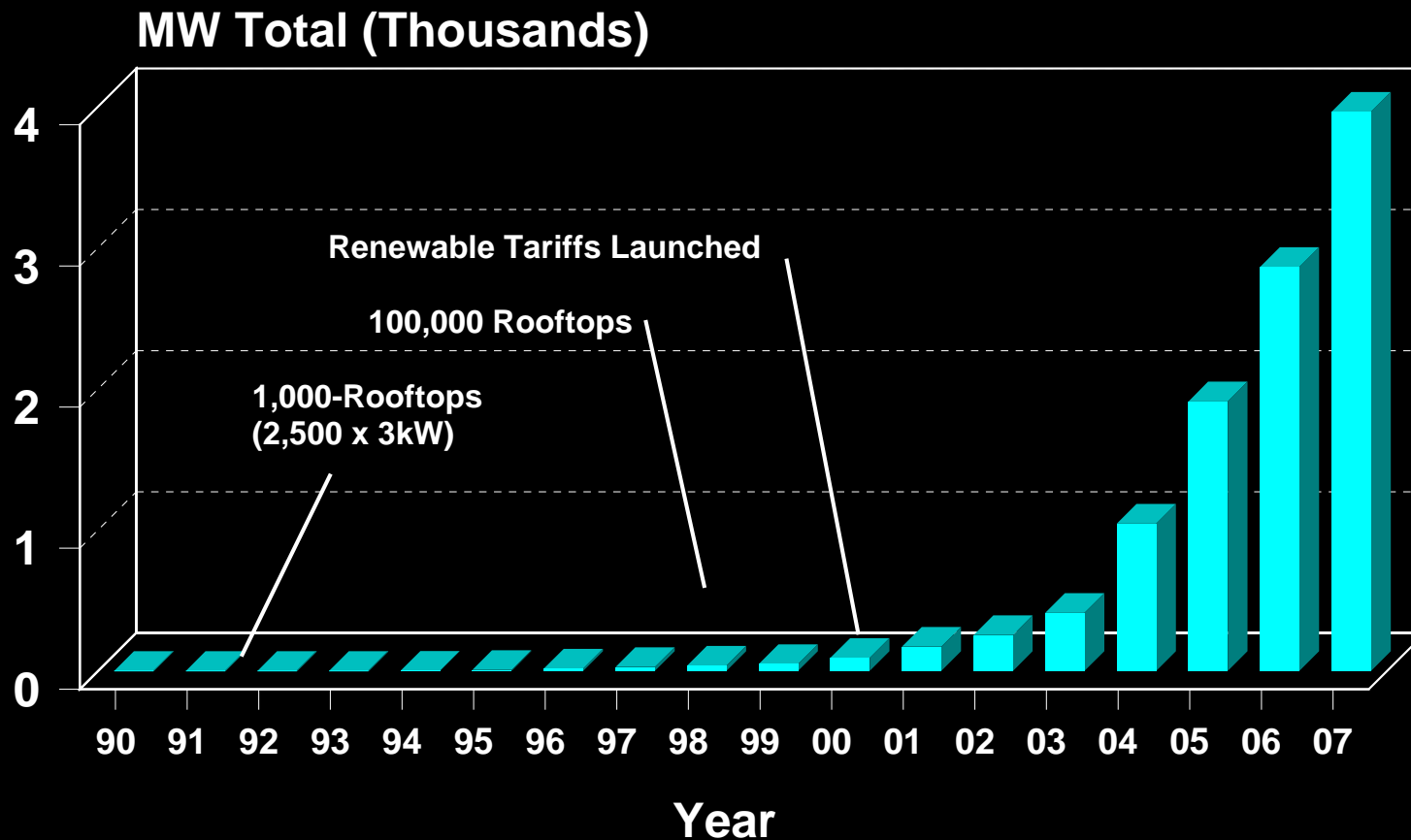
Germany--1,000+ MW/yr

Japan--250 MW/yr

Spain--350 MW/yr

California--120 MW/yr

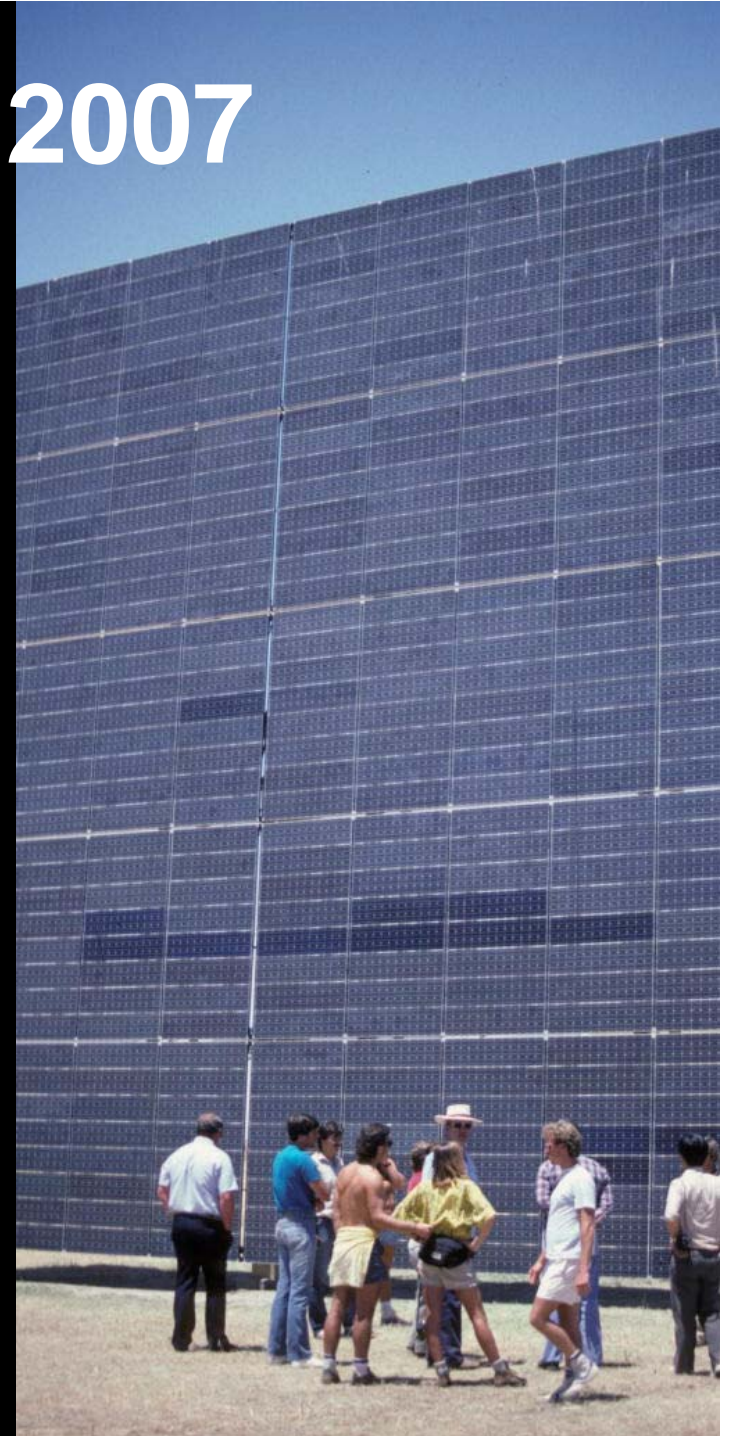
# Renewable Tariffs & Solar Photovoltaics in Germany



# Solar PV in Germany 2007

- **150,000 New Systems**
- **€6 Billion**
- **Total of 450,000 Systems**
- **~1,100 MW in 2007!**
- **Total 4,000 MW**
- **~2% Supply in Bavaria**
- **~1% Supply in Germany**

Paul Gipe, [wind-works.org](http://wind-works.org)



# German Homeowners

- 500 MW on Home Rooftops/yr
- 2,000 MW+ Total
- 2 TWh/yr
- ~ €1 Billion/yr Revenue
- Anyone with a Roof Can Do Solar in Germany!



# German Farms--Solar PV Crop

- ~700 MW on Barn Rooftops in 2007
- ~1,500 MW Total in 2007 (€9 Billion)
- ~1.5 TWh/yr (€700 Million)



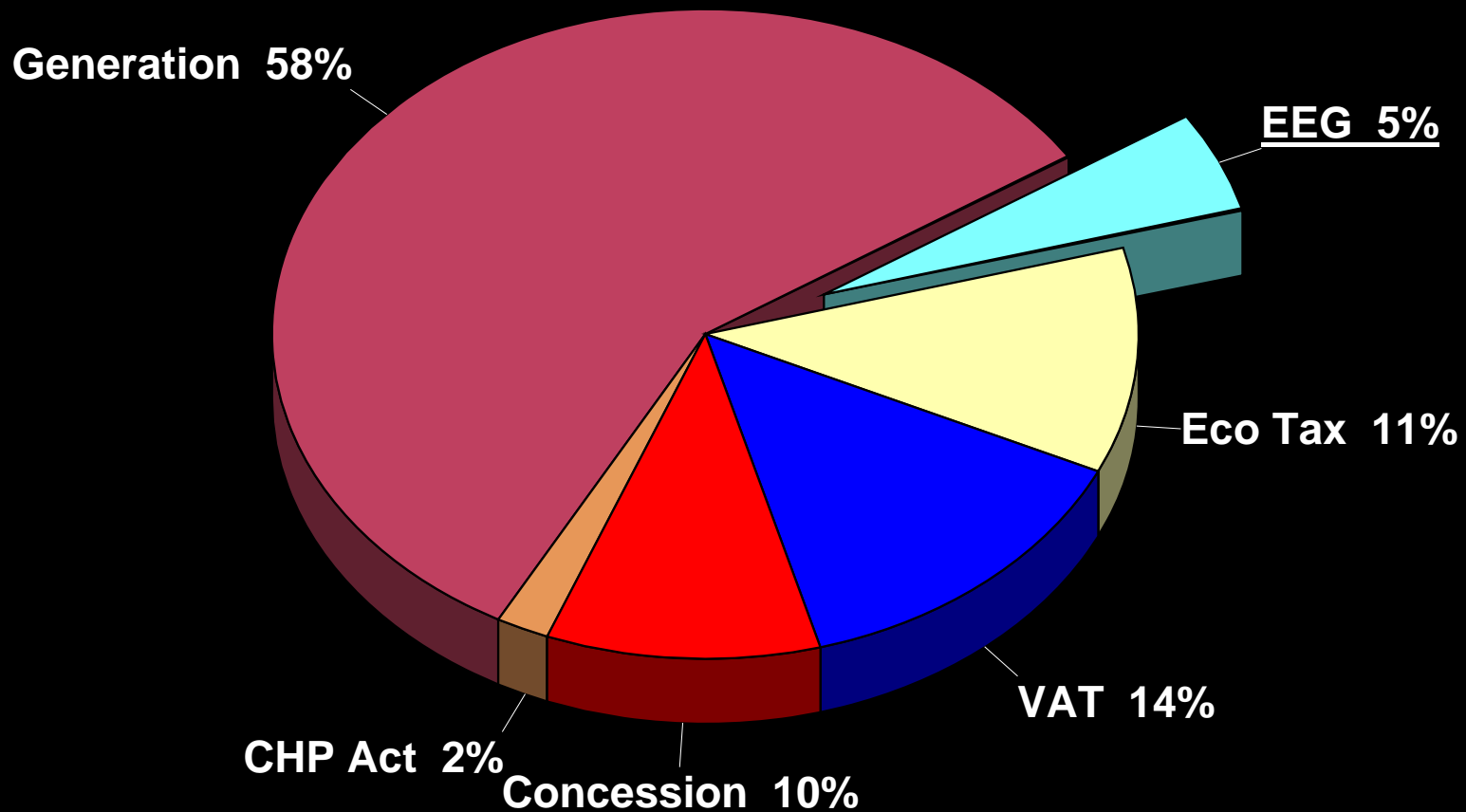
# Germany's Renewable Tariffs

## The Results (2007)

- Renewables 14% of Supply
- Renewables 6% of Primary Energy
- 70,000 Employed in Wind Industry
- 40,000 Employed in PV Industry
- 8,000 Employed in Biogas Industry
- 250,000 Employed in Renewables
- €32 (~\$50) Billion Turnover

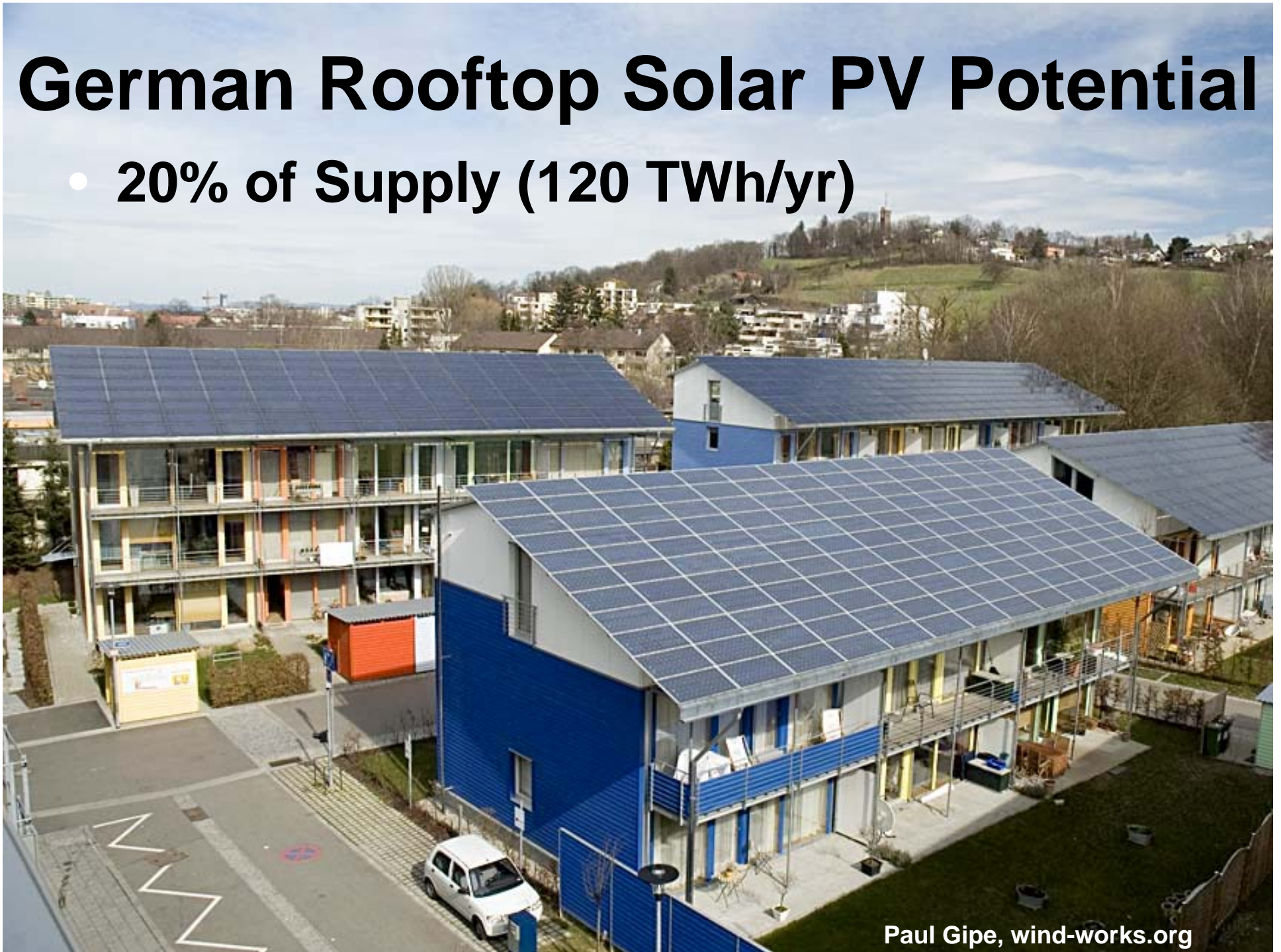
# Cost of German EEG

~\$50/yr/household



# German Rooftop Solar PV Potential

- 20% of Supply (120 TWh/yr)





# German Solar PV Potential All Surfaces

- 40% of Supply (200 TWh/yr)



Freiburg, Germany

# Aggressive Targets Require Aggressive Measures

Ferndale, Ontario

## German Renewable Energy Targets

	2010	2020	2030	2050
Electricity	12.5%	27.5%	45%	80%



# Why the European Success?

## #1 Community Involvement

Germany & Denmark

## #2 Advanced Renewable Tariffs

18 EU Countries use Electricity Feed Laws



# Renewable Tariffs Terminology

- **Feed-In Tariffs (FITs)**  
Stromeinspeisungsgesetz (StrG)
- **Electricity Feed Laws or Feed Laws**
- **Advanced Renewable Tariffs (ARTs)**  
Erneuerbare Energien Gesetz (EEG)
- **Fixed-Price Contracts**
- **Minimum Price Standards (MPS)**
- **Standard Offer Contracts\***
- **Renewable Energy Payments (Most Recent)**

\*Incorrectly applied in Ontario and elsewhere.

# Advanced Renewable Tariffs

- **Deliver More Capacity--**
  - More Quickly
  - More Equitably
- **Enabling Participation**
  - Available to Everyone



# 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](http://wind-works.org)



# Renewable Tariff Design

- Simple, Comprehensible, & Transparent
- Priority Access & Purchase
- Prices Sufficient for Development
- Lengths Sufficient for Profitability
- Fair But Not Undue Profit
- Price Differentiation

# Renewable Tariffs Contract Length

Country	Wind	Solar	Hydro	Biomass
France	15	20	20	15
Germany	20	20	20	20
Ontario	20	20	20	20
Portugal	12	12	12	
Spain (2007)*	>15	>25	>25	>20

**Longer Contracts Reduce Initial Price.**



# Renewable Tariff Design

## Price Differentiation

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

Paul Gipe, [wind-works.org](http://wind-works.org)



# **Renewable Tariff Design Price Regulation**

- **Provides Predictable Results**
- **Provides Rapid Results**
- **Provides Opportunity for All Players**
- **Provides Opportunity Geographically**
- **Provides Dispersed Wind Development**

**From Bernard Chabot, ADEME**

# 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

Paul Gipe, [wind-works.org](http://wind-works.org)

San Geronio Pass, California



# Differentiated Tariffs for Wind

- **Increases Program Flexibility**
  - Lessens Pressure to Get Prices Right the First Time
- **Reduces Development Risk**
  - Determining Final Price After 5 Years of Operation
- **Spreads Opportunity to All**
  - Not Just to Elite Few
- **Provides Fair Profits at Modest Wind Sites**
- **Limits "Excessive Profits" at Windy Sites**

# French Wind Tariffs Pre-2006 Average Price vs Initial Price



# Myths to Dispel

- **Renewables are Free or Cheap**  
But They Are Affordable & Worth Every Cent
- **Feed-in Tariffs Too Expensive**
- **Feed-in Tariffs Not Market Mechanism**

Paul Gipe, [wind-works.org](http://wind-works.org)

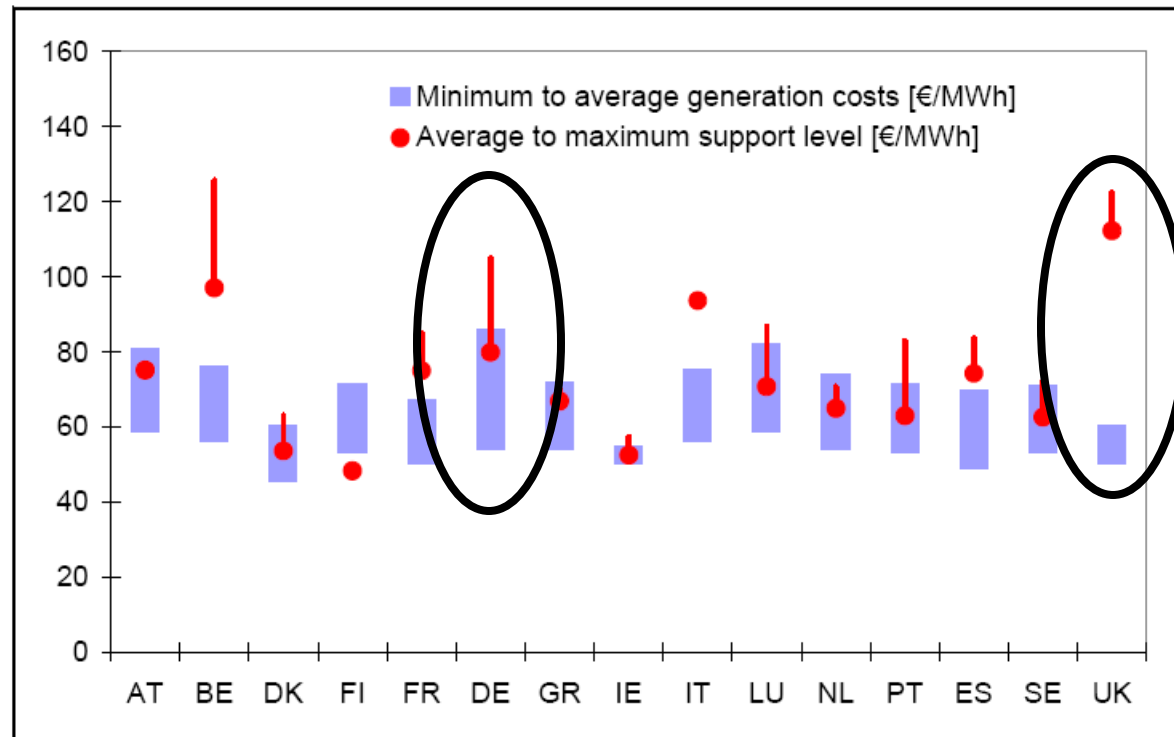
Husum, Germany

# Political Price-Political Quantity Market Mechanisms

	Price	Quantity
Feed Law	Political	Market
Quota/RPS /Tendering	Market	Political

**Both are Market Mechanisms**

# EU Policy Mechanisms



**Figure 4:**  
Price ranges (average to maximum support) for direct support of wind onshore in EU-15 Member States (average tariffs are indicative) compared to the long-term marginal generation costs (minimum to average costs). Support schemes are normalised to 15 years.



# **Stern Climate Change Review**

**“ . . . Comparisons between . . . tradable quotas and feed-in tariff price supports suggest that feed-in mechanisms achieve larger deployment at lower costs . . . ”**

**“ . . . analysis suggests that competition is greater . . . ”**

STERN REVIEW: The Economics of Climate Change, Chapter 16: Accelerating technological innovation, [http://www.hm-treasury.gov.uk/media/9A3/57/Ch\\_16\\_accelerating\\_technological\\_innovation.pdf](http://www.hm-treasury.gov.uk/media/9A3/57/Ch_16_accelerating_technological_innovation.pdf), ISBN number: 0-521-70080-9, page 366, 2006.

# Ernst & Young Germany and Britain Cost of Renewables (2006)

	GBP/kWh	~USD/kWh	TWh
GB (ROCs)	0.032	0.056	18.1
D (Feed-in Tariffs)	0.026	0.045	72.7

# Ernst & Young Germany and Britain Cost of Renewables (2006)

- Germany: 4x more energy generated
- Germany: @ 1/5 relative cost  
of GB Renewable Obligation Certificates

Paul Gipe, [wind-works.org](http://wind-works.org)

Eifel Highlands, Germany

# IEA: Quota & Feed-in Tariff Cost of European Wind (2005)

	USD/kWh
Quotas & TGC	0.13-0.17
Feed-in Tariffs	0.09-0.011

Quotas & TGC: \$0.04-\$0.06/kWh more costly.

# Often Overlooked The Value of Predictability

- **Renewable Tariffs are Bankable**  
More Important Today Than Ever!
- **Renewable Tariffs Provide Stable & Predictable Income Streams**

Paul Gipe, [wind-works.org](http://wind-works.org)

Wieringermeer Polder, the Netherlands



# **How Can Utilities Profit from Renewable Tariffs?**

- **Don't Lose Customers from Net Metering**  
Munis Don't Lose Tax Revenue from Sales
- **Gain New Generation**
- **Rate of Return on Transactions?**  
Examples: 1990s Conservation Programs
- **Tax Benefits on Transactions?**  
Washington State

# Utility Solar PV Feed-in Tariffs

- **WE Energies (Wisconsin)**  
\$0.225/kWh; 10 years  
Proposed for UP (Michigan PSC)
- **Gainesville Regional Utilities (Florida)**  
\$0.265/kWh; 20 years (Proposed)  
Replaces Net Metering  
Equivalent to GRU's Capital Subsidy

# Barriers to Renewable Tariffs

- **Philosophical: Cost vs Value**  
Cost of Generation Plus Fair Profit
- **Sticker Shock**  
Imbedded Costs & Heritage (Old) Resources  
Natural Gas: Future Cost?  
Nuclear: Cost Estimates Unreliable
- **Unfamiliarity**
- **Tax Subsidies Distort Market**  
Complicate Program Design



# Renewable Tariffs in North America .. Unthinkable?

- Yes--Just 4 years ago
- Today? No
- Now Possible
- Growing Trend  
in both USA & Canada

Paul Gipe, [wind-works.org](http://wind-works.org)



Gaspé, Quebec

# Market Mechanisms Status

- Renewable Tariffs Developing Momentum

Paul Gipe, [wind-works.org](http://wind-works.org)

Montjoyer, France

# The Mood Has Changed

- Ontario Moved First



Paul Gipe, [wind-works.org](http://wind-works.org)

Montfort, Wisconsin

# Ontario's Standard Offer Program

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



Paul Gipe, [wind-works.org](http://wind-works.org)

Goderich, Ontario

# Why?

- **All Renewables**  
Most Anyway
- **Open To All Players**  
In Theory Anyway
- **Differentiated Tariffs**  
Two (Solar & Everything Else)  
Highest Tariffs in North America
- **Simplified Contracts**  
Sort of



# Ontario's Standard Offer Program

- <44kV, <10 MW
- Wind, Solar, Hydro, Biomass
- Inclusive--Open to All
- No Program Cap



# Ontario's Standard Offer Program

- Wind, Hydro, & Biomass: \$0.11/kWh
- Solar PV: \$0.42/kWh
- Inflation Adjustment: 20%  
Except for Solar PV (Punitive?)
- 20-Year Contracts

# Ontario: What's Wrong?

- **Tariffs Too Low**

  - PV: 1/2 of What's Needed**

  - Wind: Only Windy Sites**

  - Biomass: \$0.17 CAD/kWh MoAF**

- **Inflation Adjustment Too Low**

  - 20% vs 50%: -2.5% ROI**

  - Excluding Solar Punitive?**



# Ontario SOP Results

- **Big PV: 500 MW**
- **70 MW Hydro**
- **70 MW Biomass**
- **850 MW Wind**
- **Only 50 MW Operational!**

**Small PV: 500 kW**

July, 2008

Paul Gipe, [wind-works.org](http://wind-works.org)

Freiburg, Germany



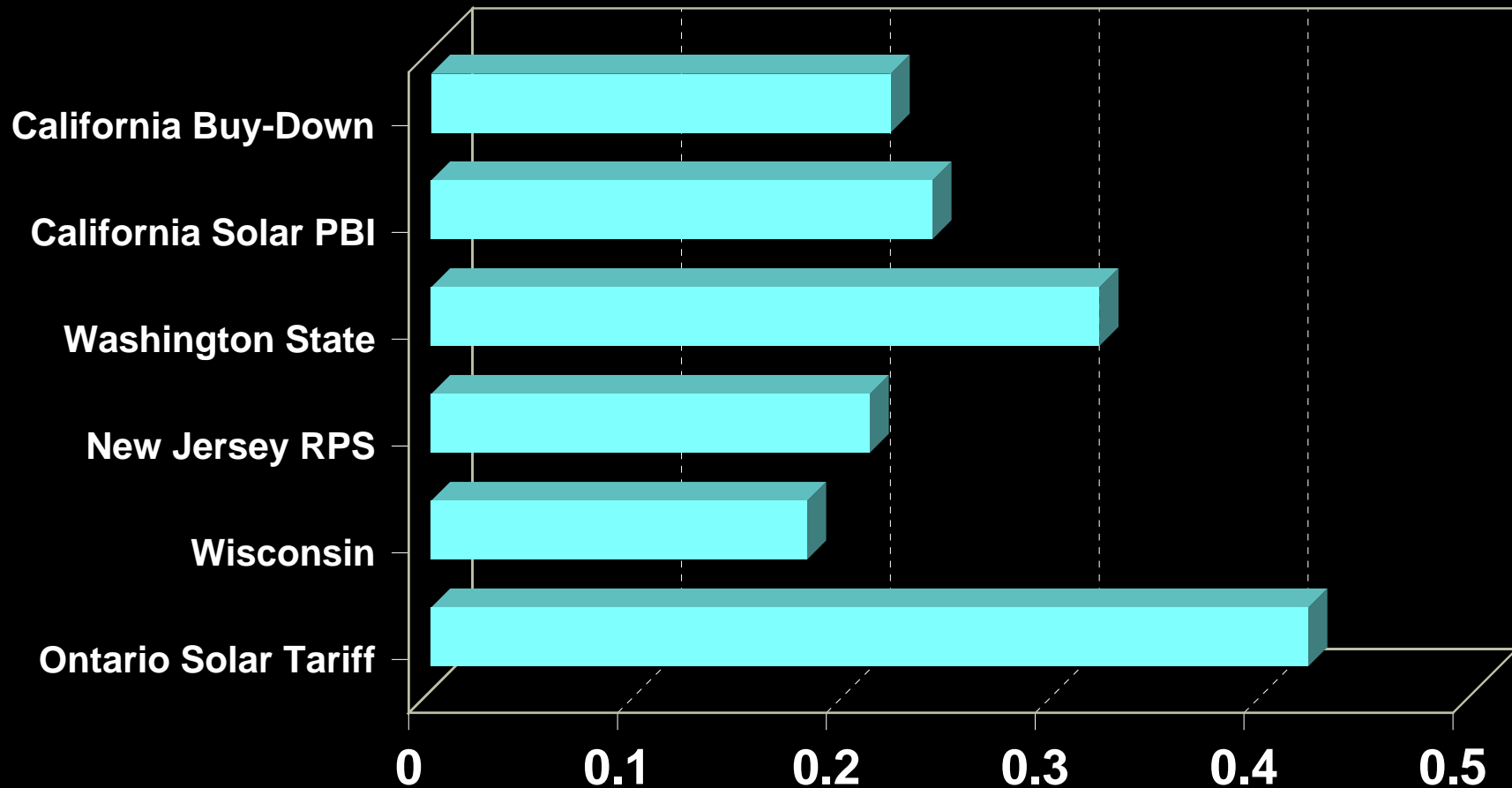
# Ontario's Standard Offer Program What's Next?

- 2-Year Review
- Revisit
  - Increase Prices
  - Increase Differentiation
  - Differentiated Tariffs for Wind
  - Inflation Indexing (60%)
- Add Offshore Wind
- Add Solar Thermal  
\$0.14-\$0.25/kWh

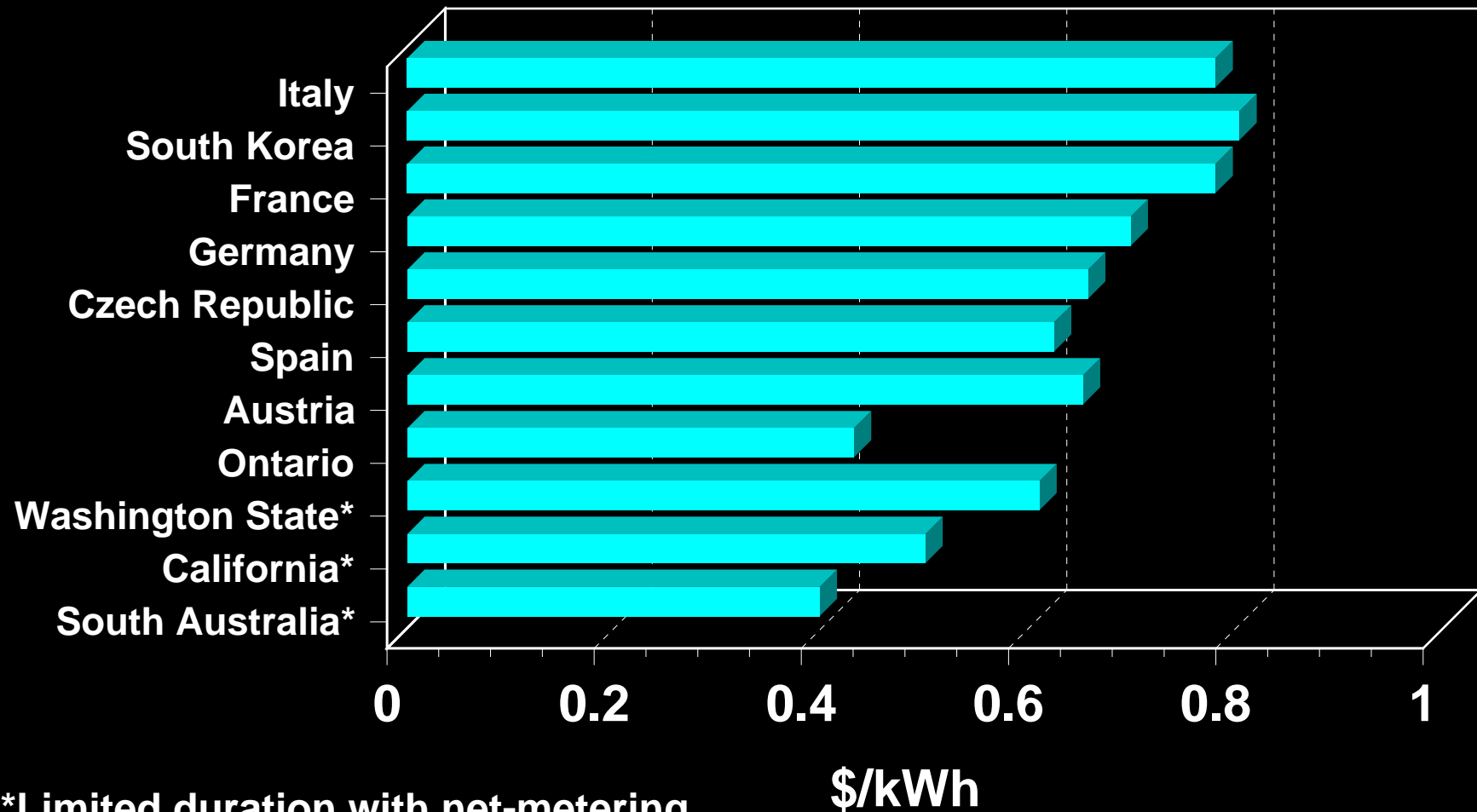


# Ontario Solar Tariff North American Comparison

\$ CAD/kWh Over 20 Years

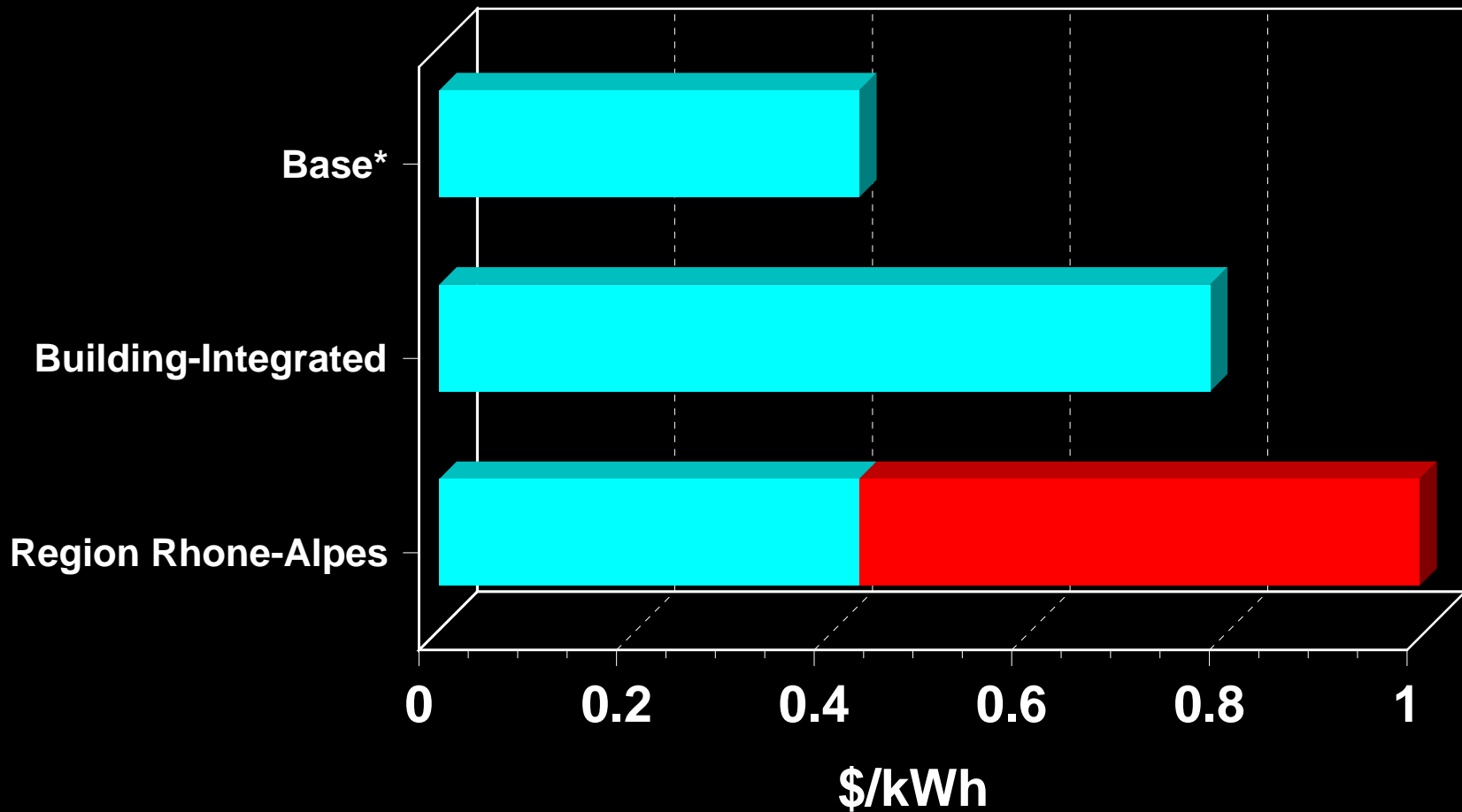


# Solar PV Tariffs Worldwide



\*Limited duration with net-metering.

# French Solar PV Tariffs



**\*Plus 50% tax credit on hardware.**

# Grassroots Movement Has Begun

- **Explosion of Interest**
- **Groups Active Across Canada**
- **Local Groups Now Active Across US**  
**Most Within the Past 8 Months!**
- **Public Out in Front**  
**Demands Aggressive Action**
- **Tipping Point Reached?**

Ferndale, Ontario

# Renewable Tariffs Are In Play

- British Columbia
- Michigan & Illinois
- Minnesota & Rhode Island
- California--Feed-in Fever
- US House & US Senate

Paul Gipe, [wind-works.org](http://wind-works.org)



# **Renewable Tariffs Are In Play Midwest**

- **Michigan, Rep. Kathleen Law**  
No Hearing on HB 5218 (MRESA)  
“Presentation” to Commerce Com.  
Governor Granholm: Phase II
- **Indiana, Rep. Matt Pierce**  
Will Introduce Bill in January
- **Illinois, Rep. Karen May**  
Bill Withdrawn, No Action



# **Renewable Tariffs Are In Play Midwest**

- **Minnesota, Rep. David Bly**

**John Farrell, ILSR**

**Workshop January 9, 2009**

- **Wisconsin**

**Michael Vickerman, RENEW**

**Governor's Global Warming Task Force**

**PSC Generic Rate Case Intervention**

- **NCEL**

**December 12, Washington, DC**

# **Indiana, Michigan, Wisconsin, Minnesota, Illinois**

- **More Like Germany than Texas**

  - Population Density**

  - Farm Size**

  - Settlement Patterns**

- **Projects More Like Germany than Texas**

  - Smaller Projects**

  - Clusters of Turbines**

Mackinaw City, Michigan

# Michigan's Renewable Energy Sources Act

- **Rapid Development**
- **Reduce Price Volatility**
- **Reduce Long-Term Prices**  
**Pay Little More Now**  
**Avoid Paying More Later**
- **Reduce CO<sub>2</sub> Gases**
- **Create New Jobs**

Paul Gipe, [wind-works.org](http://wind-works.org)

# **Michigan's Proposed Renewable Energy Sources Act**

**All Renewables**

**HB 5218 (2007) Open to All**

**Term: 20 Years**

**Differentiated Tariffs for Wind**

**Small Wind Tariff**

**Differentiated Tariffs for PV**

**Tariffs Reduced with Subsidy**

# Michigan & Germany

- **120 TWh/yr (1/5 that of Germany)**
- **1/8 the Population**
- **3/4 the Land Area**
- **1/5 the Population Density**
- **Relative to German Land Area**
  - 55% Renewable with Same Capacity**
  - Same Generation as Coal (66 TWh)**
  - Wind Generation (40 TWh) Same as Nuclear**

# Michigan & Germany

- ~30,000 Jobs on Population Basis
- Residential Solar Revenue \$200 Million/yr
- Farm Solar Revenue \$150 Million/yr
- Total Solar PV Investment \$4 Billion
- Total Wind Investment \$6 Billion



# Upcoming Campaign Events

- **Alliance for Renewable Energy  
Launched**
- **Midwest Ag-Energy, Dec. 15-16, Chicago**
- **Minnesota, Jan. 9, Northfield**
- **Michigan?**  
**Possible February Campaign Launch**

# Strategy--Hybrids

- **Washington State**  
Tariffs for In-State Products Only?
- **Distributed Generation Only?**  
Voltage Caps?
- **Project Size Caps?**  
20 MW in California?  
Wholesale Distributed Generation”  
Green Volts





# Strategy--Operating in Parallel

- **Run Alongside Existing Programs**  
With RPS & Solar Subsidies
- **Don't Disrupt Existing Markets**  
We Need All Renewables As Quickly As Possible
- **Build Track Record**
- **Renewable Tariffs**  
for Meeting RPS Target

# Challenges in North America

- **Piecemeal Policy Approach**

  - Too Slow**

  - Existing Policy Momentum**

    - RPS for Wind, Subsidies for Solar, Net-Metering**

- **Ideological**

  - Market--Non-Market Debate**

- **“Cheap Energy Contract”**

  - Michael Hoexter**

# **State & Provincial Action Required**

- **Can't Wait for Federal Action**

**Limited Federal Role**

- **Can't Rely on Federal Subsidies**

**Canada: Ottawa Deadlocked**

- **Policies Must Be Flexible**

**Tariffs With Federal Subsidies**

**Tariffs Without Federal Subsidies**

# How To Get There

- **Need More NGOs On Board**

EDF & Sierra Club

UCS: <20 MW; TGC: >20 MW

Apollo Alliance?

- **Need Political Champions**

Political Party Leaders

Governor's or Premier's Office

Paul Gipe, [wind-works.org](http://wind-works.org)



# **North America Needs Massive Reconstruction of its Infrastructure**

## **Renewable Energy Development Can Reindustrialize the North American Economy**

**Paul Gipe, [wind-works.org](http://wind-works.org)**

**Noordoostpolder, the Netherlands**





# Move From A Culture of Consumption to A Culture of Conservation

--Ontario Premier Dalton McGuinty

Paul Gipe, [wind-works.org](http://wind-works.org)

Montfort, Wisconsin

# 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](http://wind-works.org)

Goderich, Ontario



# Michigan Governor Granholm

**“If we do this right, Michigan can be the Alternative Energy Capital of North America and create thousands and thousands of jobs.\***

**\*State of the State, 2008, Governor Jennifer Granholm**



An aerial photograph of a geothermal power plant in Mammoth Hot Springs, California. The plant features several large, rectangular solar collectors and various industrial buildings. In the background, there are rolling hills and a prominent mountain peak under a clear blue sky. The text is overlaid on the upper portion of the image.

# California Lt. Governor Garamendi

**“We know what works. Seems to me we use what works.”\***

**\*Lt. Governor John Garamendi, GACC, San Francisco, CA, 2008**

**Geothermal Plant, Mammoth Hot Springs, California**

**Paul Gipe, [wind-works.org](http://wind-works.org)**

Gaspé Peninsula, Quebec

# No Time for Half-Measures

## No Time to Lose

Paul Gipe, [wind-works.org](http://wind-works.org)





# Move From A Nation of Consumers to A Nation of Producers

Paul Gipe, [wind-works.org](http://wind-works.org)

Lackawanna, New York

# We Need A Lot More Wind . . .

Matane, Quebec



Paul Gipe, [wind-works.org](http://wind-works.org)

Hinesburg, Vermont

# ... And A Lot More Solar

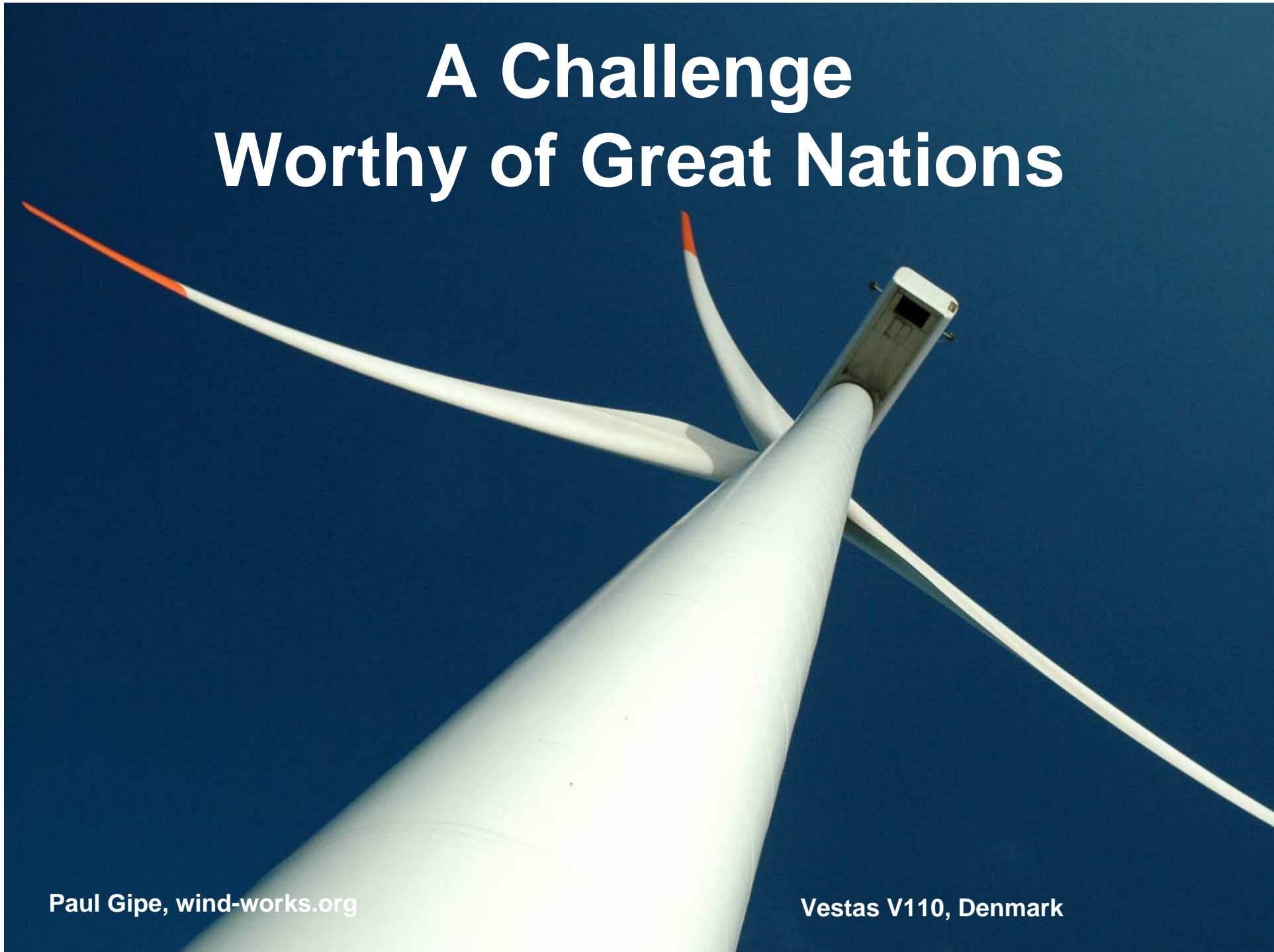


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# A Challenge Worthy of Great Nations

Paul Gipe, [wind-works.org](http://wind-works.org)

Vestas V110, Denmark



# Renewable Tariffs-- New Policy Option for North America

[www.wind-works.org](http://www.wind-works.org)

Manawatu Gorge, New Zealand

