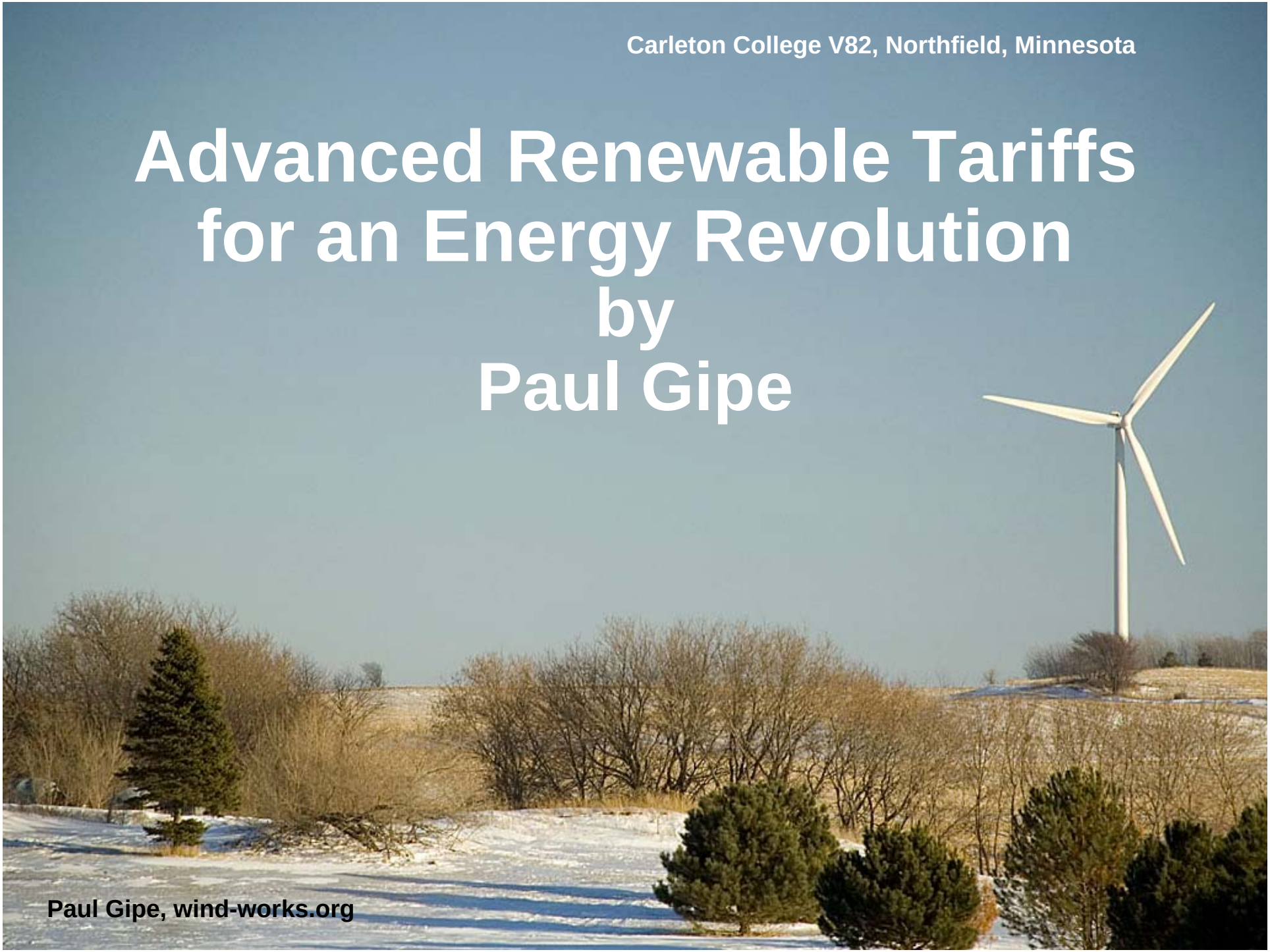
Disclaimer: The views expressed are those of Paul Gipe and are not necessarily those of the sponsor.

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.


Carleton College V82, Northfield, Minnesota
Advanced Renewable Tariffs
for an Energy Revolution
by
Paul Gipe
Paul Gipe, wind-works.org

Noordoost polder, the Netherlands
Renewable Energy Has Come of Age
Paul Gipe, wind-works.org

Montefalcone, Italy

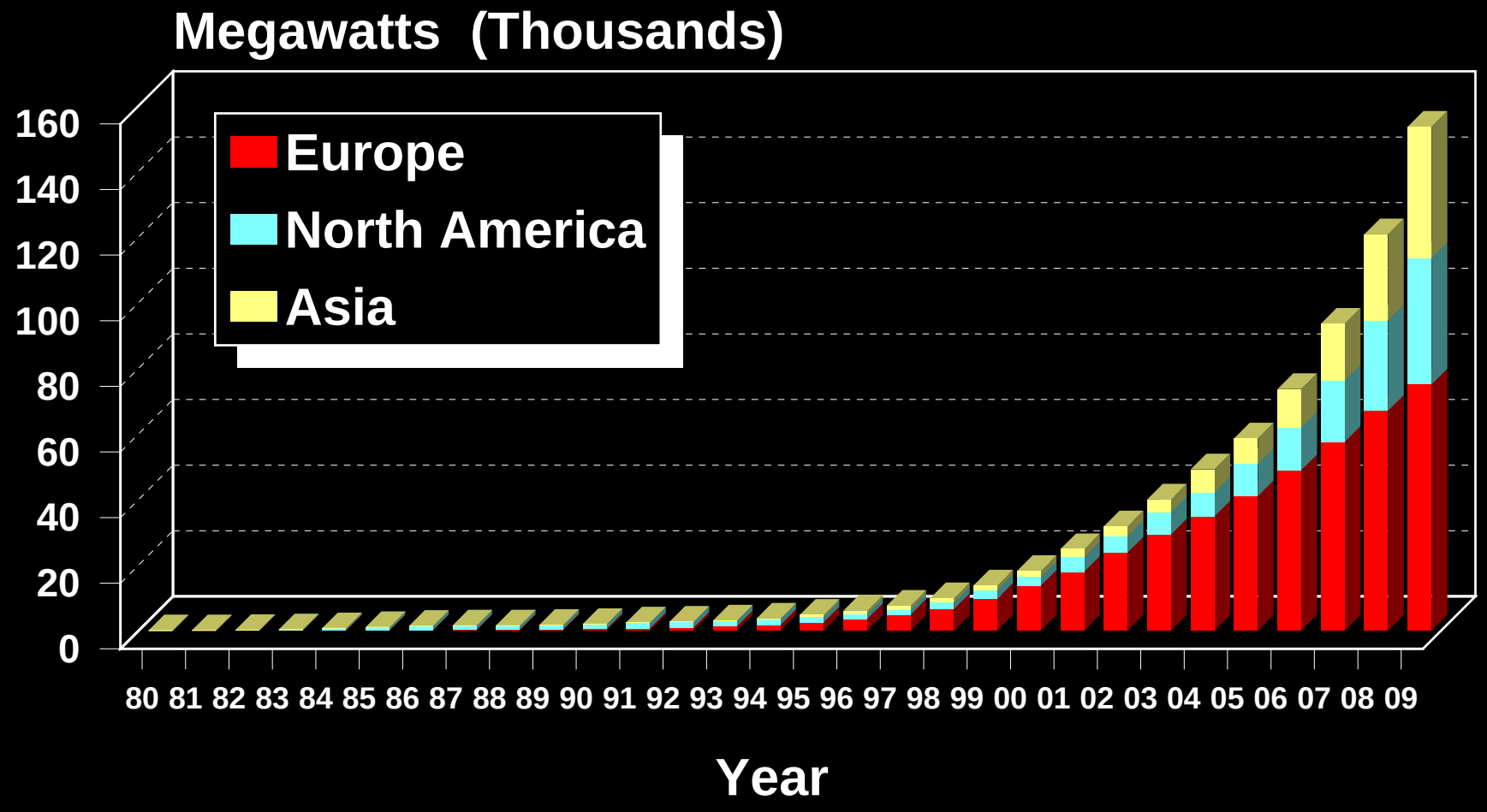
Paul Gipe, wind-works.org

Galicia, Spain

Paul Gipe, wind-works.org

Freiburg -- Germany's Solar City

2009 World Wind Capacity



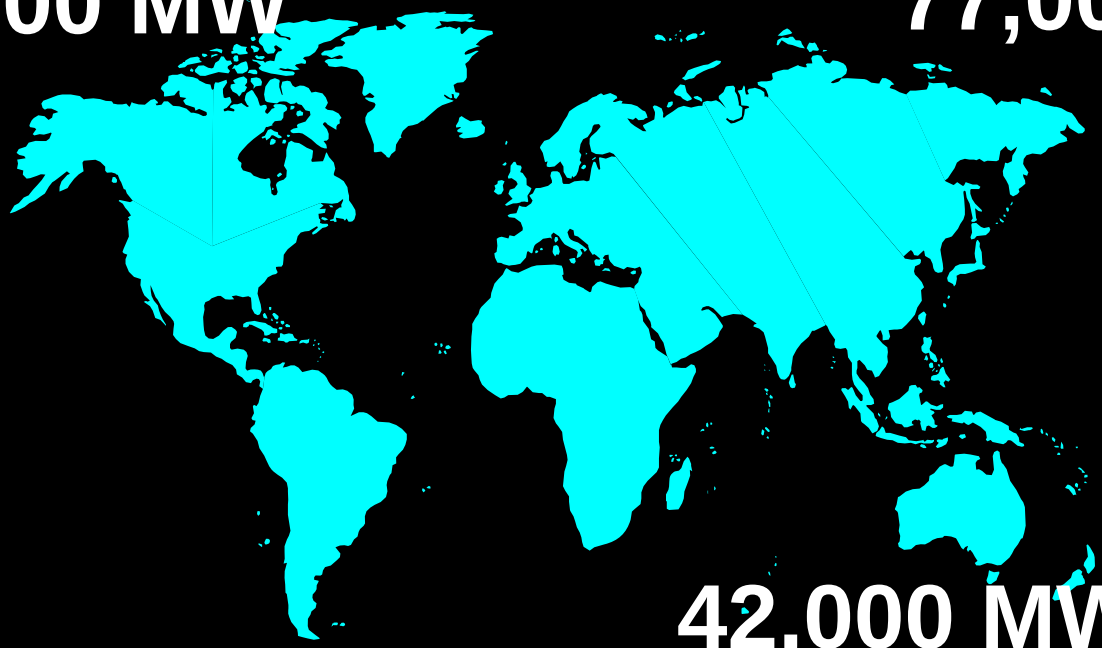
More than 1/2 From Feed-in Tariffs

Paul Gipe, wind-works.org

2009 World Wind Capacity

38,000 MW

77,000 MW



42,000 MW

Paul Gipe, wind-works.org

2009 Solar PV Capacity

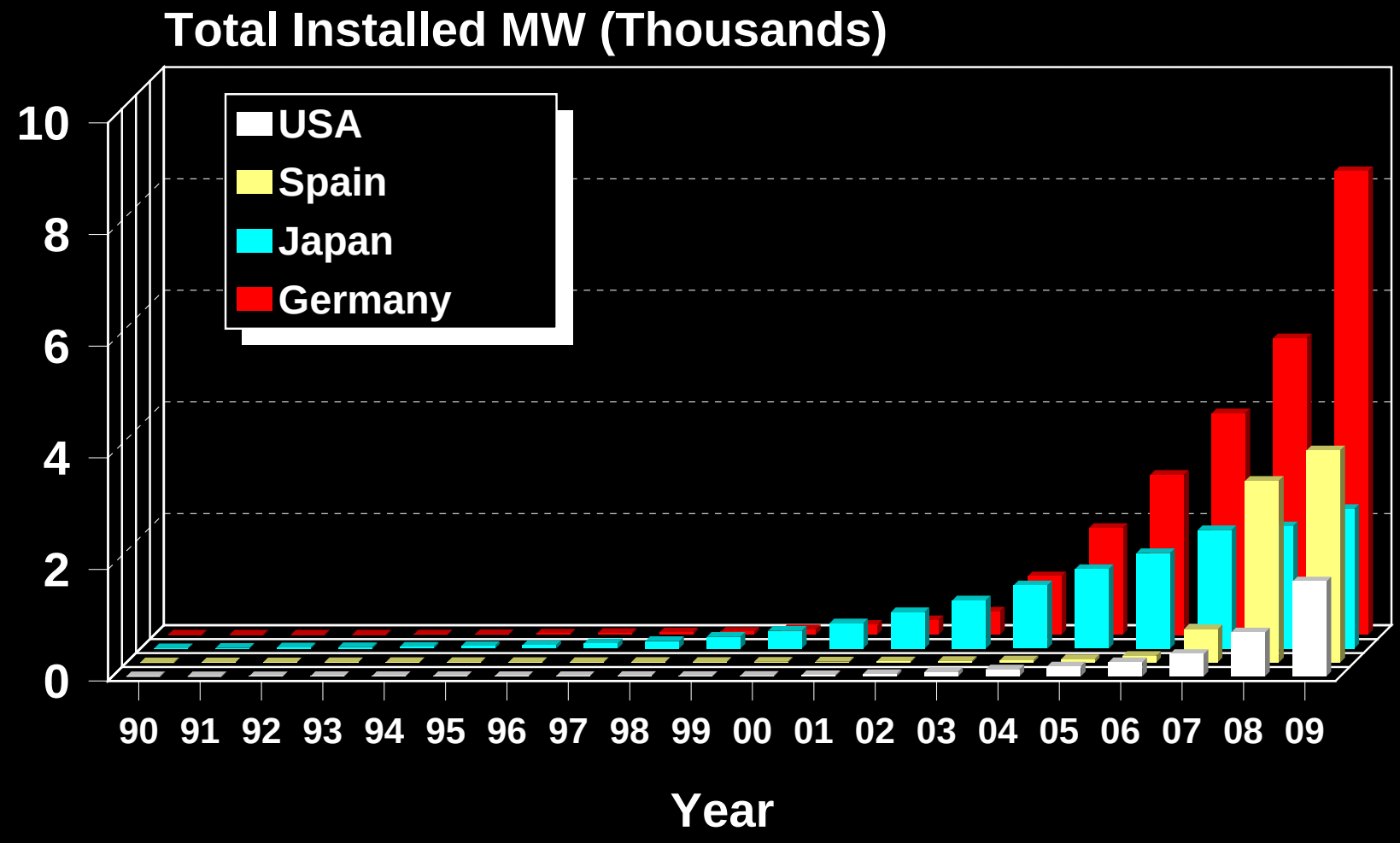
- 20,000 MW Worldwide
- 7,000+ MW/yr
- $20+ Billion
- Major Markets
  - Germany--3,800 MW*
  - Italy--700 MW/yr*
  - Japan--500 MW
  - USA--450 MW/yr
    - California--200 MW/yr
    - Colorado--25 MW/yr

*Feed-in Tariff Market

Paul Gipe, wind-works.org

Rancho Seco, California

Solar Photovoltaics Development



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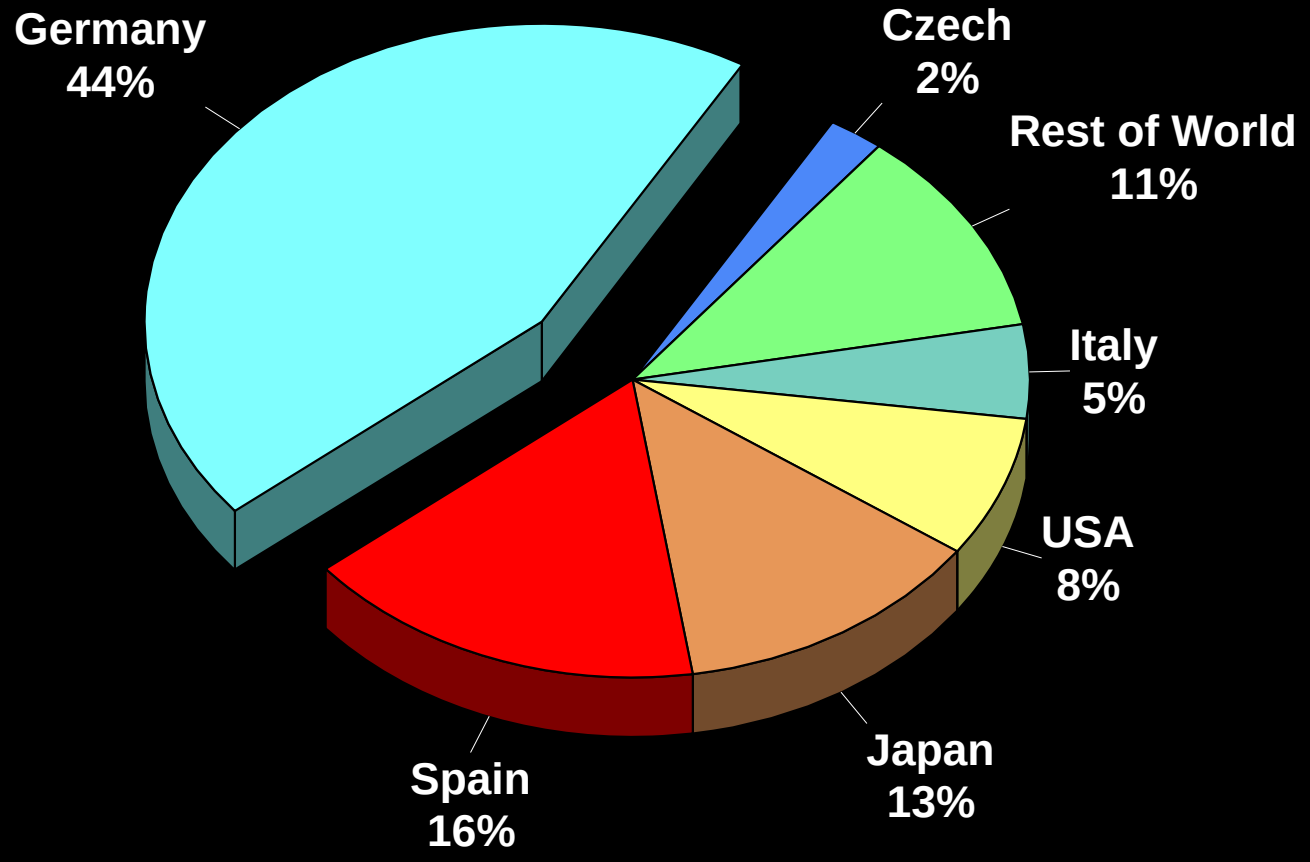
World Solar PV Capacity 2009
~20,000 MW

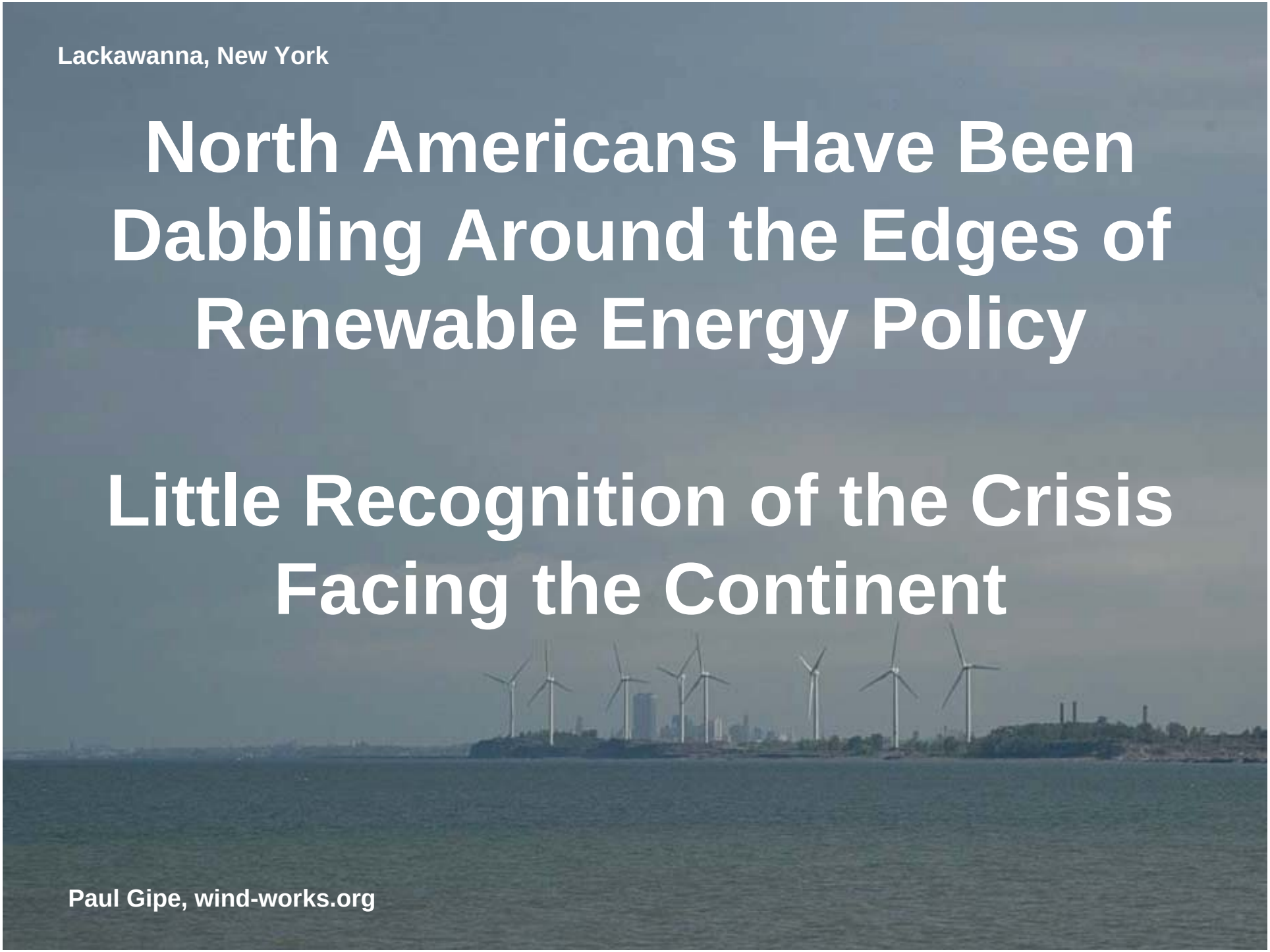


More than 3/4 from Feed-in Tariffs

Paul Gipe, wind-works.org

Setting the Stage
. . . The Scale of the Problem

Paul Gipe, wind-works.org



North Americans Have Been Dabbling Around the Edges of Renewable Energy Policy

Little Recognition of the Crisis Facing the Continent

Paul Gipe, wind-works.org

Profound Issues Confront North America's Energy Future

- Climate Change Only One Issue
- Transportation (Liquid) Fuels
  - Very Little Public Transit
- Domestic Supplies Declining

Paul Gipe, wind-works.org

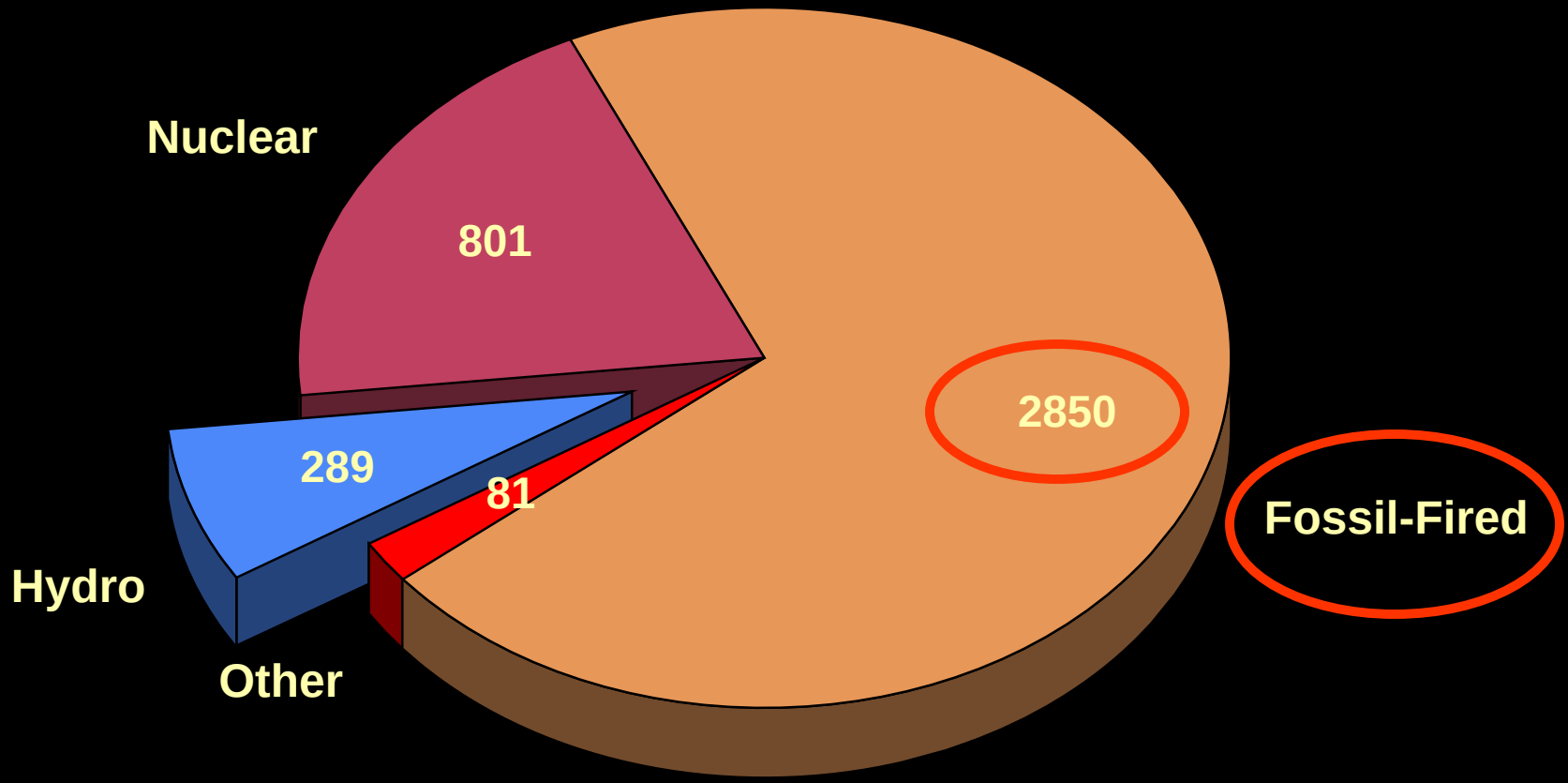
Cowley Ridge, Alberta

Profound Issues Confront North America's Energy Future

- **Our Total Dependence on Oil as a Transportation Fuel Leads to Tragic Consequences--Only Some of Which Make the News.**

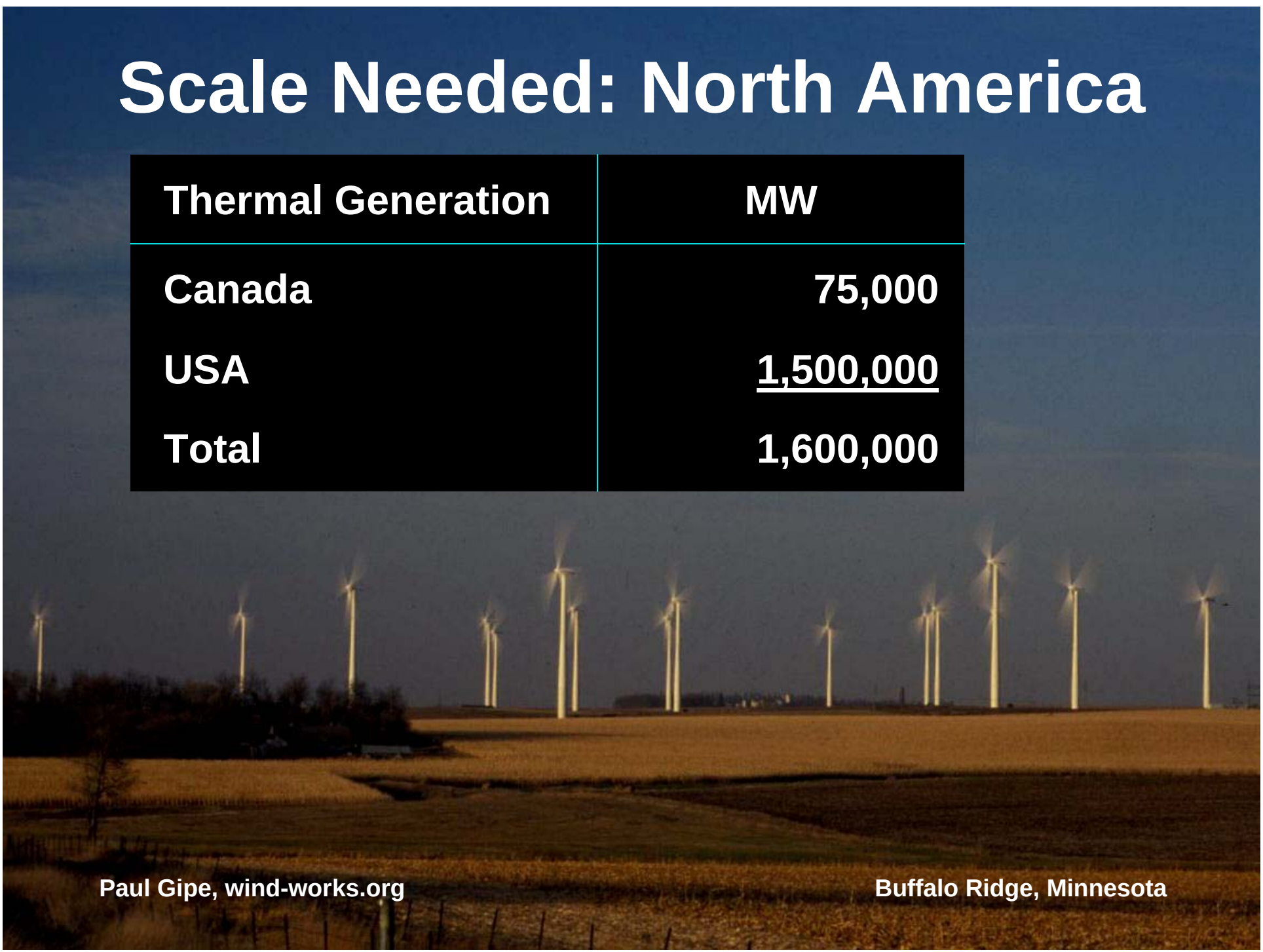
Paul Gipe, wind-works.org

US Electricity Generation ~4,000 TWh/yr



Scale Needed: North America

Thermal Generation	MW
Canada	75,000
USA	1,500,000
Total	1,600,000



Paul Gipe, wind-works.org

Buffalo Ridge, Minnesota

Electric Vehicle Charging

Paul Gipe, wind-works.org

Scale Needed: North America

Passenger Vehicle Miles	MW
Canada	50,000
USA	750,000
Total	800,000

Paul Gipe, wind-works.org

Bowling Green, Ohio

Scale Needed: North America

- ~2,500,000 MW Wind
- ~120x Today!

Paul Gipe, wind-works.org

Ponnequin, Colorado

Can It Be Done in North America?

- 2,500,000 MW / 200,000 MW/yr
- ~12.5 yrs
- <20 years Heavy Truck Production
  - Thermal Generation
  - Passenger Vehicle Miles
- Yes, It Can Be Done
- But Not At Current Pace

Paul Gipe, wind-works.org

North American RE Market Growth

- Exciting, Yes
- Significant, Yes
- Not Nearly Enough
  by Any Standard

Paul Gipe, wind-works.org

Buffalo Ridge, Minnesota

USA & Canada
100% Clean Energy?

Yes! It Can Be Done!

But Not With Current Policies

Paul Gipe, wind-works.org

Cowley Ridge, Alberta

North America is Capable of Huge National Undertakings

- TVA, BPA, WPA
- Ontario Hydro, Hydro Quebec
- Universal Health Care (Canada)
- Civil Rights, Anti-Smoking

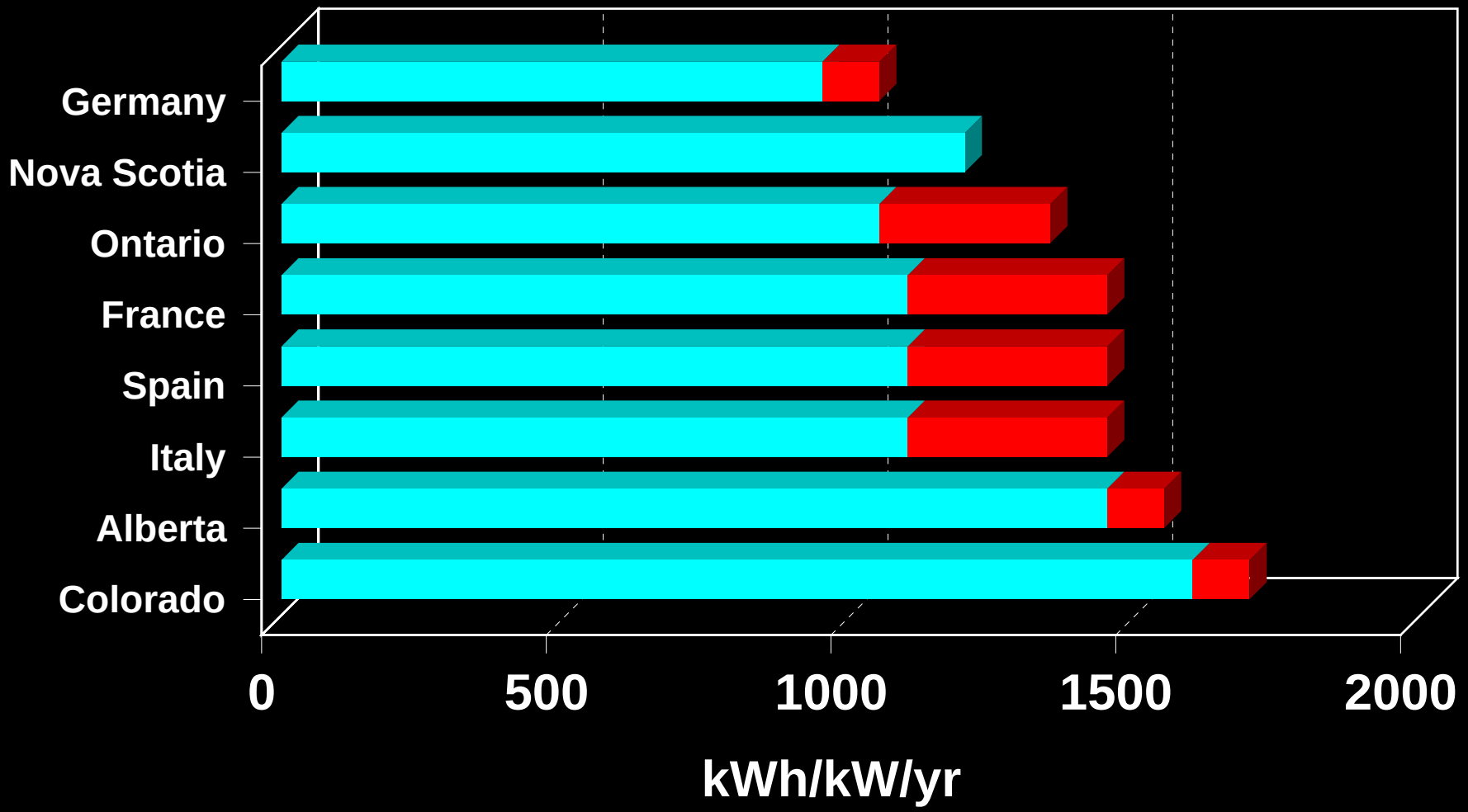
North America
Better Than Germany?

- More Land
- More Wind
- More Hydro (Notably Canada)
  - For Backup & For Storage
- Fewer People

Paul Gipe, wind-works.org

St. Olaf College V82, Northfield, Minnesota

Solar PV Yields



Source: RetScreen

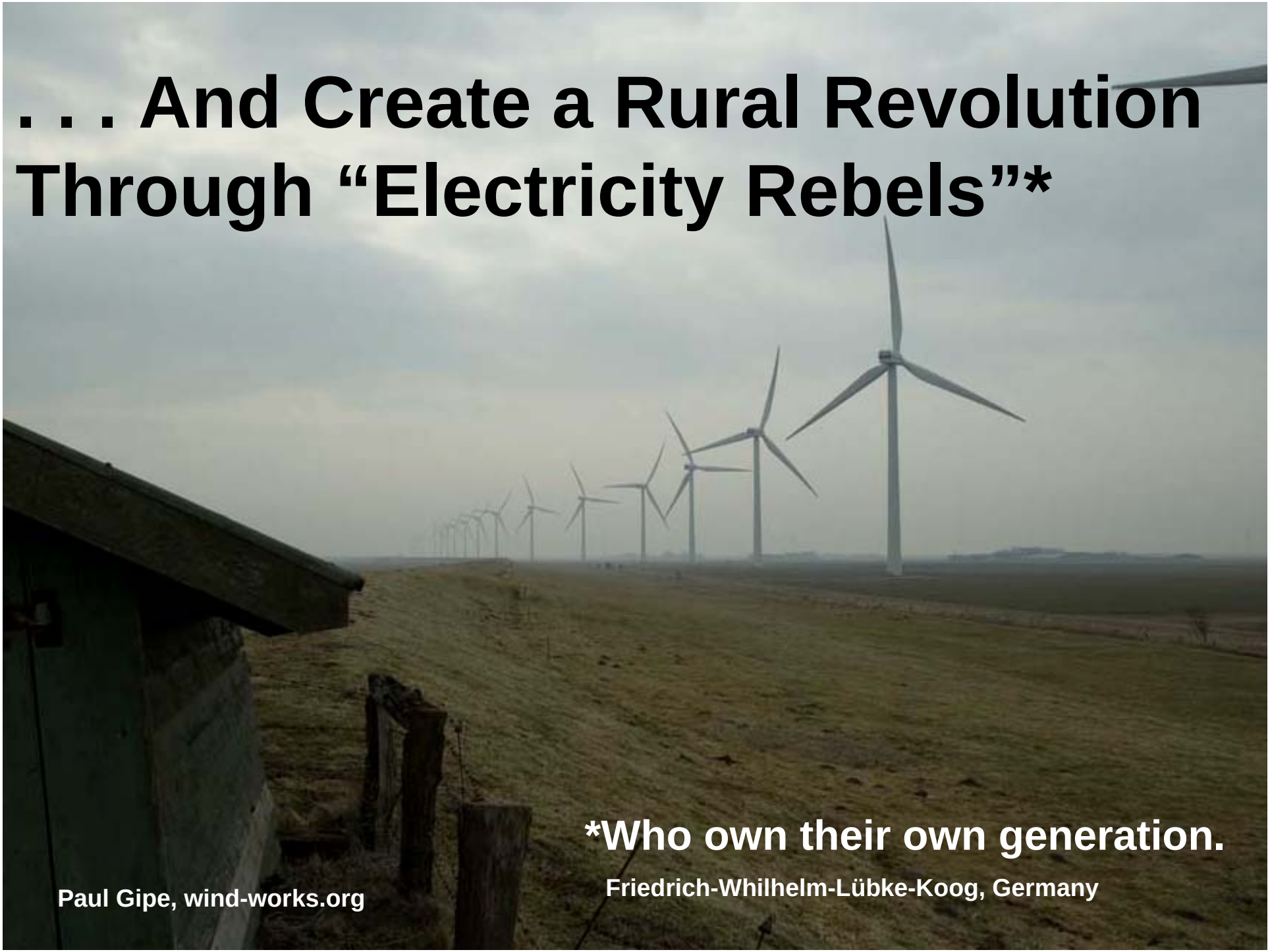
Paul Gipe, wind-works.org

North America Needs Massive Reconstruction of its Infrastructure

Renewable Energy Development Can Reindustrialize the North American Economy

Paul Gipe, wind-works.org

Noordoostpolder, the Netherlands

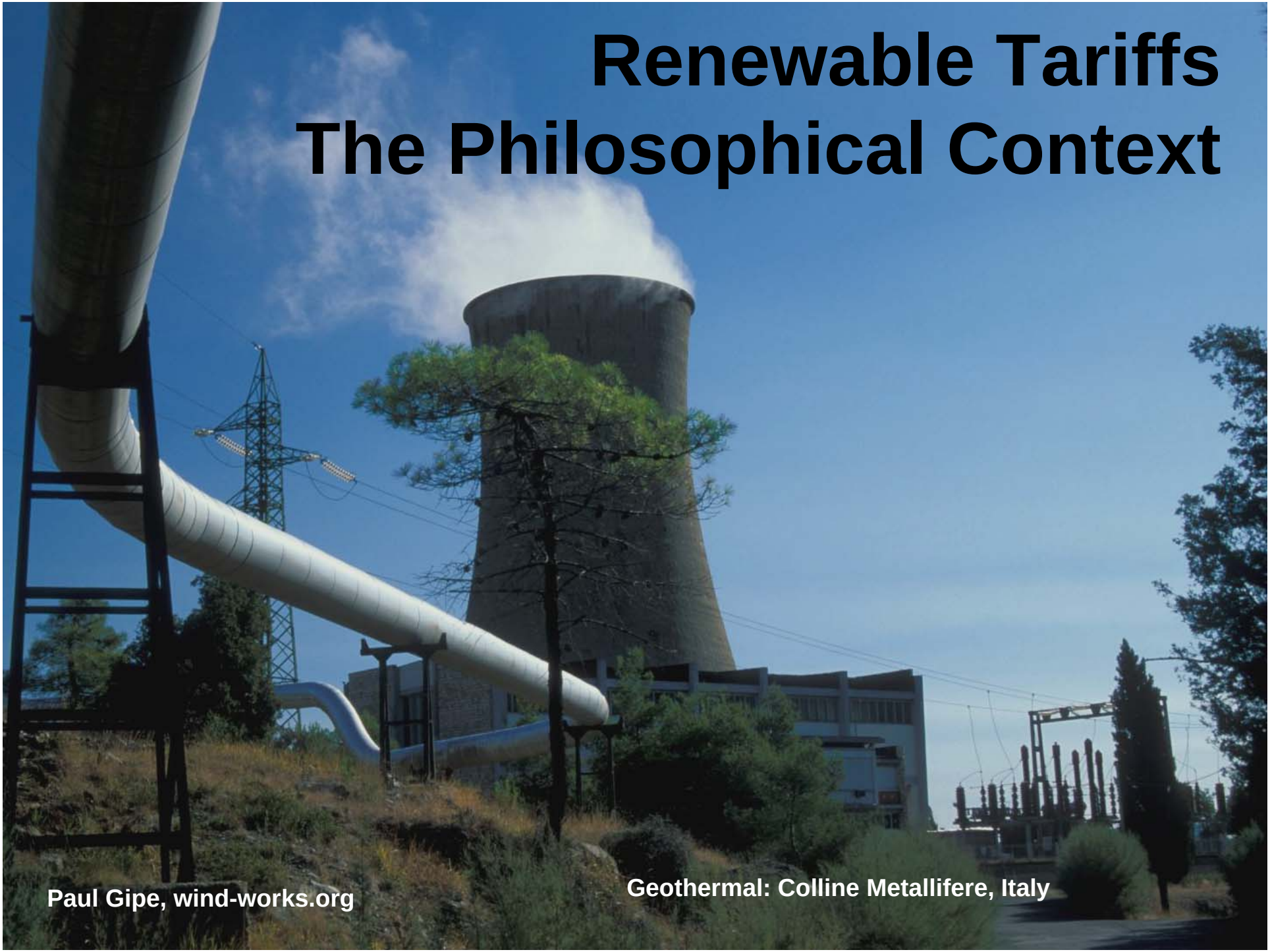

. . . And Create a Rural Revolution Through “Electricity Rebels”*
*Who own their own generation.
Friedrich-Whilhelm-Lübke-Koog, Germany
Paul Gipe, wind-works.org

A Challenge Worthy of Great Nations

Paul Gipe, wind-works.org

Vestas V110, Denmark

Renewable Tariffs
The Philosophical Context



Paul Gipe, wind-works.org

Geothermal: Colline Metallifere, Italy

What are Our Goals?

- **Primary**
  - **High Penetration of Renewables Quickly**
- **Secondary**
  - **Equitably Distributed Ownership**
  - **Rural Development**
  - **Distributed Generation**
  - **New Industry & Jobs**

Paul Gipe, wind-works.org

Wieringemeerpolder, the Netherlands

Do We Really Want Renewables?

San Gorgonio Pass, California

Paul Gipe, wind-works.org

If Yes, Then What Works Best?

- **Who Gets Contracts**
  - **Elite Few or All Who Want Them?**
- **How To Pay For Them**
  - **RECs/ROCs/Green Tags**
  - **Subsidies (PTC, ITC)**
  - **Advanced Renewable Tariffs**
    - **--Differentiated Feed-in Tariffs**

Paul Gipe, wind-works.org

Dunkerque, France

Feed-in Tariffs Deliver Results

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

Ydby, Denmark

Paul Gipe, wind-works.org

Myths to Dispel

- **Renewables are Free or Cheap**
  - **But They Are Affordable & They Are Worth It**
- **Renewables Can't Be Added Quickly**
  - **or Can't Make a Difference**
- **Feed-in Tariffs Not Market-Based**
- **Feed-in Tariffs are Costly**

Paul Gipe, wind-works.org

Husum, Germany

Renewables Can Be Added Quickly

	Wind 5 yrs	Wind 10 yrs	Solar 5 yrs
Germany	15 TWh/yr	35 TWh/yr	5 TWh/yr
Spain	15 TWh/yr	28 TWh/yr	5 TWh/yr

Germany Renewables: 10 Years--5% to 15%
Spain: 10 Years--0% to 10%
Colorado: ~61 TWh/yr

Paul Gipe, wind-works.org

High Penetration Quickly is Possible

	Percent Wind
France	1.2%
California	1.5-2.3
Germany	6.5%
Spain	14.3%
Portugal	15.3%
Denmark	21%

2009: Multiple Sources

Paul Gipe, wind-works.org

Political Price-Political Quantity Market Mechanisms

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

Both are Market Mechanisms

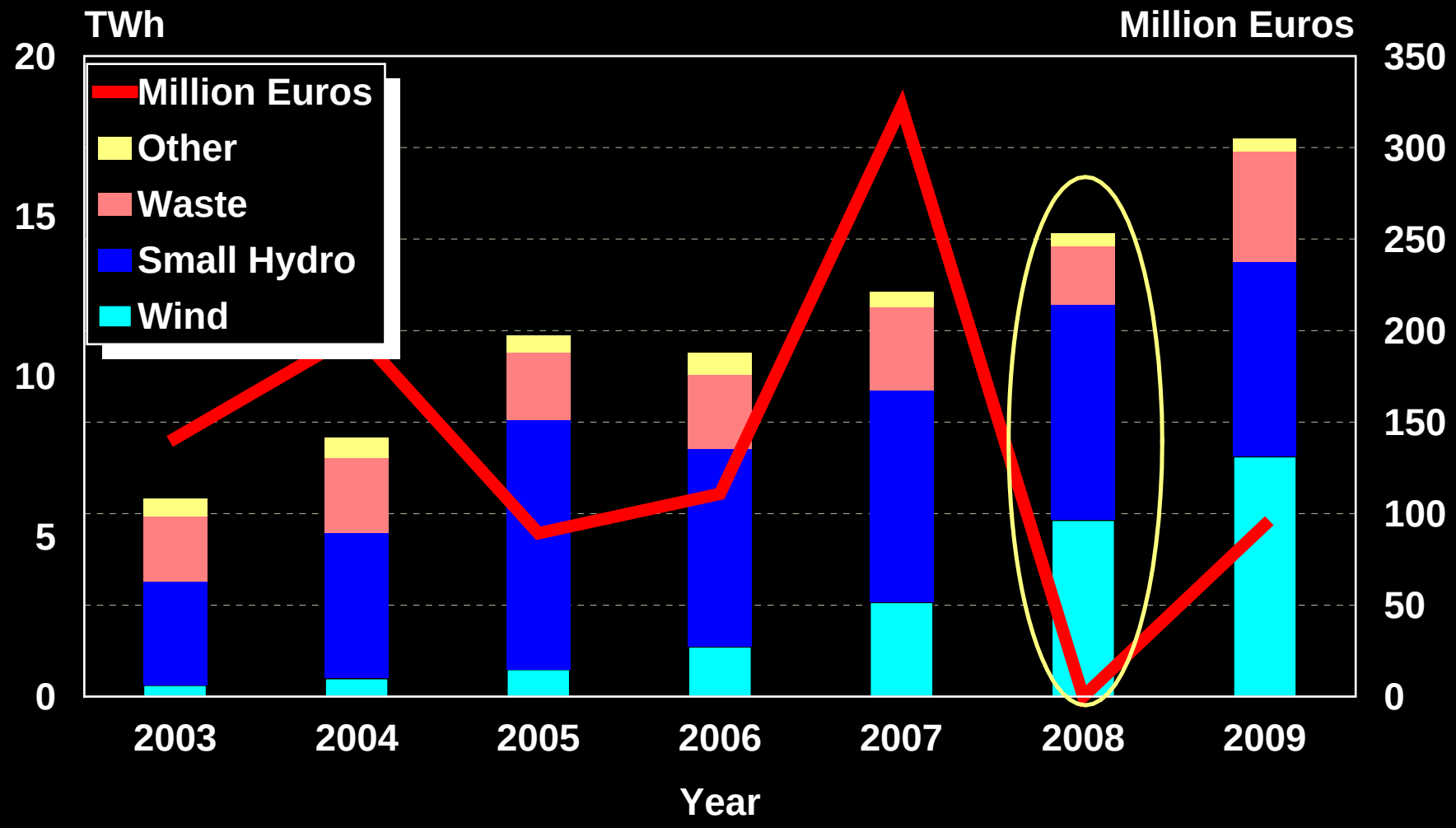
Paul Gipe, wind-works.org

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

- **Germany: 4x more energy generated**
- **Germany: @ 1/5 less relative cost**

of GB Renewable Obligation Certificates

Over Cost of French Renewable Tariffs



Source: www.cre.fr

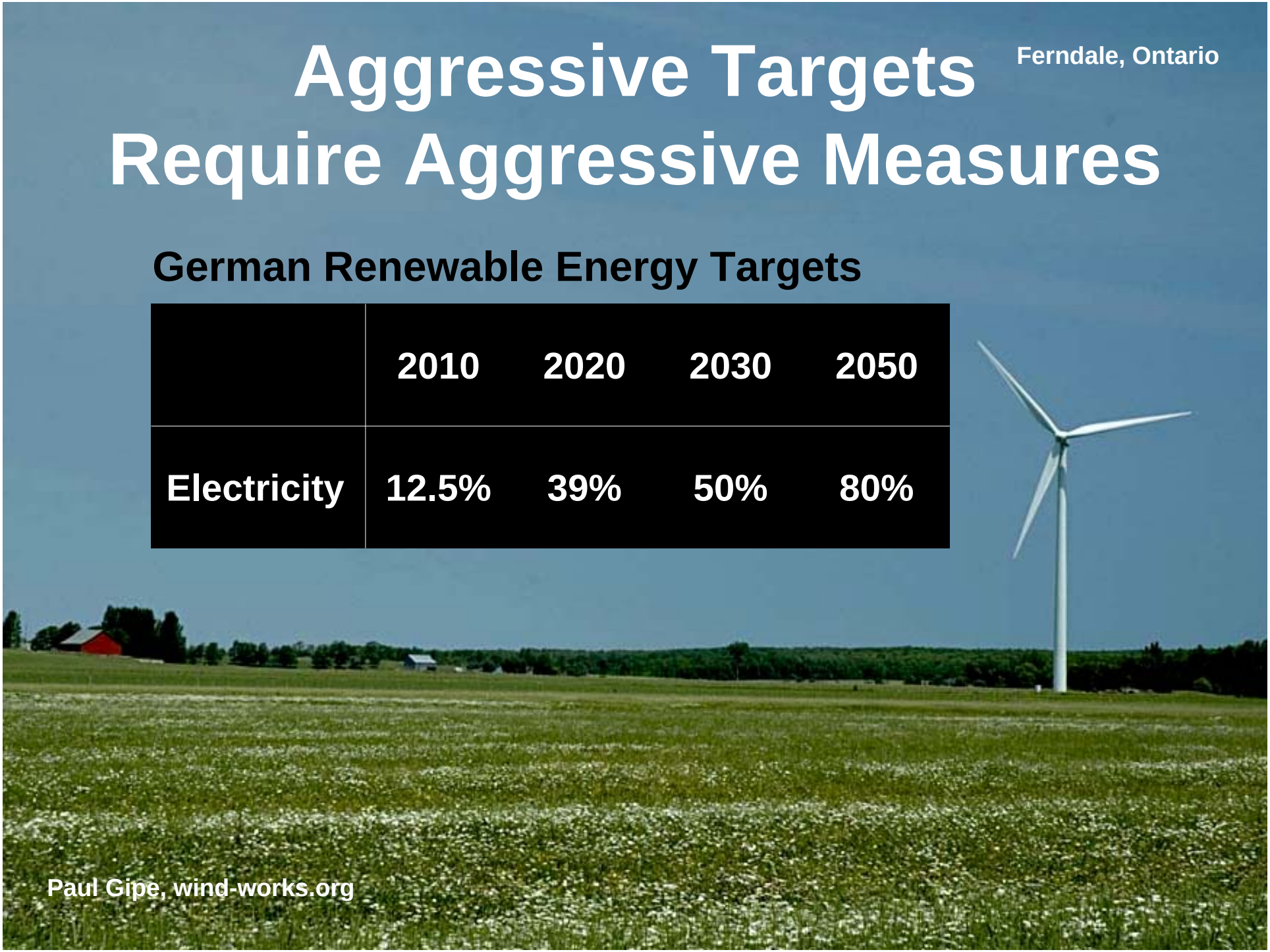
Paul Gipe, wind-works.org

Aggressive Targets Require Aggressive Measures

Ferndale, Ontario

German Renewable Energy Targets

	2010	2020	2030	2050
Electricity	12.5%	39%	50%	80%



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Why the European Success?

- **#1 Community Involvement**

  Germany & Denmark

- **#2 Advanced Renewable Tariffs**

  Many EU Countries use Electricity Feed Laws

Paul Gipe, wind-works.org

Stauning, Denmark

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

Renewable Tariff Design

- **Simple, Comprehensible, & Transparent**
- **Priority Access & Purchase**
- **Lengths Sufficient for Profitability**
- **Prices Sufficient to Pay for Generation**
  - **Fair But Not Undue Profit**
  - **Through Price Differentiation**

Paul Gipe, wind-works.org

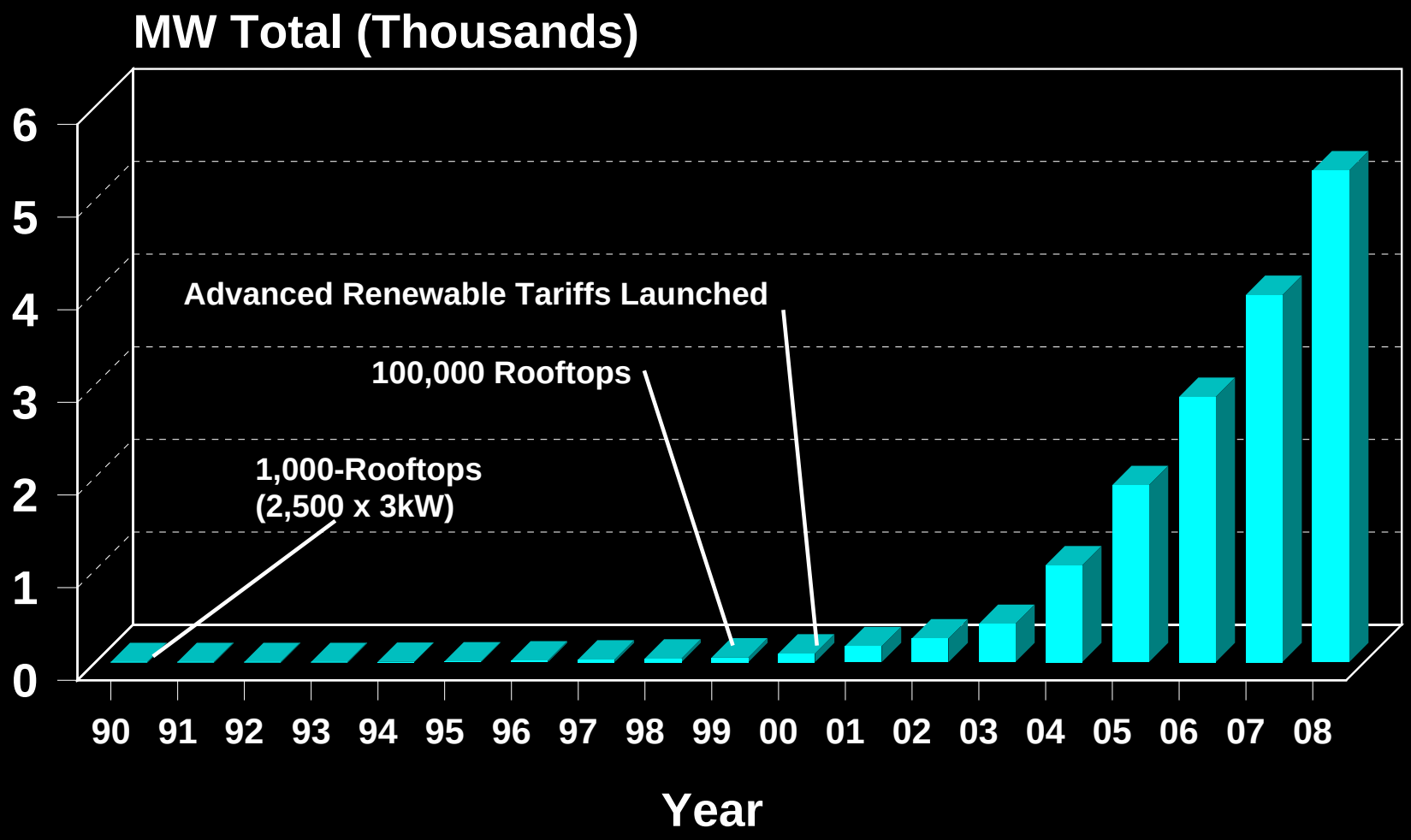
Altamont Pass, California

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)

Paul Gipe, wind-works.org

Renewable Tariffs & Solar Photovoltaics in Germany



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Solar PV in Germany

- ~3,800 MW in 2009!
- Total 9,000 MW
  - ~9 TWh/yr of Generation
- New Target: 3,000 MW/yr!
- ~2%Supply in Bavaria
- ~1+%Supply in Germany

USA: Total of 1,250 MW in 2009.

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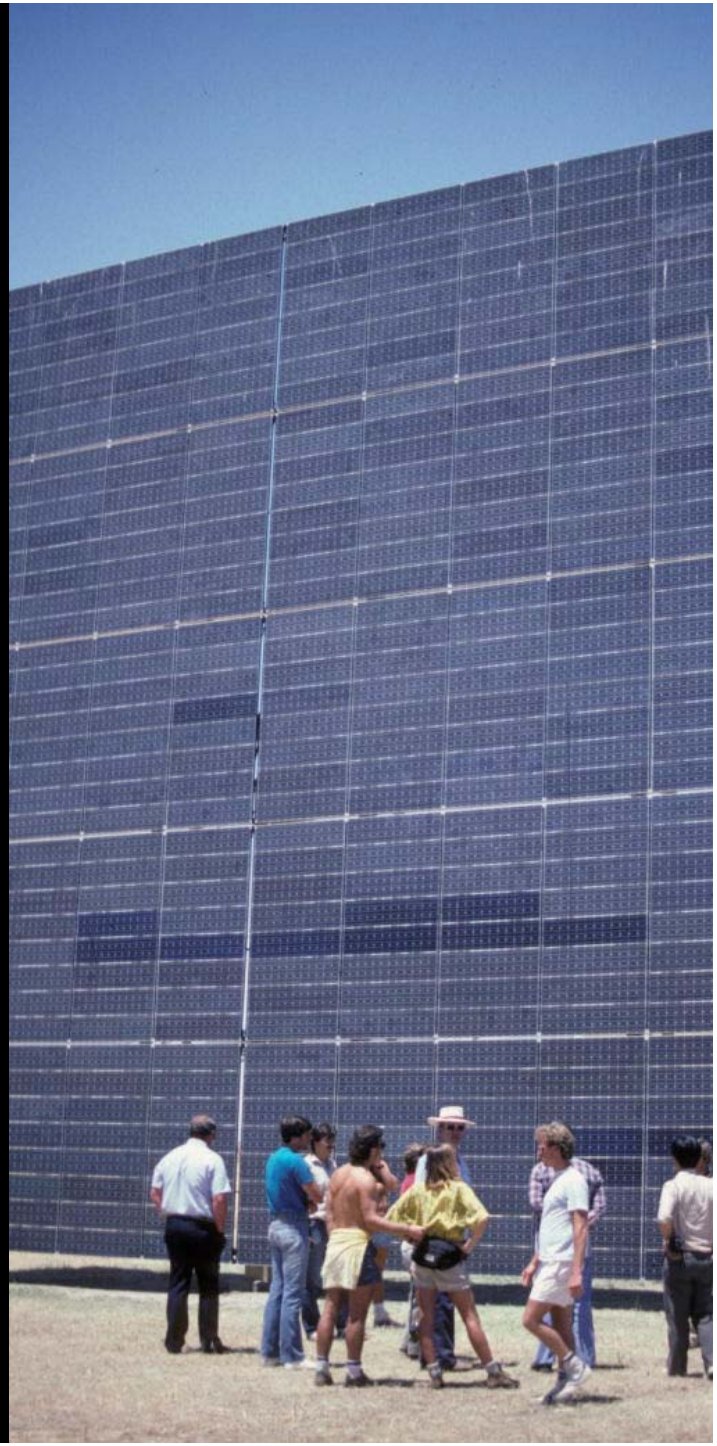


German Homeowners--New Revenue

- ~100 MW on Home Rooftops 2009
- ~4,000 MW+ Total
- ~4 TWh/yr
- ~€2 Billion/yr Revenue
- Anyone with a Roof Can Do Solar in Germany!

Paul Gipe, wind-works.org

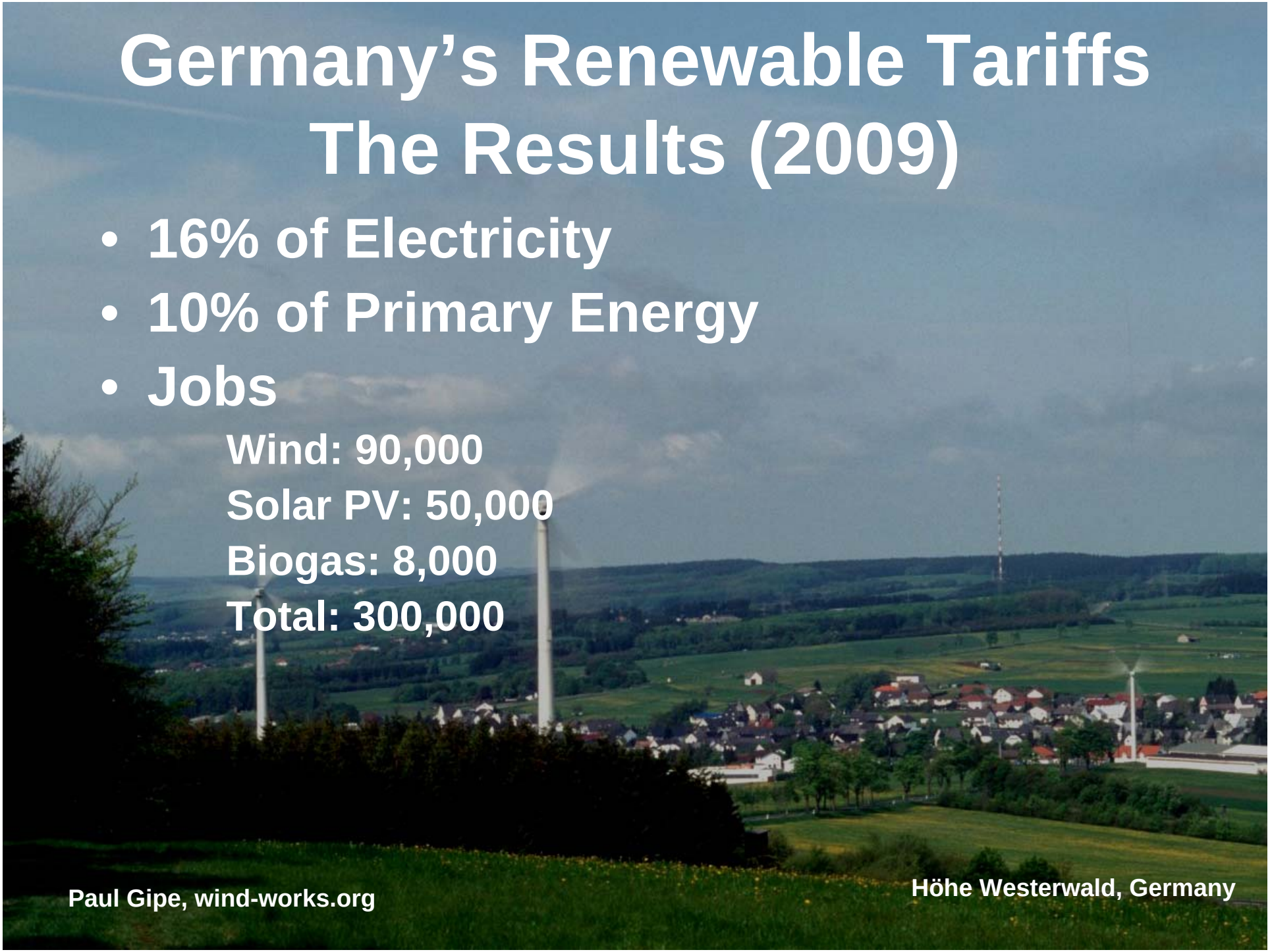
German Farms--Solar PV Crop

- ~1,000 MW on Barn Rooftops in 2009
- ~3,000 MW Total in 2009 (€15 Billion)
- ~3 TWh/yr (€1.5/yr Billion)

Schönau, Germany
German Churches . . .
. . . Protecting Creation
Paul Gipe, wind-works.org

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



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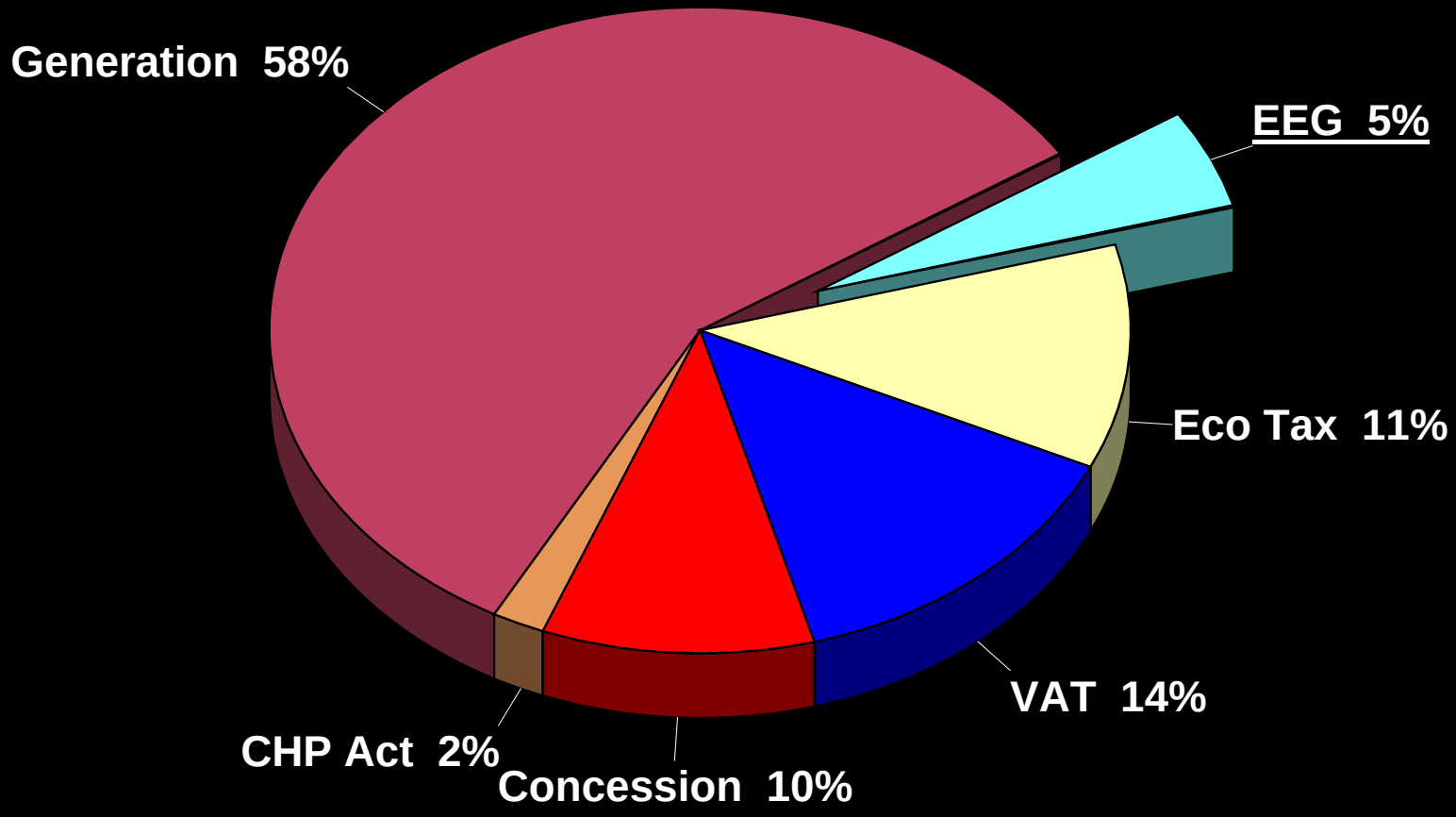
Höhe Westerwald, Germany

Cost of German EEG (2008) ~$50/yr/household



BMU: EEG Costs <5%, ~€0.01/kWh, 2008.

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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

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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 Differntiated Tariffs
Italy	Quota	2011 Cuts: New Target; 3,000 MW 2011-13

Paul Gipe, wind-works.org

FIT Programs in Development

Finland	Wind & Biomass
Great Britain	Renewable Heat
Malaysia	All Resources
Philippines	All Resources
Japan	All Resources
Nova Scotia	ComFIT, no Solar PV

Paul Gipe, wind-works.org

Building Acceptance

- **Must Share Opportunity**
- **Public Must Participate**

  by Creating Equal Opportunity for All
- **For Renewables**

  To Reach Their Potential

Paul Gipe, wind-works.org

Husum, Germany

Increasing Acceptance #1

“Your Own Pigs Don’t Stink”

Paul Gipe, wind-works.org

Jutland, Denmark

Community Power

- Greater Acceptance
- More Power More Quickly
- More People Involved Locally
- More Money Locally
- More Jobs Locally

Thyborøn-Harboøre Vindmøllelaug

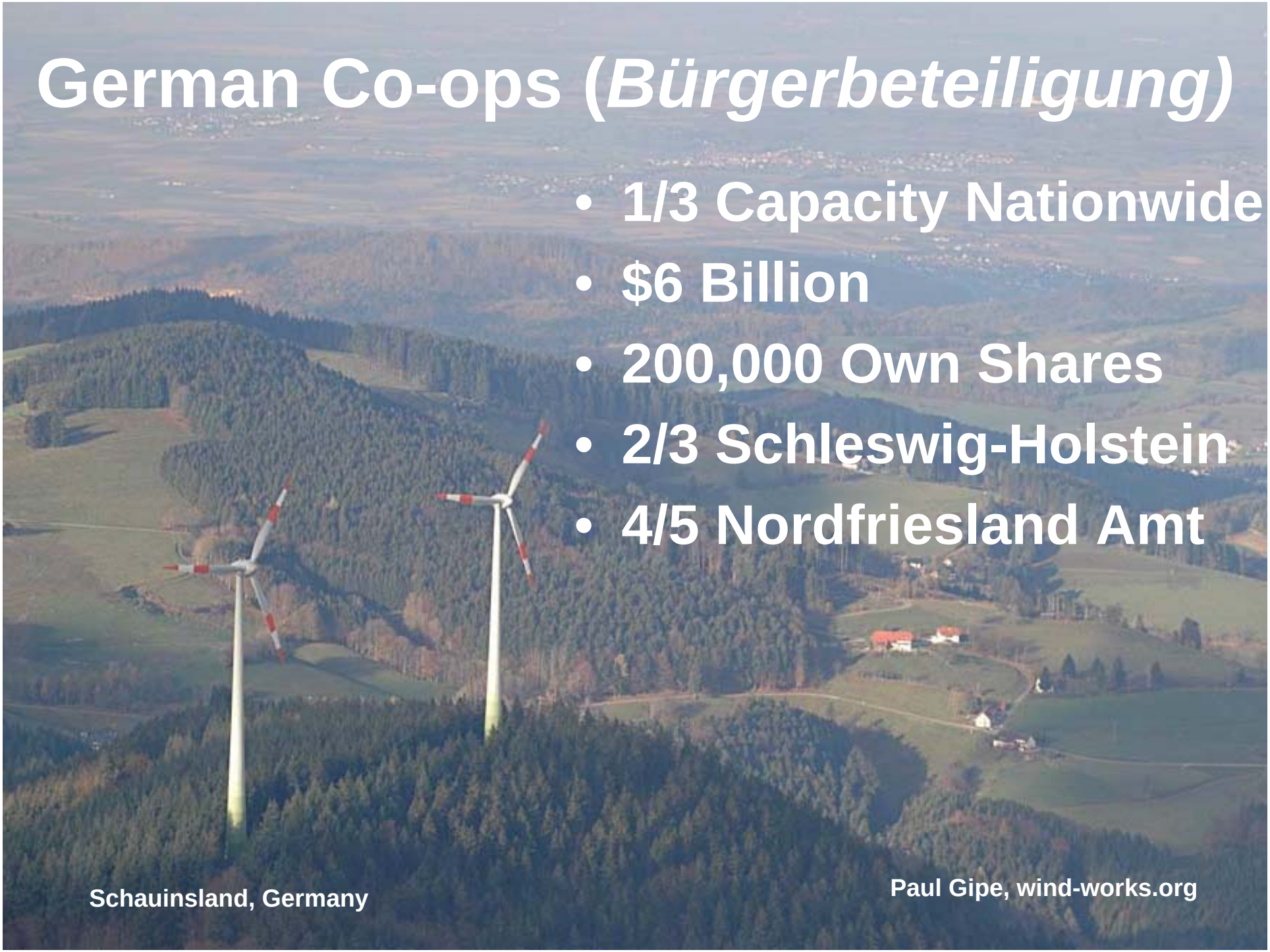
Danish Co-ops

(*Vindmøllelaug or Fællesmølle*)

- **1/4 Capacity Nationwide**
- **~ $1.7 Billion**
- **100,000 Households Own Shares**
- **5% of Population**

Anton Bro

German Co-ops (*Bürgerbeteiligung)*



- 1/3 Capacity Nationwide
- $6 Billion
- 200,000 Own Shares
- 2/3 Schleswig-Holstein
- 4/5 Nordfriesland Amt

Schauinsland, Germany

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WindShare
Toronto, Canada

- First Urban Turbine in N.A.
- Co-Owned
  - WindShare Co-op
    - 450 Members
  - Toronto Hydro
- Prominent Location
- Highly Visible
- Highly Popular

Paul Gipe, wind-works.org

Co-Op & Farmer-Owned Wind

	Farmer	Co-op	Corporate
The Netherlands	60%	5%	35%
Germany	10%	40%	50%
Denmark	64%	24%	12%
Great Britain	1%	1%	98%
Spain	0%	0%	100%

Source: Dave Toke, University of Birmingham, 2005, 2008

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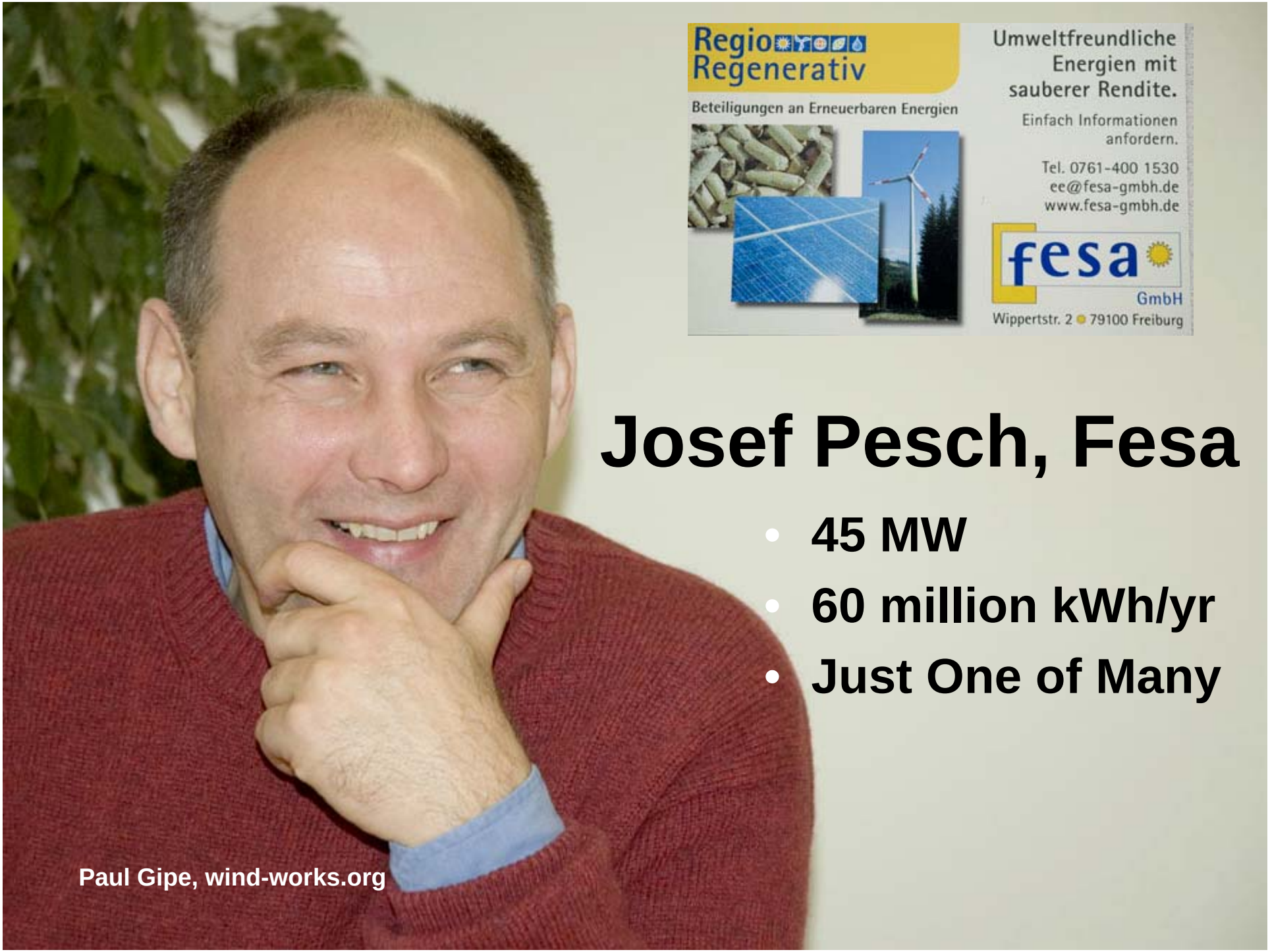
Stromrebellen (Electricity Rebels)

- Democratizing Generation
- Creating Local Investment
- Creating Local Jobs
- Creating Opportunity--and Hope
- Denmark, Germany, and

  France, Minnesota, Ontario and . . . ?

Paul Gipe, wind-works.org

Friedrich-Wilhelm-Lübke-Koog, Germany


Regio Regenerativ
Beteiligungen an Erneuerbaren Energien
Umweltfreundliche Energien mit sauberer Rendite.
Einfach Informationen anfordern.
Tel. 0761-400 1530
ee@fesa-gmbh.de
www.fesa-gmbh.de
fesa GmbH
Wippertstr. 2 • 79100 Freiburg
Josef Pesch, Fesa
45 MW
60 million kWh/yr
Just One of Many
Paul Gipe, wind-works.org

Ursula Sladek, EWS

(Elektrizitätswerke Schönau)

- 31,000 Customers
- Hydro, Solar, & Wind

Paul Gipe, wind-works.org

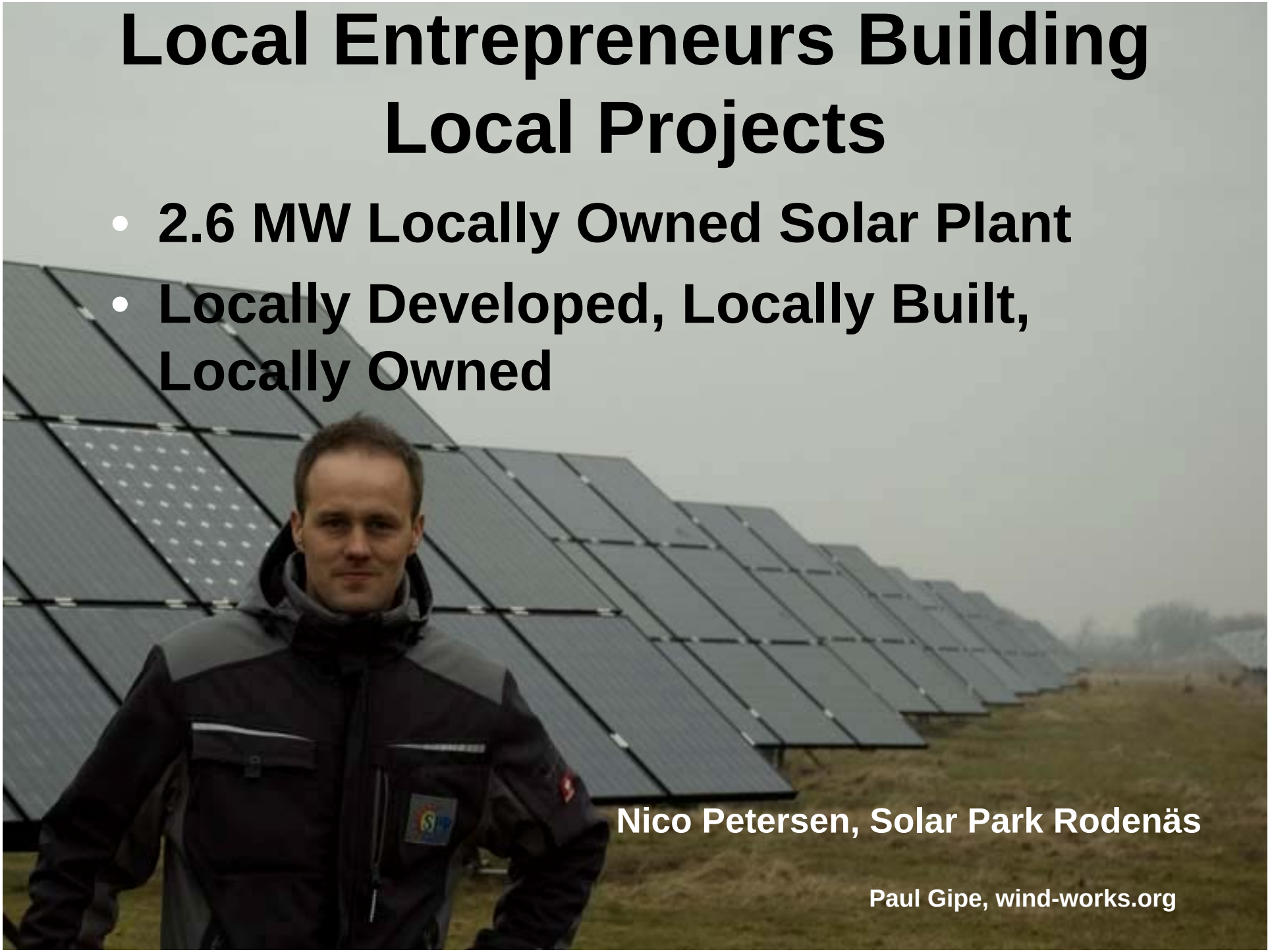
Local People Helping Local People
Hans-Heinrich Andresen

- Manages 16 Wind Farms
- in 16 Villages
- All Locally Owned
  - 15 Owners in Smallest
  - 400 Owners in Largest
- Now Planning Their Own Transmission Line!

Paul Gipe, wind-works.org

Local Entrepreneurs Building Local Projects

- 2.6 MW Locally Owned Solar Plant
- Locally Developed, Locally Built, Locally Owned



Never Underestimate the Ingenuity of Farmers

- When the Barn Doesn't Face South
- Build a Rack That Will!

Paul Gipe, wind-works.org

Friedrich-Wilhelm-Lübke-Koog, Germany

Community Power
is also about Faith in Yourself and in Your Community
Yes, You Can Do This
You Don’t Have to be Danish, German, or French

Carleton College V82, Northfield, Minnesota

Challenges in North America

- **Piecemeal Policy Approach**
  - **Too Slow**
  - **RPS for Wind, Subsidies for Solar**
- **“Cheap Energy Contract”**
  - **Cheap Today--Expensive Tomorrow**

Paul Gipe, wind-works.org

Challenges in North America

- **Low Program Caps**
  - California: 20%?
  - LABC-Los Angeles: 3%
  - Oregon: 25 MW! (Why Bother?)
- **Solar Only or Wind Only**
- **Timidity & Lack of Vision**
  - Do We Want Renewables or Don't We?

Paul Gipe, wind-works.org

Friedrich-Whilhelm-Lübke-Koog, Germany

Renewable Tariffs . . .
Developing Momentum

Toronto, Ontario

Paul Gipe, wind-works.org

Renewable Tariffs in North America . . Unthinkable?

- **Yes--Just 4 years ago**
  - **“You’re Absolutely Nuts!”**
    - **Andy Karsner, DOE, 2006**
- **Today? No**
- **Now Possible**
- **Growing Trend**
  - **in North America**
  - **& Developing World**
    - **China, India, Mongolia**

Paul Gipe, wind-works.org

Gaspé, Quebec

Grassroots Movement

- **Explosion of Interest**
- **Groups Active**
  - **Across US & Canada**
- **Public Out in Front**
  - **Demands Aggressive Action**
- **Tipping Point Reached?**

San Gorgonio Pass, California

Paul Gipe, wind-works.org

Ferndale, Ontario
Renewable Tariffs Are In Play
• Nova Scotia to British Columbia
• Washington State to Florida
• Vermont to California
• US House
Paul Gipe, wind-works.org

Ontario Moved First

First Modern System of Advanced Renewable Tariffs in North America

Ontario “Gets It”

- **Closing Coal Plants**
- **Delaying Nuclear Build**
- **Putting Renewables First**

Groundbreaking in North America

Paul Gipe, wind-works.org

Goderich, Ontario

Ontario's Green Energy Act

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

Paul Gipe, wind-works.org

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**

Paul Gipe, wind-works.org

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)**

Paul Gipe, wind-works.org

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**

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**

Paul Gipe, wind-works.org

Kingston, Ontario

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

Paul Gipe, wind-works.org

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!

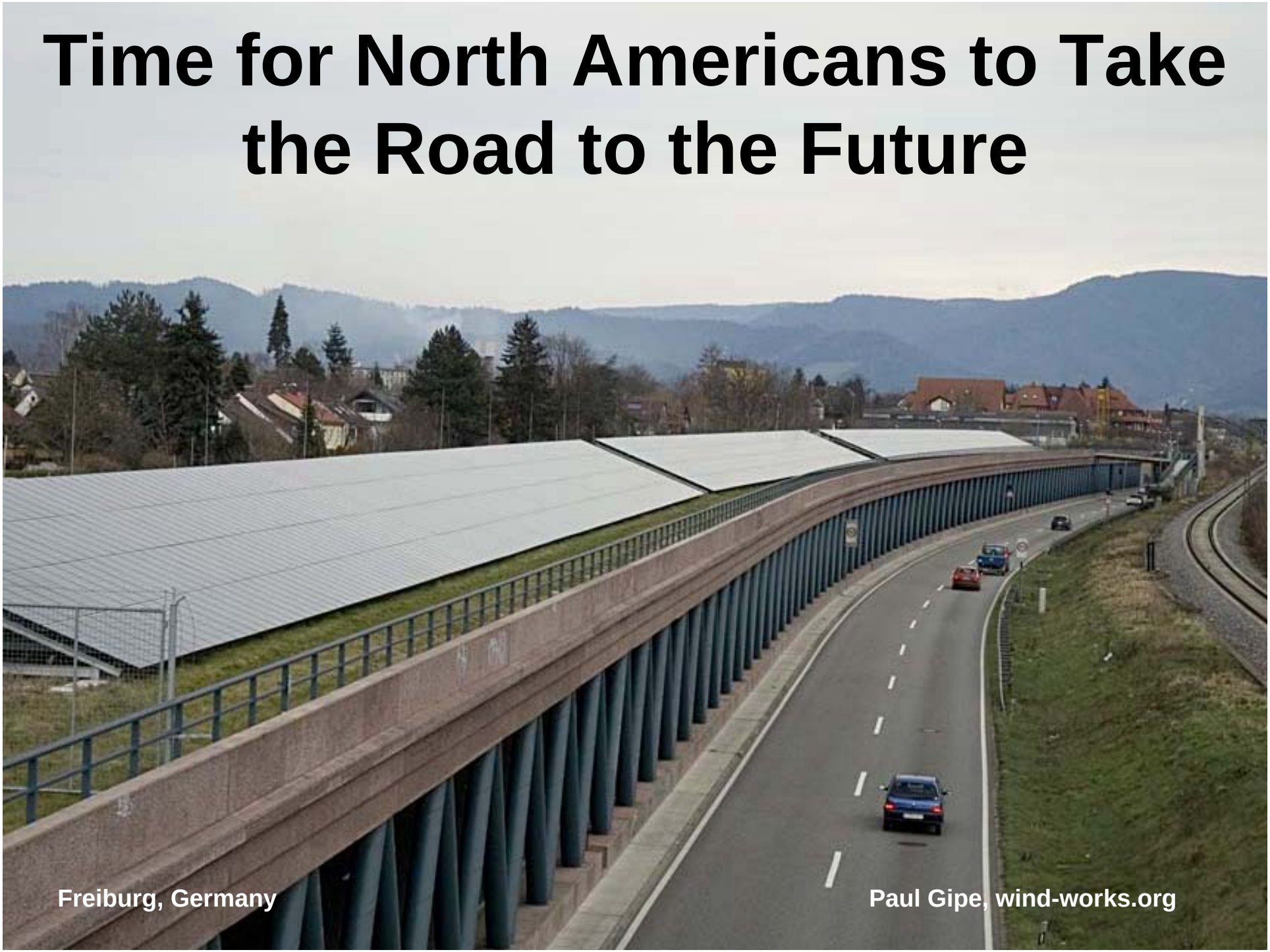
Paul Gipe, wind-works.org

Ontario Success Due To

- **Push for Renewable Policy**
  - **Not a Solar PV or a Wind Policy**
- **Push for Conservation & Efficiency**
  - **Reduces Program Costs to Ratepayers**
    - **(Danes Pay Less for Electricity Than Ontarians)**
- **Collaborative Strategy**
  - **Green Energy Act Alliance: Green NGOs, Ag, & Labor**
  - **Trade Groups: CanSIA, CanWEA, OWA**
- **Public Consultation**

“Nothing is as powerful as an idea whose time has come.”
-- Victor Hugo*
Paul Gipe, wind-works.org
*"Il n'est rien au monde d'aussi puissant qu'une idée dont l'heure est venue." Victor Hugo
.

Time for North Americans to Take the Road to the Future



Freiburg, Germany

Paul Gipe, wind-works.org

Feed-in Tariffs

“Turn farms, homes, and businesses into entrepreneurs”

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

Move From
A Culture of Consumption
to
A Culture of Conservation
--Ontario Premier Dalton McGuinty
Paul Gipe, wind-works.org
Montfort, Wisconsin

Move From
A Nation of Consumers
to
A Nation of Producers

Paul Gipe, wind-works.org

Lackawanna, New York

Gaspé Peninsula, Quebec
No Time for Half-Measures
No Time to Lose
Paul Gipe, wind-works.org

We Need A Lot More Wind . . .

. . . A Lot More Solar

. . . A Lot More Renewable Energy
Technology for Life*
*from N.F.S. Grundtvig, Danish Theologian
Paul Gipe, wind-works.org

Renewables . . .

When You Look Closely . . .

. . . Worth Every Cent

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Manawatu Gorge, New Zealand