

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

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Carleton College V82, Northfield, Minnesota

# Advanced Renewable Tariffs for a North American Energy Revolution for GACC-Energy Forum by Paul Gipe



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)



Lackawanna, New York

# 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](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**



# ... And Create a Rural Revolution Through “Electricity Rebels”\*

**\*Who own their own generation.**

Friedrich-Whilhelm-Lübke-Koog, Germany

Paul Gipe, [wind-works.org](http://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](http://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: ~53 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

Cowley Ridge, Alberta

# Political Price-Political Quantity Market Mechanisms

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

**Both are Market Mechanisms**

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

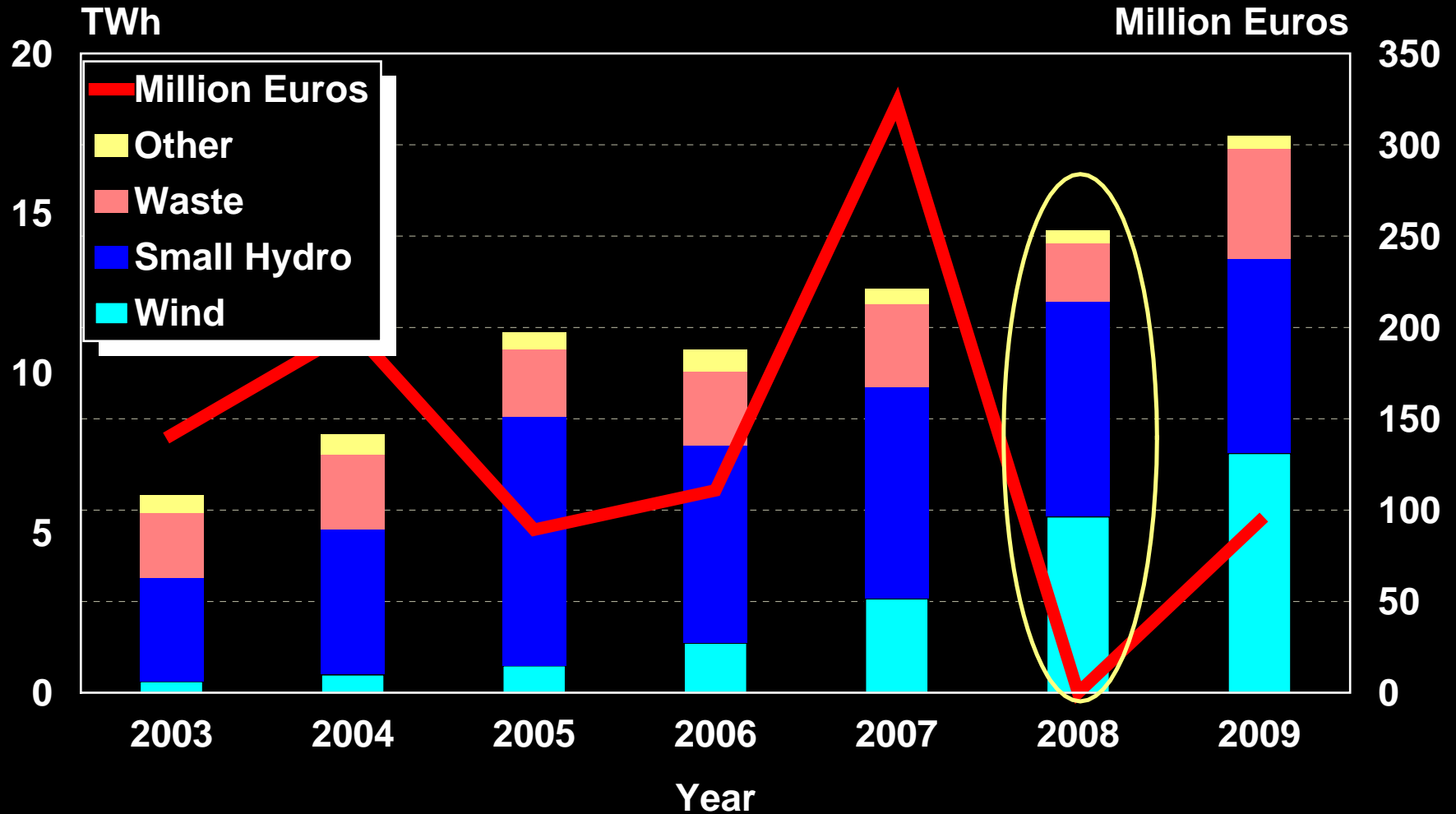
Manawatu Gorge, NZ

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

Paul Gipe, wind-works.org



# Over Cost of French Renewable Tariffs

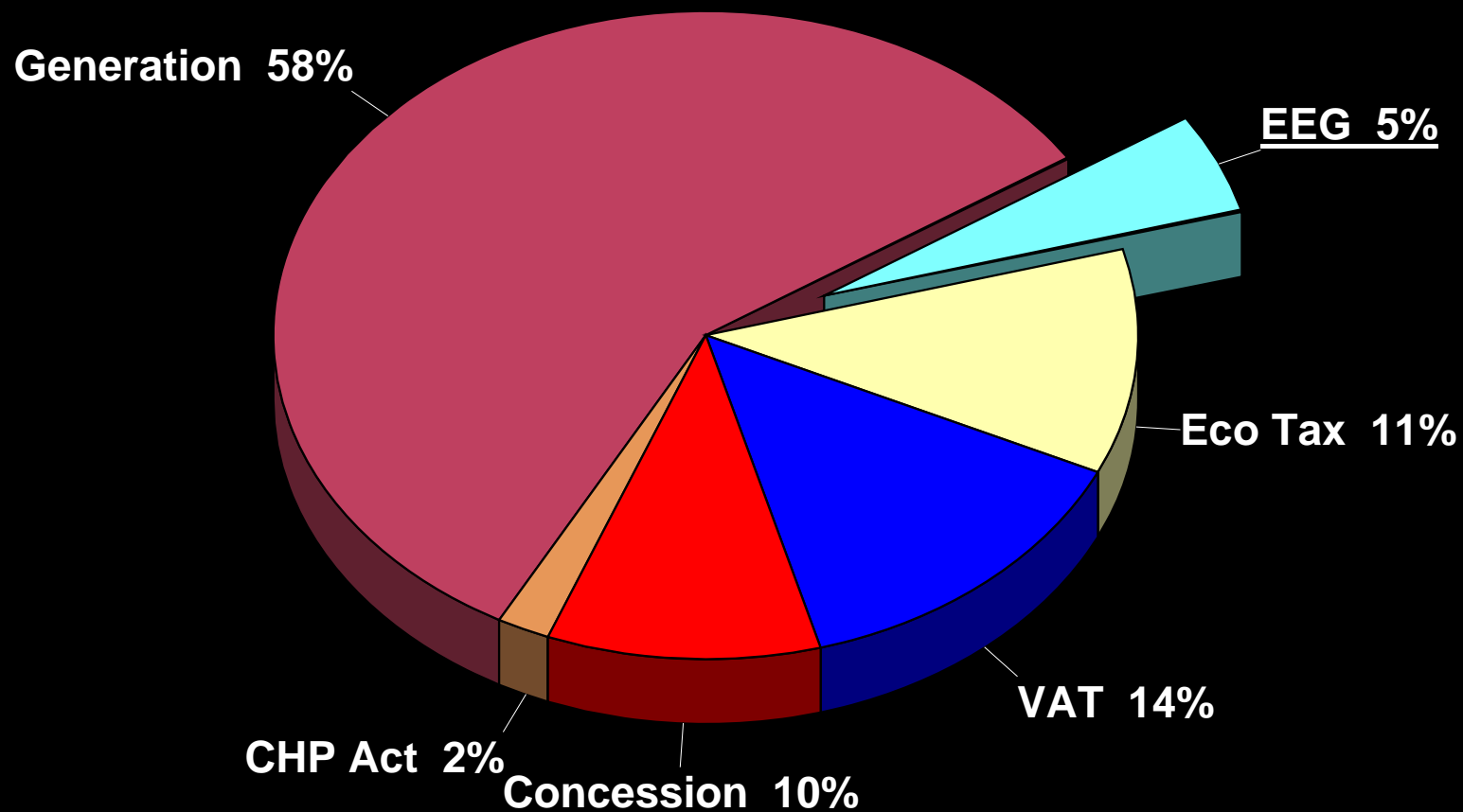


Source: [www.cre.fr](http://www.cre.fr)

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

# Cost of German EEG (2008)

## ~\$50/yr/household



BMU: EEG Costs <5%, ~€0.01/kWh, 2008.

Paul Gipe, wind-works.org

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



# 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)



# European Projected Development 2010 with Feed-in Tariffs

	Wind	Solar PV
Germany	2,500	6,000
Spain	2,500	50-100
France	1,000	400
Italy	Quota	1,500

USA: Wind, 10,000 MW?; PV, 450 MW

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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 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**

# 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

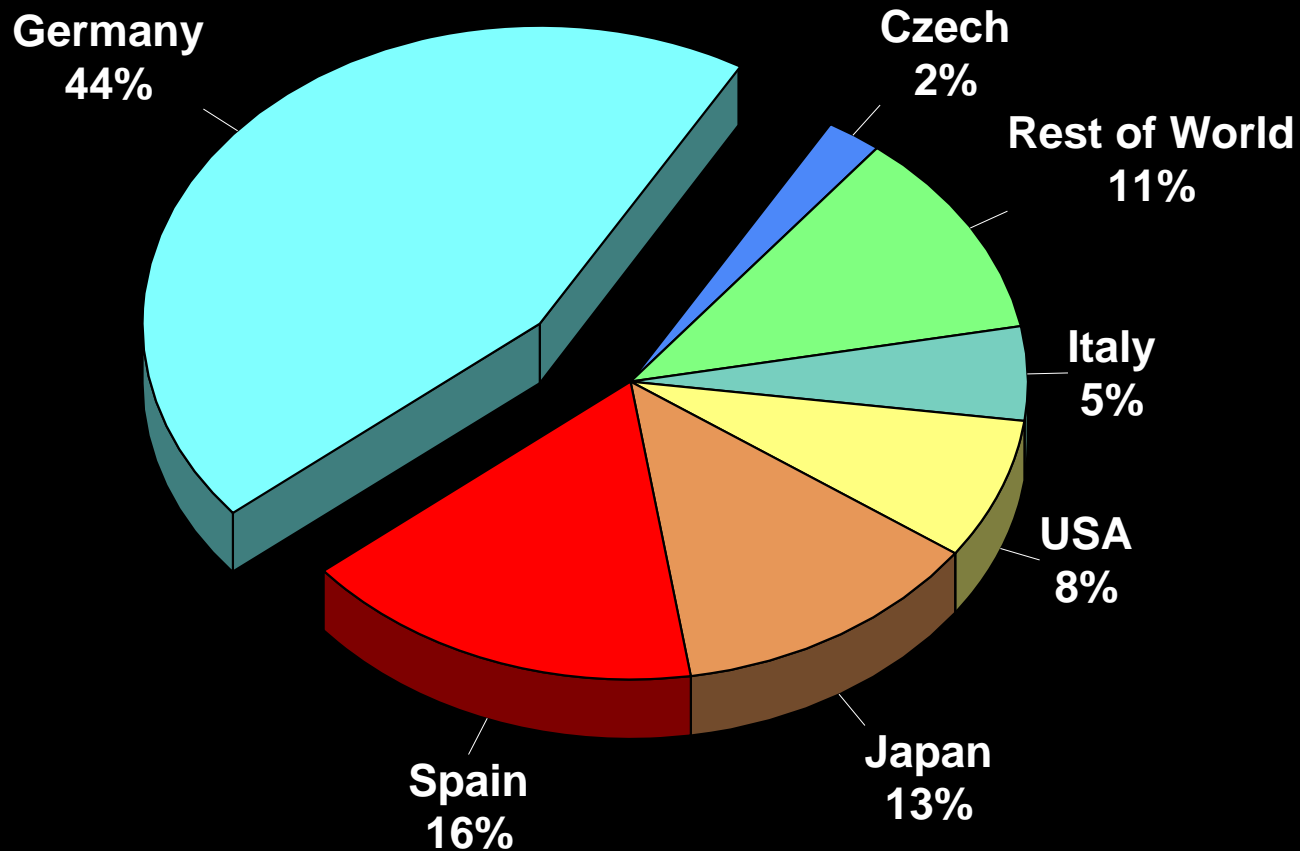
\*Feed-in Tariff Market

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

Rancho Seco, California

# World Solar PV Capacity 2009

## ~20,000 MW



More than 3/4 from Feed-in Tariffs

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

# Stromrebellen (Electricity Rebels)

- **Democratizing Generation**
- **Creating Local Investment**
- **Creating Local Jobs**
- **Creating Opportunity--and Hope**
- **Denmark, Germany, and  
France, Minnesota, Ontario and . . . ?**



# 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**



# Local Entrepreneurs Building Local Projects

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

Nico Petersen, Solar Park Rodenäs

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

# Ontario Moved First

## First Modern System of Advanced Renewable Tariffs in North America



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

Montfort, Wisconsin

# Ontario “Gets It”

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



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

Goderich, Ontario

# 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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# Some Comparisons for Scale

- **France Solar PV 2010**  
400 MW ~ as much as US in 2009
- **Italy Solar PV 2010**  
1,500 MW ~ as much as US in 30 years!
- **Germany Solar PV 2010**  
June 2,100 MW ~more than US in 30 years!  
April & July ~ each more than US in 2009
- **Ontario Solar PV 2010**  
~ as much as California in 2009

# Advanced Renewable Tariffs

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



Gaspé Peninsula, Quebec

# No Time for Half-Measures

## No Time to Lose

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# We Need A Lot More Wind . . .

Matane, Quebec



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

Hinesburg, Vermont

# ... A Lot More Solar



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

# Renewable Energy

## The Revolution Has Begun!

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

Manawatu Gorge, New Zealand

