

REN21 Renewables 2012 Global Status Report North American Perspective

Webinar for the Clean Energy Solutions Center:
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Worldwatch Institute, Washington DC

Overview of presentation

1) Renewable Energy Market Trends

- Technology development and deployment
- Investments
- Policies

2) Overall potential of renewables

3) Renewable energies as a key pillar to reach North American policy priorities

4) Outlook

Installed Capacity and New Additions/Production by Technology

•The U.S. and Canada are global leaders in total capacity and new additions/production for a number of renewable technologies

Total Installed Capacity End 2011

	Renewable power capacity (incl. hydro)	Renewable power capacity (not incl. hydro)	Renewable power capacity per capita (not incl. hydro) ²	Biomass power capacity	Geothermal power capacity	Hydropower capacity
1	China	China	Germany	United States	United States	China
2	United States	United States	Spain	Brazil	Philippines	Brazil
3	Brazil	Germany	Italy	Germany	Indonesia	United States
4	Canada	Spain	United States	China	Mexico	Canada
5	Germany	Italy	Japan	Sweden	Italy	Russia

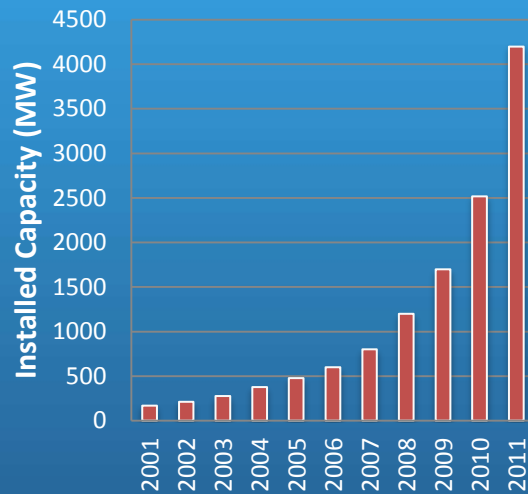
	Solar PV capacity	Solar PV capacity per capita	Wind power capacity	Solar hot water/heat capacity ¹	Solar hot water/heat capacity per capita ¹	Geothermal heat installed capacity	Geothermal direct heat use ³
1	Germany	Germany	China	China	Cyprus	United States	China
2	Italy	Italy	United States	Turkey	Israel	China	United States
3	Japan	Czech Rep.	Germany	Germany	Austria	Sweden	Sweden
4	Spain	Belgium	Spain	Japan	Barbados	Germany	Turkey
5	United States	Spain	India	Brazil	Greece	Japan	Japan

Capacity Added/Production

	New capacity investment	Hydropower capacity	Solar PV capacity	Wind power capacity	Solar hot water/heat capacity ¹	Biodiesel production	Ethanol production
1	China	China	Italy	China	China	United States	United States
2	United States	Vietnam	Germany	United States	Turkey	Germany	Brazil
3	Germany	Brazil	China	India	Germany	Argentina	China
4	Italy	India	United States	Germany	India	Brazil	Canada
5	India	Canada	France	U.K./ Canada	Italy	France	France

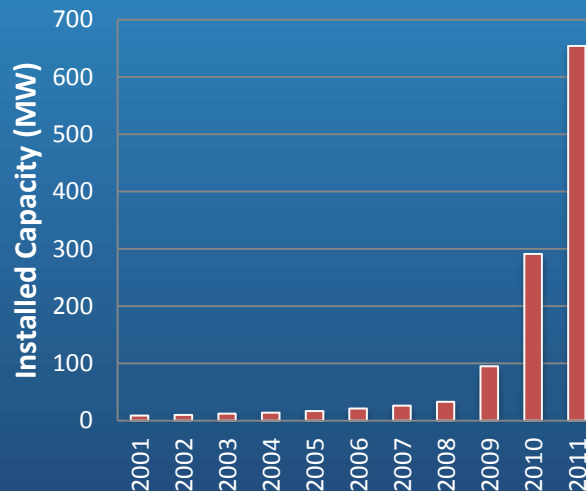
Solar Installed Capacity

Solar PV: U.S.

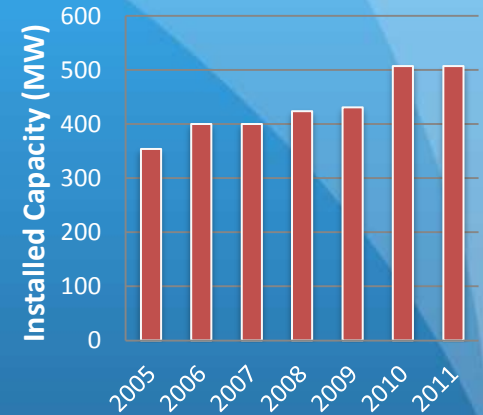


•The United States has an estimated solar potential of 200,000 GW [NREL]

Solar PV: Canada

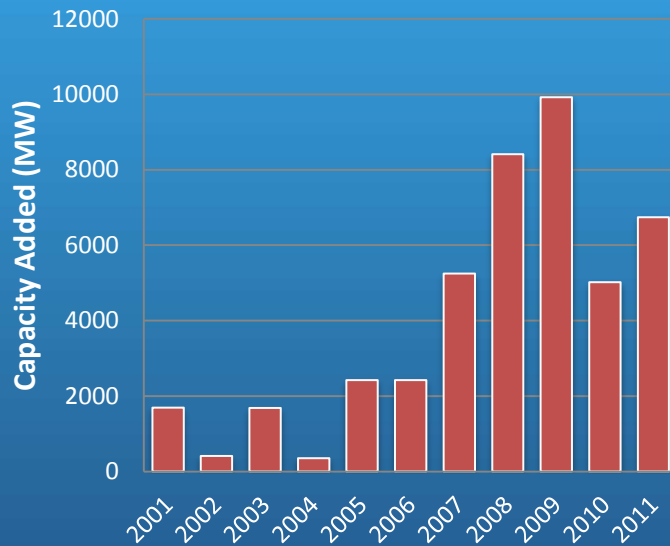


CSP: U.S.

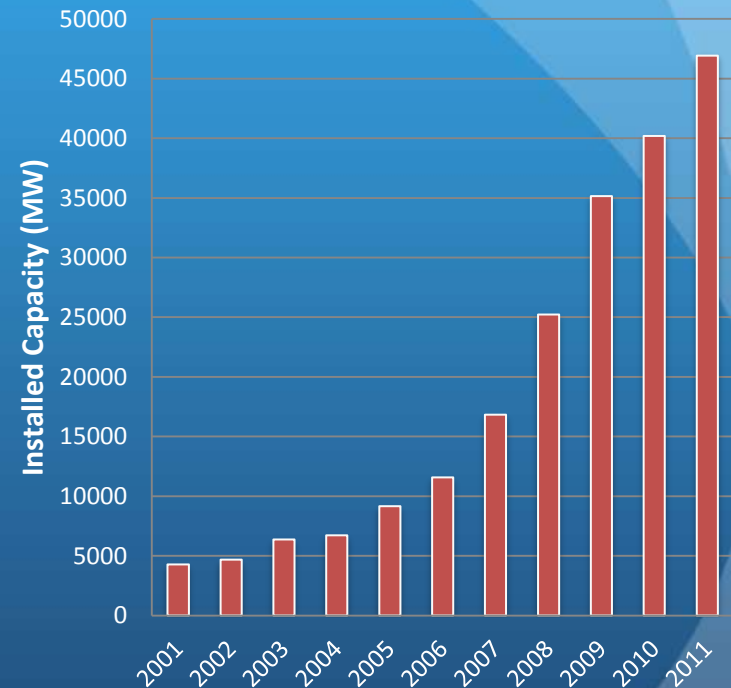


Wind Power Installed Capacity: United States

New Additions



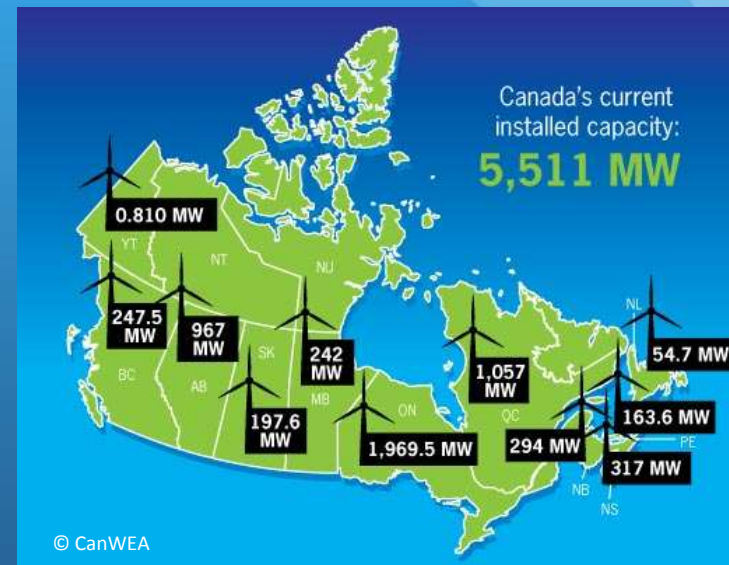
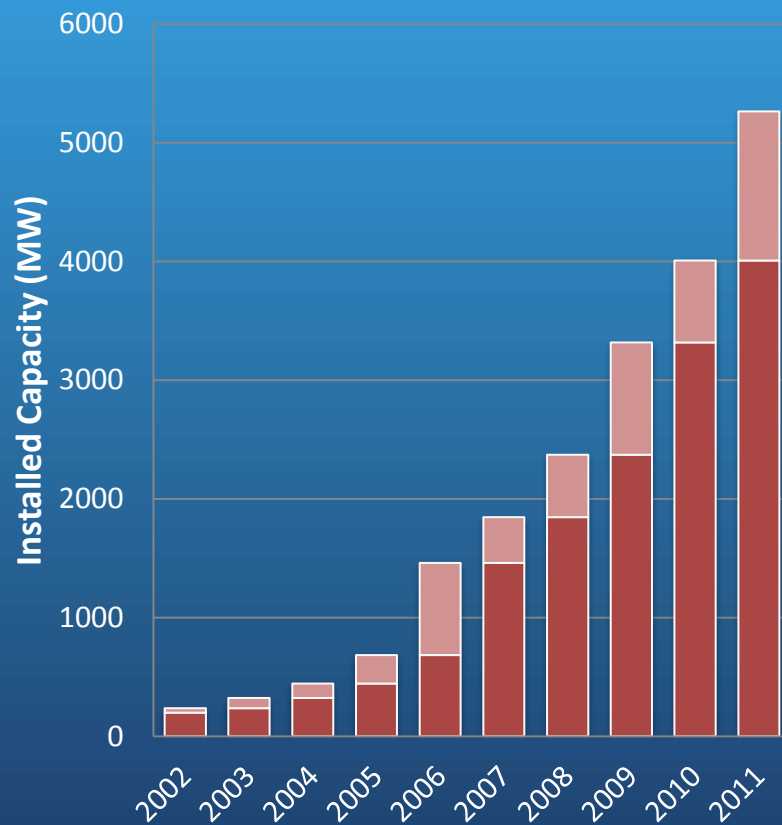
Cumulative Capacity



- 2nd largest capacity by country at 46,919 MW
- Policy fluctuation has had a significant effect on capacity additions

Wind Power Installed Capacity: Canada

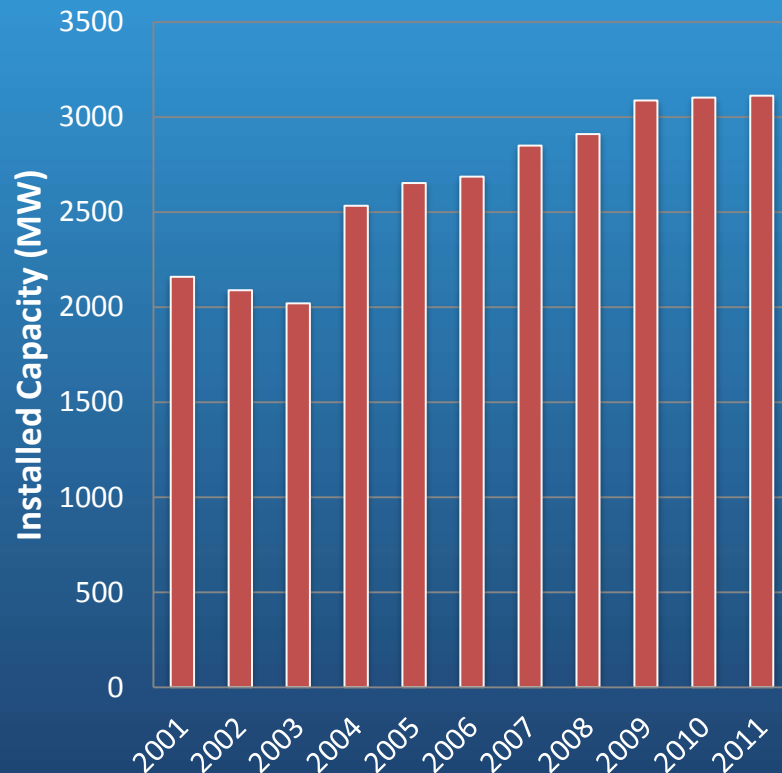
Canada



- 9th largest capacity by country at 5,265 MW (end-2011)
- Ontario accounts for over 1/3 of all Canadian wind power capacity

Geothermal Installed Capacity

Geothermal Installed Capacity : U.S.



- The U.S. accounts for over $\frac{1}{4}$ of global geothermal capacity
- Canada has no geothermal electricity generation capacity; however, more than 80,000 geothermal heat pumps are in use

Bioenergy

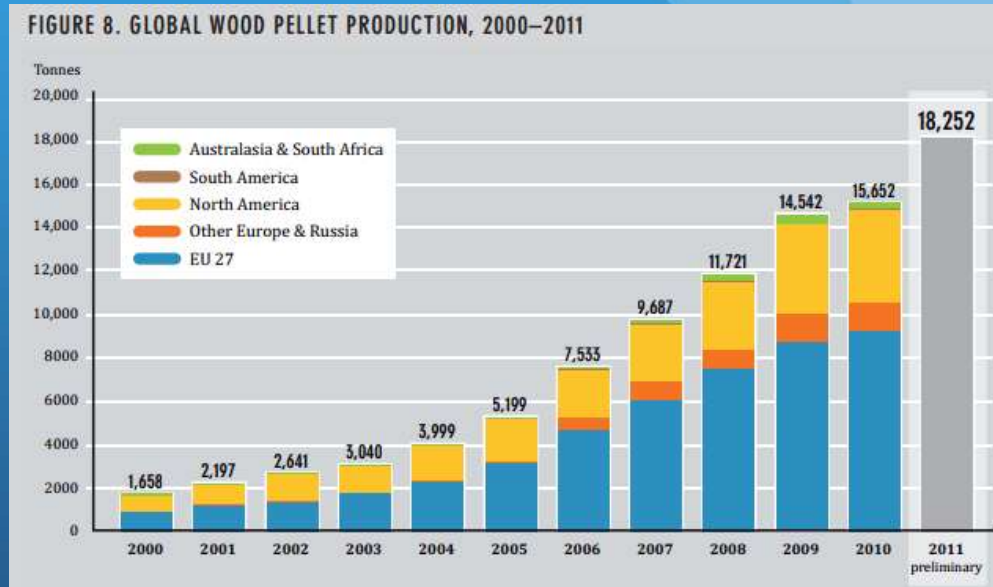
Ethanol

- U.S. was the world's largest ethanol producer at 54 billion liters in 2011 (63% of global production)
- Canada was the world's 4th largest ethanol producer at 1.8 billion liters in 2011

Biodiesel

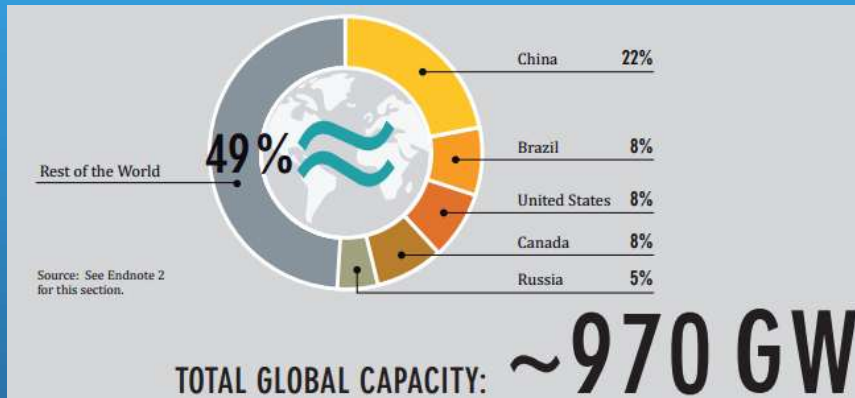
- U.S. became the world's largest biodiesel producer at 21.4 billion liters
- 159% growth over 2010 production overtook Germany, Brazil, Argentina and France for top spot

Solid Biomass



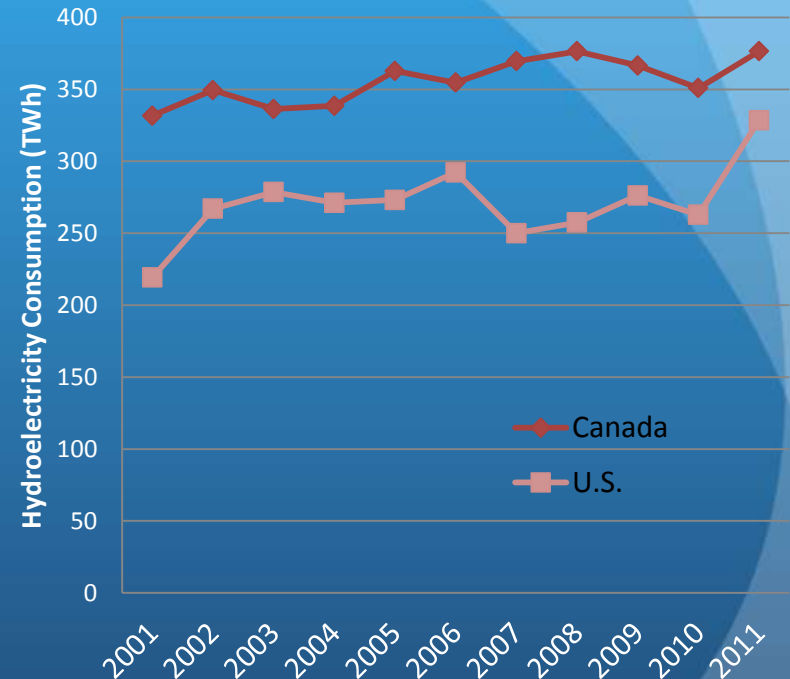
Hydro

Global Hydropower Installed Capacity Share



- The United States has the world's 3rd largest hydropower installed capacity, Canada ranks 4th

Hydroelectricity Consumption in the US and Canada

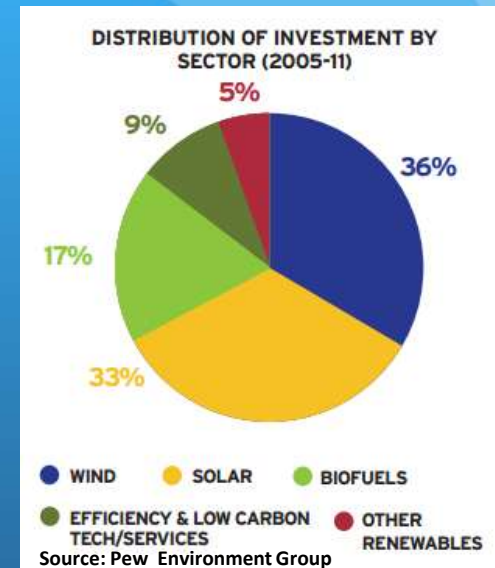
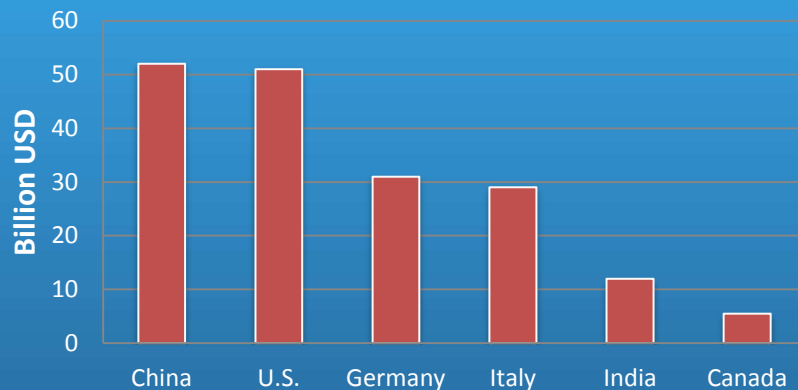


Policies and Investment Overview

1. Trends in renewable energy investment
2. Regulatory Policies
 - Renewable Portfolio Standard (RPS)
 - Feed-in tariff
 - Net Metering
3. Fiscal incentives and public financing

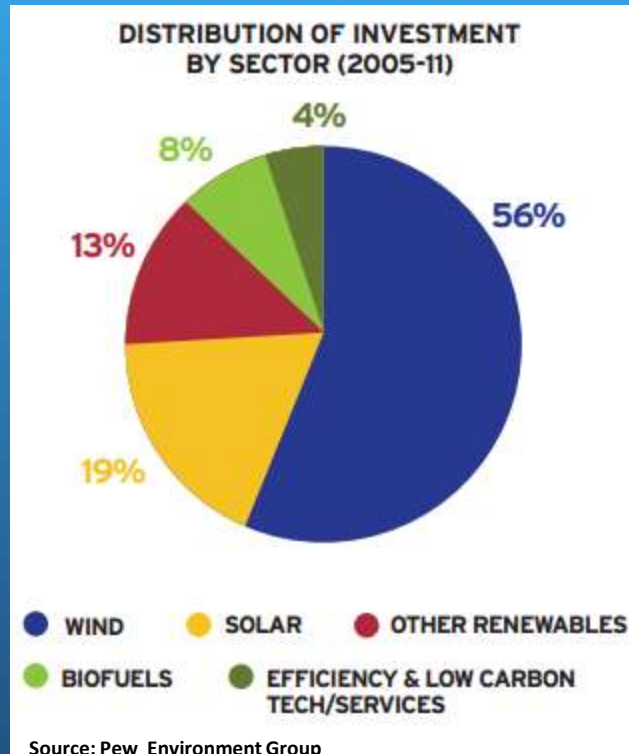
Renewable Energy Investment: United States

Total RE Investments: Top 5
Countries and Canada



- U.S. 2nd in global total investment at \$51 billion (to \$52 billion in China)
- 57% growth over 2010 investment
- 5-year growth rate of 11.6%

Renewable Energy Investment: Canada



- \$5.5 billion total investment in 2011
- Ranks 11th of G-20 countries
- 5-year growth rate of 22%

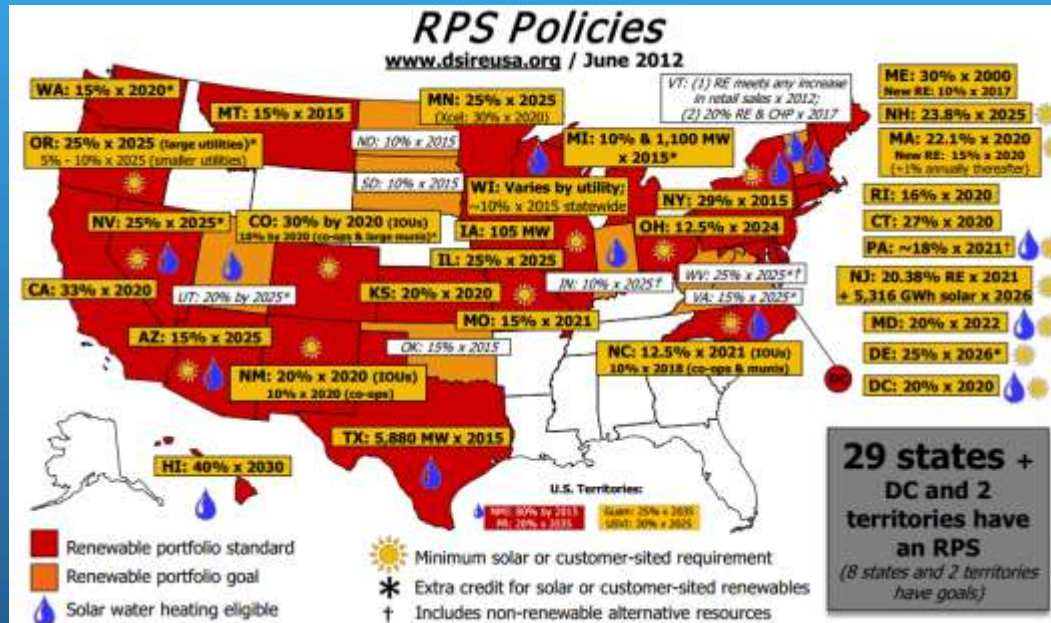
Policies: Overview

	REGULATORY POLICIES						FISCAL INCENTIVES				PUBLIC FINANCING	
	Feed-in tariff (incl. premium payment)	Electric utility quota obligation/RPS	Net metering	Biofuel obligation/mandate	Heat obligation/mandate	Tradable REC	Capital subsidy, grant, or rebate	Investment or production tax credits	Reductions in sales, energy, CO ₂ , VAT, or other taxes	Energy production payment	Public investment, loans, or grants	Public competitive bidding
United States ³	○	○	○	●	○	○	●	●	●	○	●	○
Canada	○	○	○	●			●	●	●		●	●

- Regulatory policies continue to be found primarily at the sub-national (state/provincial) level in North America
- Fiscal Incentives and public financing can be found at the federal and sub-federal levels

Policies: Renewable Portfolio Standard (RPS)

United States



Canada

- RPS policies exist in 4 Canadian provinces:
 - British Columbia
 - Nova Scotia
 - Ontario
 - Prince Edward Island

Policies: Feed-in Tariff (FiT)

Provincial FiTs in Canada

2 Canadian provinces have FiTs

- Nova Scotia
 - Wind: CAD 0.131-0.499/KWh
 - Biomass CHP: CAD 0.175/KWh
 - In-stream tidal: CAD 0.652/KWh
 - Run of river hydro: CAD 0.140/KWh
- Ontario FiT
 - Biomass: CAD 0.13-0.138/KWh
 - Biogas: CAD 0.104-0.195/KWh
 - Landfill gas: CAD 0.103-0.111/KWh
 - Wind: CAD 0.135/KWh
 - Solar PV: CAD 0.443-0.802/KWh
 - Hydro: CAD 0.122-0.131/KWh
- Ontario microFIT (10 KW or less)
 - Solar PV: CAD 0.642-0.802/KWh
 - Wind: CAD 0.135/KWh
 - Hydro: CAD 0.131/KWh
 - Biomass: CAD 0.138/KWh
 - Biogas: CAD 0.160/KWh
 - Landfill gas: CAD 0.111/KWh

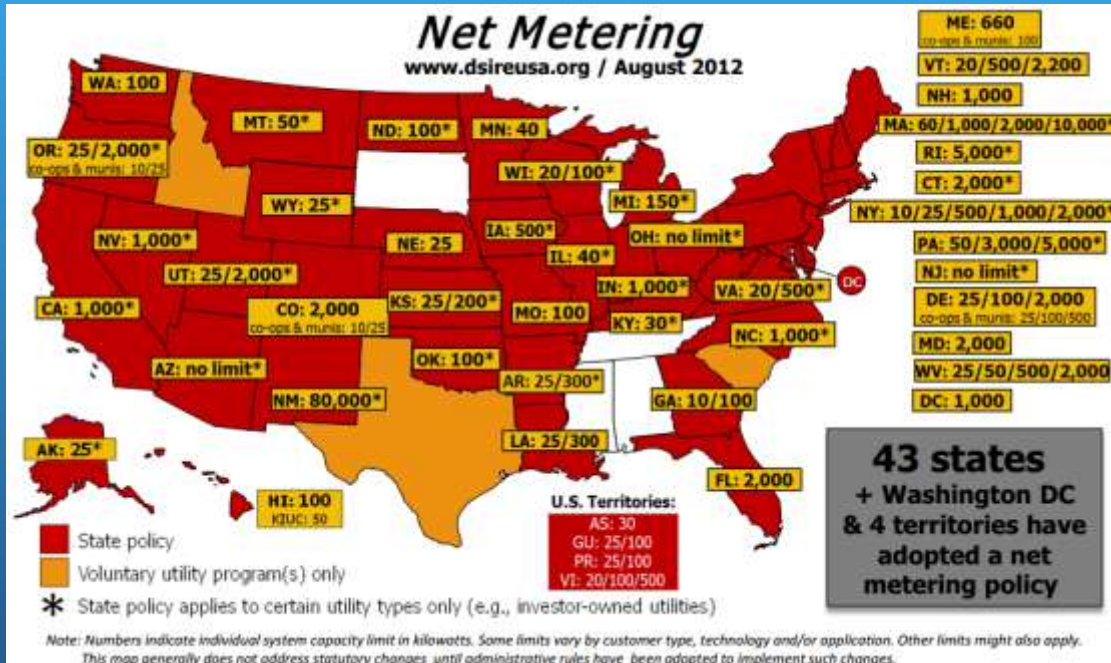
State FiT in the United States

5 U.S. states have FiTs

- California
- Hawaii
 - Solar PV: USD 0.189-0.218/KWh
 - CSP: USD 0.254-0.315/KWh
 - Wind (on shore): USD 0.120-0.161/KWh
 - Hydro: USD 0.189-0.213/KWh
 - Other RPS eligible RE tech.: USD 0.128/KWh
- Oregon
 - Solar: USD 0.317-0.375/KWh
- Rhode Island
 - Solar PV: USD 0.2895-0.3335/KWh
 - Wind: USD 0.13335/KWh
- Vermont
 - Hydro: USD 0.125/KWh
 - Wind: USD 0.123-0.20/KWh
 - Biomass: USD 0.125/KWh
 - Solar PV: USD 0.30/KWh
 - Landfill gas: USD 0.120/KWh
 - Farm Methane: USD 0.160/KWh

Policies: Net Metering

United States



Canada

- Net Metering policies exist in 7 Canadian provinces:
 - Manitoba
 - New Brunswick
 - Nova Scotia
 - Ontario
 - Prince Edward Island
 - Quebec
 - Saskatchewan

Fiscal Incentives and Public Financing

United States

- Wind Production Tax Credit (PTC)
- DoE \$145 million investment in R&D for developing solar energy technologies. The investment is distributed to 69 projects in 24 states
- DoE \$43 million investment over 5 years for advancing the development and deployment of offshore wind technology
- Electric vehicle credits
- 24 states offer tax credits for renewables
- 28 states plus Puerto Rico offer sales tax incentives for renewables
- 15 states plus Puerto Rico offer grant programs for renewables
- 37 states offer loan programs for renewables
- 18 states plus the District of Columbia and Puerto Rico have public benefits funds for renewables totaling USD7.8 billion in investment by 2017
- 18 states plus the District of Columbia and Puerto Rico have rebate programs for renewables
- 37 states plus Puerto Rico offer property tax incentives for renewables

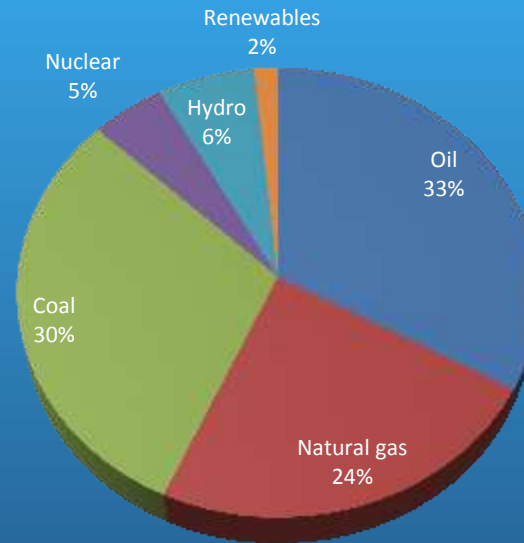
Canada

- ecoENERGY for Renewable Power program has provided \$1.4 billion over 14 years for 4500 MW of renewable power capacity
- ecoENERGY Innovation Initiative provides funding for R&D and demonstration projects
- ecoENERGY for renewable heat program expired March 31, 2011
- NextGen Biofuels Fund

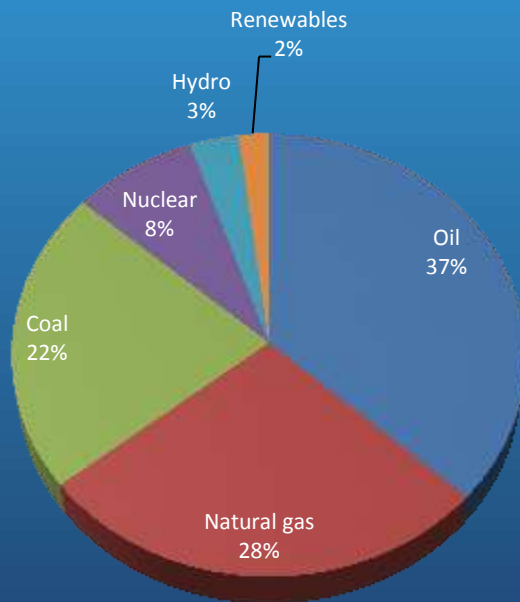
Where do we stand?

Share of Primary Energy Consumption by Fuel (2011)

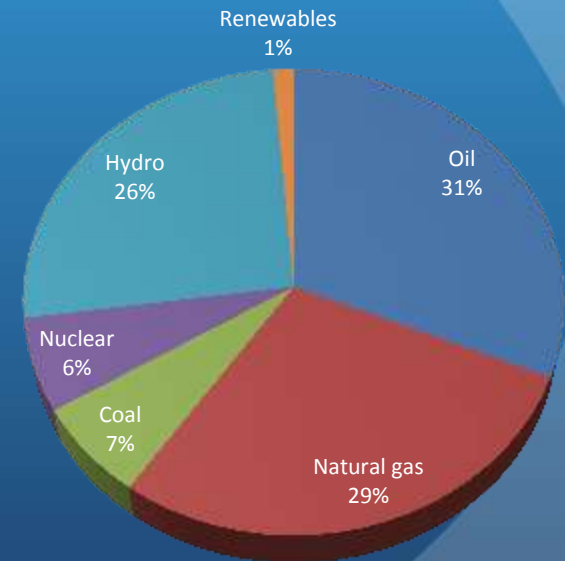
Global



United States



Canada



Source: BP

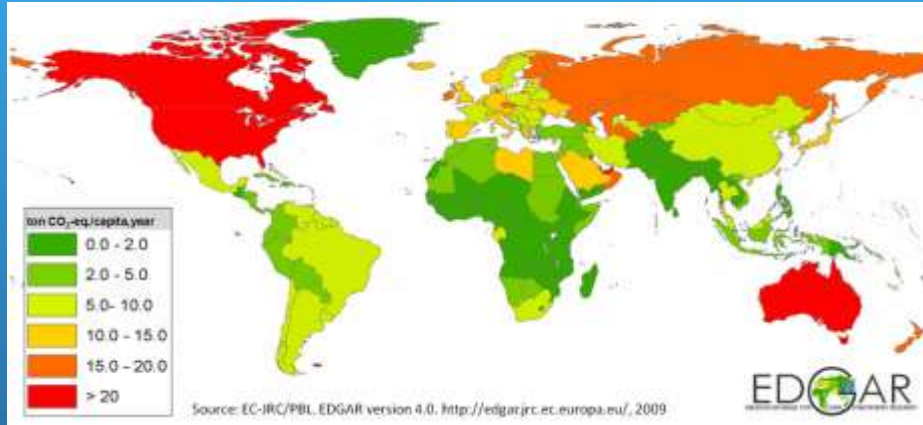
Renewable Energy as a Pillar of National Policy

- Job creation
 - U.S. has an estimated 392,000-505,000 renewable energy jobs
- Industry and Manufacturing
- Energy security
 - Domestic production from renewables reduces reliance on foreign energy imports
- Environmental preservation
 - Reduce local air and water pollution
 - Positive impact on emissions

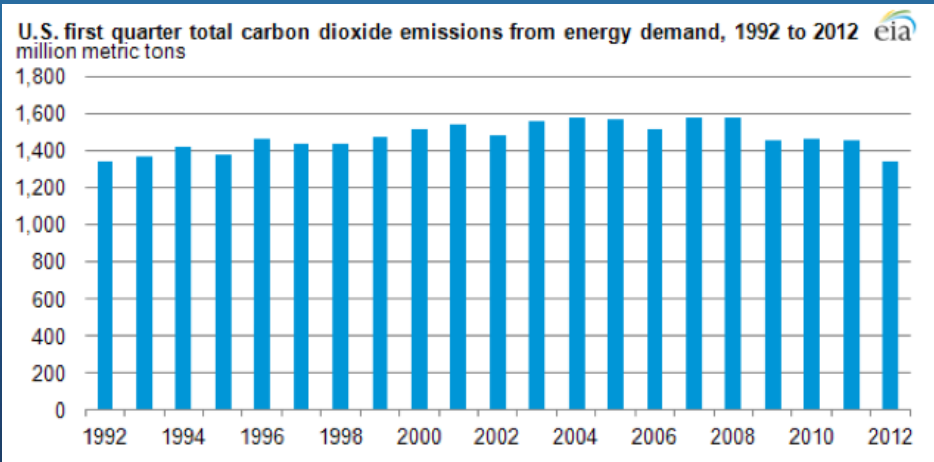
Emissions

- Fossil fuel combustion accounts for 70% of global CO₂ emissions

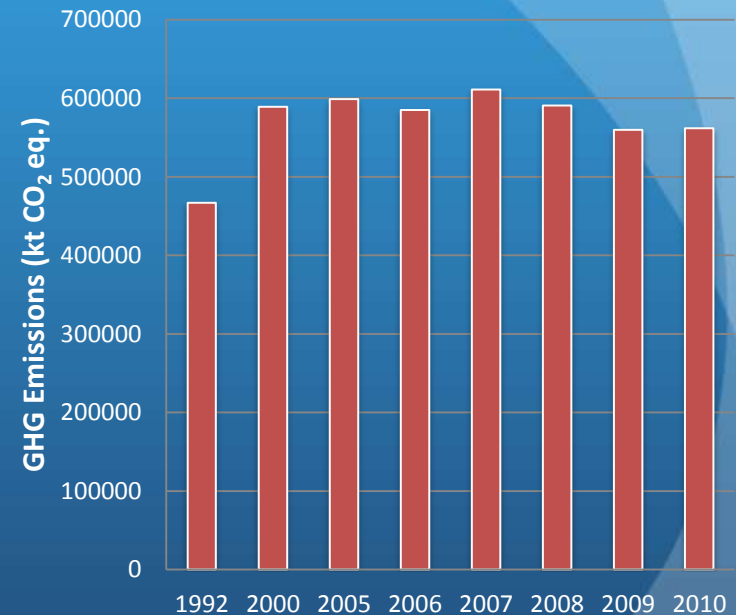
CO₂ Emissions Per Capita



CO₂ Emissions from Energy Demand: U.S.



GHG Emissions from Energy: Canada



Outlook

- Lack of comprehensive climate and energy legislation at the federal level
 - Major developments in both the United States and Canada will continue to be focused at the sub-national level (provinces and states) due to political vacuum at the federal level
 - Consequence of diverging views of key political actors, including U.S. presidential candidates
- Uncertainty over future of fiscal incentives
 - Wind PTC set to expire
 - Political pressure on loans/grants (i.e. Solyndra)
- Natural gas boom in the US. How will this impact renewables?
- U.S. caught in the middle of a paradigm shift, with no clear consensus
 - Keystone XL Pipeline
 - Importance of vested interests
 - California AB-32
 - Trade policy impacts
 - EPA endangerment findings