

Moving Beyond Fossil Fuels: Alternative Energy Options

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FRONTIER GROUP

Sights around the old neighborhood



About Frontier Group

- ▶ Non-profit, non-partisan, multi-issue research and public policy organization.
- ▶ Founded in 1996.
- ▶ Affiliated with network of public interest organizations including Environment America Research & Policy Center, U.S. PIRG Education Fund and others. (includes organizations such as PennEnvironment)



Reports and resources:
www.frontiergroup.org

What I'll be talking about today

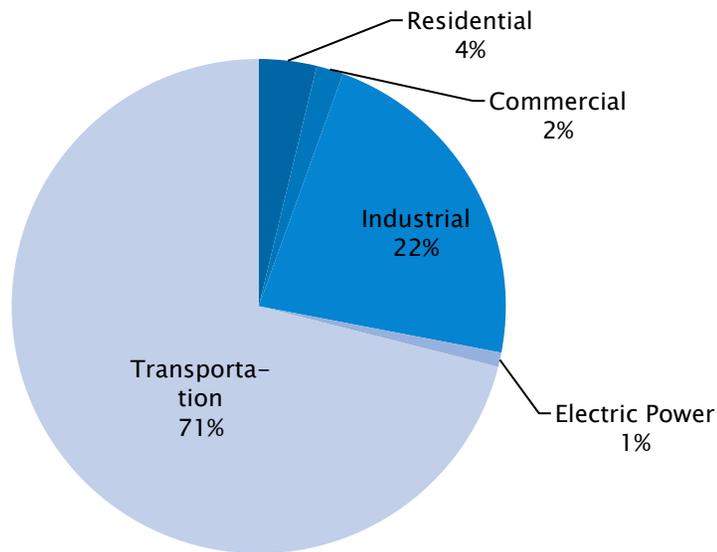
How we use gas and oil.

Alternatives

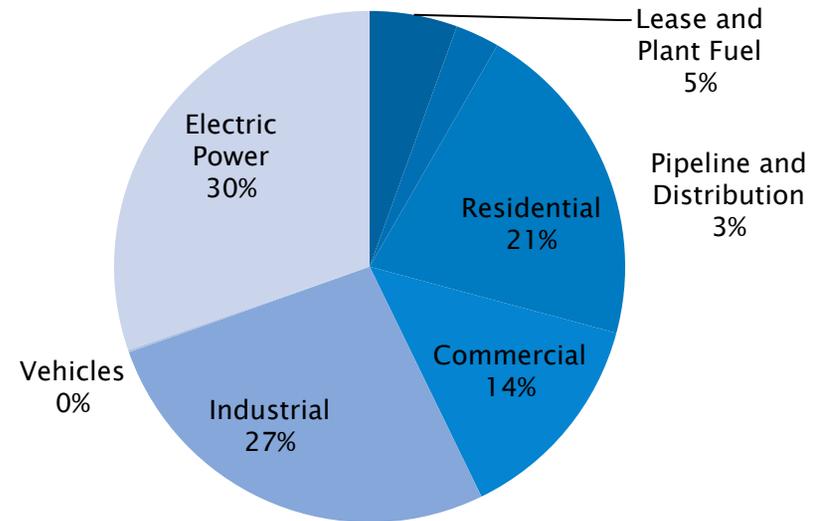
Barriers to a clean energy future

Where we use fossil fuels

Oil Consumption



Natural Gas Consumption



What we use oil and gas for

To heat water.

To heat air.

To generate electricity.

To power machinery.

To make stuff.

Heating water

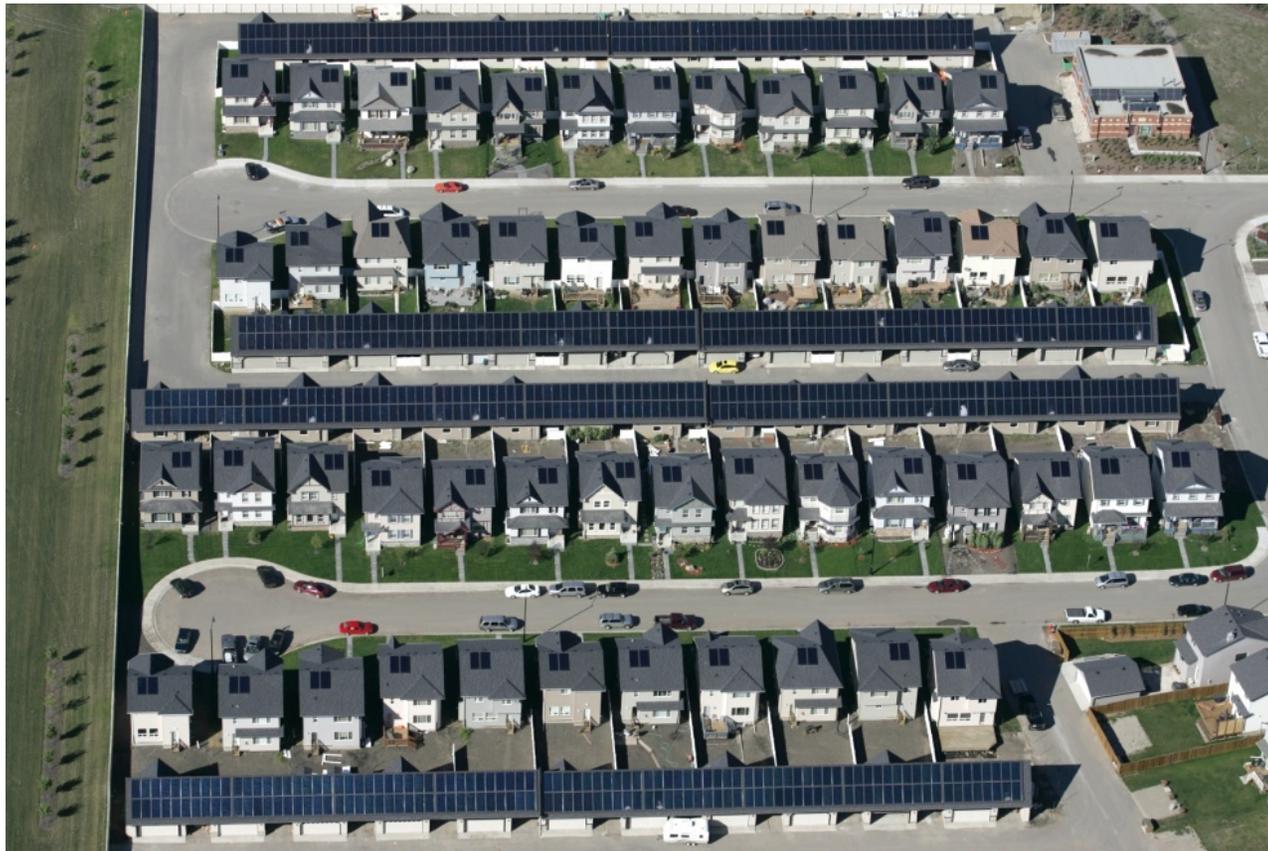
Solar water heating.

Residential and commercial potential to offset 2.5% of U.S. natural gas consumption.



Heating water

Neighborhood-scale solar :



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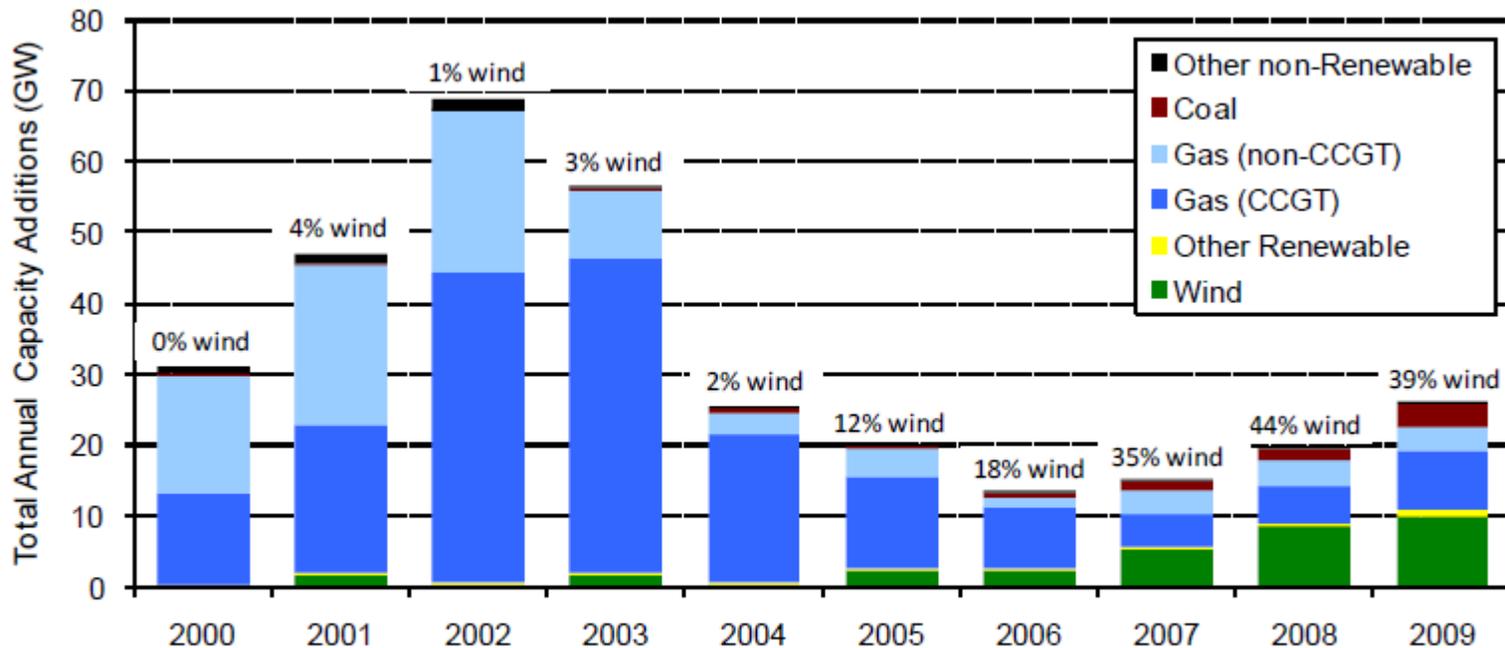
Heating air

THE NATIONAL ACADEMIES

Advisers to the Nation on Science, Engineering, and Medicine

- Can cut energy consumption by 30 percent below projected levels by 2030 through energy efficiency alone.
- Significant reduction in natural gas use in buildings.
- Eliminates need for new electricity generating capacity.

Generating electricity (wind)



Source: EIA, Ventyx, AWEA, IREC, Berkeley Lab

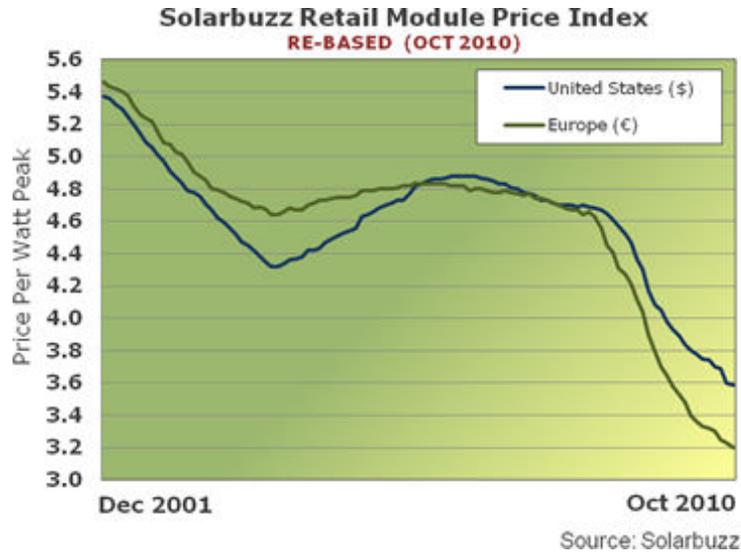
Figure 2. Relative Contribution of Generation Types in Annual Capacity Additions

Large-scale solar



Enough large-scale projects now permitted to generate electricity for 1 million homes.

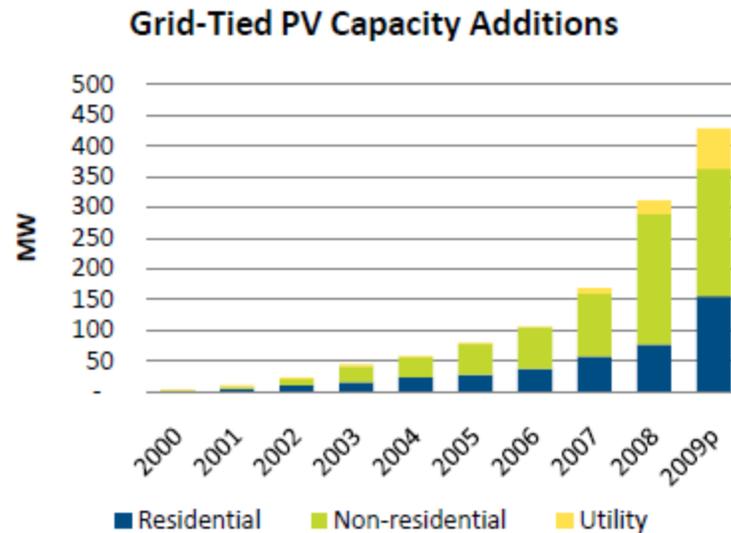
Generating electricity – solar



Solar photovoltaics:

< Prices dropping ... (~25% in last two years)

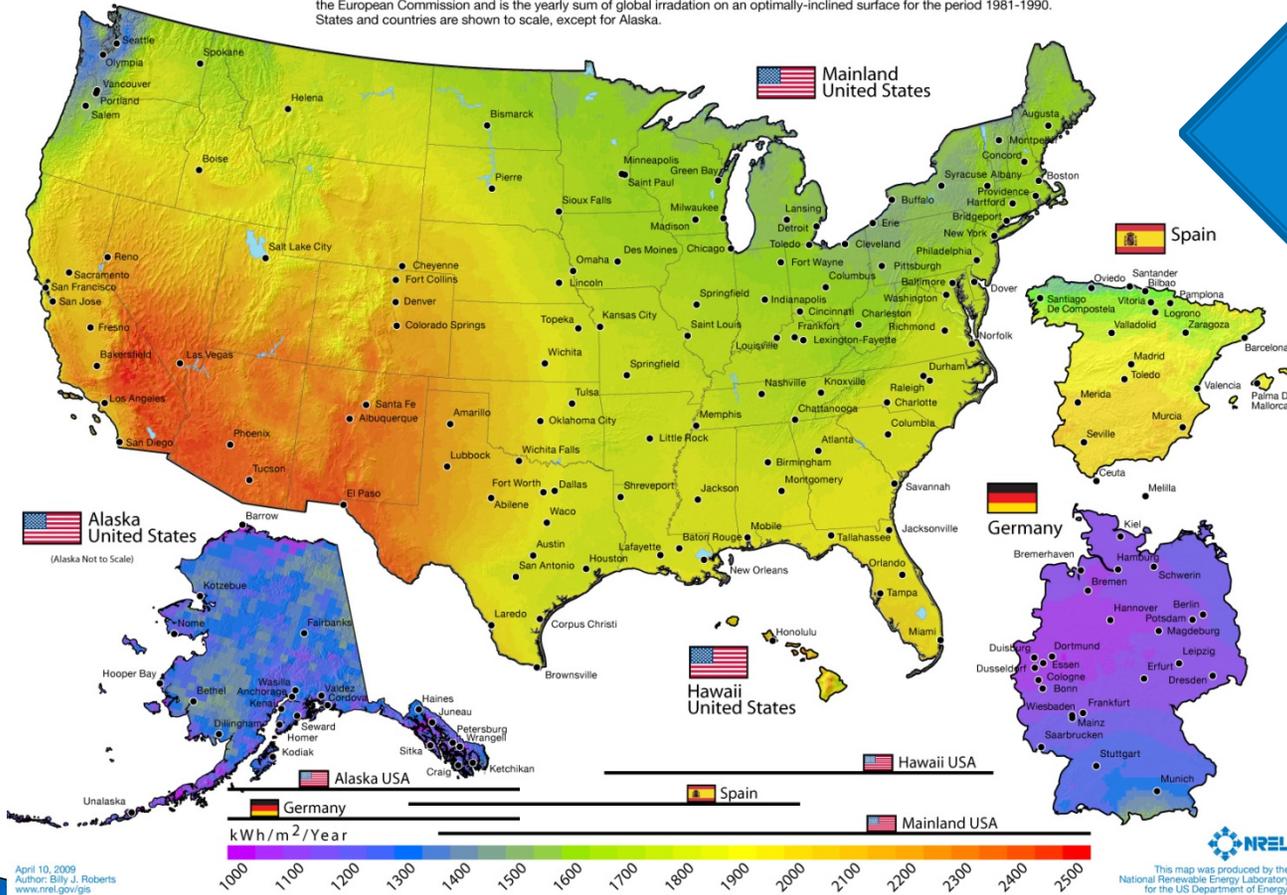
Installations growing ... >



Solar potential

Photovoltaic Solar Resource: United States - Spain - Germany

Annual average solar resource data are for a solar collector oriented toward the south at a tilt = local latitude. The data for Hawaii and the 48 contiguous states are derived from a model developed at SUNY/Albany using geostationary weather satellite data for the period 1998-2005. The data for Alaska are derived from a 40-km satellite and surface cloud cover database for the period 1985-1991 (NREL, 2003). The data for Germany and Spain were acquired from the Joint Research Centre of the European Commission and is the yearly sum of global irradiation on an optimally-inclined surface for the period 1981-1990. States and countries are shown to scale, except for Alaska.



Transportation

New fuel economy/
global warming
pollution standards
(~34 mpg by 2016).

More on way.



Plus plug-in vehicles: electric vehicles and hybrids.

How far can we go?

(Blueprint case vs. Reference case, in quadrillion Btu)

	2005	2020		2030	
Fuel		Reference Case	Blueprint Case	Reference Case	Blueprint Case
Petroleum	40.1	37.9	33.4	38.1	28.8
Natural Gas	22.6	23.8	18.5	23.6	15.7
Coal	22.8	25.2	15.1	29.3	4.5
Nuclear Power	8.2	8.8	8.8	8.6	8.5
Hydropower	2.7	3.1	3.1	3.2	3.2
Other Renewables ^a	3.5	9.1	10.7	13.0	16.2
Other ^b	0.2	0.2	0.2	0.3	0.3
Total	100.1	108.0	89.8	115.9	77.2
Energy Savings					
vs. Reference case			17%		33%
vs. 2005			10%		23%

Union of Concerned Scientists

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Barriers to a clean energy future

- ▶ NOT primarily about technology or cost, but rather about ...
- ▶ Financing (high up-front costs)
- ▶ Knowledge
- ▶ Split incentives
- ▶ Old rules
- ▶ Lack of clear direction from government.

Reasons for hope

- ▶ There are many clean alternatives to fossil fuels.
- ▶ Cost and lack of technology are not the main things holding us back – rather, there are specific, tangible barriers that can be addressed through smart public policy.
- ▶ There are many ways each of us can help to bring about a cleaner energy future.



Thank you

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