

# Contemporary Challenges to a Clean Energy Future

## Overview

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## What do we mean by Clean Energy?

### ➤ Some Definitions:

- Energy that... *"meets the needs of the present without compromising the ability of future generations to meet their needs."*
- Clean Energy is *"broadly defined so as to deal with both the reduced environmental foot print balanced with increased global demand for energy and the imperative for energy independence"*
- *"Environmentally friendly sources of power and energy."*
- Clean energy is *"energy that is produced without burning fossil fuels"*

What's In and What's Out? It Depends...

# Why Clean Energy?

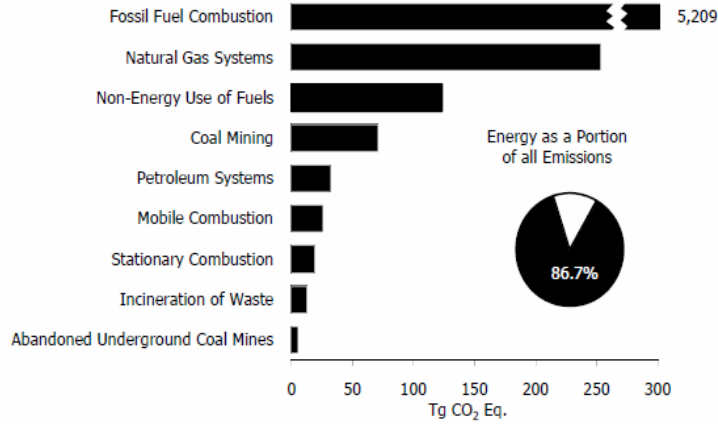
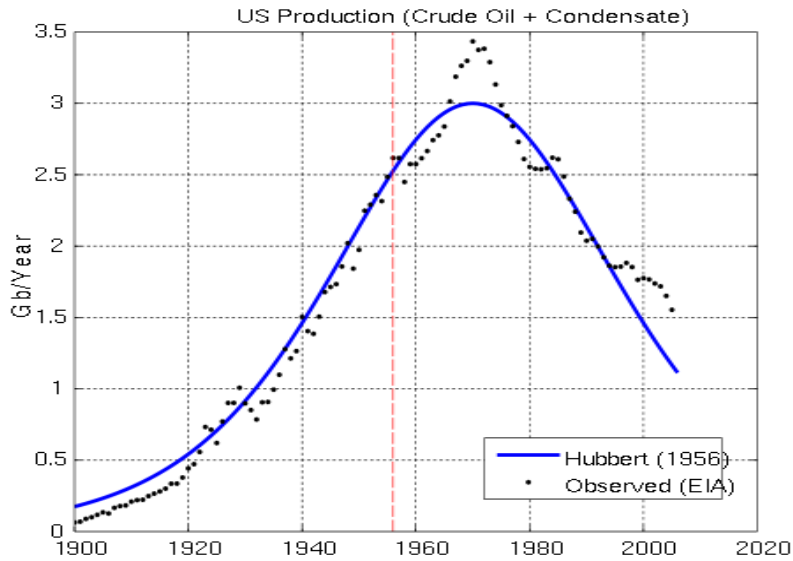
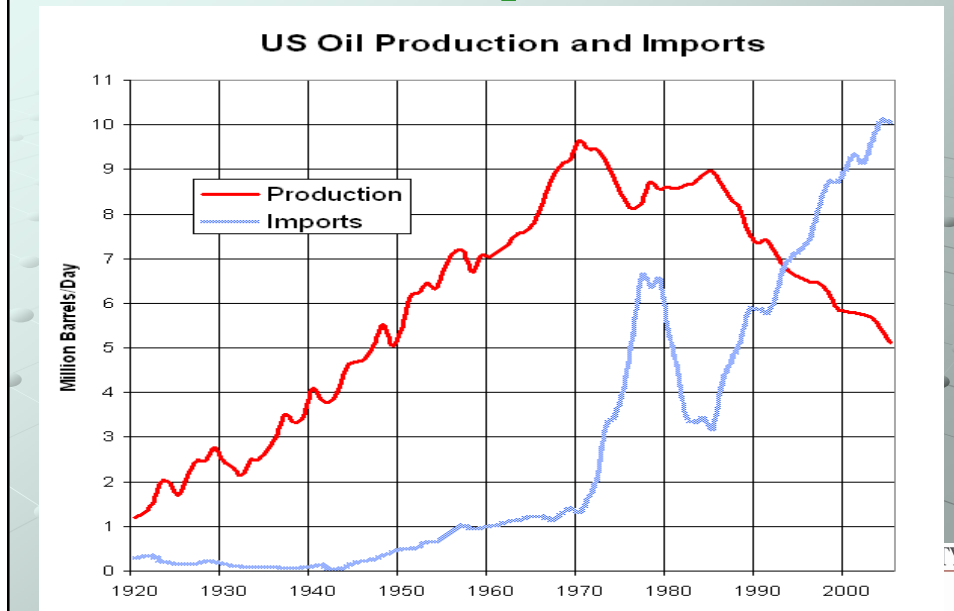


Figure 2-5: 2009 Energy Sector Greenhouse Gas Sources

# Hubbert's Curve and the Evidence

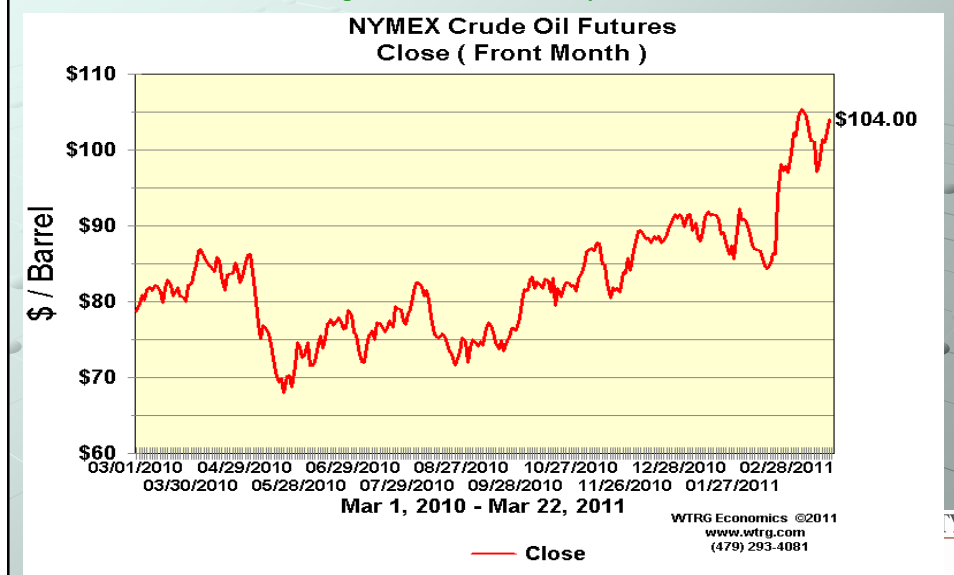


## U.S. A Net Importer of Oil



## The Price of Oil – Updated

(High=\$140 Barrel in July 2008)



# Clean Energy Investments

**Global** : New investment in clean energy was \$162 billion in 2009

- (China leads at \$33.7 billion)

- Second highest figure ever, after \$173 billion in 2008, and up from \$157 billion in 2007

**U.S.**: Clean energy investment was \$17 billion in 2009, down 45% from 2008

**WA**: \$600 million in new federal stimulus funding in 2010, in addition to \$2 billion for Hanford cleanup



Workers service a wind turbine at Nine Mile Canyon Site  
Photo courtesy of Energy Northwest

Source: New Energy Finance, 2010



# Estimated Growth in Selected Global Clean Energy Sectors, 2000-2010

## Ten Years in Clean Tech: At a Glance

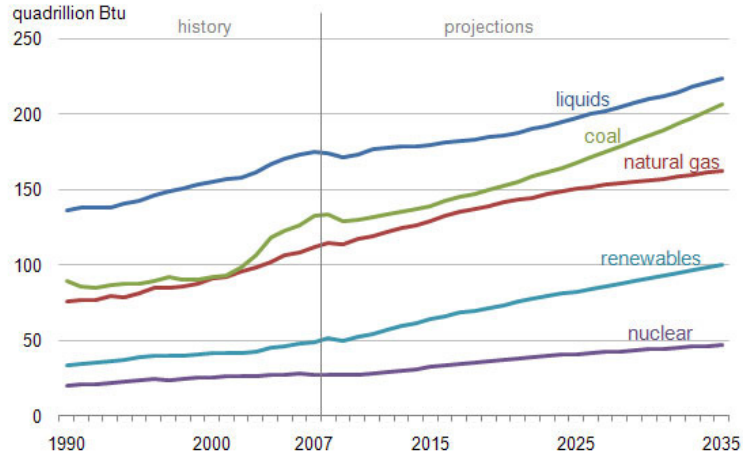
	2000	2010
Combined Global Market for Solar PV and Wind	\$6.5 billion	\$131.6 billion
Average Cost to Install a Solar PV System (Per Peak Watt)	\$9	\$4.82
Number of Hybrid Electric Vehicles on the Road in U.S.	Less than 10,000	More than 1.4 million
Number of Hybrid Electric Vehicle Models Available Globally	2	30
LEED-Certified Commercial Green Buildings in the World	3	8,138
Number of U.S. States with RPS	4	29
Percentage of Total U.S. Venture Capital Invested in Clean Tech	Less than 1%	More than 23%

Source: Clean Edge, Inc., 2011

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## Projected World Energy Use by Source, 2007-2035

Figure 2. World marketed energy use by fuel type

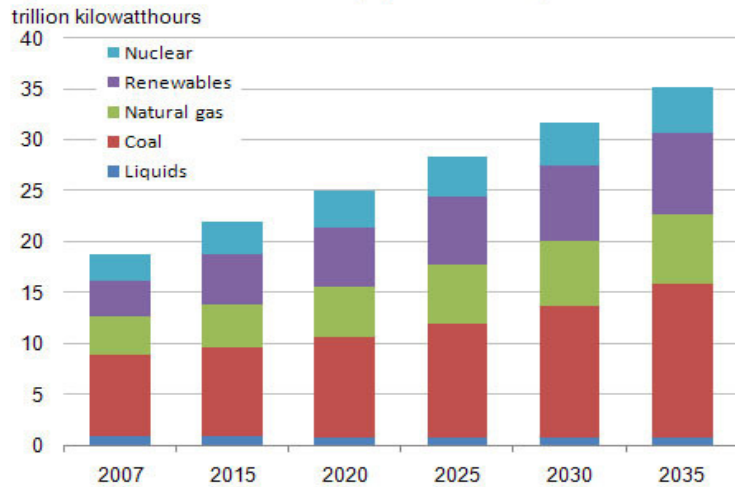


Source: DOE-EIA International Energy Outlook, 2010

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## Net Electricity Generation Estimates by Source, 2007-2035

Figure 6. World net electricity generation by fuel

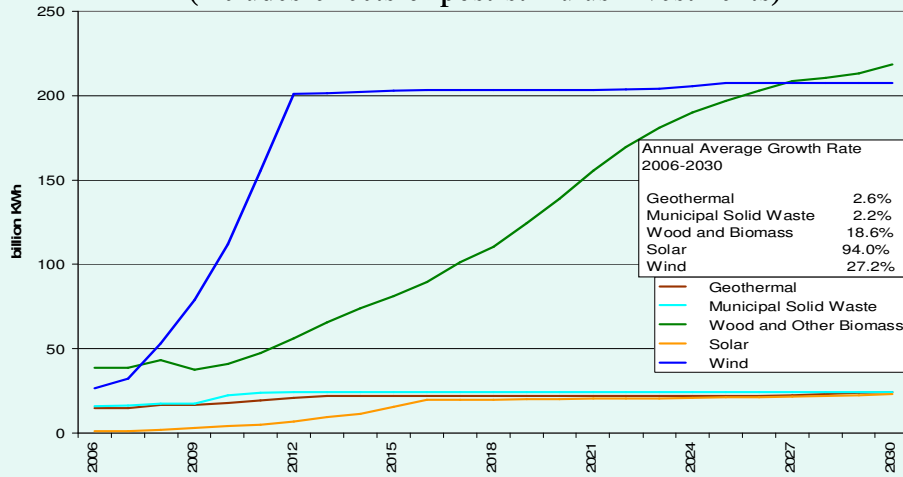


Source: DOE-EIA International Energy Outlook, 2010

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# U.S. Non-Hydro Renewable Electricity Generation 2006-2030

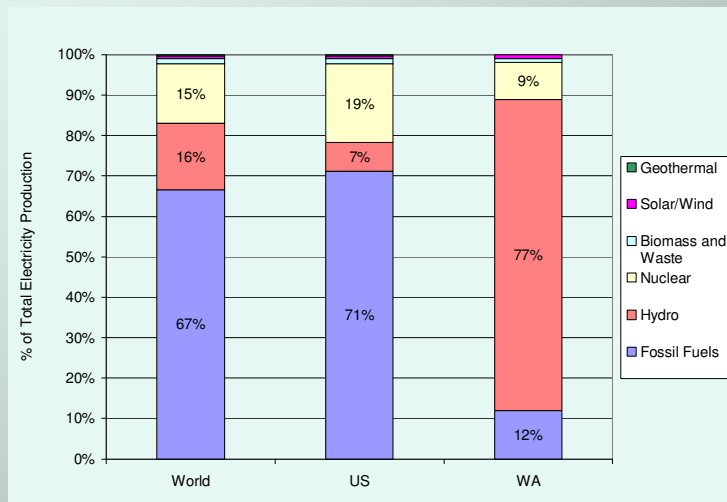
(includes effects of post-stimulus investments)



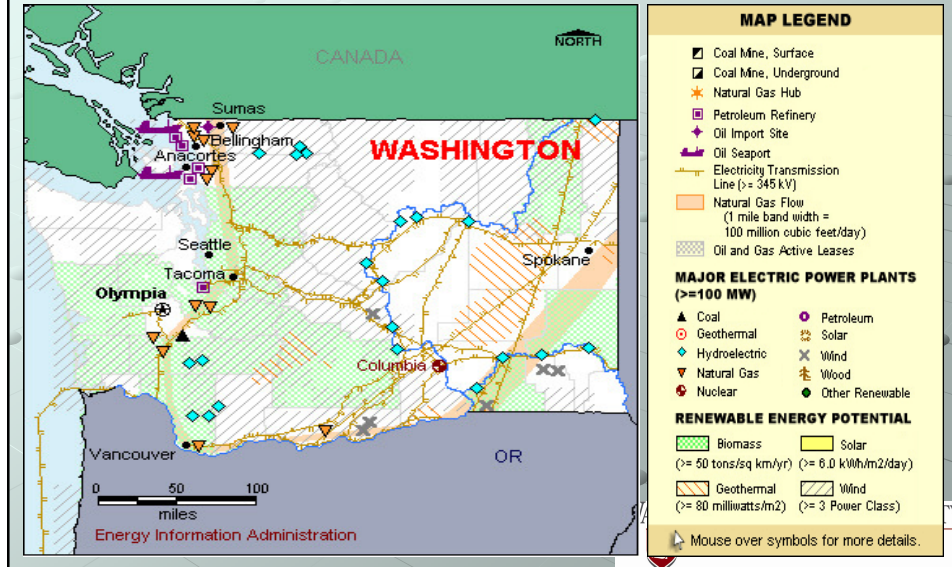
Source: DOE-EIA, March 2009



# 2006 Resource Mix for Electric Power Generation



## Electrical Power Generation in Washington State, 2009



## What's Missing? CONSERVATION

- Federal EPA's *Action Plan for Energy Efficiency*: 50% of new electric load growth should be achieved via conservation by 2025.
- The NW Public Power Council's 6<sup>th</sup> Plan:
  - Projects an increase from current 21,000 average megawatts today to 28,000 average megawatts by 2030.
  - 80% of new load growth could be met through conservation.

## Contact

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