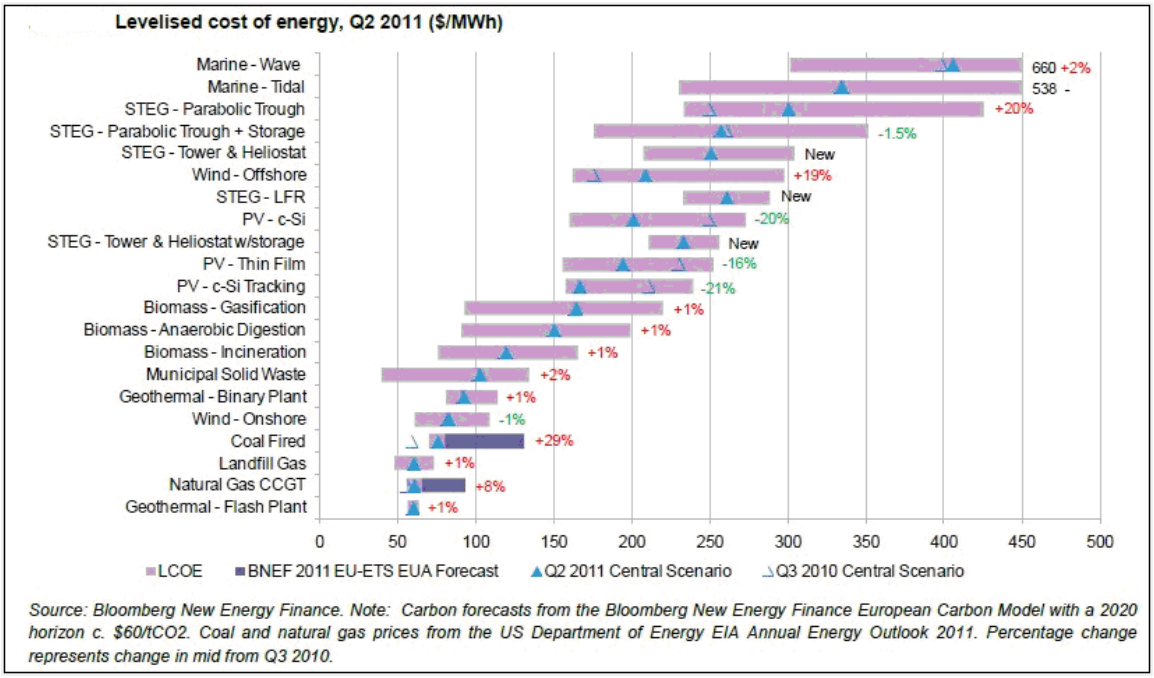
ACORE Leadership Council

ACORE Leadership Council Discussion Points
Overcoming Common Myths About Renewable Energy

I. Myths Related to Renewable Energy Technology/Resources

1) Renewable energy is too expensive and far from reaching grid parity

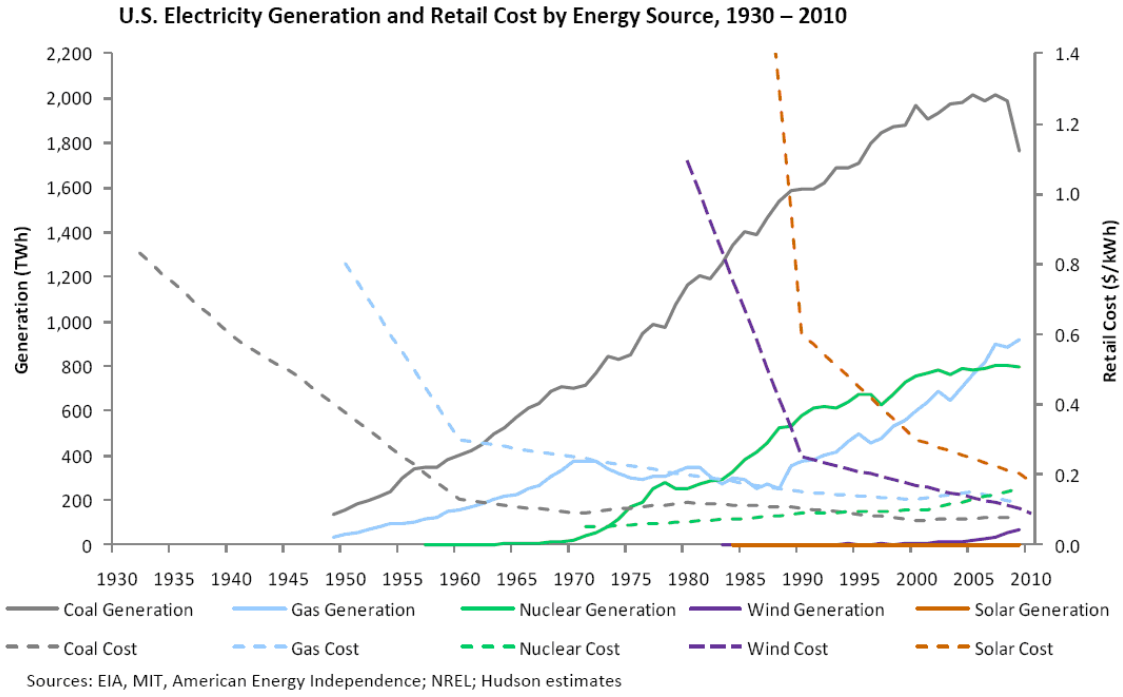
- A number of renewable energy resources are already at or below grid parity in many regions of the country and continue to decline in costs, including, wind, biomass, geothermal, hydropower and waste-to-energy.



Source: Bloomberg New Energy Finance. Note: Carbon forecasts from the Bloomberg New Energy Finance European Carbon Model with a 2020 horizon c. $60/tCO2. Coal and natural gas prices from the US Department of Energy EIA Annual Energy Outlook 2011. Percentage change represents change in mid from Q3 2010.

- The installed cost of solar technology has declined nearly 35% between 1998 and 2010,[1] is currently at grid parity in Hawaii, and is expected to reach grid parity in many other regions of the country by 2014.

[1] Lawrence Berkeley National Laboratory. (2010). Tracking the Sun III - The Installed Cost of Photovoltaics in the U.S. from 1998-2009, pg. 3. http://eetd.lbl.gov/ea/emp/reports/lbnl-4121e.pdf



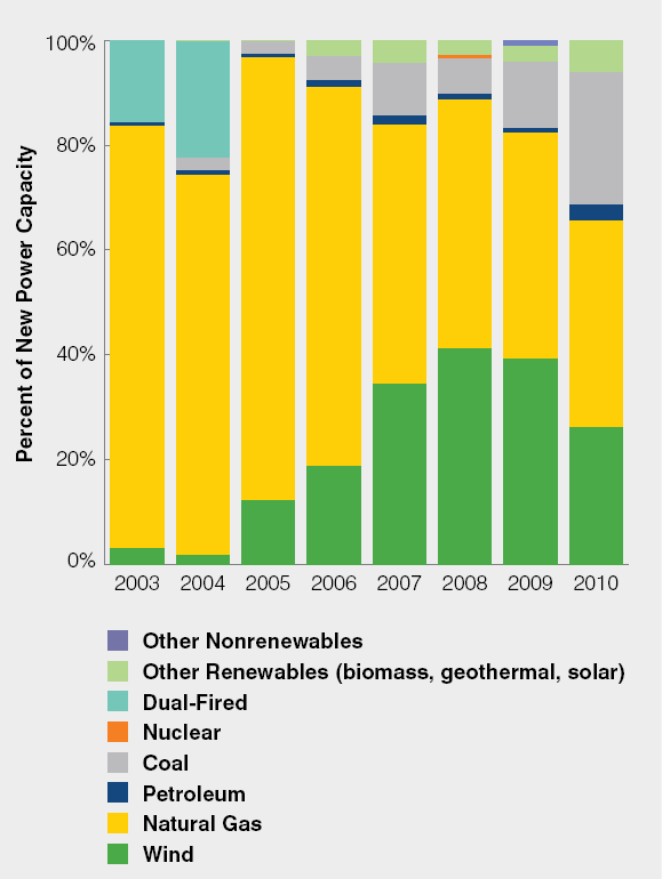
- Renewable energy has seen substantial declines in cost from incremental generation, rates of decline that far exceed those experienced by conventional energy sources
- Renewable energy technologies are just beginning to reach scale and forecast more massive cost reductions
- While the cost of non-renewable energy resources is based on fuel supply and technology, the cost of renewable energy is only based on technology, as the fuels (wind, solar, geothermal and water flow) are free. This means as technology continues to improve through innovation and economies of scale, the cost of renewable energy will decline. This stands in contrast to non-renewable resources which will see increasing costs due to demand and reduced supply.
- The cost competitiveness of renewable energy resources varies across the country based on factors such as resource availability, incumbent non-renewable energy sources in the region and conditions of the local electricity market
- The fuel price is zero for a number of renewable energy resources including, wind, solar, geothermal, hydro, and waste-to-energy (costs associated with ash disposal). This facilitates long term cost savings, and avoids price volatility and inevitable increased cost of non-renewable resources.
- The cost of renewable resources does not factor in the cost savings from significant reductions in air and water pollution and the corresponding improvements to human health and the environment.

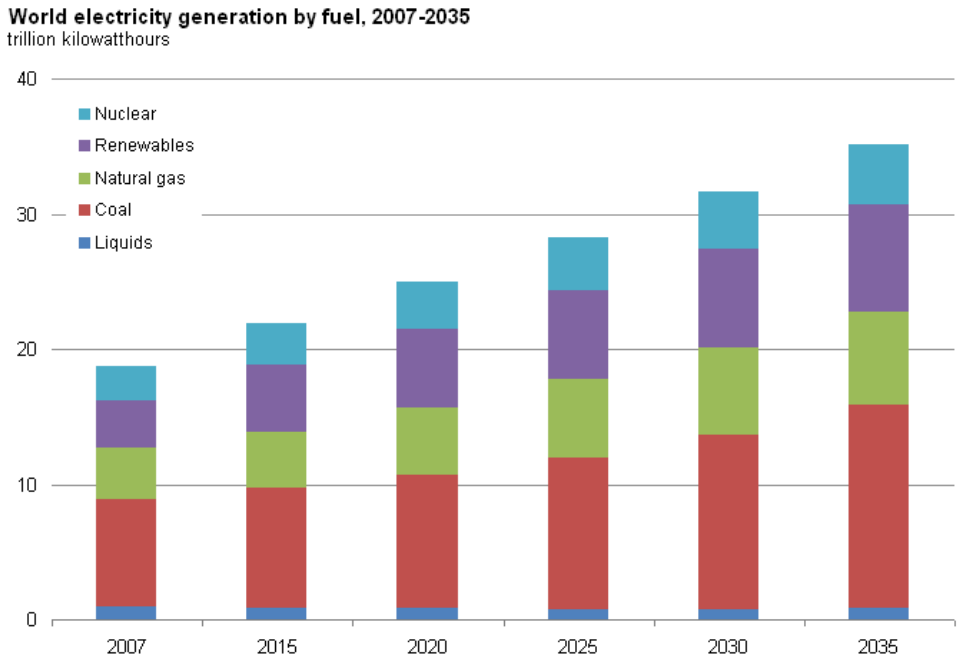
2) Renewable energy has not been proven at commercial scale and cannot meet more than a few percentage points of our energy demand.

- Renewable energy has been operating at commercial scale in the U.S. and around the world, and the market continues to increase rapidly.

- Denmark has been producing 18-20% of its electricity from wind since 2004.[2]
- China's wind market increased by 2360% between 2005 and 2010 while its solar market increased by 1185% during the same period.[3]
    - China projects that renewable sources will account for 20-25% of its energy mix by 2020 and 40-45% by 2050.[4]
- In the U.S. as of 2010, installed renewable power projects exceeded 130 GW – representing around 12% of the nation's total electricity capacity, while responsible for around 10.3% of total electricity generation. Over 22 GW of power projects have received permitting or are under construction. (Source: Trade Associations, EIA, Bloomberg New Energy Finance).
    - Renewable energy was responsible for 33% of annual power capacity additions in 2010, second only to natural gas which was responsible for 40%.[5]
    - The renewable fuels industry produced over 13.3 billion gallons of biofuels in 2010. This displaced the need for roughly 445 million barrels of oil, more than the total estimated crude oil imports from Saudi Arabia last year.[6]
    - About 60 more biofuels projects are under construction, which would together produce over 2 billion gallons a year.[7]

[2] Danish Energy Agency. (2009). Energy Statistics 2009, pg. 9. http://www.ens.dk/en-US/Info/FactsAndFigures/Energy_statistics_and_indicators/Annual%20Statistics/Documents/Energi%20Statistics%202009.pdf
[3] Li Junfeng. (2011). Energy and Environment in China, pg. 15. http://www.finnode.fi/files/37/Energy_and_Environment_in_China.pdf #15
[4] Worldwatch Institute. (2011). China's Growth in Clean Energy Matches Ambition http://www.worldwatch.org/Chinas-Growth-in-Clean-Energy-Matches-Ambition
[5] American Wind Energy Association. (2011). 2010 U.S. Wind Industry Market Update, pg. 1. http://awea.org/learnabout/publications/factsheets/upload/Market-Update-Factsheet-Final_April-2011.pdf
[6] Renewable Fuel Association. (2010). Ethanol Economic Contribution 2010, pg. 1. http://ethanolrfa.org/page/-/Ethanol%20Economic%20Contribution%202010%20Final%20Revised%20010411.pdf?nocdn=1
[7] Bloomberg New Energy Finance Desktop. Accessed August 2011.





Derived from EIA, International Energy Statistics database (as of November 2009), web site www.eia.gov/emeu/international. Projections: EIA, World Energy Projection System Plus (2010).

- The U.S. is the "Saudi Arabia" of renewable energy, with abundant resources in all regions of the country.[8]
- U.S. Government and other studies estimate:
  - The U.S. could obtain 20% of electricity from wind by 2030.[9]
  - 26 coastal states could obtain 20-100% of electricity by adding offshore wind.[10]
  - Enough sunlight hits the Earth each day to supply the entire world's electricity needs for a year.[11]
  - The U.S. has 100 GW of potential geothermal.[12]

3) Renewable energy is inefficient, unreliable due to intermittency issues, and requires expensive back up.

- The current electric grid operating system is capable of incorporating various renewable energy resources at significant scale, including wind and solar, without additional back-up or storage capacity. Required system reserves, existing operating parameters and technology allows grid managers to better plan and adjust to energy fluctuations and to predict the availability of these resources with ever improving accuracy .
  - An NREL study tested a 20% renewables scenario in the Western grid in 2017, found manageable impact given area cooperation to balance loads. It did not require additional storage.[13]
- The additions of computer technology to the aging grid, to make it "smart" will allow it to incorporate much higher percentages of variable resources.
- Many renewable energy resources are not intermittent and can serve as a baseload supply of electricity including geothermal, biomass, hydropower and waste-to-energy.
- Intermittent sources like solar and wind can provide reliable power at scale and function just like baseload power when combined with storage technology or natural gas co-firing in the form of hybrid power plants.
- Improved conventional ramping technology, such as that related to natural gas, will help the grid accommodate variable resources in more cost effective ways.

4) Only certain states have sufficient renewable energy resources that can be developed to meet a worthwhile percentage of their energy need and generate economic benefit.

- There are studies showing all regions have abundant renewable energy resources, including the Southeast.[14]

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[8] National Renewable Energy Laboratory. (2009). Renewable Energy Technology Resource Maps for the United States. http://www.nrel.gov/gis/docs/resource_maps_200905.ppt

[9] Department of Energy (2009). 2008 Wind Technologies Market Report, pg. 61. http://eetd.lbl.gov/ea/ems/reports/2008-wind-technologies.pdf

[10] Department of Energy (2008). 20% Wind Energy by 2030, pg. 68. http://www.20percentwind.org/20percent_wind_energy_report_05-11-08_wk.pdf

[11] Hudson Valley Clean Energy. http://www.hvce.com/environmental-benefits/

[12] Massachusetts Institute of Technology (2006). The Future of Geothermal Energy, pg. 20. http://www1.eere.energy.gov/geothermal/pdfs/future_geo_energy.pdf

[13] National Renewable Energy Laboratory (2010). How do High Levels of Wind and Solar Impact the Grid? The Western Wind and Solar Integration Study, pg. 11. http://www.nrel.gov/wind/systemsintegration/pdfs/2010/lew_wwsis_grid_impact.pdf

[14] American Council on Renewable Energy. (2011). Renewable Energy in America: Markets, Economic Development and Policy in the 50 States. http://www.acore.org/publications/50states

- Wind – Best resource in the world is in the center of the US; also strong in parts of Appalachians Rockies and off both coasts (near most populated areas)
- Solar – Best resource in world in US Southwest; very strong resource throughout Southeast, and center of country; ample resources in North
- Geothermal- Very strong in the West; pockets of geothermal in Pennsylvania region and Texas region
- Biomass- Southeast, Midwest and West
- Hydropower- Northwest, West, Northeast, and along Mississippi
- Waste-to-Energy- All regions

6) The major barriers to the competitiveness and scale up of renewable energy technologies are technical problems, which require innovative breakthroughs. To this end the government should focus on policies that foster R&D and innovation, instead of policies to support the scale up and commercialization of renewable energy.

- Renewable energy is already scaling up and growing at a significant rate
- Many renewable energy technologies including wind, solar, geothermal, hydropower, waste-to-energy and biomass, are able to be scaled up now and are experiencing significant cost reductions
  - Over the past five years, the wind power market has more than tripled in installed capacity in the U.S, while the solar photovoltaic market has increased by more than six times.
- While these resources will continue to see improvements in technology and corresponding cost reductions, the major barriers to scaling up and reaching grid parity are the lack of consistent and effective policies to foster market demand, private sector financing and development of the necessary infrastructure
- R&D and innovation are still needed for emerging technologies such as marine and hydrokinetic, as well as for next-generation versions of existing technologies, but cannot be done at the expense of scaling up existing technologies
- The most effective way to encourage private sector innovation, improve technology and lower costs is to scale up existing technologies.
  - Encouraging market scale up early and quickly creates economies of scale and profits that attracts new private sector entrants to compete through lower costs and new innovations for a piece of a growing market.

7) It is not necessary to develop renewable energy as non-renewable resources can meet all our energy needs at low cost in perpetuity

- Growth in population and standards of living around the globe are causing significant increases in energy demand, which can only be met in the long-term through increasing energy generation from renewable energy resources, within a broader portfolio of energy sources.
- As demand increases, non-renewable, finite resources will decrease in supply, experience more price volatility, and increase in costs.
- Simultaneously, the cost of renewable energy, which has zero fuel costs (except for bioenergy), will fall as technology improves, and will meet every increasing portions of our energy demand

- Increased use of renewable fuels in the transportation sector will reduce our unsustainable reliance on foreign sources of oil, which accounted for over 50% of trade deficit in 2010.[15]

II. Myths Related to Impacts from Renewable Energy Development

1) Renewable energy development will hinder economic growth and job creation

- Renewable energy development is a key ingredient of economic growth and job creation in the 21st century.
- Global energy demand will double or triple by 2050 with a significant portion being met through clean, abundant renewable energy. This will necessitate billions of dollars of investment and corresponding jobs to help meet this demand through renewable energy.[16]
    - Annual investments in global renewable energy markets could reach $106-$230 billion a year in 2020 and as much as $424 billion a year in 2030 (in year 2000 dollars).[17]
    - Global investment in Clean Energy [RE, EE, smart grid, storage technology] increased 230% from '05-'09.[18]
- Renewable energy development is labor intensive so leads to significantly more jobs per unit of production than non-renewable resources.
    - From 2003-2010, four of five fastest growing job segments of clean economy were in renewable energy. This includes
        - +15,110 jobs in wind (+14.5%),
        - +3,732 jobs in solar thermal (+18.4%),
        - +12,286 jobs in solar PV (+10.7%).[19]
- In 2010, 2.7 million people were employed in the U.S. clean [low-carbon] economy
    - About 26% of the clean economy jobs are in the manufacturing sector compared to only 9% of jobs in the broader economy.
    - On a per job basis, establishments in the clean energy economy export roughly twice the value of a typical U.S. job.[20]
- The clean economy creates new jobs in almost every segment of the economy including:
    - Electricity generation
    - Transportation
    - Chemicals
    - Fuels
    - Lighting

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[15] U.S. Census Bureau. (2011). Petroleum as a Percentage of the Total Trade Deficit. http://www.census.gov/foreign-trade/statistics/graphs/PetroleumImports.html#graph2

[16] World Energy Council (2007). Deciding the Future. Energy Policy Scenarios to 2050, pg. 4. http://www.worldenergy.org/documents/scenarios_study_es_online.pdf

[17] PEW Center on Global Climate Change (2010). In Brief: Clean Energy Markets: Jobs and Opportunities, pg. 2. http://www.pewclimate.org/docUploads/Clean_Energy_Update__Final.pdf

[18] The PEW Charitable Trusts (2010). Who's Winning the Clean Energy Race? http://www.pewenvironment.org/uploadedFiles/PEG/Publications/Report/G-20Report-LOWRes-FINAL.pdf

[19] Brookings. (2011). Sizing the Clean Economy, pg. 22. http://www.brookings.edu/~/media/Files/Programs/Metro/clean_economy/0713_clean_economy.pdf

[20] Brookings. (2011) Sizing the Clean Economy, pg. 4.

  - Water
  - Construction
- As of late 2010, more than 500,000 jobs had been created in the clean energy, clean technology sectors in California
  - In construction, 88,810, or 20.5% of sector total, were in green jobs.
  - In manufacturing, 61,300, or 14.2% of sector total, were in green jobs.[21]
- In addition, renewable energy development fosters job creation in urban, suburban and rural areas, in all sectors of our economy, from manufacturing to construction to the professional services.
  - Research indicates investment in renewable energy creates between 2-4 times the jobs of convention electricity sources.[22]

Type of Renewable Energy	U.S. Job Estimates	Relation to Industry
Wind	75,000	Direct/indirect
Solar	93,500	Direct/indirect*
Hydropower	200,000-300,000	Direct
Geothermal	18,300	Direct/indirect
Biomass power	14,000	Unknown
Biodiesel	51,893	Unknown
Ethanol	70,402; 69,564; 260,711	Direct; indirect; induced
Total	**853,370-953,370**	

** Estimate comes from a direct survey of solar employers, who reported the number of workers who spend 50% or more of their time in solar.*

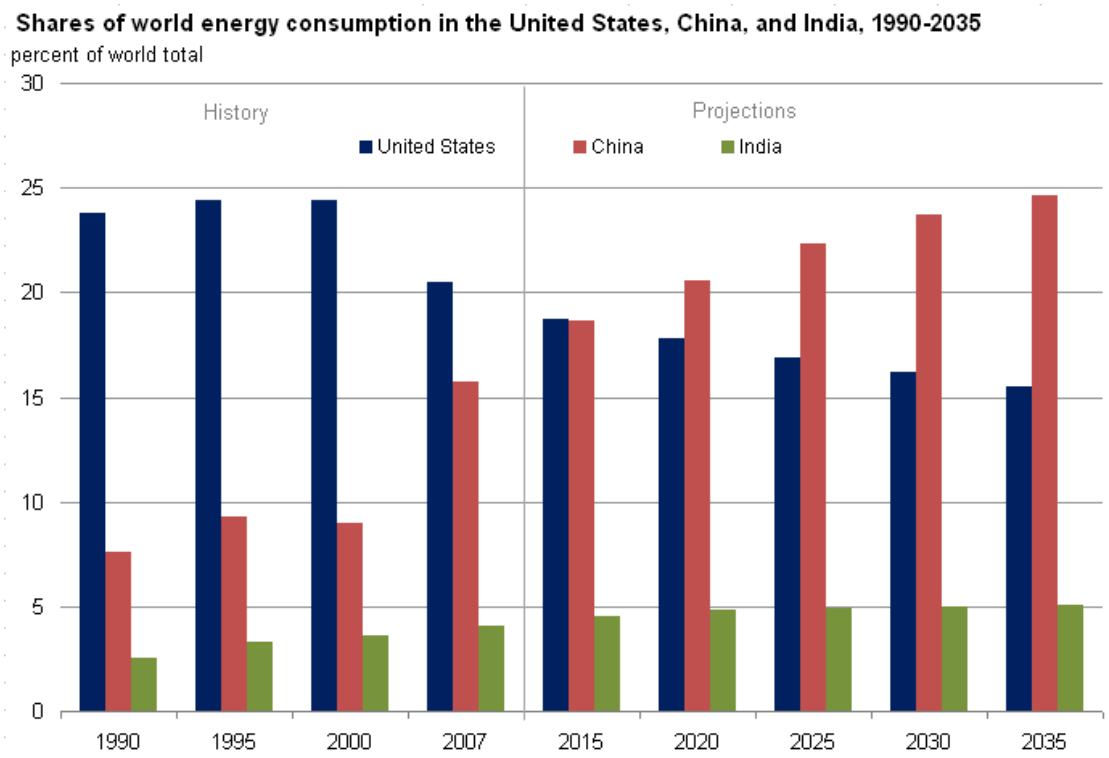
Energy and Environment Study Institute, 2011

2) Renewable energy development will make us less competitive globally

- Renewable energy development is essential for the U.S. to retain its leadership role in the 21st century global economy.

[21] California Employment Development Department. (2010). California's Green Economy: Summary of Survey Results, pg. 20. http://www.labormarketinfo.edd.ca.gov/contentpub/GreenDigest/CA-Green-Economy-SummarySurveyResults.pdf

[22] CleanEdge (2010). Clean Tech Job Trends 2010, pg. 3. http://www.cleanedge.com/reports/pdf/JobTrends2010.pdf



EIA, International Energy Statistics database (as of November 2009), web site www.eia.gov/emeu/international . Projections: EIA, World Energy Projection System Plus (2010).

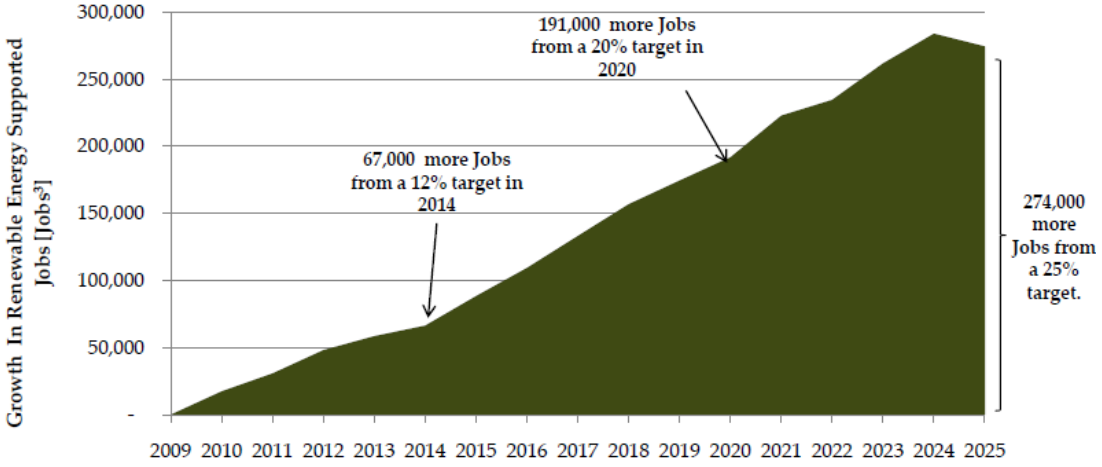
- Clean energy, which includes renewable energy, energy efficiency and smart grid technologies, is one of the leading growth sectors of this century as populations grow, standard of living increases, and countries search for an abundant, stable, affordable and environmentally sustainable supply of energy.
    - The clean energy sector is forecasted to grow to $2.3 trillion by 2020 and continue to increase thereafter.[23]
    - To ensure the U.S. is able to capture a viable portion of the rapidly growing clean energy sector, including the private sector investment and jobs, the U.S. must foster renewable energy development.

3) The U.S. cannot compete against other countries such as China for renewable energy development and the corresponding jobs

- The U.S. is fully capable of competing against other countries in the development of renewable energy, including the jobs associated with innovation, construction, supporting technology, various services and even manufacturing.
    - Many renewable energy technologies were invented in the U.S. including solar and wind
- Despite economic gains in China, the U.S. continues to be far ahead in R&D, innovation and corresponding venture capital investment - vital components of the clean energy economy.

[23] The PEW Charitable Trusts (2010). Global Clean Power: A $2.3 Trillion Opportunity, pg. 9. http://www.pewtrusts.org/uploadedFiles/wwwpewtrustsorg/Reports/Global_warming/G20-Report-LowRes.pdf

- Although competitors have lower labor standards, there are many other factors that determine where manufacturing facilities open including market demand, favorable economic conditions, and amicable siting policies.
- As we have seen elsewhere, especially Germany, stable market demand has proved to be a leading factor as companies locate manufacturing facilities near customers to reduce the extremely high cost of shipping renewable energy technologies.
    - In 2010, U.S. domestic manufacturing accounts for 50% of the wind turbine value, up from less than 25% a few years before,, according to the U.S. International Trade Commission
    - Renewable Energy Standard of 25% by 2025 could create 274,000 renewable energy jobs
        - 116,000 wind industry
        - 60,000 biomass
        - 50,000 solar
        - 34,000 hydropower
        - 15,000 waste-to-energy[24]



(Navigant Consulting, 2010)

- In addition to manufacturing, renewable energy development also leads to jobs in construction, maintenance, and the related management and services

4) The only benefits of, or justifications for, renewable energy development are environmental, namely pollution reduction and mitigation of climate change

- Renewable energy development is a key component of economic growth, job creation and energy security.
- Renewable energy development diversifies our energy supply mix with sources that have zero cost, thereby hedging against price volatility from non-renewable energy sources.
- The scale up of renewable energy, which is a domestic resource, contributes to our economic and energy security by increasing investment at home while reducing the amount of money we send to overseas to often volatile regions of the world.

[24] Navigant Consulting (2010). Job Impacts of an 25% by 2025 RES Alliance for Jobs Study, pg. 1. http://www.resallianceforjobs.org/public/RESAllianceStudyBackgrounder.pdf

5) Policies supporting renewable energy are a bad investment, costing the government much more than it gets in return.

- Government support for renewable energy development is a wise investment as it fosters private sector investment and returns funds to the Treasury in future tax revenue that far exceeds the amount of government investment.
    - The $2 billion 1603 Treasury Grant Program stimulated nearly $9 billion in new clean energy investment
    - The 1705 Loan Guarantee Program attracted nearly $40 billion in private investment
- The 5.2 GW of wind power installed in reliance on the 1603 cash grant or PTC in 2010 will result in an estimated net benefit of $100 million in tax revenue to the U.S. Treasury.[25]
- There is a long history of the U.S. government subsidizing key industries early on, to get them launched – including railroads, airplanes, automobiles (through building of the national highway system), the internet, semiconductors, and more
    - The overall economic returns of those early government investments far more than the initial cost

III. Myths Related to Renewable Energy Markets and Policy

1) Policies promoting renewable energy, in the form of carrots or sticks, interfere with the free energy market.

- Energy generation is one of the most heavily regulated and subsidized sectors of our economy. There is simply no such thing as, nor has there ever been, a free energy market.
- The construction and operation of non-renewable and renewable energy facilities, the sale of the generated energy, as well as the grid through which the energy passes, are all heavily regulated by federal, state and local laws.
- All energy sources, both non-renewable and renewable, are subsidized at both the federal and state level. Renewable resources have received inconsistent, unpredictable subsidies over the past two decades, while non-renewable energy technologies have been the recipients of permanent subsidies for multiple decades.
- Policy support for renewable energy technology is important to ensure U.S. competitiveness and launch valuable new industries.

2) Renewable energy is over-subsidized

- Renewable energy sources, like all non-renewable sources, have received government subsidies. However, permanent subsidies for non-renewable resources have been in place for many decades, and subsidies for renewables only began in the 1970.
- In addition, subsidies for renewables have been in place for insufficient periods of time, are unpredictable, and have even been allowed to expire on several occasions.

[25] General Electric Analysis. 2011. GE estimated the net present value (NPV) of Federal government tax expenditures (costs) and revenues associated with the 5.2 GW of wind installed in 2010. These cash flows started with manufacturing and construction in 2009 and 2010 and assumed a 20-year operating life thereafter. GE estimated that 70% of the wind capacity that went online in 2010 (~3.5 GW) used the 1603 Grant, while the rest used the PTC.

- Non-renewables have been the recipients of the vast majority of federal energy incentives over time (including direct spending, R&D and tax expenditures)
- Fossil fuels enjoyed $72 billion in subsidies from 2002-2008 versus $29 billion for renewable over the same period
- Tax incentives for renewables, which have been historically well below non-renewables, received a short-term boost in FY 2008 which is expected to last through 2012 and then decline

3) The renewable energy sector is basically a government program with most of the financing and investment of renewable energy coming from the government.

- $243 billion was invested in the global clean energy sector in 2010 with 70% coming from the private sector.[26]
- Private sector entities are investing in all stages of renewable energy development, from innovation to commercialization
- Government policies are needed to foster this private sector investment in a young industry that is competing against non-renewable sources, which have been in place for decades and continue to receive government subsidies.
- The private sector investment far exceeds the amount of dollars spent by the government.
- In 2010, there were 1400 private venture-backed "CleanTech" startups in existence worldwide – this is real business, and is being funded by private investors[27] (source: Ernst & Young)
    - More than 17% of U.S. venture capital went to renewable energy and energy efficiency investments in 2010, up 61% from 2009.[28]
    - There are already several hundred public companies in the world who get 50% or more of their business from "CleanTech" solutions (source: Ernst & Young)

4) Various financial incentives such as tax credits, mandates such as an RPS, and programs such as the Loan Guarantee Program are redundant.

- These policies all support different stages and aspects of renewable energy development and are complementary in nature.
- Policies such as an RPS foster the market demand for renewable energy that will allow developers to obtain the financing for their renewable energy project
- Financial incentives such as the tax credits and the 1603 grant foster the commercial scale up of renewable energy technology by encouraging private sector investment in renewable energy projects
- Programs such as the Department of Energy Loan Guarantee Program or the proposed Clean Energy Deployment Administration (CEDA) help emerging technologies that have been proven at pilot phase obtain private sector financing for their first commercial

[26] PEW Charitable Trusts found that global stimulus spending was $77 billion in 2010 (or 30% of the total investment), pg. 4-5. http://www.pewenvironment.org/uploadedFiles/PEG/Publications/Report/G-20Report-LOWRes-FINAL.pdf

[27] Ernst & Young. (2010) Venture Insights- Global Cleantech Investments, pg. 22. http://www.dena.de/fileadmin/user_upload/Download/Veranstaltungen/2011/Vortr%C3%A4ge_BEF_EE/06.04._10.00_Pr%C3%A4sentation_Christiansen_Venture_Insights.pdf

[28] National Venture Capital Association. (2011). NCVA Yearbook 2011, pg. 24. http://www.nvca.org/index.php?option=com_content&view=article&id=257&Itemid=103

project. Once a technology has been proven at commercial scale, the risks will be lowered and it will be able to obtain private sector financing without a loan guarantee.

Solar Energy

1) Solar technology does not work well in cold climates

- Solar PV technology works in any climate where the sun shines and actually works more efficiently in cold climates

2) Solar technology does not work in cloudy conditions

- Solar PV can work in cloudy conditions. It is the energy from light that is harnessed for power production, and this light exists on cloudy days. Concentrated solar technology only works in areas where there is significant direct sunlight such as the Southwest.

Wind Energy

1) Wind turbines kill numerous birds and bats

- Wind turbines do kill some birds and bats, about 28,500 a year according to a 2005 USDA study.[29] This compares to:
  - Buildings and windows which kill an estimated 550 million birds each year;
  - Power lines which kill 130 million birds a year;
  - House cats, which kill an estimated 100 million birds a year;
  - Automobiles which kill an estimated 60-80 million birds each year; and
  - Pesticides, which kill an estimated 67 million birds each year.

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[29] USDA Forest Service. (2005). A Summary and Comparison of Bird Mortality from Anthropogenic Causes with an Emphasis on Collisions, pg. 11. http://www.fs.fed.us/psw/publications/documents/psw_gtr191/Asilomar/pdfs/1029-1042.pdf