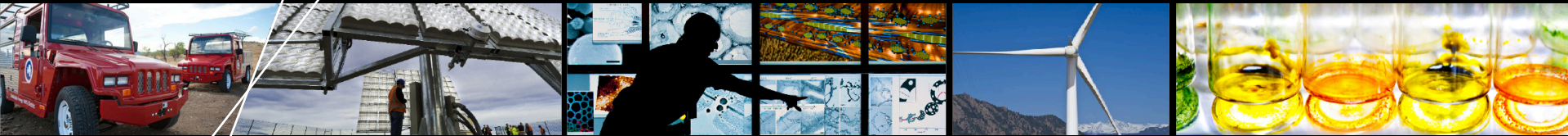


# Renewable Energy in an “All-Of-The-Above” World



**Federal Utility Partnership  
Working Group Seminar  
January 14, 2014  
Dr. Dan E. Arvizu  
Laboratory Director**

# A Profound Transformation is Required

## Today's Unsustainable Energy System

## Future Sustainable Energy System



### TRANSFORMATION

- Limited fuel diversity
- Subject to price volatility
- Inefficient and rigid
- Significant carbon emissions
- Delivery systems vulnerable

- Diverse supply options
- Affordable, stable and reliable
- Efficient and flexible
- Carbon neutral
- Secure and resilient
- Engine for innovation

1/13/2014

# A National Conversation is Well Underway

JOURNAL REPORT | UNLEASHING INNOVATION

# ENERGY

THE WALL STREET JOURNAL

Monday, September 23, 2013 | R1

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## Six Myths About Renewable Energy

So, you think renewables are a speck on the energy landscape? That they can create millions of green jobs? Think again.

**Test Your Alternative IQ**  
A lucky seven questions about renewable energy.  
Answers on page R2.

1. What country produces the most electricity, in absolute terms, from renewable sources?  
a) Iceland b) Norway  
c) U.S. d) China
2. What country gets the largest percentage of its electricity from renewable sources?  
a) Iceland b) Norway  
c) Paraguay d) U.S.
3. Last year, what was the biggest source of new generating capacity in the U.S.?  
a) Natural gas  
b) Wind power  
c) Nuclear-power upgrades  
d) Solar power
4. U.S. wind farms have roughly the same generating capacity on paper as the entire power sector in which country?  
a) Luxembourg b) Spain  
c) France d) Australia
5. True or false: The Romans used geothermal energy.
6. What country has the most installed solar power capacity?  
a) U.S. b) Spain  
c) China d) Germany
7. California and Arizona lead the U.S. in solar-power capacity. What state is No. 3?  
a) Hawaii b) New Jersey  
c) Florida d) Nevada



## The Myths

1. Renewables are an insignificant source of power
2. Renewables can replace all fossil fuels
3. Renewables are too expensive
4. Variability dooms renewable energy
5. Cheap natural gas is the enemy of renewable energy
6. Renewable energy means millions of green jobs

# Are Global Markets Prepared?

## Advanced Energy: Investing in the Future... Renewables or fossil fuels?

- A distributed resources electricity model including high penetration of renewables
- Growing importance of natural gas
- Infrastructure investment needs
- Policy in the context of divided government

### Forum Speakers



Dan Arvizi  
Director  
National Renewable  
Energy Laboratory



Dr. Ing. Leonard  
Birnbaum  
Chief Commercial Officer  
E.ON



David Crane  
President and CEO  
NRG Energy



Chris Faulkner  
Chief Executive Officer  
Breitling Oil & Gas Corp



Andrés Gluski  
President and CEO  
The AES Corporation



Mark Little  
Chief Technology Officer  
General Electric



Miguel Martínez  
San Martín  
Chief Financial Officer  
Repsol UPF, S.A.



Lucian Pugliese  
President  
Energy Policy Research  
Foundation



Adam Sieminski  
Administrator  
Energy Information  
Administration



Charif Souki  
Chairman and CEO  
Cheniere Energy



7th Annual

**PLATTS**  
GLOBAL ENERGY  
OUTLOOK FORUM

December 12, 2013 • 8 am – 3 pm

Waldorf Astoria  
301 Park Avenue,  
New York

## Bridging the US Boom: *Global Markets Prepare*

The 7th annual Platts Global Energy Outlook Forum elevates the level of debate by tackling tough topics and sparking lively discussion between panelists and high-level delegates. Each year the forum attracts the participation of some 200 senior energy leaders, government officials, financiers and mainstream media from 10 to 15 countries. Plan now to attend, network with your peers and get deep insight into the world's most pressing energy issues!

8:00 – 9:00 am

**Registration**

9:00 – 9:10 am

**Welcome and Opening Remarks**

Miguel Martínez San Martín, Chief Financial Officer Repsol UPF, S.A.

9:15 – 10:45 am

**Advanced Energy: Investing in the Future**

While cheap, reliable gas and other hydrocarbons fuel the bulk of a growing world for the next few decades, what are the smart investments in technology, people and efficiency solutions which can be made today that will lead to an era of advanced energy? Are renewables still viable or do they lose steam to smarter ways of extracting and consuming abundant fossil fuels? We'll discuss what an advanced energy future encompasses, with alternative energy production, the latest technologies and real-world demands at the forefront.

11:00 – 12:30 pm

**Executive Roundtable: Switching, Ditching and Bridging Fuels**

Does nuclear power hold its place with carbon limits or will utilities inevitably move away from it? Will switching from coal to gas make as much sense in 10 or 20 years as it does now? Can alternative energy play a larger role in the power mix? These choices impact generations, and the long-term winners will best decide how to bridge the bounty of US gas toward a future of reliable and affordable power. We'll hear from the visionaries who are making the first decisions, while others wait to react.

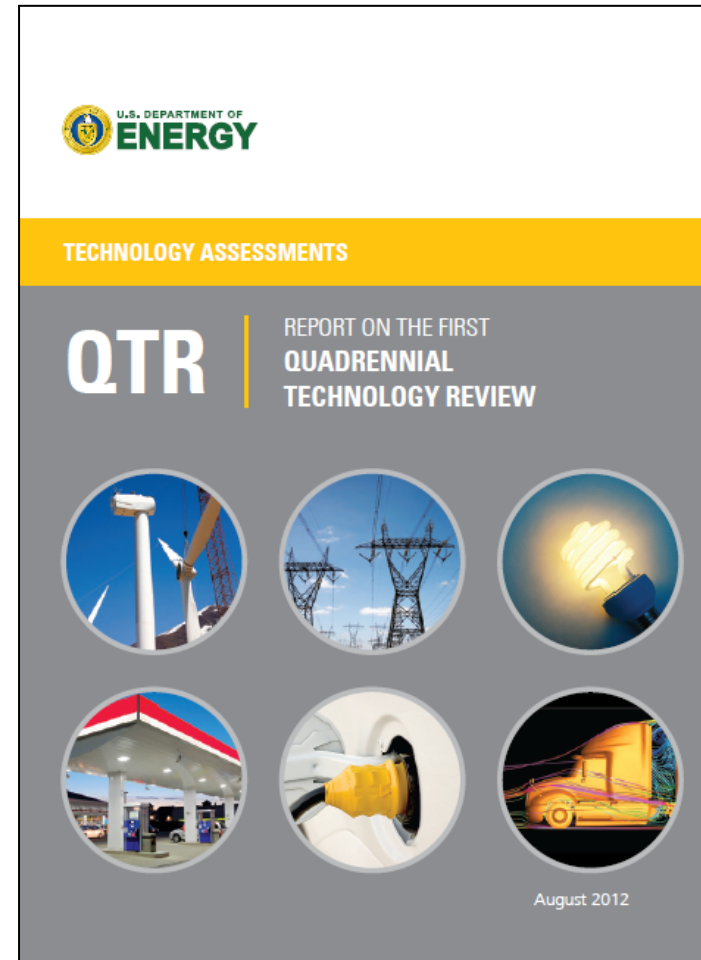
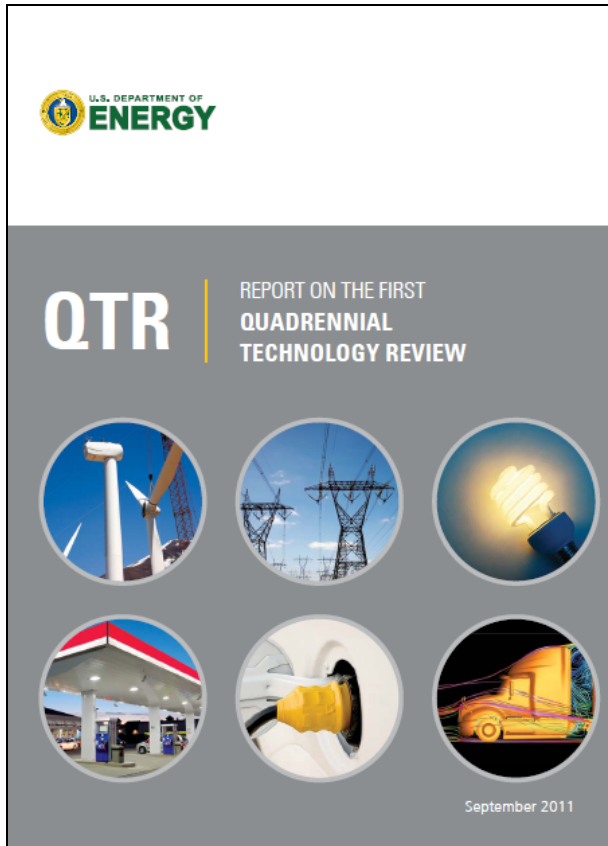
12:30 – 2:00 pm

**Award of Excellence Ceremony Lunch  
Keynote Address**



Dr. Ernest Moniz  
United States Secretary of Energy

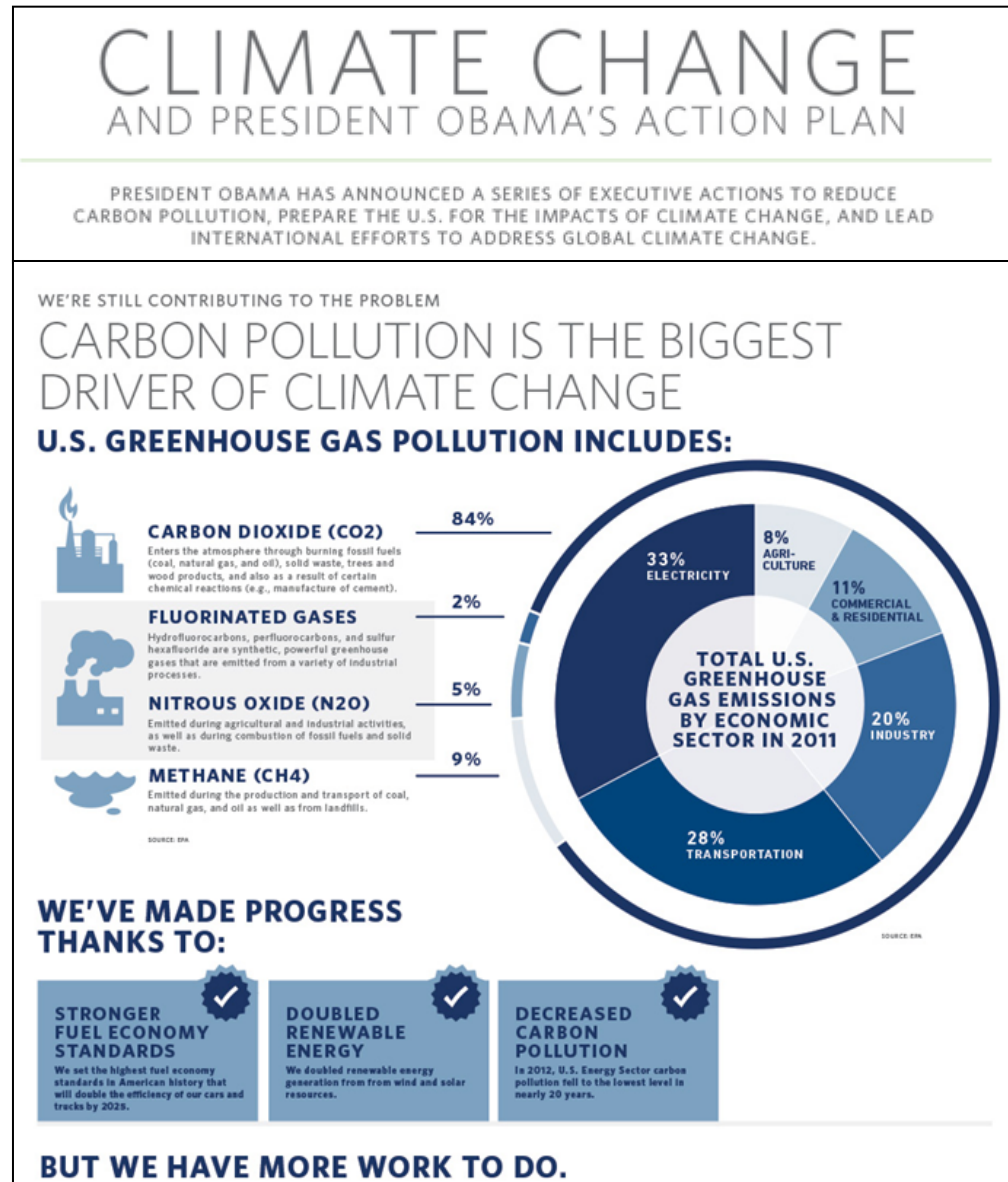
# Moving Toward a Quadrennial Energy Review



# Climate Action Plan

The plan's three key thrusts:

- **Cut Carbon Pollution in America**
- **Prepare the United States for the Impacts of Climate Change**
- **Lead International Efforts to Combat Global Climate Change and Prepare for its Impacts**



# Climate Action Plan

## THE PRESIDENT'S PLAN TO CUT CARBON POLLUTION IN AMERICA

### REDUCING CARBON POLLUTION FROM POWER PLANTS



Power plants are the largest major source of emissions in the U.S., together accounting for roughly 40 percent of all domestic greenhouse gas pollution.

**PROGRESS:**

Renewable energy accounts for about half of all new generation capacity installed by 2015.

**PROGRESS:**

25 states have renewable energy targets to place, and more than 20 have set energy efficiency targets.

**CONTINUING THE MOMENTUM FOR THE FUTURE:**

There are currently no federal standards in place to reduce carbon pollution from power plants.

**2013-2016**

President Obama is directing the EPA to work closely with states, industry and other stakeholders to establish carbon pollution standards for both new and existing power plants.

### ACCELERATING CLEAN ENERGY LEADERSHIP



During the President's first term, the United States more than doubled generation of electricity from wind and solar energy.

**PROGRESS:**

In 2009, the Administration has approved 20 utility-scale solar facilities on public lands, which will provide enough electricity to power 4.4 million homes and support an estimated 10,000 jobs.

**PROGRESS:**

In 2012, the President set a goal to lease permits for 70 gigawatts of renewable on public lands by the end of the year, and the Department of Interior surpassed that goal ahead of schedule.

**CONTINUING THE MOMENTUM FOR THE FUTURE:**

To ensure America's continued leadership position in clean energy, President Obama has set new goals:

**2014**

President Obama's Fiscal Year 2014 Budget commits to increasing funding for clean energy technology across all agencies by 20 percent. This includes investment in a range of energy technologies, from advanced biofuels and emerging nuclear technologies to clean coal.

**2020**

To ensure America's continued leadership position in clean energy, President Obama has set a goal to double wind and solar electricity generation once again by 2020.

**2020**

President Obama has also directed the Department of Interior to permit enough renewable electricity generation to power more than 6 million homes. Federal agencies are setting a new goal of reaching 100MW of installed renewable capacity across federally-subsidized housing stock by 2020.

**2025**

The Department of Defense — the single largest consumer of energy in the United States — is committed to deploying three gigawatts of renewable energy on military installations by 2025.

THE PRESIDENT'S PLAN WILL

## PREPARE THE U.S. FOR THE IMPACTS OF CLIMATE CHANGE

### WE'VE MADE GREAT PROGRESS



The Administration and partners developed national strategies to help decision makers address the impacts of climate change on freshwater resources — fish, wildlife, and plants — and oceans.

**PROGRESS:**

In 2010, federal agencies released Climate Change Adaptive Plans for the first time, outlining strategies to protect their operations, missions and programs from the effects of climate change.

**PROGRESS:**

The US Global Change Research Program, NOAA, USACE, and FEMA developed and released interactive, low-level risk maps and a calculator to aid rebuilding efforts in NY and NJ after Superstorm Sandy.

### THERE'S MORE WORK TO DO

Moving forward, the Obama Administration will help states, cities, and towns build stronger communities and infrastructure, protect critical sectors of our economy as well as our natural resources, and use sound science to better understand and manage climate impacts.



### SUPPORT CLIMATE-RESILIENT INVESTMENTS

at the community level by removing policy barriers, modernizing programs, and establishing a short-term task force of state, local, and tribal officials to advise on key actions the federal government can take to support local and state efforts to prepare for climate change.

### REBUILD AND LEARN FROM SUPERSTORM SANDY

by piloting innovative strategies in the Superstorm Sandy-affected region to strengthen communities against future extreme weather and other climate impacts and building on a new, consistent flood-risk reduction standard established for the Sandy-affected region, agencies will update their flood-risk reduction standards for all federally-funded projects.



### LAUNCH AN EFFORT TO CREATE SUSTAINABLE AND RESILIENT HOSPITALS

In the face of climate change through a public-private partnership with the healthcare industry.

BECAUSE CLIMATE CHANGE SPANS INTERNATIONAL BORDERS, THE PRESIDENT'S PLAN WILL ALSO

## LEAD INTERNATIONAL EFFORTS TO ADDRESS GLOBAL CLIMATE CHANGE

America will continue to take on a leadership role in engaging the world's major economies to advance key climate priorities and in galvanizing global action through international climate negotiations. The plan will:

### WORK WITH OTHER COUNTRIES TO TAKE ACTION TO ADDRESS CLIMATE CHANGE

ENHANCE MULTILATERAL ENGAGEMENT WITH MAJOR ECONOMIES

EXPAND BILATERAL COOPERATION WITH MAJOR EMERGING ECONOMIES

COMBAT SHORT-LIVED CLIMATE POLLUTANTS

REDUCE EMISSIONS FROM DEFORESTATION AND FOREST DEGRADATION

EXPAND CLEAN ENERGY USE AND CUT ENERGY WASTE

NEGOTIATE GLOBAL FREE TRADE IN ENVIRONMENTAL GOODS AND SERVICES

PHASE OUT SUBSIDIES THAT ENCOURAGE WASTEFUL CONSUMPTION OF FOSSIL FUELS

LEAD GLOBAL PUBLIC SECTOR FINANCING TOWARD CLEANER ENERGY

STRENGTHEN GLOBAL RESILIENCE TO CLIMATE CHANGE

MOBILIZE CLIMATE FINANCE

### LEAD EFFORTS TO ADDRESS CLIMATE CHANGE THROUGH INTERNATIONAL NEGOTIATIONS



The United States has made historic progress in the international climate negotiations during the past four years.

**PROGRESS:**

In 2009, the U.S. and China launched the 2009 World Clean Energy Research Center to promote research and development of clean energy technology needed equally by the U.S. and China.

**PROGRESS:**

Negotiations at the Copenhagen Accord helped to secure the world toward a new, sustainable economic trajectory through 2050 by limiting greenhouse gas emissions.

Read the whole plan at <http://www.whitehouse.gov/share/climate-action-plan>

# Secretary Moniz's Priorities

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- Believes Quadrennial Energy Review (QER), driven by the Climate Action Plan, is very important and labs will play an important role, especially in analysis
- Understands a constrained budget environment but expects DOE to do new things
- Will focus on engaging national labs as strategic partners to help set DOE direction
- Believes national labs can have greater impact on solving national grand challenges and economic competitiveness
- Thinks strategic international engagement is important but must be coordinated





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