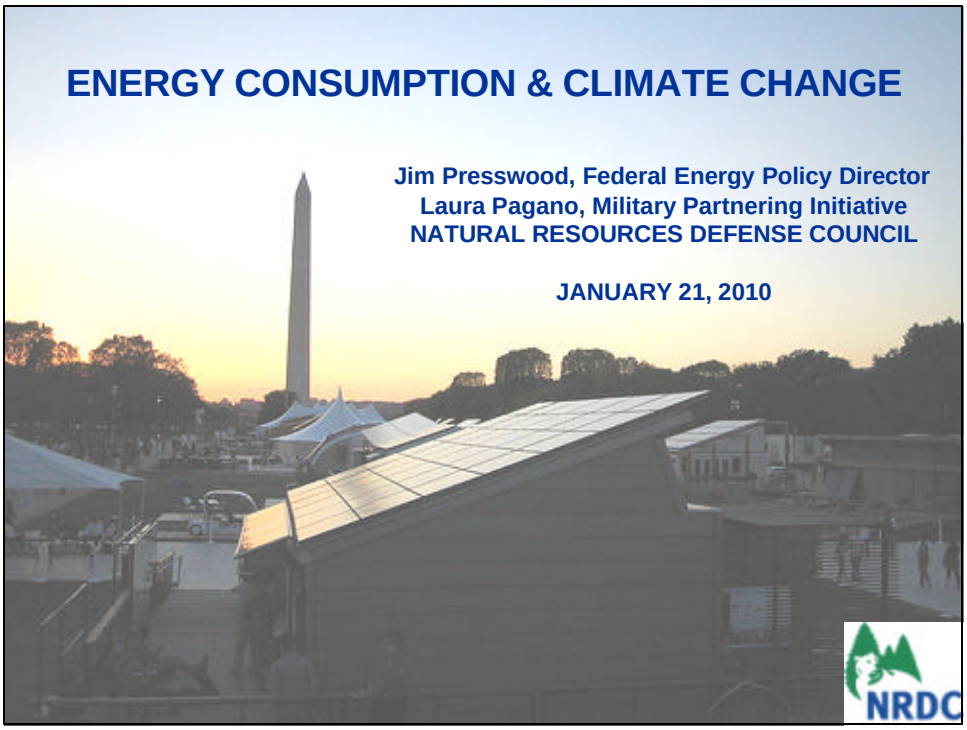


ENERGY CONSUMPTION & CLIMATE CHANGE

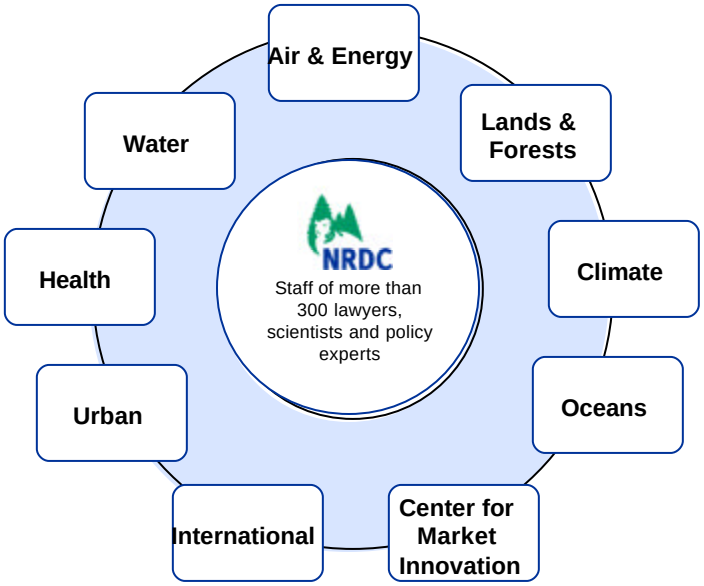
Jim Presswood, Federal Energy Policy Director
Laura Pagano, Military Partnering Initiative
NATURAL RESOURCES DEFENSE COUNCIL

JANUARY 21, 2010

AGENDA

- ? **NRDC G2**
- ? Global Warming Impacts and Emerging Policies
- ? Energy Efficiency: Barriers, Opportunities, & Tools
- ? Developing Renewable Energy Sources
- ? Clean Alternative Fuels

NRDC G2



Offices

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NRDC STRATEGIC PRIORITIES

Curbing Global Warming

- Our scientists, lawyers and policy experts work to help implement practical solutions that will drastically cut global warming pollution.

Building the Clean Energy Economy

- America's dependence on fossil fuels is a major contributor to global warming, toxic air pollution and dependence on some of the world's most oppressive regimes.

Saving Wildlands Across the Americas

- The destruction of wildlands means the loss of vast areas of biological diversity, critical regulators of global climate, and irreplaceable sanctuaries for recreation and contemplation.

Reviving Our Oceans

- Our ocean policy experts work on both coasts, and internationally, to create and implement a visionary, comprehensive strategy to revitalize the world's oceans.

Stemming the Tide of Toxic Chemicals

- Reducing or eliminating the load of dangerous chemicals in the products we buy, the air we breathe, the food we eat and the water we drink can help reduce the toll of human disease and suffering.

Speeding the Greening of China

- China is now one of the leading emitters of global warming pollution. It's the world leader in coal consumption, as well as the top emitter of sulfur dioxide and mercury. China's environmental pollution affects not only the Chinese people and their economy, but also the health of our entire planet.

NRDC HAS A LONG HISTORY OF SUSTAINABLE ENERGY EXPERTISE

NRDC has well-developed relationships with:

- **The 3 major electric utility trade associations**
  - Edison Electric Institute
  - American Public Power Association
  - National Rural Electric Cooperatives Association
- **Many individual utilities**

David Goldstein

Dr. Goldstein has worked on energy efficiency and energy policy since the early 1970s. He currently co-directs NRDC's Energy Program, where his work has spanned a broad range of energy issues in the building sector, energy planning, utility policy, and transportation.

Sheryl Carter

Sheryl helps lead NRDC's energy program which promotes the increased development of energy efficiency, renewables and other environmentally sound and cost-effective energy resources to reduce the public health, environmental and global warming impacts of our energy production and use.

NRDC participates in all phases of sustainable energy planning and strategy, including:

- **Center on Energy Efficiency and Renewable Technologies**
  - includes most of the nation's major renewable energy developers
  - we co-founded CEERT in 1990
- **California's Renewable Energy Transmission Initiative (RETI)**
- **Strategies for renewable energy siting, operation, and transmission**

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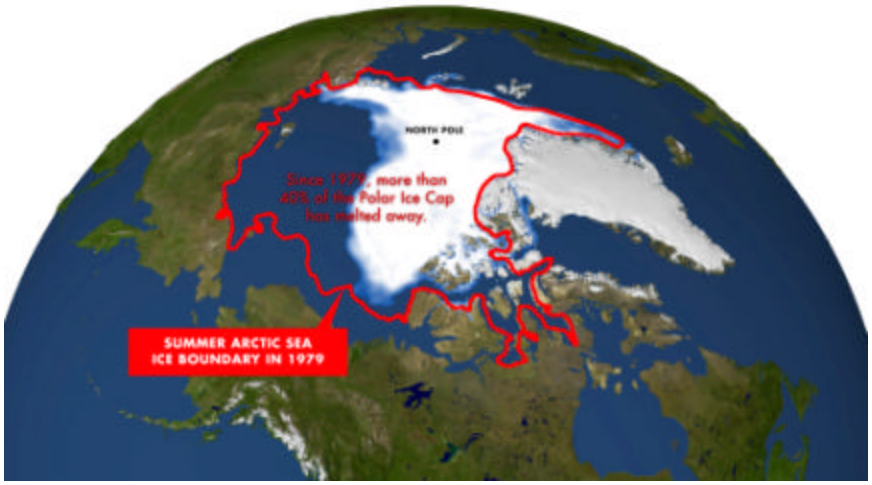
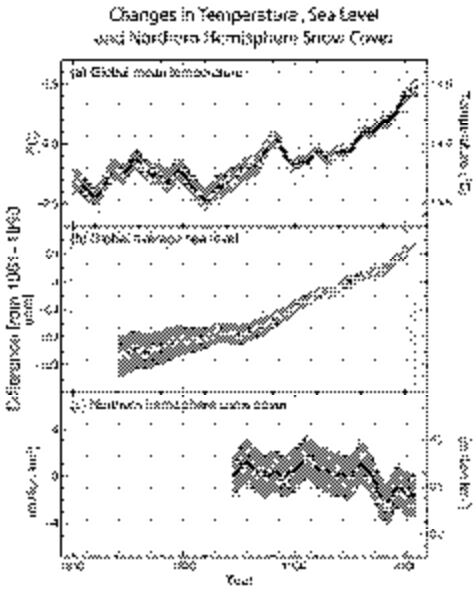
GLOBAL WARMING ALREADY HAPPENING



GLOBAL WARMING IMPACTS



- **Other illustrative impacts**
  - Increased ocean acidity
  - More frequent extreme heat
  - Faster-than-expected arctic ice melt…

MOMENTUM BUILDING FOR COMPREHENSIVE FEDERAL CLIMATE LEGISLATION

- Corporate, scientific and public pressure are growing and Congress is responding
  - Near unanimous opposition to Kyoto in 1997
  - 2003 McCain and Lieberman cap and trade legislation garnered 44 votes
  - 2005 Bingaman-Domenici-Specter Climate Resolution garnered 54 votes
  - 2009 House legislation and Copenhagen Accord

MILITARY ALSO FOCUSED ON ENERGY AND GLOBAL WARMING IMPACTS

"Projected climate change poses a serious threat to America's national security. . . . Climate change acts as a threat multiplier for instability in some of the most volatile regions of the world." CNA, National Security and the Threat of Climate Change (2007)

"Military installations are almost completely dependent on a fragile and vulnerable commercial power grid, placing critical military and Homeland defense missions at unacceptable risk of extended outage."
Report of the Defense Science Board Task Force on DoD Energy Strategy (2008)

"U.S. dependence on fossil fuels undermines economic stability, which is critical to national security. . . . [D]iversifying energy sources and moving away from fossil fuels where possible is critical to future energy security."
CNA, Powering America's Defense (2009)

Federal Mandates

- **Executive Order 13514 of October 2009** (requires federal agencies to implement the 2030 net-zero-energy building requirement beginning in 2020; 26% improvement in water efficiency by end of FY 2020 or 2% annual decrease through FY 2020)
- **Executive Order 13423** (requires 3% annual reduction in energy consumption through FY 2015 or 30% by FY 2015 (relative to 2003 baseline); 2% annual reduction in water in FY 08 through FY 2015 or 16% by the end of FY 2015 (relative to 2007 baseline)
- **Energy Policy Act of 2005** (requires renewable power to equal not less than 3% of the electric energy consumed by the federal government in FY 2007-2009, not less than 5% in FY 2010-2012, not less than 7.5% in FY 2013 and after)
- **Energy Independence and Security Act of 2007** (requires fossil fuel usage to be reduced by 55% in new buildings and major renovations by 2010 and eliminated (100%) by 2030 (relative to 2003 baseline)
- **National Defense Authorization Act of 2007** (sets goal of having 25% of DoD energy consumption come from renewables by 2025)

EMERGING FEDERAL AND INTERNATIONAL CLIMATE POLICIES

House Legislation - ***American Clean Energy and Security Act*** of 2009 ("ACES," H.R. 2454) (passed House 6/09). Requires reductions of:

- **17% by 2020**
- **83% by 2050**

Senate Legislation - ***Clean Energy Jobs and American Protection Act*** of 2009 ("CEJAPA," S. 1733) (passed Senate Environment & Public Works Committee 10/09). Requires reductions of:

- **20% by 2020**
- **83% by 2050**

Need Federal CAP & TRADE law requiring global warming pollution reductions (based on 2005 levels)

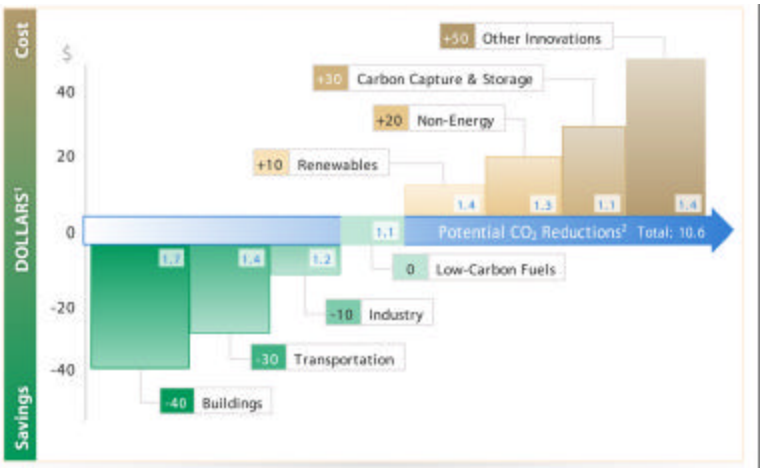
- **20% by 2020**
- **83% by 2050**

International - ***Copenhagen Accord***, Nonbinding Political Agreement (12/09)

- 2º Celsius Above Pre-Industrial Levels Limit
- up to $100 billion per year for adaptation
- international verification

STRATEGY TO CUT U.S. EMISSIONS 80% BY 2050

2050 U.S. C02e Abatement Curve Shows Cost and Payoff by Sector



1 Constant 2007 dollars
2 Billions of tons of CO2 equivalent eliminated per year relative to business as usual projections

Source: NRDC analysis partially extrapolated from McKinsey report; see www.marketinnovation.org

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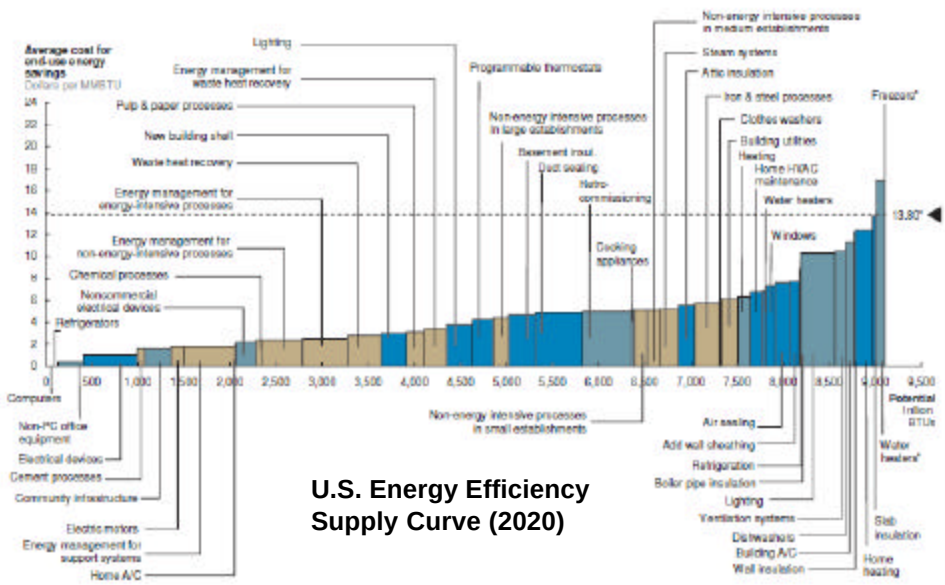
ENERGY EFFICIENCY OPPORTUNITIES



* AEO 2008 business-as-usual forecast price of saved energy in 2020, $13.80 per MMBTU

* Average price of avoided energy consumption at the industrial price; $35.60/MMBTU represents the highest regional electricity price used; new build cost based on AEO 2008 future construction costs

Source: EIA AEO 2008, McKinsey analysis

BARRIERS TO ENERGY EFFICIENCY

	Description of barrier	Representative options to address
Split incentives	• Different parties "own" capital investments and savings (typically relevant for owner vs. tenant, developer vs. owner)	• Educate and build awareness • Leverage/build actor relationships to execute broad-based program • Unlock funding and financial support that leads to win-win economics • Invest in enabling infrastructure to change decision outcomes • Create supportive regulatory structures
Fragmentation of consumer base	• Individual **consumers highly dispersed** and partially hidden behind master-meters • **Cumbersome process to access** individual consumers	
Transaction costs/ Capital constraints	• Capital constraints on big-ticket investments • **Competing investment priorities** • High costs of construction and renovations • Savings measurement is costly	
Consumer education	• **Limited transparency** for consumers over energy consumption • Lack of information on energy efficiency programs • **Low consumer awareness** of CO_2 impact	
Inconvenience	• **Bureaucratic challenges** with funding and contracting of work • Inconvenience of **construction work** • Often "**too small to matter**" vs. inconvenience	
Lack of price signal	• Inaccurate price signals distort true economics • Consumers lack clear visibility of costs and benefits • Competing claims	

Need a framework and fact base to prioritize activities:
- **Which option best applied to which barrier in what context?**
- **What is the expected result?**

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TOOLS TO ACHIEVE ENERGY EFFICIENCY

Requirements

Building codes
- National targets
  - 30% better than national model codes by 2010
  - 50% better than national model codes by 2014 (res.) and 2015 (comm.)

Appliance efficiency standards
- Multitude of DOE standards in process
- California standards

Utility Energy Efficiency Resource Standard
- 15% savings for electric utilities and 10% savings for natural gas utilities by 2020

State utility efficiency regulatory policies
- Decoupling
- Efficiency as the first resource in resource procurement budgets

Incentives

Tax incentives for homes and commercial buildings
- Performance-based incentives for efficiency measures

State utility performance-based incentives

Assistance

Manufacturing and industrial efficiency programs

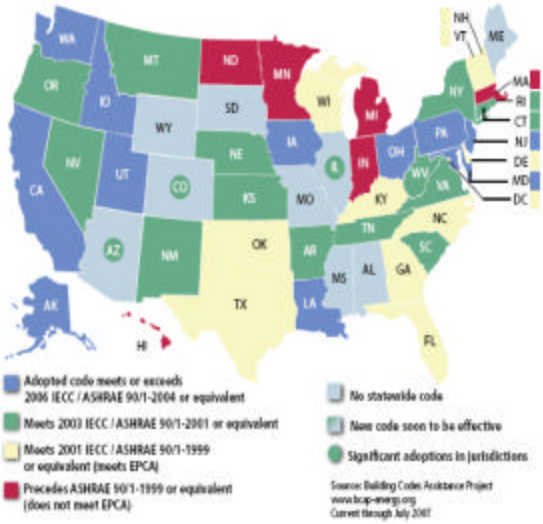
Finance
- Clean Energy Development Authority
- Expansion of DOE Programs

RD&D

NRDC

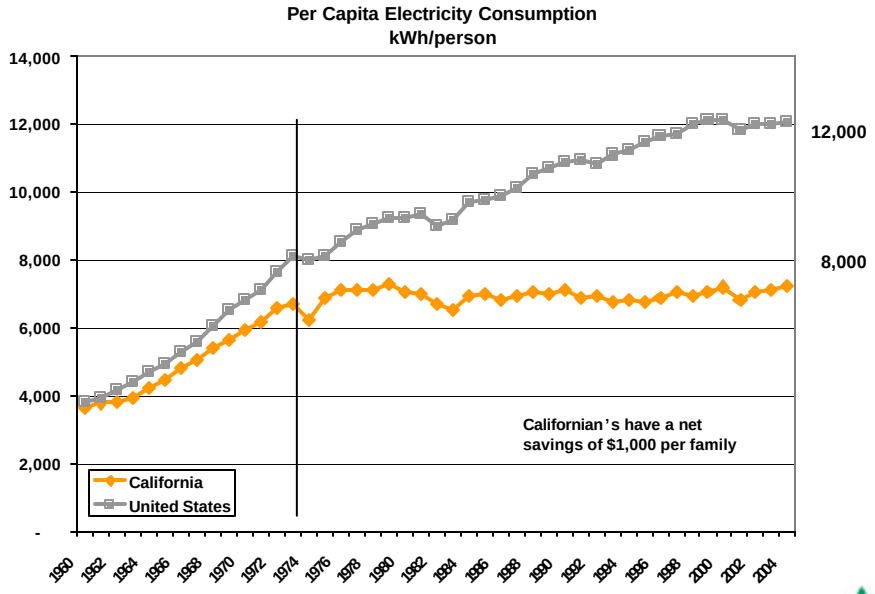
STATE BUILDING CODES AND APPLIANCE STANDARDS

Figure 2: Status of Residential State Energy Codes



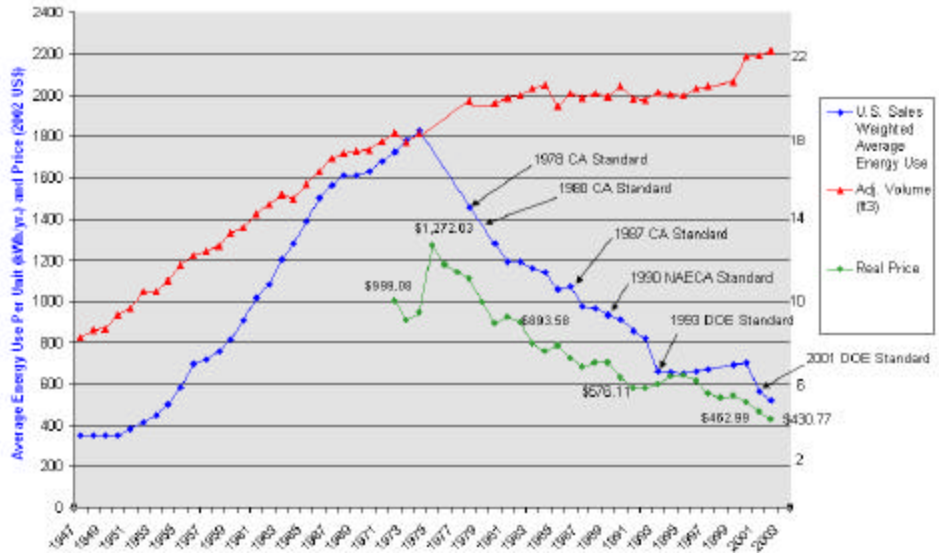
- Nine states have no statewide building code
- Fourteen others have not adopted updated building codes
- Federal incentives and mandates to adopt best available codes can help raise the bar nationwide without pre-empting leading states

CALIFORNIA SUCCESS ON ENERGY EFFICIENCY

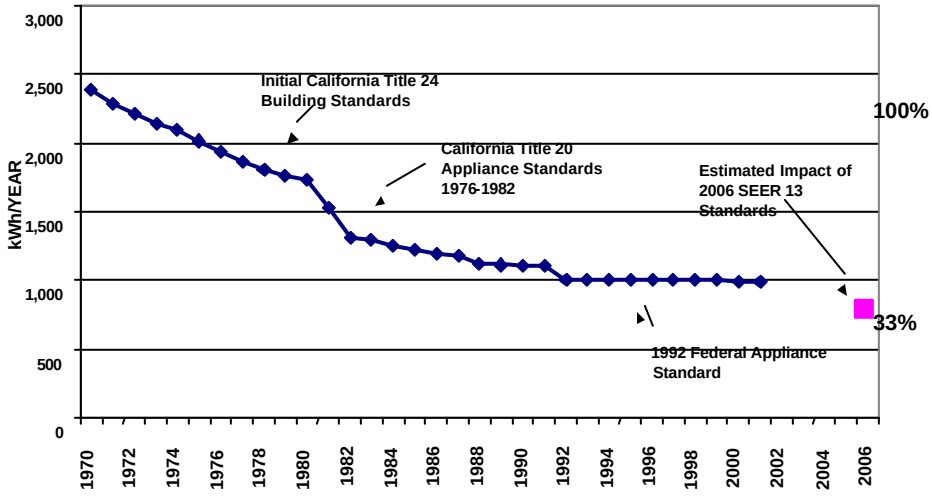


Source: http://www.eia.doe.gov/emeu/states/sep_use/total/csv/use_csv

U.S. REFRIGERATOR ENERGY USE V. TIME WITH REAL PRICE



CALIFORNIA NEW HOME AIR CONDITIONING USE



Source: CEC Demand Analysis Office

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TOOLS TO DEPLOY RENEWABLE ENERGY

Requirements

Renewable Electricity Standard (RES)
- Federal standard requiring utilities to achieve 25% by 2025

Renewable Fuel Standard (RFS)
- Maintain sustainability standards
- transition to a low carbon fuel standard

Incentives

Federal tax incentives
- Production tax credit
- Investment tax credit

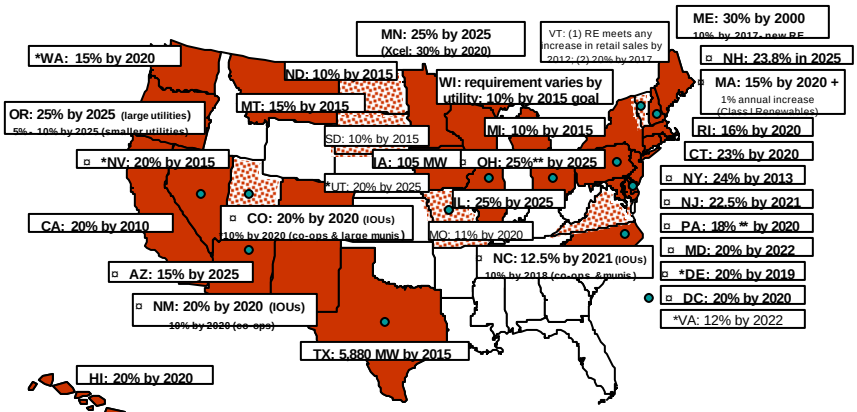
Assistance

Renewable deployment grants
- Robust DOE deployment program that provides grants to scale up emerging technologies

Finance
- Clean Energy Development Authority

RD&D

STATE RENEWABLE ELECTRICITY STANDARDS



▫ Minimum solar or customer-sited RE requirement
* Increased credit for solar or customer-sited RE
**Includes separate tier of non-renewable "alternative" energy resources

RENEWABLE ENERGY SITING PRINCIPLES

***Wind and solar** power are pollution free, but they **are not impact free**. Not only do they leave an industrial footprint on the land, potentially altering some pristine places forever. Therefore, siting should be guided by robust, well-developed principles to maximize output and minimize impact on important resources.*

Siting principles to balance energy development with land conservation (developed by NRDC and its NGO partners)

1. The nation must transition to a sustainable energy economy by moving away from fossil fuels as quickly as possible.
2. Clean, renewable energy generation must be developed and deployed immediately to assist in this transition.
3. Clean energy offers significant opportunities for creating jobs and contributing to our economic prosperity.
4. Renewable energy is required at different scales across the landscape.
5. Properly sited transmission projects and upgrades should connect clean renewable energy resources –not facilitate carbon-heavy generation –and avoid or minimize impacts to sensitive resources.
6. The social and ecological impacts of renewable energy development must be assessed through science-based planning processes, with opportunities for robust public involvement.
7. The impacts of renewable energy development should be viewed in the context of the full range of the nation's energy supply and development.
8. Land that has already been disturbed should be preferred for development.
9. Renewable energy should be given priority over fossil fuels on public lands.
10. Given the multiple benefits that wildlands provide, rapid development of renewable energy resources should avoid impacts on these sensitive and unique lands.

Opportunities

- **Develop principles for siting renewable energy sources which balance energy development needs with land conservation values**
- **Tailor principles to fit military lands unique features and avoid impacting DoD readiness requirements**

We have applied these general principles to a specific geography by identifying renewable siting criteria for California desert areas

RENEWABLE ENERGY SITING TOOL USE AND DEPLOYMENT

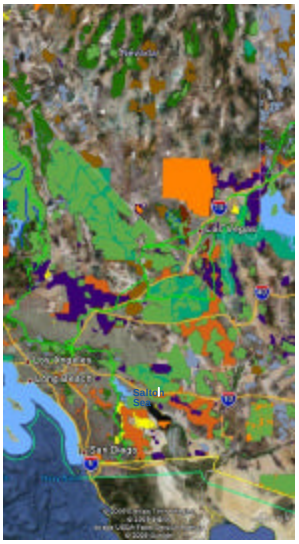
An important part of successful siting is knowing where not to site, where attempting to locate a renewable energy source will create substantial resource conflicts. NRDC partnered with Google Earth and Audubon to create a map of the Western United States showing categories of land where renewable development is not appropriate. See http://www.nrdc.org/land/sitingrenewables/default.asp. This map has been highly useful for renewable energy developers.

Inappropriate Renewable Energy Development Sites

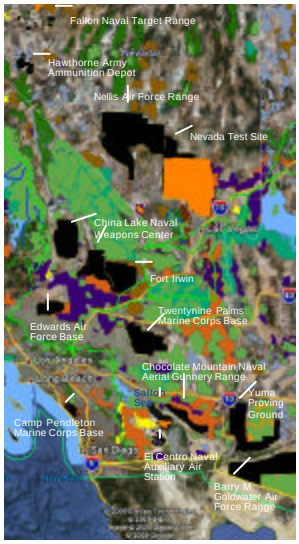
NRDC

RENEWABLE ENERGY SITING TOOL USE AND DEPLOYMENT

NRDC-Identified No-Go Areas for Renewable Energy Projects



. . . with DoD lands



Opportunities

- **Add military perspective to database of sites not appropriate for renewable energy development**
- **Create comprehensive map tool of military sites with the most potential for renewable energy surety** (based on DoD's developed siting principles)

NRDC

MILITARY PARTICIPATION IN DEVELOPING REGIONAL GRID STRATEGIES

DoD should consider developing a comprehensive renewable energy siting strategy, including identifying sites on lands reserved for use by DoD that add to DoD energy surety without impact to mission or readiness. This strategy could optimize utilities' location and needs and develop effective participation in the process of creating regional grid strategies for renewable energy development.

"For various reasons, the grid has far less margin today than in earlier years between capacity and demand. . . . The confluence of these trends, namely increased critical load demand, decreased resilience of commercial power, inadequacy of backup generators, and lack of transformer spares in sufficient numbers to enable quick repair, create an unacceptably high risk to our national security . . . ."

Report of the Defense Science Board Task Force on DoD Energy Strategy (2008)

Opportunities

This strategy could initially focus on the western part of the U.S. ("Western Interconnection") which:

- **functions as an integrated grid;**
- **has utilities with mandatory renewable energy acquisition targets**

The strategy should:

- **map highest potential lands for DoD renewable energy sources against utilities' aggregate regional procurement needs and DoD mission requirements**
- **identify/create effective participation opportunities in grid development processes**

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CLEAN ALTERNATIVE FUELS AND GLOBAL WARMING

The Defense Department can act as a catalyst for clean or high carbon fuels depending on its decisions.

- If DOD commercializes potentially high carbon fuels, the environmental ramifications may extend far beyond DOD's immediate carbon footprint.
- Thus, DOD should avoid high carbon fuels and commercialize demonstrably sustainable ones so that private industries also have these alternatives.
- Truly sustainable fuels require careful planning from inception so that emerging technologies are built upon a sustainable foundation.
- A sustainable foundation will include a lifecycle assessment of a range of factors such as greenhouse gas pollution, water demand, biodiversity, ecological impacts, and air quality. It is critical that DOD project these factors for a mature industry.
- Failure to anticipate environmental liabilities could eventually lead to significant deployment setbacks such as those of corn ethanol. However, planning ahead could create new clean and indigenous fuels that foster energy and climate security.

CLEAN ALTERNATIVE FUELS OPPORTUNITIES

NRDC could provide technical and policy support on a range of clean alternative fuels. In doing so, it would also develop a deeper understanding of the military's unique logistic and fuel performance requirements. Two-way information sharing might help the military and NRDC identify fuel technologies that meet critical military and environmental needs while avoiding those with significant unintended consequences.

"The Task Force also urges the Department to work with partners to conduct comprehensive and objective "well-to-wheel" life cycle assessments of each synthetic fuel technology. It should include issues such as environmental footprint and mitigation costs and risks, resource availability and scalability, all of which can affect the viability of alternative fuel technologies . . . ."

Report of the Defense Science Board Task Force on DoD Energy Strategy (2008)

Opportunities

Information sharing between military and NRDC. Potential topics include:

- Development and deployment of clean alternative fuels
- Appropriate life cycle assessment standards and methods
- Concerns about high carbon fuels, which must not be used in a carbon-constrained world with global warming
- A nuanced and comprehensive understanding of the military's fuel performance and logistics requirements

CONTACT INFORMATION

Jim Presswood
Federal Energy Policy Director
Natural Resources Defense Council
(202) 289-2427
jpresswood@nrdc.org

Laura Pagano
Military Partnering Initiative
Natural Resources Defense Council
(415) 875-6100
lpagano@nrdc.org