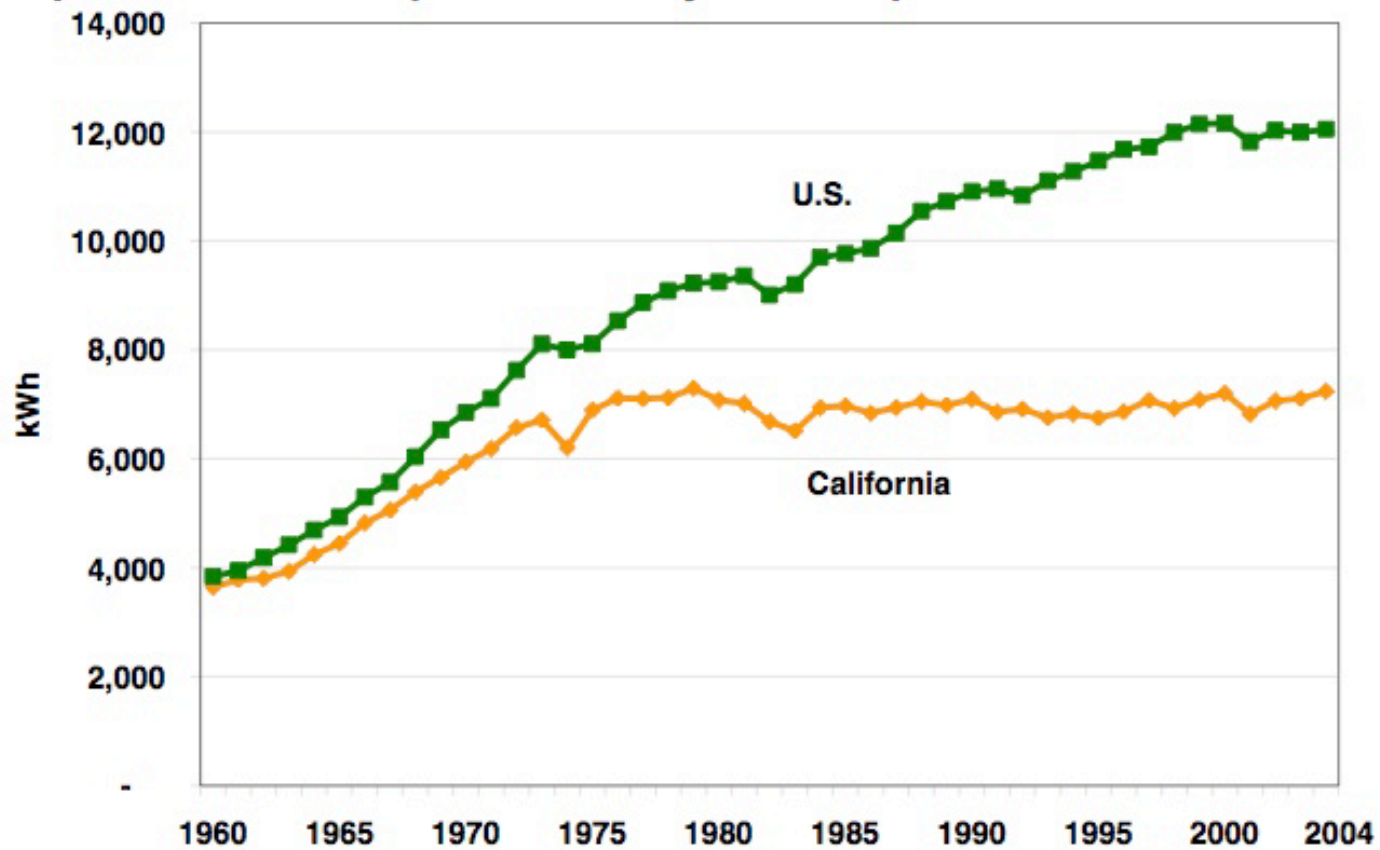


Stabilizing Climate: An Energy Efficiency Revolution

November 18, 2009
Nicky Phear



Comparison of Per Capita Electricity Consumption in U.S. and California



Source: California Energy Commission, 2005.¹⁰

California's 40 year flat line energy per capita:

4 reasons:

1. Late 1970's CA adopted first energy efficiency standards for appliances, equipment, and then new buildings (residential and commercial). These are updated on a regularly scheduled basis.
2. Late 1970's CA also adopted system benefits charge. 3% surcharge on all utility bills – heating and electric – residential and commercial.

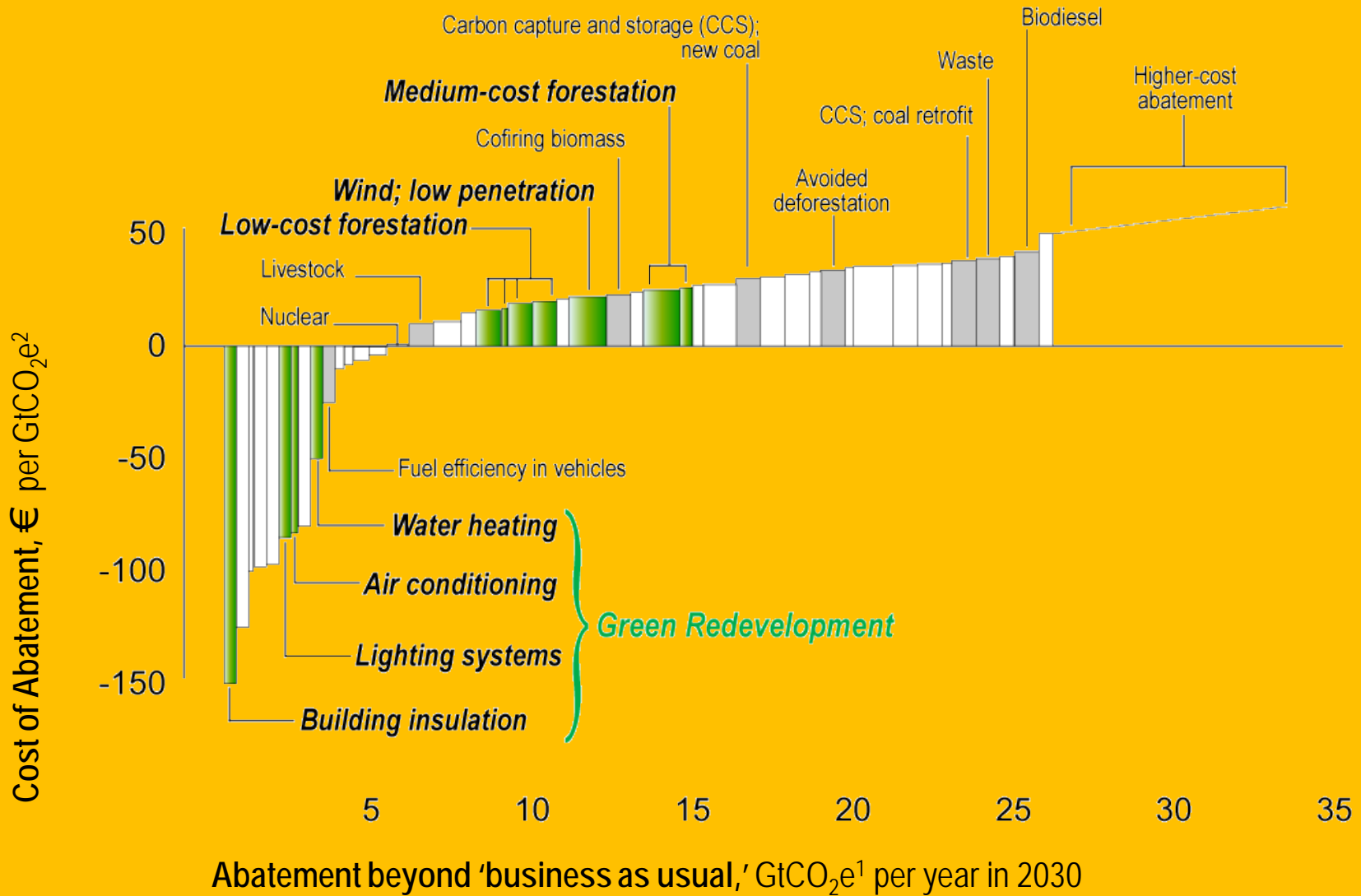
Pays for:

- CA Energy Commission
- Research and Dev – including Berkeley lab
- Subsidizes for retrofits/weatherization
- Subsidizes renewable energy

3. “Flex Your Power” program of rebates – with plenty of advertizing so consumer awareness in these rebates is vast. Utilities required by law to send out info with energy bill. Easy and user-friendly rebate programs.
4. DECOUPLING – first state to do this. Profits linked to how effective energy efficient programs are. Very aggressive.

Source: McKinsey Global Institute, 2007

Opportunities & GHG Reduction Costs



World GHG Emissions Flow Chart

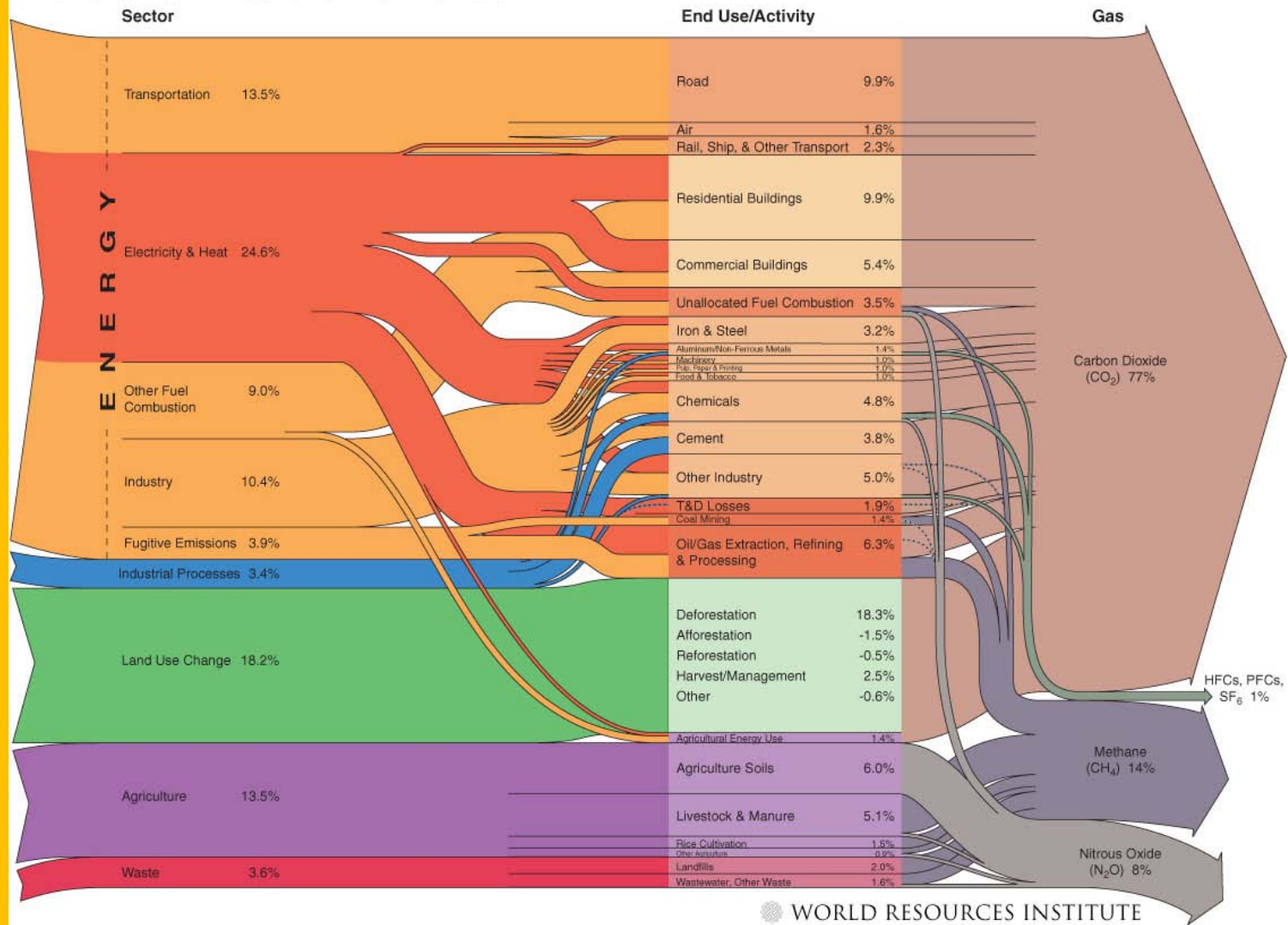
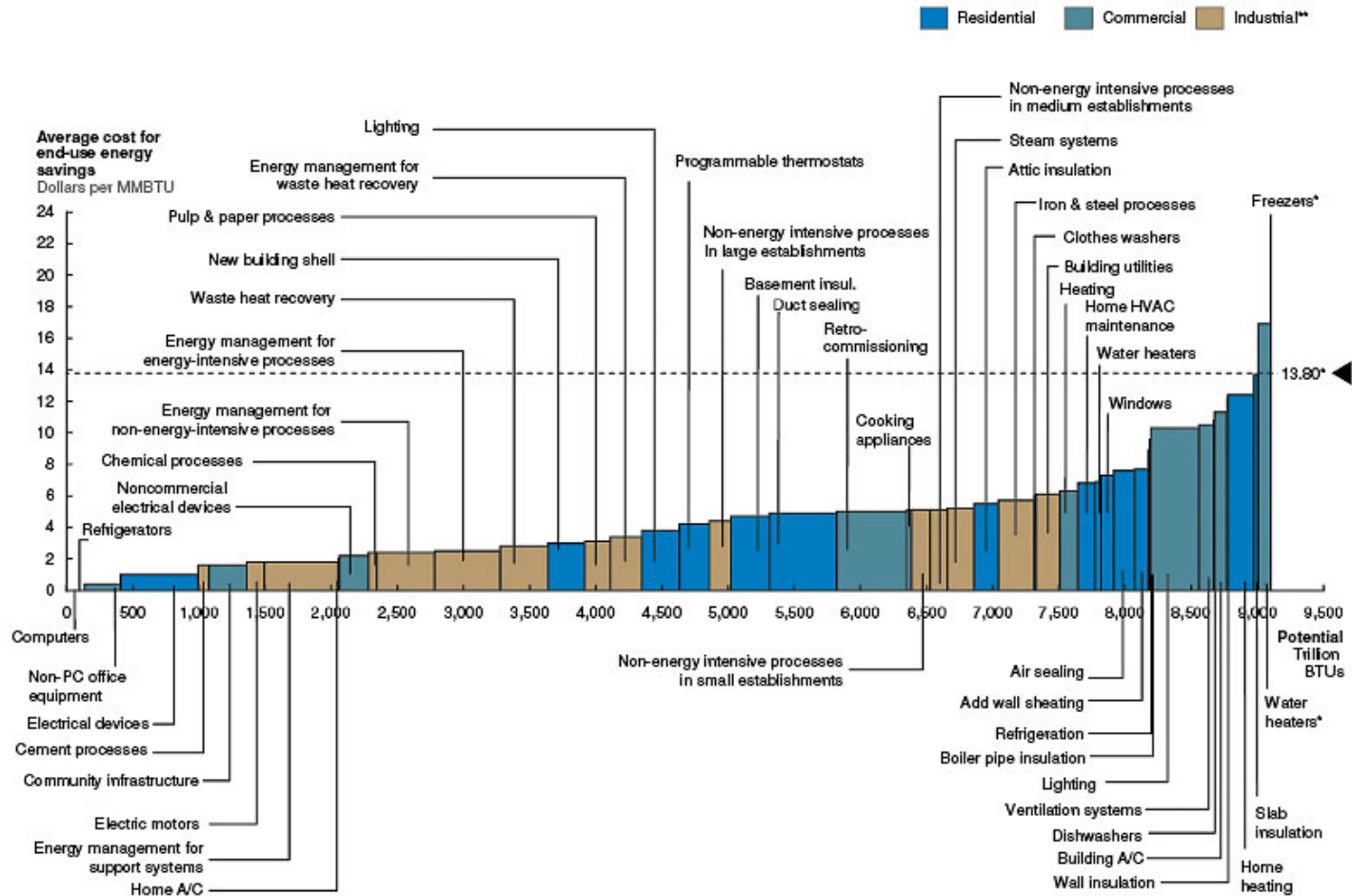


Exhibit 7: U.S. energy efficiency supply curve – 2020



* 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

** Our 49th source of savings, refining processes, offers no NPV-positive savings

Source: EIA AEO 2008, McKinsey analysis

Energy Efficiency

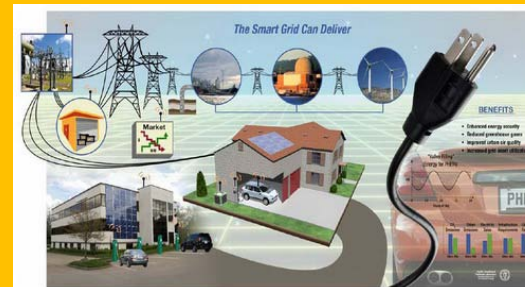
Opportunities:

- Cheapest way to reduce emissions.
- Low technical, economic, and political hurdles.
- Benefits start immediately.
- Methods lead to job creation.

Barriers (why haven't we done all this yet?)

- Measures require substantial upfront investment for savings that accrue over the lifetime of the investment.
- Efficiency potential is highly fragmented across millions of locations and billions of devices.
- Measuring energy not consumed is by its nature difficult
- Inertia

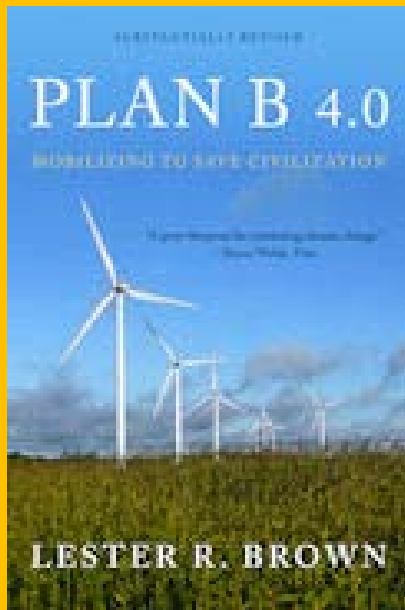
Consider solutions to these barriers...



Lester Brown

Plan B 4.0: Mobilizing to Save Civilization

2009 Earth Policy Institute



Climate Action Plan

Cut Global Net CO₂ Emissions 80% by 2020

Three components:

1. Raising energy efficiency and restructuring transportation
2. Replacing fossil fuels with renewables
3. Ending net deforestation and planting trees to sequester carbon

...to prevent global atmospheric CO₂ concentrations from exceeding 400 parts per million, minimizing future temperature rise.

Lighting

A worldwide switch to highly-efficient home, office, industrial, and street lighting would cut electricity use 12%, equivalent to closing 705 of the world's 2,670 coal-fired power plants

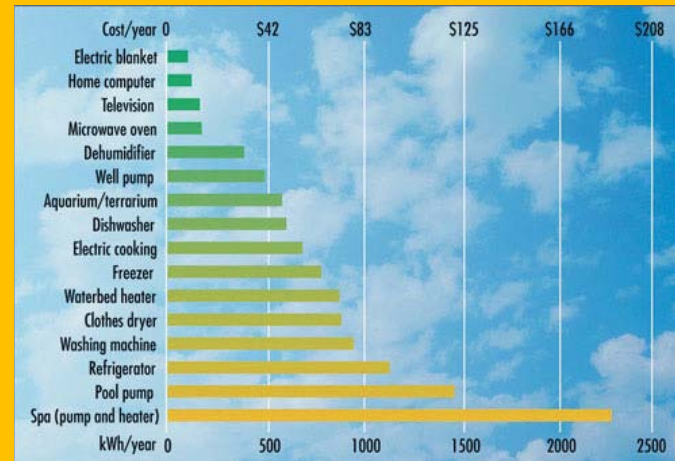
- Countries and companies are beginning to **phase out the sale of incandescent lights** (Australia, Canada, EU, Brazil, India, China, Currys, Wal-Mart)
- The **traffic light retrofit to LEDs** saves NYC and Albuquerque \$1,000,000/year – they paid the project back in 1 year. UC-Davis replaced all light bulbs in campus parking lot with LEDs.
- UM?
- Energy performance contracting** – Performance contracting is a method of leveraging the savings realized from reductions in energy consumption. A third party agrees to pay for and install energy conservation measures in exchange for a share of the energy savings, thus requiring little upfront funding.



Appliances

Japan's Top Runner Program uses today's most efficient appliances to set tomorrow's standards; e.g. helped boost computer efficiency by 99%

- **Appliance efficiency standards** need to be written into policy and enforced.
- Some governments are **capping standby power use** at 1-watt per appliance.



Zero Carbon Buildings

Retrofits with better insulation and more efficient appliances can cut energy use 20-50%

- **Building Retrofits** -- The Clinton Climate Initiative reducing energy use of the [Empire State Building](#) by up to 38 percent and energy costs by \$4.4 million annually.
- **Weatherization Programs** -- Portland weatherized 10,000 multifamily units and over 800 homes in two years; in Feb 2009 Congress passed the American Recovery and Reinvestment Act that provides for the weatherization of more than a million homes.
- **Green Building Standards** -- The University of Montana has made a commitment that all new buildings will be built according to silver LEED standards.
- **Incentivizing renewable energy developments** -- City of Berkeley pays the up-front costs of renewable energy installations; Chicago offers a grant program to put green roofs and cool roofs on their buildings. Today, there are more than 200 public and private green roofs totaling more than 2.5 million square feet in Chicago.



Transportation

- **Plug-in hybrid electric vehicles (PHEVs)** running primarily on emissions-free electricity generated by the wind and the sun would allow for low-carbon commuting, grocery shopping, and other short-distance travel.
- **Restructuring transport** to emphasize rail, light rail, and bus rapid transit would save energy while making walking and cycling safer.
- **Moving from oil to electricity** reaps big gains.



A New Materials Economy

Reduce, Reuse, Recycle

Sharply reduce materials use to increase the efficiency of material use by 4-10%.

Energy savings from **recycling** are huge, especially major metals like steel that require much more energy to make from raw ore than to recycle.

A Landfill tax and disposal charges are effective ways to encourage recycling.

Banning or discouraging the use of energy-intensive non essential items work well.

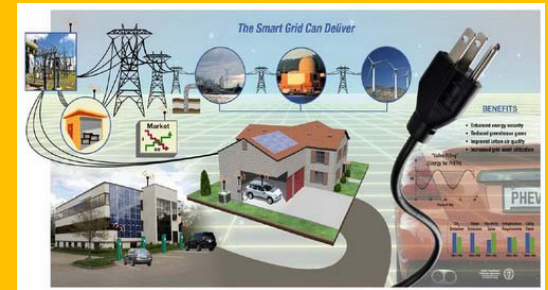
It is also possible to **require manufacturers to pay** for collection, disassembly and recycling.



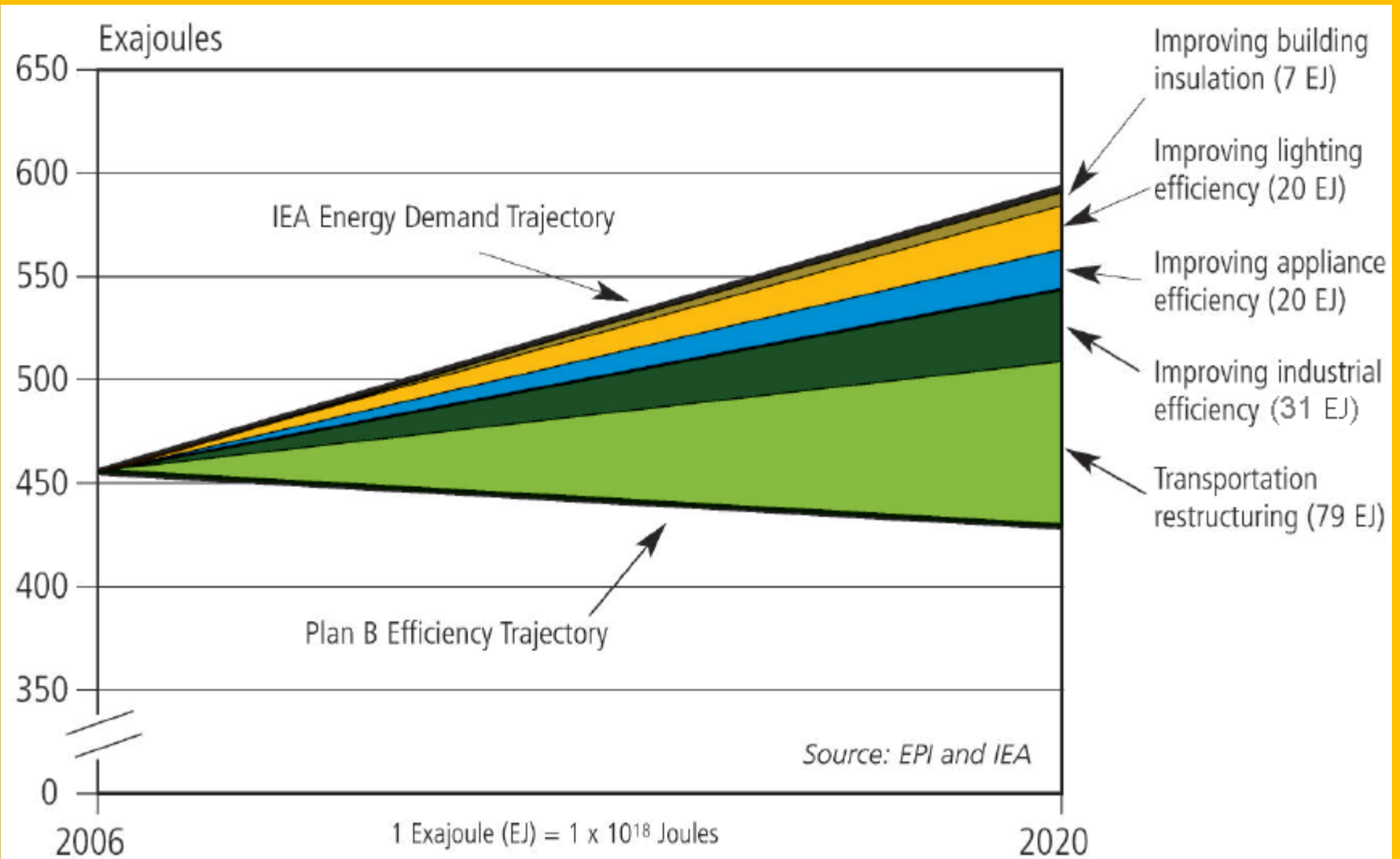
Smart Grid

Smart Grid, Smart Meters, Smart Appliances

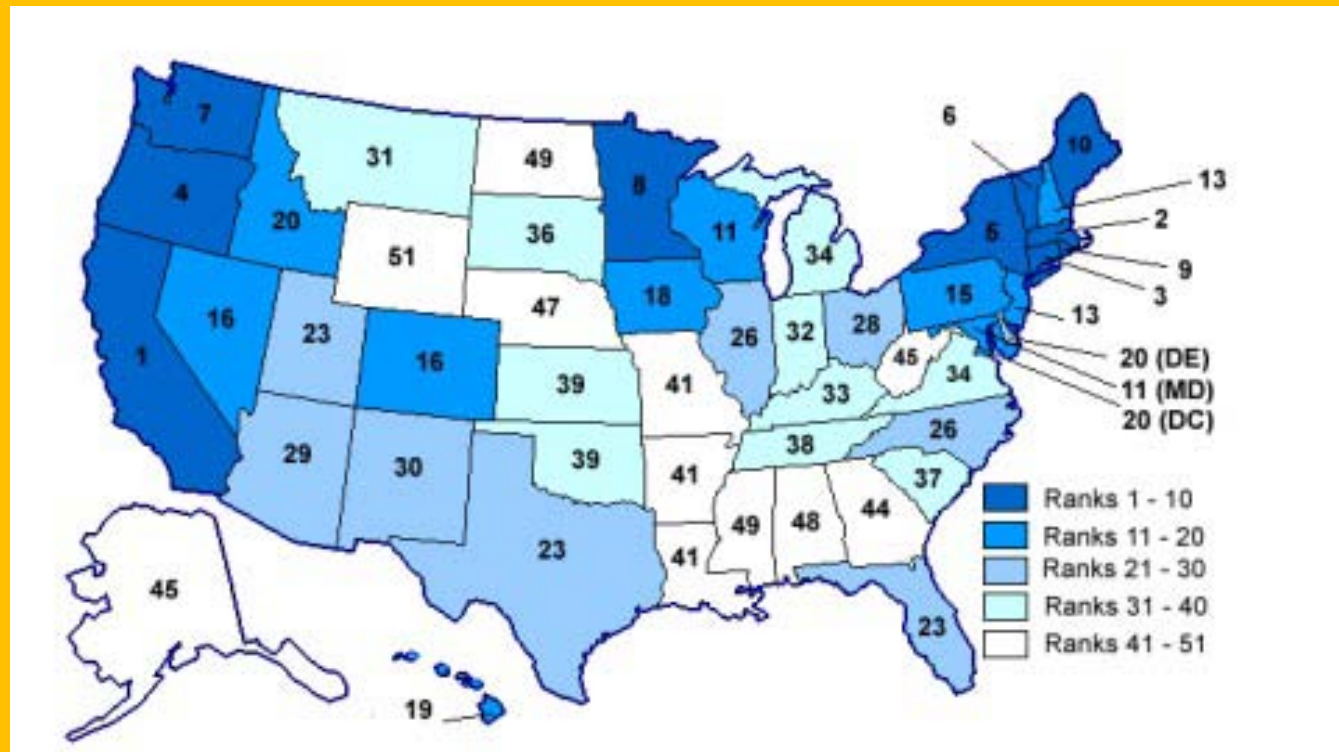
- **Reduce Peak Demand** -- Building large power plants just to handle peak daily and seasonal demand is a very costly way of managing an electrical system.
- **Smart Grid** technologies move electricity more efficiently over space and time:
 - Links areas where there is a surplus of energy (wind, solar and/or geothermal) energy to consumptive centers.
 - Enables electricity use to be shifted over time from periods of peak demand to those of off-peak demand.
 - Variable rates to reduce peak electricity use, which saves money from having to over build the energy system.
 - Allow for two way metering so that customers who have rooftop solar electric panels or their own windmill can sell surplus electricity back to the utility.
- **Smart Meters** enable consumers to see exactly how much electricity is being used at any one time so they can cooperate in reducing peak demand in a way that save both the customer and utility money.
- **Smart Appliances** can be programmed to allow use during non peak times.



Plan B Energy Efficiency Measures



The American Council for an Energy Efficient Economy has released new rankings for state efficiency efforts. California is No. 1. Wyoming last. (October 21, 2009)



UM Climate Events this Week

Tuesday, November 17

UM Climate Action Plan Open House

3:00 pm, University Center Theater, 3rd Floor UC Center

Sponsored by the UM Office of Sustainability.

* The UM is in the process of creating a Climate Action Plan to analyze and prioritize strategies to reduce its emissions. The plan addresses the three largest sectors of UM carbon dioxide emissions: purchased electricity, transportation, and energy on campus from the steam co-generator. This Open House provides an opportunity to learn about and comment on the draft; the comment period will continue until December 1. [Read more...](#)

Wednesday, November 18

Down to the Wire: Confronting Climate Collapse

8:00 pm, University Center North Ballroom, 3rd Floor UC Center

Dr. David Orr, Professor of Environmental Studies and Politics

Sponsored by the President's Lecture Series and Brennan Guth Memorial Lecture in conjunction with the EVST program.

Thursday, November 19

Spring Semester Climate Change Internship Opportunities

An open forum for students

5:00-6:00 pm, Main Hall, Room 210

Sponsored by the Climate Change Studies Program.

Students interested in doing a climate change-related internship next spring are welcome to attend this forum to learn about available opportunities and meet potential supervisors. Details will soon be provided on the [CCS website](#) for students who cannot make it to the forum. See also attached document.

Climate Change Internship Opportunities - Spring Semester 2010

Oganizations	Supervisor	#Interns Requested	# of Credits & Hours Requested
Trout Unlimited	Bruce Farling	1	2 cr.,6 hrs per week
Montana Audubon – Research Assistant	Amy Cilimburg	1	1-2 cr., 3-9 hrs per week
Montana Audubon – Research Assistant	Amy Cilimburg	1	2-3 cr., 6-9 hrs per week
Clark Fork Coalition	Karen Knudsen	1	2 cr.,6 hrs per week
Ecology Project International	Julie Osborn/Erin Foster West	1	3-4 cr.,8-12 hrs per week
Climate Solutions – Agriculture focus	Beth Berlin	1-2	2-3 cr., 6-9 hrs per week
Climate Solutions – Business focus	Beth Berlin	1-2	2-3 cr., 6-9 hrs per week
Pew Environment Group and M&R Strategic Services	Elizabeth Andrews	1-2	4 cr., 15 hr. per week, \$1500 stipend
The Elements Tour	Seth Warren	2	3 cr.,9 hrs per week
The UM Office of Sustainability	Cherie Peacock	1	2 cr.,6 hrs per week
UM's ASUM Sustainability Office	Erica Bloom	1-2	2 cr., 90 hours
Missoula Urban Demonstration Project, MUD-- Carbon Footprint Evaluation	Bethann Garramon	1-2	2 cr.,6 hrs per week
The Sustainable Business Council	Genevieve King	1	3 cr.,9 hrs per week
Missoula City Greenhouse Gas Advisory Committee	Brian Kerns	1	2 cr.,6 hrs per week