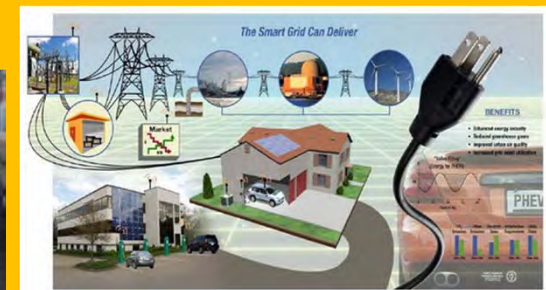


# Stabilizing Climate: An Energy Efficiency Revolution

November 15, 2010

Nicky Phear



# Climate Change Internship Opportunities

## Spring Semester, 2011

Partnering organizations include:

- Ecology Project International
- The UM Office of Sustainability
- UM ASUM Sustainability Center
- Climate Ride
- Missoula City Greenhouse Gas Advisory Committee
- The Sustainable Business Council
- City of Missoula Conservation Lands Management
- US Forest Service Northern Region
- Aldo Leopold Research Institute
- Woody Biomass Utilization Program
- Clear Sky Climate Solutions
- The Clark Fork Coalition

# Climate Stabilization and the Wedge Solution

- 1) What target should we set and why?
- 2) How many wedges will this require, and which ones do you think we should be use?
- 3) Discuss the pros and cons of the wedges you select.
- 4) Choose someone to present your proposal to the class.



**Group #1**

Syiling	Hannah
Parks	Ryan
Garrow	Kimberly
Dudek	Brianna

**Group #2**

Lombard	Brian
Micus	Joshua
Lewis	Casey
Sinnema	Sarah
Burns	Justin

**Group #5**

Johnson	Haley
Durglo	Jacob
Shafer	Stephen
Salo	Colton

**Group #4**

Frost	Hannah
Mobley	John
Hartford	Morgen
Newman	Emile

**Group #3**

Bossler	Lea
Klessens	Darcy
Schaad	David
Silva	Benjamin
Leyva	Ryan

**Group #6**

Miller	Jennifer
Caponi	Emily
Franz	Justin
Stoner	Ian
Butterworth	Andrew

**Group #10**

Johnson	Marine
Schulte	Jason
Ryan	Hannah
Wenzel	James

**Group #7**

Donachie	Kevin
Menahan	Mara
Grossman	Jessie
Ryan	Justin

**Group #8**

Berry	Erik
Motroni	Dylan
Crystal	Ruth
Stockman	Evan

**Group #11**

Snieder	Julia
Reid	John
Licitra	Stephan
Barker	Tess

**Group #12**

Winer	Jed
Corrick	Stephen
McNally	Timothy
Jokisch	Aleta
Buss	Brendan

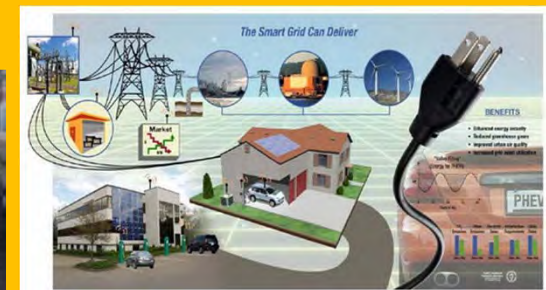
**Group #9**

Brandt	Ivar
Weinrich	Kadin
Farrell	William
Idler	Kelsea

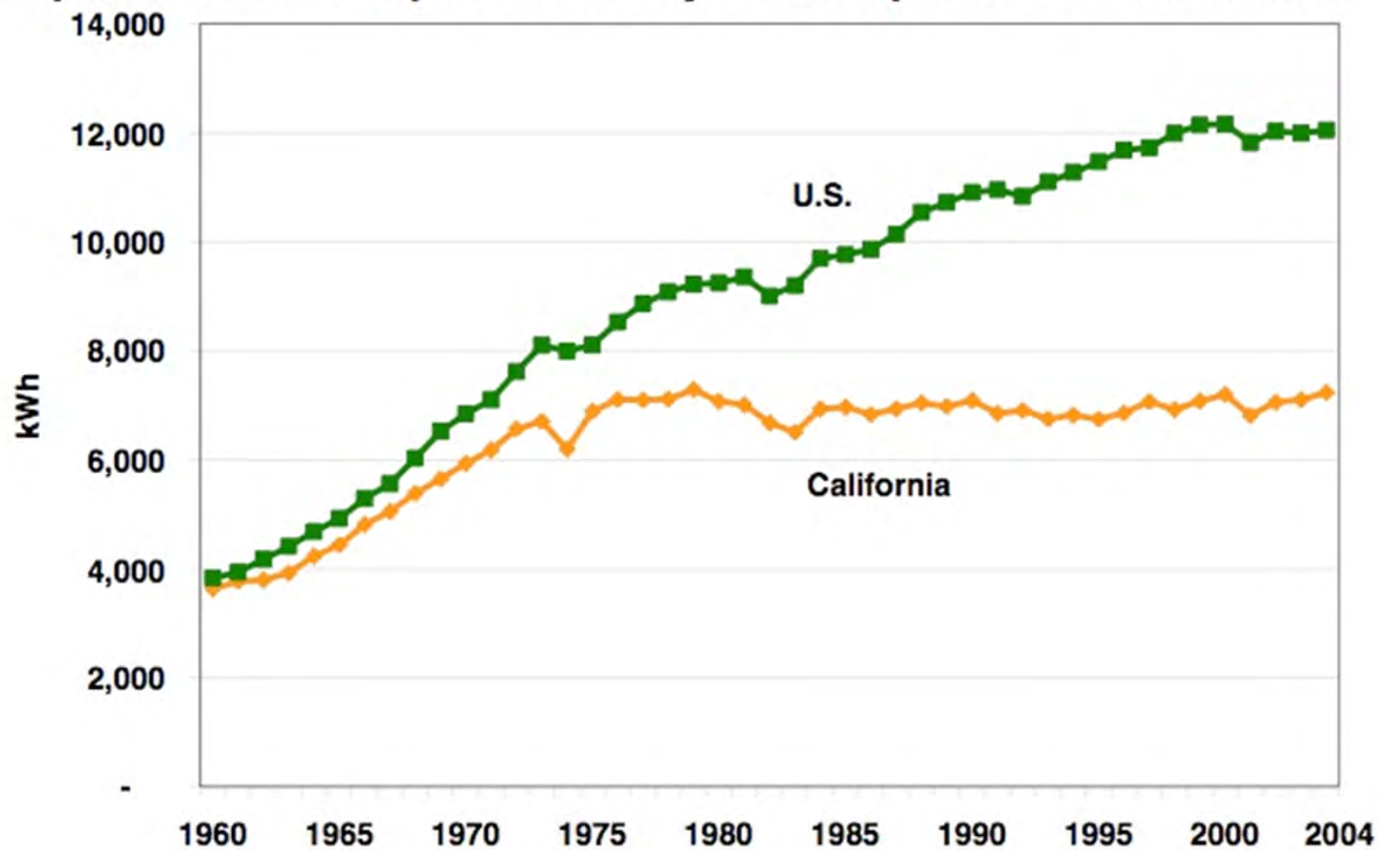
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## Comparison of Per Capita Electricity Consumption in U.S. and California



Source: California Energy Commission, 2005.<sup>10</sup>

## California's 40 year flat line energy per capita:

### Four 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

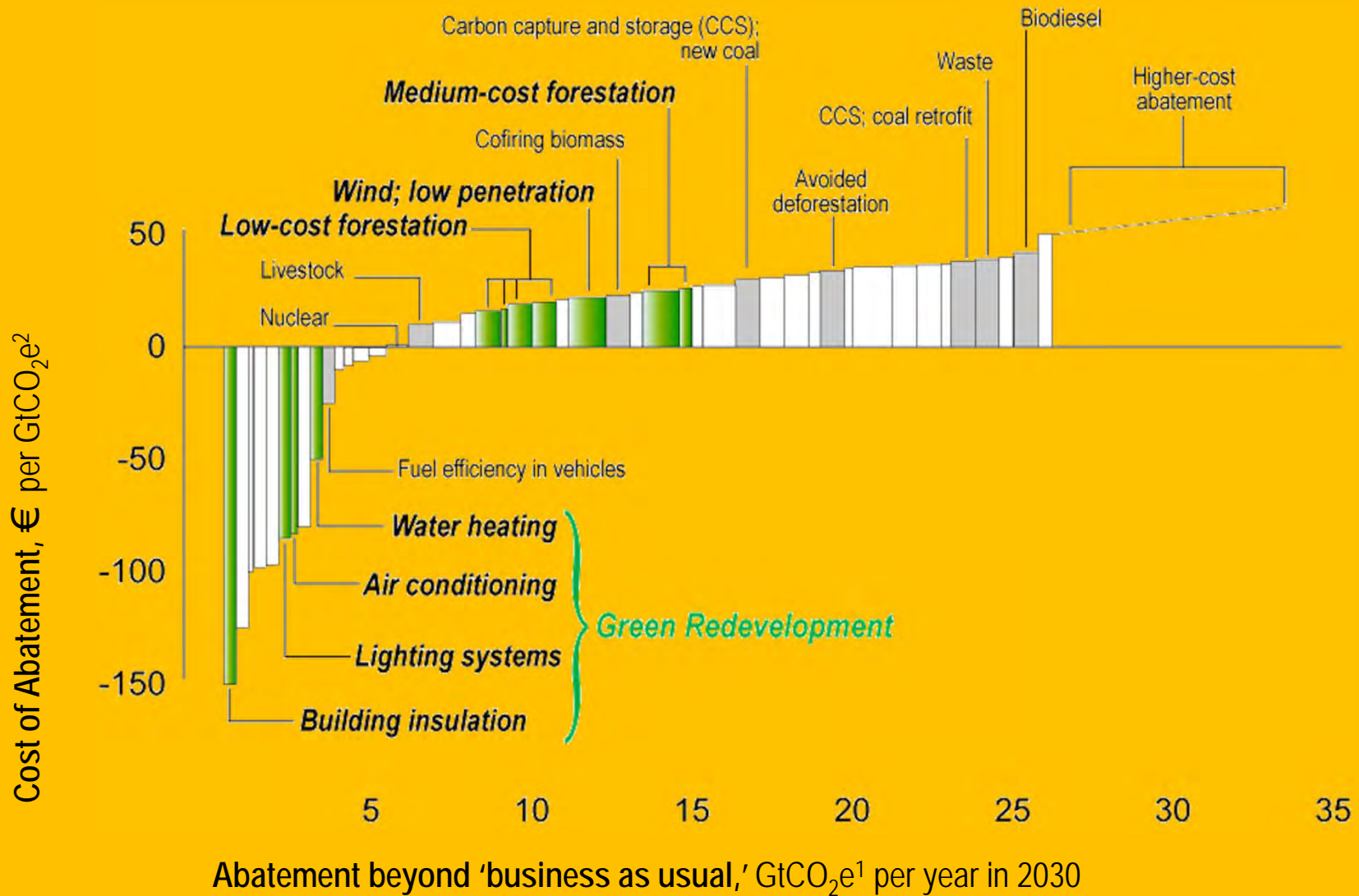
- Subsidizes renewable energy

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

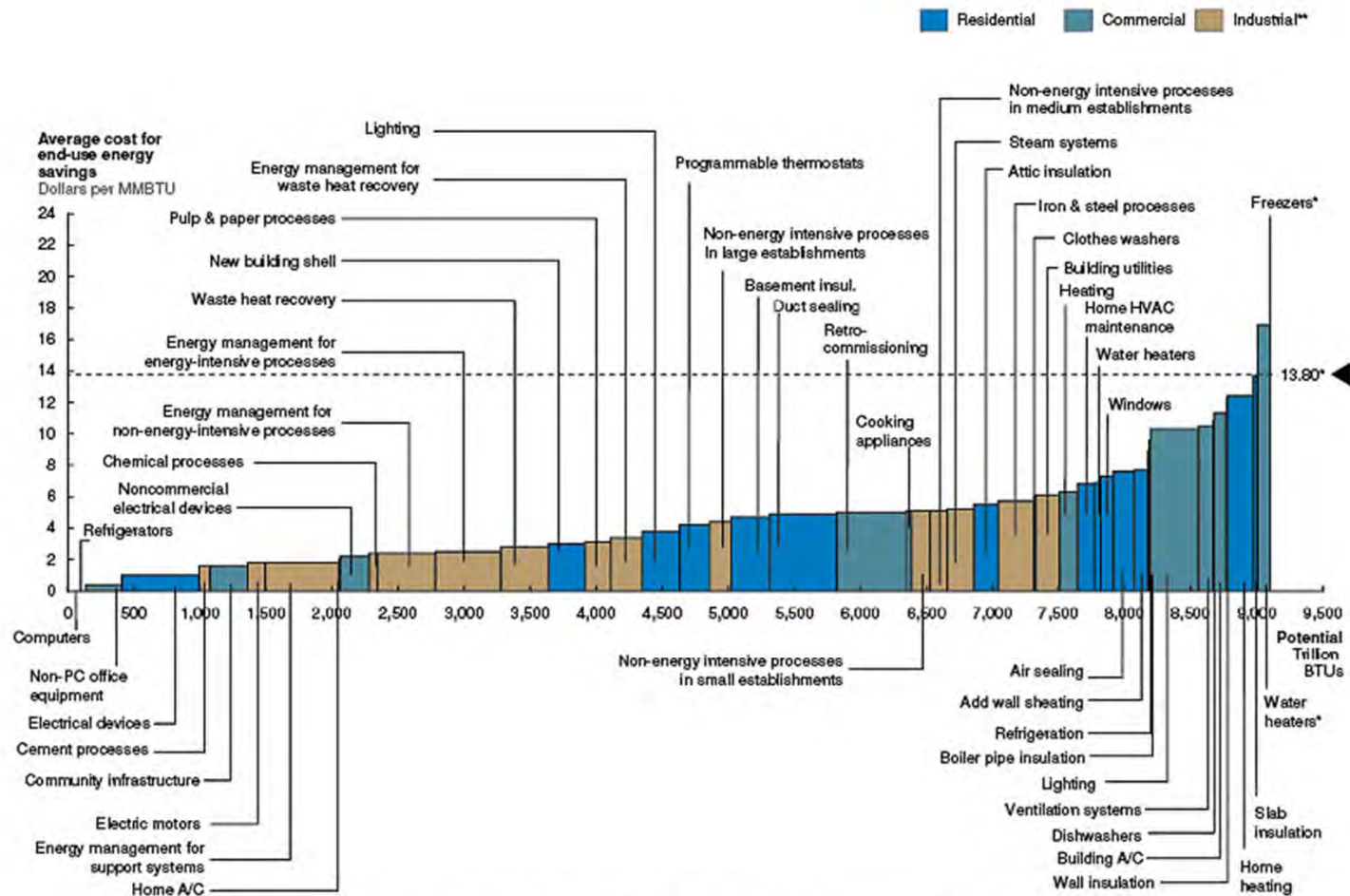
# Opportunities & GHG Reduction Costs





# McKinsey Study: *Unlocking Energy Efficiency in the U.S. Economy*

## 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 49<sup>th</sup> source of savings, refining processes, offers no NPV-positive savings  
 Source: EIA AEO 2008, McKinsey analysis

# Energy Efficiency

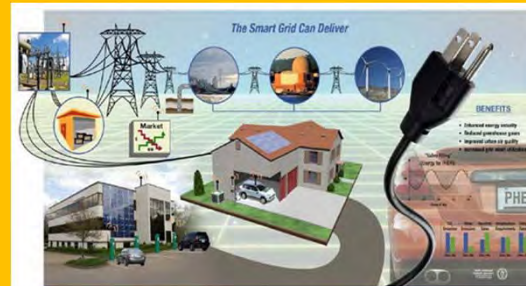
## Opportunities:

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

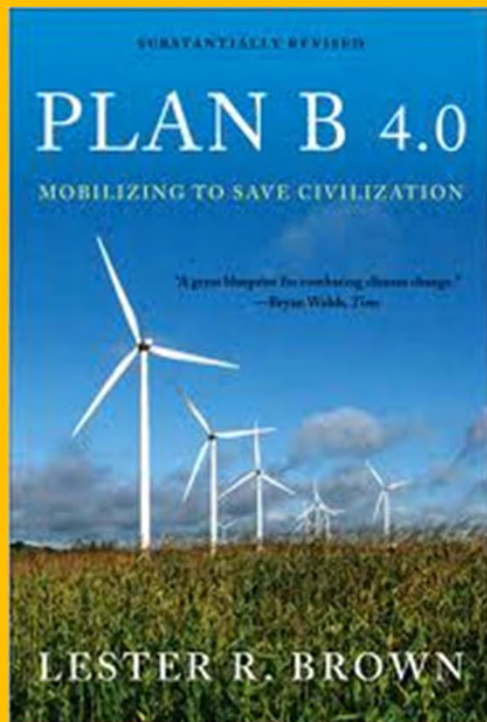
## Barriers (why haven't we done all this yet?)

- 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 CO<sub>2</sub> 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 CO<sub>2</sub> concentrations from exceeding 400 parts per million, minimizing future temperature rise.

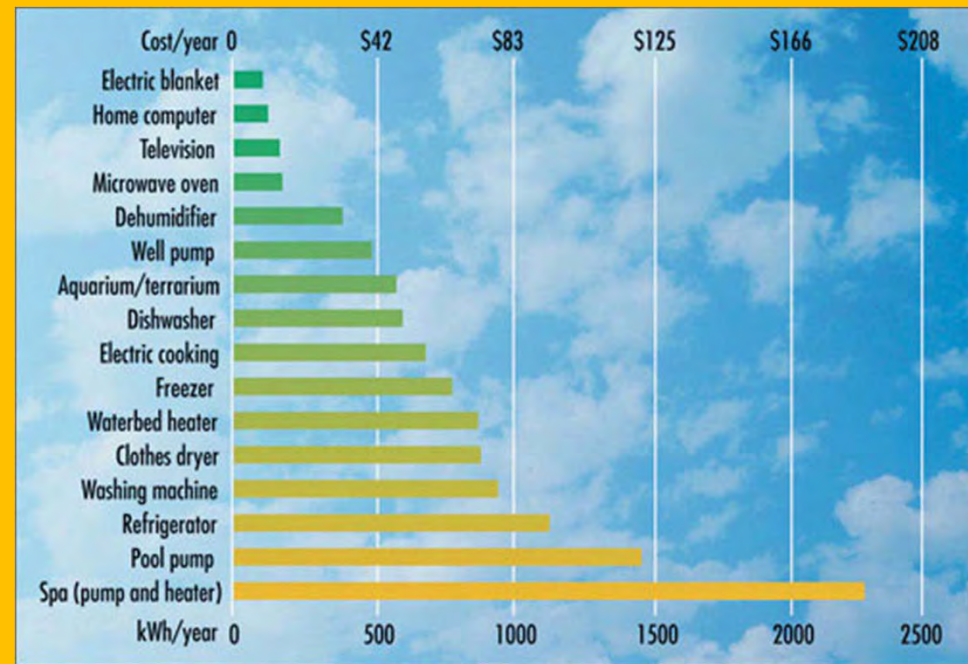
# Lighting



- A worldwide switch to highly-efficient lighting would cut electricity use 12%, equivalent to closing 705 of the world's 2,670 coal-fired power plants.
- Traffic light retrofit to LEDs saves New York City \$6,000,000/year.

# Appliances

- Energy used in appliances in standby mode worldwide account for up to 10% total electricity consumption. S. Korea is mandating a 1-watt limit on standby for many appliances.



- Japan has a world-leading program that raised efficiency standards boosting computer efficiency by 99%.

- Flat screen plasma TVs use easily twice as much electricity as traditional TVs; UK considering banning. TVs account for about 10% of residential energy use in CA.

# Buildings

- Retrofits with better insulation and more efficient appliances can cut energy use 20-50%.
- A retrofit of the Empire State Building expected to reduce energy use by 38% and energy costs by \$4.4 million annually.



Photograph by Diane Cook and Len Jenhei



# Living Buildings



# Transportation



- Plug-in hybrid electric vehicles running primarily on electricity generated by the wind and the sun could draw most of their energy during “off peak” hours.



# Transportation



Japan's high speed rail :

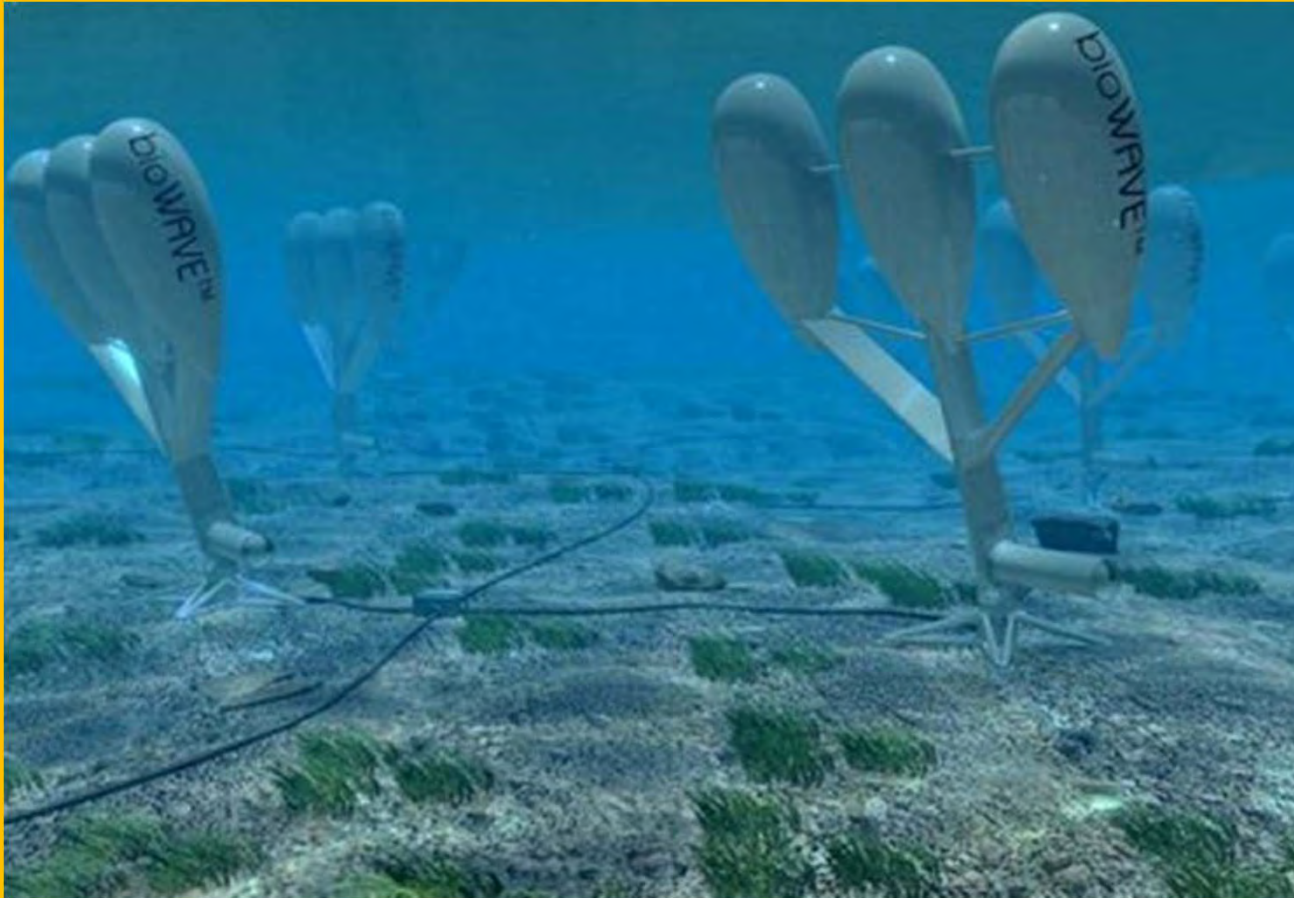
- carries a million passengers a day
- travels 3 times faster than cars
- late arrivals average 6 seconds
- create 1/3 fewer emissions than car travel

# Smart Grid

- Link regions rich in wind, solar, and geothermal energy with consumption centers, allow for two way metering, and “smarter” energy use.
- Reduce peak power demand:
  - dishwasher can be programmed to run at 2 am when power is cheaper
  - turning off all refrigerators in UK for brief periods of time would save 2,000 MW in the UK, enough to close 4 coal-fired power plants.



# A New Materials Economy



# Recycling

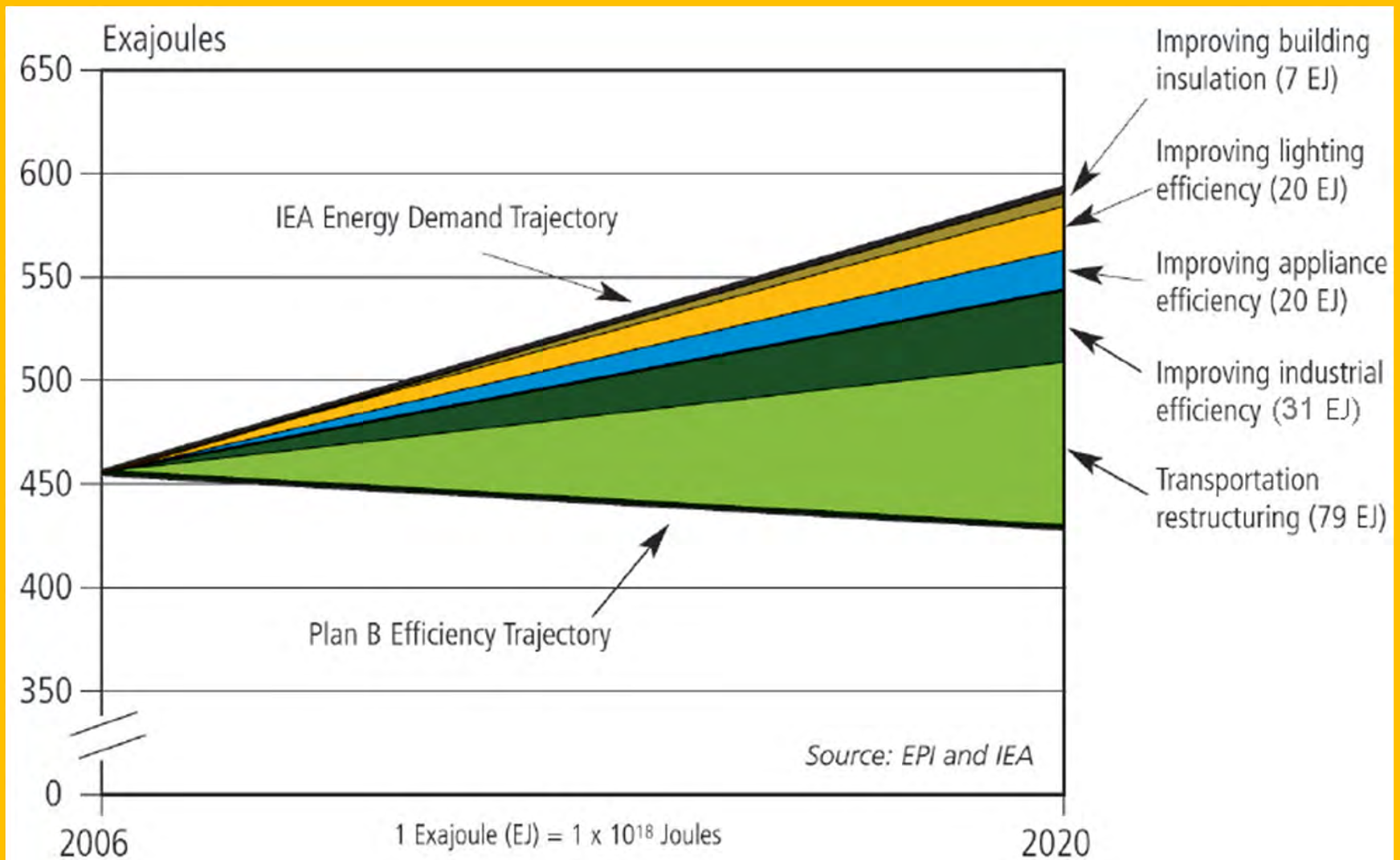
Currently only 29% of garbage in USA is recycled. Florida has boldly set a goal of recycling 75% of waste by 2020.

Finland has banned the use of one-way soft drink containers.

San Francisco mayor has banned the use of city funds to purchase bottled water.



# 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)

