

REVISED AND EXPANDED

PLAN B 3.0

MOBILIZING TO SAVE CIVILIZATION

LESTER R. BROWN

"We should all heed Brown's advice."
—President Bill Clinton



**A Summary of
Plan B 3.0:
*Mobilizing to Save
Civilization,*
a book by
Lester R. Brown**


EARTH POLICY INSTITUTE

Overview

A Civilization in Trouble

- Lessons from China
- Three New Stresses
 - Peak Oil
 - Rising Food Insecurity
 - Climate Change
- Failing States
- Tipping Points

Time for Plan B

- Stabilizing Population, Eradicating Poverty
- Restoring the Earth
- Plan B Budget
- Climate Action Plan
- Putting a Price on Carbon
- A Wartime Mobilization
- Pieces of the Puzzle
- Let's Get to Work

A Civilization in Trouble

- World facing a backlog of unresolved social and environmental problems
 - Rapid population growth, rampant poverty, hunger and disease in many countries
 - Water tables falling and rivers running dry
 - Forests shrinking
 - Soils eroding, grasslands turning to desert
 - Species disappearing, fisheries collapsing

Lessons from China

If China's per capita income reaches U.S. levels by 2030 and consumption patterns follow, China would need:

- 2 times current world paper production
- > 1 billion cars, compared to the current world fleet of 860 million
- Paved area equal to its rice-growing area
- More oil than the world currently produces

Lessons from China

- Western economic model – fossil fuel-based, automobile-centered, throwaway economy – will not work for China
- If it will not work for China, it will not work for India, nor for the other 3 billion people in developing countries
- In integrated global economy, it will no longer work for industrial countries either

Three New Stresses

1. Peak Oil
2. Rising Food Insecurity
3. Climate Change





Peak Oil

- Top 20 oil fields were all discovered between 1917 and 1979
- Since 1981, oil extraction has exceeded new discoveries by a widening margin
- World conventional oil reserves drop each year, with most of the easily-recovered oil already pumped

Peak production of conventional oil is on our doorstep, if not already here. In a world where oil production is no longer expanding, one country can get more oil only if another gets less.

Rising Food Insecurity

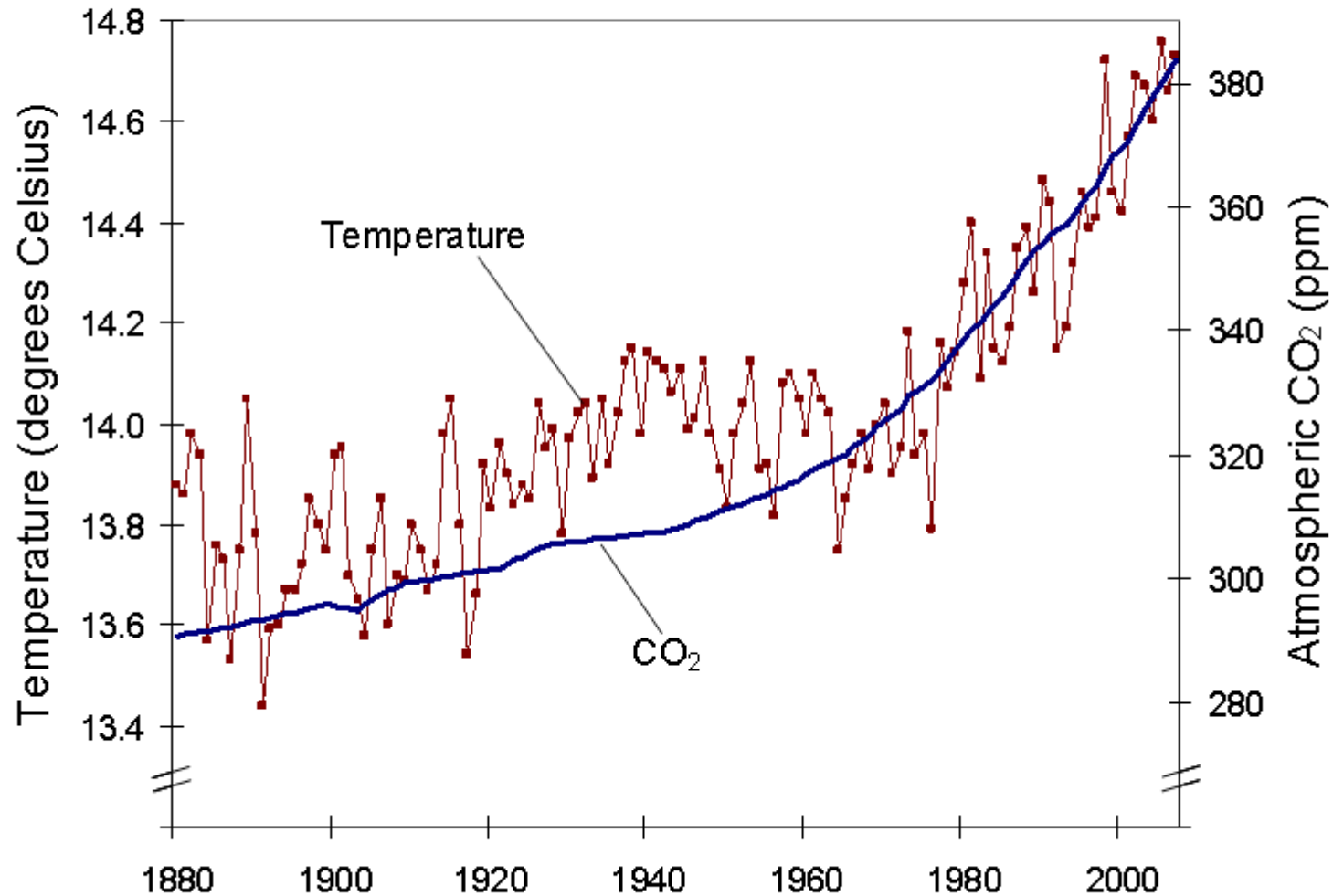
- Supply Tightening
 - Little unused arable land
 - Irrigation potential plateaued
 - Slowing growth in crop yields
- Demand Growing
 - Adding > 70 million to world population annually
 - 4 billion people desire to move up the food chain and eat more grain-intensive livestock products
 - Food vs. Fuel: Expanding biofuel production means that cars and people compete for crops

The number of hungry people in the world fell between 1970 and the 1990s. Now this number is growing and will continue to rise unless these trends are reversed.

Climate Change

- Since start of Industrial Revolution, carbon dioxide (CO₂) in the atmosphere has risen from 277 parts per million to 387 parts per million
- Burning fossil fuels – coal, oil, and natural gas – emits 7.5 billion tons of carbon each year
- Deforestation emits 1.5 billion tons each year
- Electricity generation and transportation are the largest sources of CO₂ emissions, with coal-fired power plants the biggest culprit
- As CO₂ accumulates, global temperature rises

Average Global Temperature and Atmospheric Carbon Dioxide Concentrations, 1880-2007



Source: NASA GISS and NOAA/ESRL

Climate Change

- The earth has warmed an average 0.6°C (1.0°F) since 1970
- Rising temperatures fuel stronger storms and increase crop-withering heat waves
- The Intergovernmental Panel on Climate Change (IPCC) projects earth's average temperature will rise 1.1 - 6.4°C (2.0 - 11.5°F) during this century

Ice Melting

- Losing our Reservoirs in the Sky
 - Mountain glaciers rapidly disappearing worldwide
 - Himalayan and Tibetan-Qinghai Plateau glaciers feed the major rivers of Asia during the dry season, providing critical irrigation water for agriculture
 - If melting continues at current rates, rivers like the Yellow, Yangtze, Ganges, and Indus could become seasonal, devastating wheat and rice harvests

Ice Melting

- Rising Seas
 - Massive Greenland and West Antarctic ice sheets are melting at accelerating rates
 - Together hold enough water to raise sea level 12 meters (39 feet)
 - A 10 meter rise in sea level today would inundate coastal areas home to more than 600 million people

The risk is that climate change could spiral out of control, making it impossible to arrest trends such as rising temperatures, ice melting, and rising seas, threatening food security and creating hundreds of millions of climate refugees.



Pressures Mounting

- The backlog of unresolved problems is growing as the world fails to solve existing problems even as new ones are added to the list
- The risk is that these accumulating problems and their consequences will overwhelm more and more governments, leading to widespread state failure

Failing States

- States fail when governments lose control of part or all of their territory, and can no longer ensure their people's security
- Rapidly growing populations, resource depletion, and political stresses are pushing more countries such as Afghanistan, Haiti, and Sudan toward state failure each year, increasing instability around the world

How many failing states will it take before civilization itself fails?

Tipping Points

- Can we address the root causes of state failure in time to avoid global political instability?
- Can we halt deforestation before the Amazon rainforest dries out, becoming vulnerable to fire?
- Can we close coal-fired power plants fast enough to avoid losing the Greenland and West Antarctic ice sheets?
- Can we cut carbon emissions quickly enough to keep temperature from spiraling out of control?

Business as usual is not working – It's time for Plan B.

Plan B: Four Main Goals

1. Stabilizing Population
2. Eradicating Poverty
3. Restoring the Earth's Natural Support Systems
4. Stabilizing Climate

Stabilizing Population and Eradicating Poverty

- Universal primary education
- Eradication of adult illiteracy
- School lunch programs for 44 poorest countries
- Assistance to preschool children and pregnant women in 44 poorest countries
- Reproductive health care and family planning services

Total Additional Annual Cost = \$77 billion

Restoring the Earth

- Protecting and restoring forests
- Conserving and rebuilding soils
- Protecting biodiversity
- Restoring fisheries
- Stabilizing water tables
- Planting trees to sequester carbon

Total Additional Annual Cost = \$113 billion

Plan B Budget

Additional Global Annual Expenditure Needed:

Basic Social Goals \$77 billion

Restoring the Earth \$113 billion

Total Budget \$190 billion

Perspective: This equals just *one sixth* of annual world military spending.

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



Raising Energy Efficiency

- Buildings
 - Retrofits with better insulation and more efficient appliances can cut energy use 20 to 50%
- Lighting
 - A worldwide switch to highly-efficient home, office, industrial, and street lighting would cut electricity use 12%, equivalent to closing 705 coal-fired power plants
- 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%



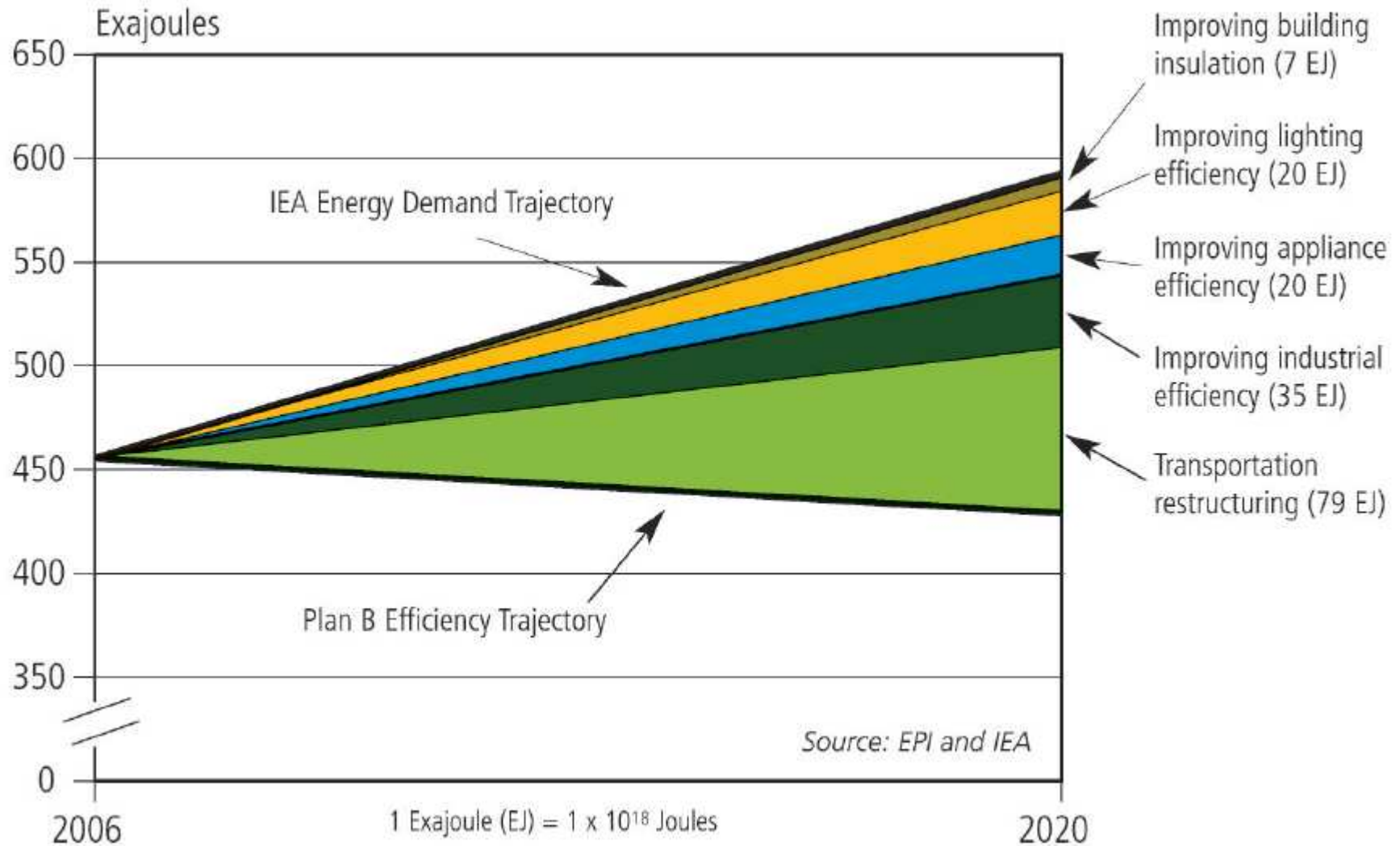
Raising Energy Efficiency

- Industry
 - Improving manufacturing efficiency for carbon emissions heavyweights (chemicals, petrochemicals, steel, and cement) offers major opportunities to curb energy demand
- Transportation
 - 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 Automotive Economy

- Plug-in hybrid electric vehicles (PHEVs) running primarily on emissions-free electricity generated by the wind and the sun would allow for low-carbon short-distance car trips
- Combining a shift to PHEVs with widespread wind farm construction would allow drivers to recharge batteries at a cost equivalent of less than \$1 per gallon of gasoline

Plan B Energy Efficiency Measures



Replacing Fossil Fuels with Renewables

- Wind
- Solar
- Geothermal
- Other: Small-scale Hydro, Tidal and Wave Power, Biomass

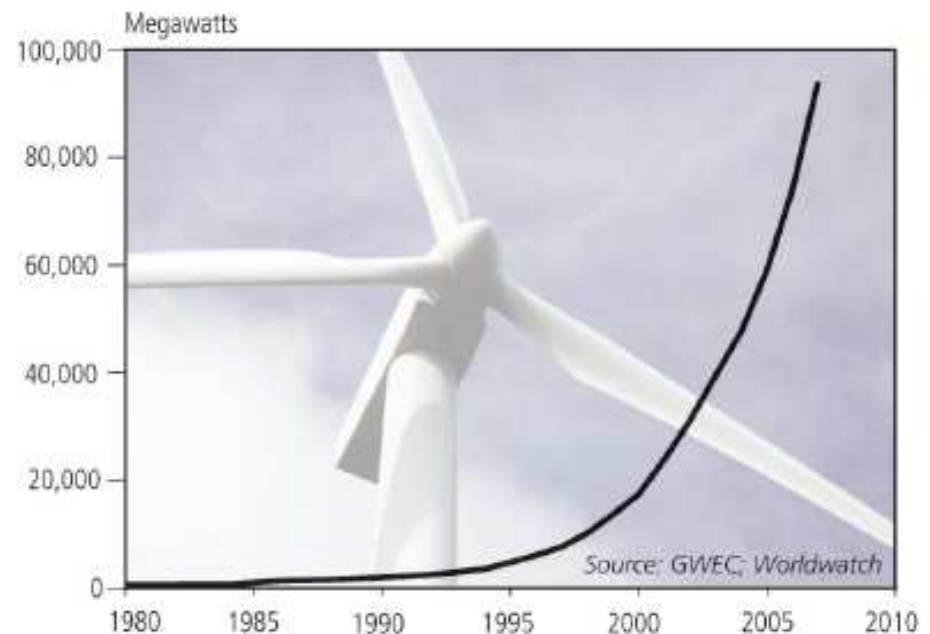


Photo Credit: iStockPhoto / Gary Milner

Harnessing the Wind

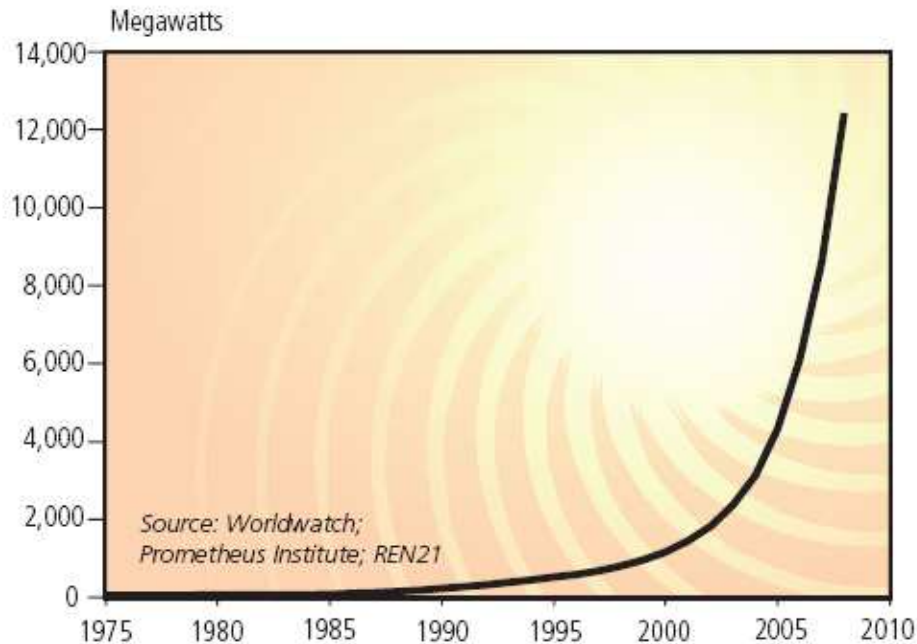
- Centerpiece of Plan B energy economy
- Abundant – North Dakota, Kansas, and Texas alone could satisfy U.S. energy needs
- Widespread – in every country
- Increasingly inexpensive
- Plan B goal: 3 million MW of installed capacity worldwide by 2020
- Need 1.5 million 2-MW turbines installed by 2020

World Cumulative Installed Wind Power Capacity, 1980–2007



The Power of the Sun

World Cumulative Photovoltaic Production, 1975–2007



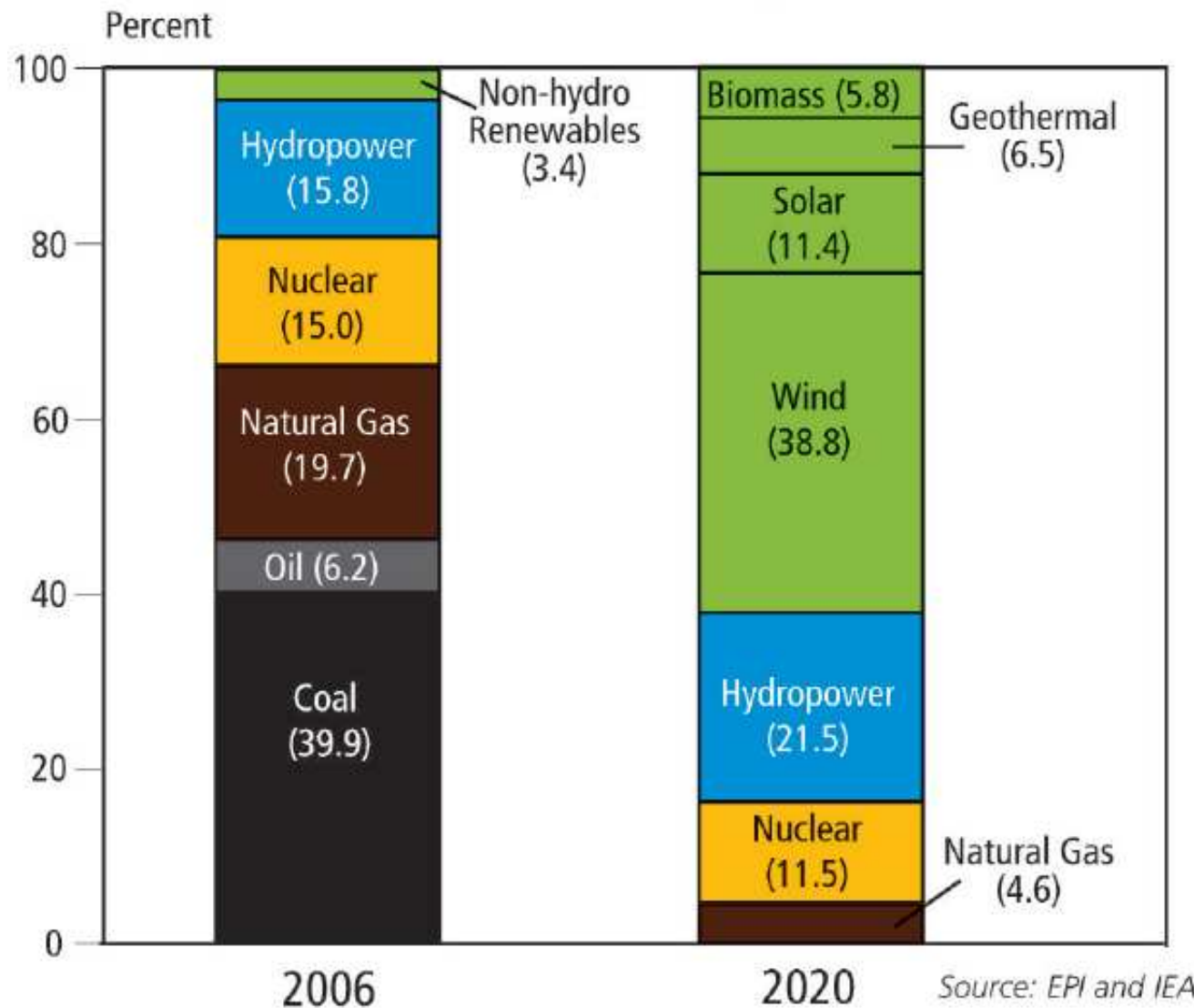
- Technologies include photovoltaics (PV), solar thermal power plants, solar hot water and space heaters
- Sunlight hitting the earth in 1 hour could power global economy for 1 year
- Plan B goal: Solar heating, electricity each exceed 1 million MW installed capacity by 2020

Geothermal: Energy from the Earth

- Heat in the upper 6 miles of earth's crust contains 50,000 times the energy found in global oil and gas reserves
- Plan B goal: increase geothermal heating 5-fold to 500,000 thermal MW, and geothermal electricity production 22-fold to 200,000 MW by 2020



World Electricity Generation by Source in 2006 and in the Plan B Economy of 2020

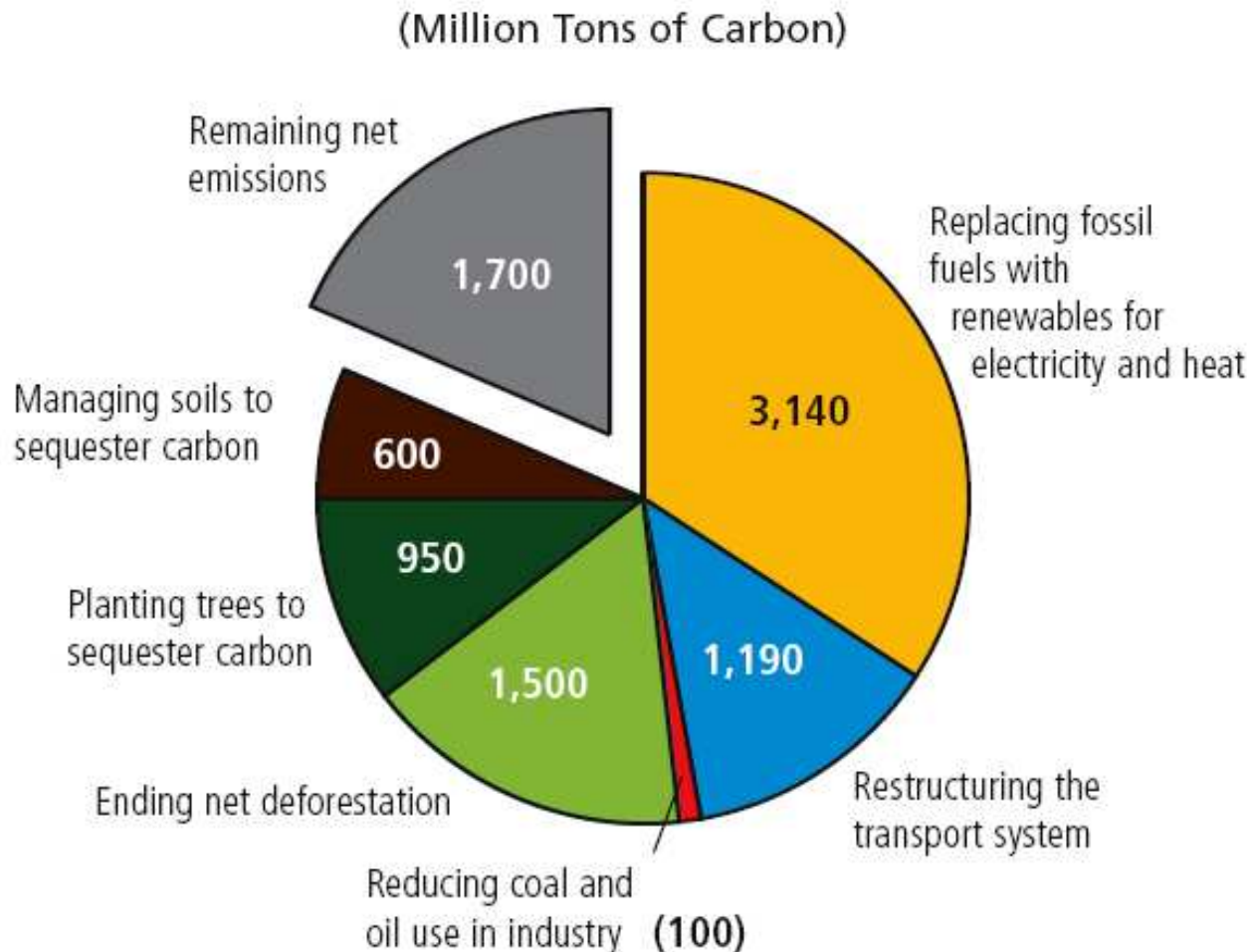


Ending Net Deforestation, Planting Trees

- Ending net deforestation by 2020 can reduce annual CO₂ emissions by 1.5 billion tons of carbon
- Planting trees and adopting less-intensive farming and land management practices can stabilize soils and sequester carbon

Adding these measures to our renewable energy goals will allow us to reduce net CO₂ emissions 80% by 2020.

Plan B Carbon Dioxide Emissions Reduction Goals for 2020



Baseline Emissions (2006) = 9,180 Million Tons of Carbon

Source: EPI

Putting a Price on Carbon

- Problem: Price of fossil fuels does not reflect costs of climate change, markets not telling ecological truth
- Solution: Tax restructuring
 - Plan B proposal: Raise tax on carbon emissions by \$20 per ton each year, to exceed \$200 per ton of carbon by 2020
 - Offset carbon tax with reduction in income taxes

An aerial photograph of a vast aircraft manufacturing plant, likely during World War II. The image shows hundreds of aircraft, mostly bombers, lined up on the tarmac. The planes are arranged in neat rows, stretching far into the distance. The ground is a mix of dirt and grass, and the sky is clear. The overall scene conveys a sense of large-scale industrial production and military readiness.

A Wartime Mobilization

- On entering World War II, the U.S. mobilized resources and completely restructured its economy within months
- Protecting the U.S. drove this mobilization; saving civilization will require action equal in urgency, but much larger in scale
- We have the technologies necessary to implement Plan B – what is needed now is the political will to do so

Pieces of the Puzzle



Countries and cities around the world give a sense of what is possible:

- In Copenhagen 36% of commuters bike to work
- Iran cut its rapid population growth rate from 4.2% in the early 1980s to 1.3% in 2006 through national literacy, health, and family planning programs
- China has 40 million rooftop solar water heaters harnessing energy equal to the output of 54 coal-fired power plants
- Japan's high-speed rail system moves hundreds of thousands of passengers each day, measuring delays in seconds

Pieces of the Puzzle

- Once almost treeless, South Korea has reforested 65% of its land
- In the Philippines 19 million people get electricity from geothermal power plants
- In Germany a systematic shift of taxes from labor to energy reduced annual CO₂ emissions by 20 million tons and created 250,000 jobs between 1999 and 2003
- Denmark gets 20% of its electricity from wind and is aiming for 50%
- Proposals for 90 coal-fired power plants in the United States have been shelved since 2007

Let's Get to Work

Saving civilization is not a spectator sport.

– Lester R. Brown

- What You Can Do

- Educate yourself on environmental issues
- Spread the word: letters to the editor, op-eds, internet
- Get politically involved: let elected officials know what's important
- Take action in an area that is important to you, such as closing coal-fired power plants, tax restructuring, or ending net deforestation



The Choice is Ours

- Will we stay with business as usual and preside over an economy that continues to destroy its natural support systems until it destroys itself?
- or*
- Will we adopt Plan B and be the generation that changes direction, moving the world onto a path of sustained progress?

The choice is ours. It will be made by our generation, but it will affect life on earth for all generations to come.

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