Lecture 1: The Climate Crisis Reinvented

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1. The climate crisis reinvented (3.28.2016)
Klein, chapters 1 & 2 | Optional: Dove & Kammen, chapter 1

2. Our mistrust of the future makes it hard to give up the past (4.4.16)
Klein, chapters 3 | Optional: Dove & Kammen, chapter 5

3. We don't tenure Mother Teresa (4.11.2016)
Klein, chapter 9 | Optional: Dove & Kammen, chapter 2

4. What are the barriers to action? (4.18.2016)
Klein, chapter 6 - 8 |

5. A new economics of the planet (4.25.2016)
Klein, chapter 4 | Optional: Dove & Kammen, chapter 3; Klein 12

6. Pasteur's Quadrant (5.2.2016)
Klein, chapter 7, 11 | Optional: Dove & Kammen, chapter 4

An 80 Percent Reduction in Greenhouse Gas Emissions
(and if we delay we must go carbon negative)

IPCC AR5 (2014): Climate Projections and Associated Risks

Antarctic ice core records: 400,000 years

- Cyclic climate change as we enter and leave ice ages
- Tight correlation between temperature and CO$_2$
- Never have seen CO$_2$ levels over 300 ppm – until now (400 ppm)!
- Some temperature spikes “briefly” warmer than now – but sea level was 15 feet higher in these periods
- Current rate of temperature climb unprecedented in record (not visible here)
The Institutions

The Convention

The Negotiations

The Ongoing Negotiations

- UNFCCC Timeframe
  - COP 13, 2007: Bali Road Map, detailed plan on how to move forward
  - COP 14, 2008: Poznan "half way"
  - COP 15, 2009: Copenhagen, foreseen as the conclusion of the negotiations under the AWGs, failure
  - COP16, 2010: Cancun, pragmatic/incremental approach

- Other International Processes
  - Major Economy Forum, G8, G20
  - Bilaterals and Regional Consultations
  - REDD + Partnership
  - High-level Advisory Group on Climate Change Financing (AGF)
    - Sometime more political momentum, but less transparency and inclusiveness

The Ongoing Negotiations

The parties to the Convention

- The developed Countries (Annex I)
  - EU
  - Umbrella
  - JUSGANNZ

- The developing countries (Non-Annex I)
  - G77/China (130+ countries)
  - LDCs: Least developed countries
  - OPEC: oil producing and exporting countries...
  - AOSIS (SIDS): Small Islands States
  - Africa
    - One country might join more than 1 grouping: e.g. Algeria is a member of Africa, OPEC and G77/China

The Environmental Integrity Group, with both developed (Switzerland) and developing countries (Mexico, South Korea)
The Process of Negotiations

14. In reflection of [because of] their historical responsibility for the accumulation of greenhouse gas emissions in the atmosphere, [developed country Parties] and other Parties included in Annex I of the Convention [must] [should] [have leadership] in the global effort to build a low-carbon economy that ensures continued growth and sustainable development and that increases capacity to adapt to the impacts of climate change [shall take the lead in combating climate change] and the adverse effects thereon [in particular on taking corresponding measures in mitigation] [in taking on ambitious economy-wide quantified emission limitation and reduction commitments immediately implementing ambitious and legally binding emissions reductions] [through deep reductions in their emissions] [or actions.] [Developed country Parties and other developed Parties included in Annex II of the Convention] [must] [shall fulfill their commitments under the Convention in supporting all developing country Parties, particularly the most vulnerable, in understanding adaptation measures and enhanced nationally appropriate mitigation actions (NAMAs), in a measurable, reportable and verifiable manner, and in assisting [providing support] enabling them through the provision of [transfer of] technology cooperation and transfer and capacity building and financial resources [that help these countries] to move towards a low-emission development path.

The Actors

And then ....

Smoking in the US
Are we really this dumb?

% of Americans Who Smoke

THE SEVENTIES
THE ENVIRONMENTAL DECADE
- Three books inspired the environmental awareness:
  1. Silent Spring; by Rachel Carson.
  2. The Population Bomb; by Paul Ehrlich.
  3. The Closing Circle; by Barry Commoners.

AIR QUALITY CONTROL
- The 1970 Clean Air Act targeted Auto and Smokestacks Emissions, it significantly improved air quality.
- The major air pollutants are:
  1. Sulfur Dioxide SO2; sources are volcanic emissions, and the burning of high-sulfur containing coal. It is highly corrosive and can damage the respiratory tract
  2. Nitrogen Oxides; sources are lightning, decomposing organics, and auto and industrial emissions. It can damage the respiratory tract and deplete the ozone layer

Source: Centers for Disease Control and Prevention (CDC), 2014
http://www.cdc.gov/tobacco/data_statistics/tables/trends/cig_smoking/index.htm

1965: Health warnings required on packages
1983: Cigarette tax doubles
1998: CA Bans Smoking in Bars
1992: U.S. Bans Sale to Minors
1996: U.S. Bans Smoking on Airplanes
1970: Advertisements banned from TV
1988: U.S. Bans Smoking in Bars
2014: CVS Stops cigarette sales at 7,600 retail pharmacies

Smoking sections on airplanes

The major air pollutants are:
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- Nitrogen Oxides; sources are lightning, decomposing organics, and auto and industrial emissions. It can damage the respiratory tract and deplete the ozone layer
Continue; **Major air pollutants**

- 3. Carbon Monoxide; sources are natural and also from incomplete burning of fossil fuels, mainly auto emissions, it contributes to the global warming and to the formation of ozone at low altitudes
- 4. Ozone; Is the primary ingredient of smog, causes eye irritation, nasal congestion, asthma, damage to lung and immune system. (The Ozone layer is ozone at high altitude and protects life by blocking ultraviolet radiation)

Continue; **Major air pollutants**

- 5. Particulates; Natural sources include soil erosion, pollen, volcanoes. Human made sources include diesel engines emissions, cement manufacturing, road construction, wood-burning stoves, etc. Particulates finer than 10 micrometers may not be filtered from the lungs, some particulates are carcinogenic, some are irritants

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**The Cuyahoga River Fire, 1969**

*Image of the Cuyahoga River Fire, 1969*

**Federal Subsidies Overwhelmingly for Fossil Fuels**

*Image of a pie chart showing federal subsidies for different energy sources. The chart indicates that fossil fuels receive the largest subsidies.*

**Reduction in Acid Rain**

*Images showing a comparison of acid rain levels in 1985 and 2012. The legend indicates a decrease in acid rain levels over the years.*

**The Ozone Hole**

*Images showing the ozone hole from 1979, 2013, and an expected 2050.*
Environmental Kuznets Curve

EKC reflects [technology] choices

Reduction by structural conversion of industry
Reduction by energy conservation
Reduction by fuel conversion

Factors contributing to reduce Sox emission in Japan
Toshihiko MASUI
National Institute for Environmental Studies, Tsukuba

Environmental Indicators vs. Income

"Kuznets Curves"

A. Population without Safe Water

B. Urban Population without Adequate Sanitation

C. Urban Concentration of Particulate Matter

D. Urban Concentration of Sulphur Oxides

E. Urban Water quality

F. Carbon Dioxide Emissions

California Advancing Energy Efficiency

Per Capita Electricity Consumption

AB 32 Emissions Reductions

% Change from 1990 levels

4) Abatement technology

- Is technology sufficient to explain why there can be EKC?
- Even without preferences for environmental quality or externalities and institutions to internalize them, increasing returns to scale in abatement technology can explain the appearance of an EKC (Andreoni and Levinson, 2001).