

# Science and Politics in Ozone and Climate

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*Symposium for the 30<sup>th</sup> anniversary of the Montreal Protocol*

*Paris, 19-20 September 2017*

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**Transnationale  
Umweltpolitik zum  
Schutz der  
Ozonschicht**

USA und Deutschland  
im Vergleich

Campus

**Transnational  
Environmental Policy**

Reconstructing ozone

Reiner Grundmann

Routledge Studies in Science, Technology and Society



# Overview

- Similarities between both cases
- Differences between both cases
- Linear model of science policy relation
- Tame and wicked problems
- Political options
- Conclusions

# Ozone and climate: similar

- CFCs and GHGs (esp. CO<sub>2</sub>) have a long lifetime
  - Accumulate in the atmosphere
  - Delay in action makes problem worse in the future
- CFCs and GHGs are emitted locally but diffuse globally
  - Problem is global in nature
  - Solution needs to be global
- Lobby groups resist regulation
- Scientists play an active role
  - They have alerted us to the problem
- Science assessments have been unified

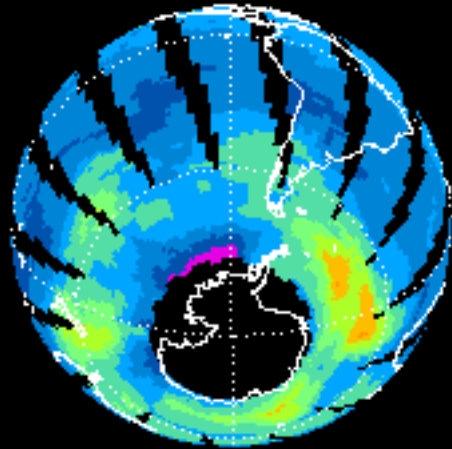


# Ozone and climate: different

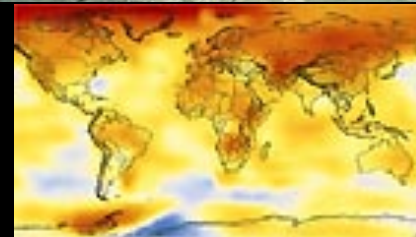
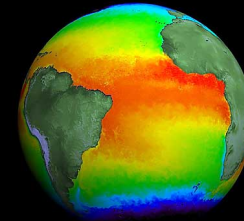
- CFCs were industrially produced
- CFCs were main causes of ozone depletion
- CFCs were a small part of economic activity
- '5 chemical firms in 4 countries dominated global CFC production' (Falkner 2008)
- Substitutes for different applications were becoming available at low cost
- many GHGs occur also naturally
- There are other climate drivers than GHGs
- GHGs are part of society's infrastructure
- Every country is part of the carbon cycle
- The cost of decarbonization is high, esp. if climate sensitivity is high

# Ozone and climate: different

Total Ozone for Aug 1, 1997



GSFC/916





# How climate change triggers earthquakes, tsunamis and volcanoes

Global warming may not only be causing more destructive hurricanes, it could also be shaking the ground beneath our feet



FOOD

## What does obesity have to do with climate change? Plenty, say some scientists

By Tom Laskawy on Dec 12, 2012

Tweet

Share

After a year filled with superstorms, droughts, floods, and wildfires, there's little doubt that climate change is having a dramatic impact on our lives. But it also threatens to cause more subtle impacts on our health. And we're just starting to get a handle on what they might be. The latest? It looks like



FACT:

More than 12 million Syrians and 3 million Iraqis were displaced

...  
IN THIS YEAR ALONE, MORE THAN 300,000 PEOPLE CROSSED THE MEDITERRANEAN SEA FLEEING CONFLICT IN THEIR HOMES

MIGRANTS

## How Climate Change is Behind the Surge of Migrants to Europe

# Linear model?

- Unified assessments as key to success?
- Science 'speaking with one voice'
- Science in the 'driving seat'?

- 
- The role of unique crisis signal
    - The 'ozone hole'
  - The role of pragmatic solutions and technical innovation
    - Spray can ban
    - ODS free fridge
  - Change in political and economic constellations
    - USA, Europe "level playing field"
    - CFC producers changed in 1986

- Despite the IPCC, dissonant voices have not disappeared
- Political options are central:
  - Science can set agenda, but does not design policy

- 
- Too many crisis signals, no shock surprises
  - ...??...
    - No-regret policies?
  - After stalemate in Kyoto and Copenhagen
    - Paris agreement
    - BRICS (and USA?) crucial: rising future emissions in the former



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NATURE GEOSCIENCE | CORRESPONDENCE

# Climate change as a wicked social problem

**Reiner Grundmann**

Nature Geoscience 9, 562–563 (2016) | doi:10.1038/ngeo2780

Published online 29 July 2016

## Tame and wicked problems

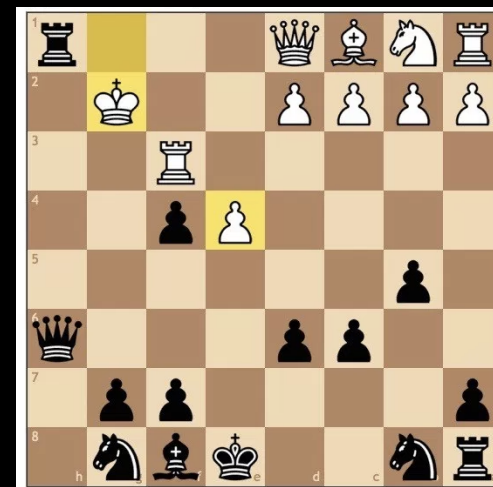
*Tame*: Solving an equation;  
achieving checkmate in five moves

*Wicked*: Success criteria are  
inherently political and subject to  
change

Crime, education, health policies

Scientific consensus is not needed  
to advise policy. Steps are taken  
incrementally and pragmatically.

No solution available, but better or  
worse ways of managing it



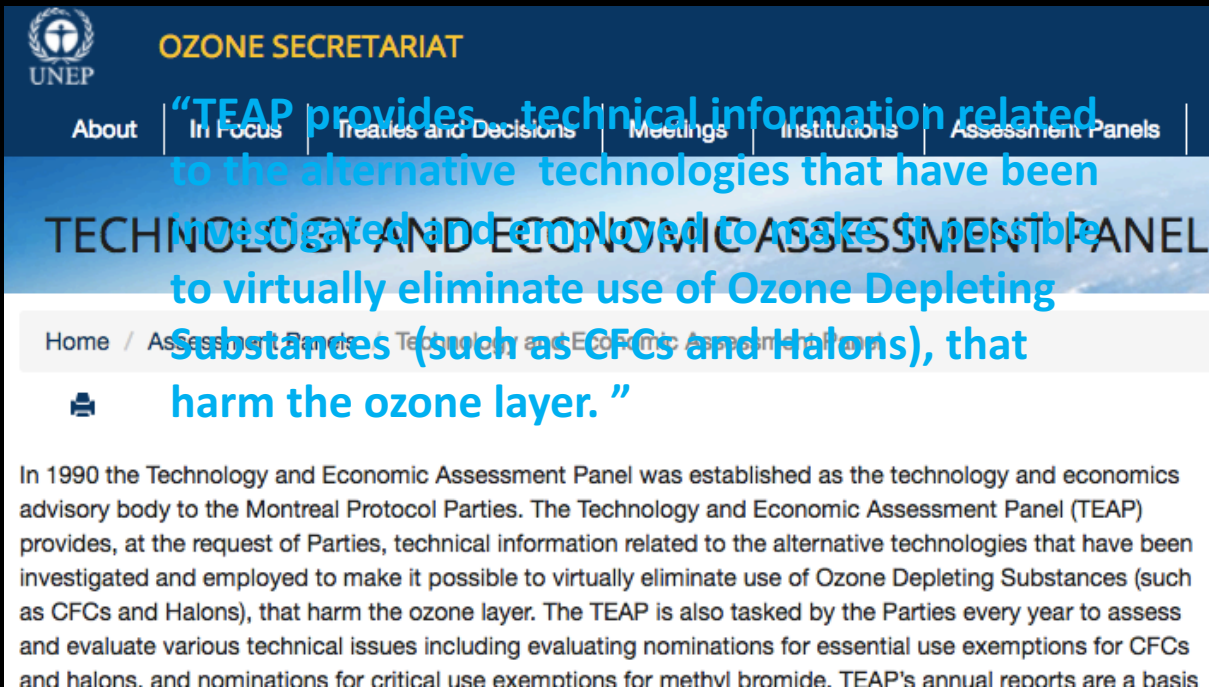
# Tame and wicked problems

- Ozone is a tame problem
- Ozone has an obvious 'stopping point' ('solution')
  - Going back to a world without CFC emissions
  - Banning a class of industrial chemicals
- Climate change is a wicked problem
- What counts as 'solution' and 'progress' is inherently political and changes over time
  - Reduction but not elimination of GHGs
  - Addressing all climate drivers and their impacts -- locally, regionally, globally

# Political options

## Ozone:

1. Do nothing (adapt to ozone loss)
2. Ban CFCs



The screenshot shows the UNEP Ozone Secretariat website. The header includes the UNEP logo and the text "OZONE SECRETARIAT". Below the header is a navigation menu with links: "About", "In Focus", "Treaties and Decisions", "Meetings", "Institutions", and "Assessment Panels". The main heading is "TECHNOLOGY AND ECONOMIC ASSESSMENT PANEL". Below this is a breadcrumb trail: "Home / Assessment Panels / Technology and Economic Assessment Panel". A quote is displayed: "TEAP provides... technical information related to the alternative technologies that have been investigated and employed to make it possible to virtually eliminate use of Ozone Depleting Substances (such as CFCs and Halons), that harm the ozone layer." Below the quote is a printer icon. The main text block begins with: "In 1990 the Technology and Economic Assessment Panel was established as the technology and economics advisory body to the Montreal Protocol Parties. The Technology and Economic Assessment Panel (TEAP) provides, at the request of Parties, technical information related to the alternative technologies that have been investigated and employed to make it possible to virtually eliminate use of Ozone Depleting Substances (such as CFCs and Halons), that harm the ozone layer. The TEAP is also tasked by the Parties every year to assess and evaluate various technical issues including evaluating nominations for essential use exemptions for CFCs and halons, and nominations for critical use exemptions for methyl bromide. TEAP's annual reports are a basis

## Climate:

1. rolling out nuclear power plants across the globe;
2. switching all energy supply to solar, wind or biofuels;
3. taxing carbon (or energy) with low or high rates;
4. implementing emission trading systems;
5. developing carbon capture and storage;
6. developing new zero carbon energy systems;
7. taking adaptation more seriously;
8. developing geo-engineering projects;
9. adopting vegetarian or vegan diets and lifestyles;
10. restricting population growth;
11. abolishing capitalism;
12. abolishing democracy.

# Conclusion

Success of Montreal Protocol was the result of many interacting factors during a window of opportunity created by the ozone hole crisis

- Change of industry position

- Change of Europe's position

- Indications that ozone hole was caused by CFCs

- 'Banning' and 'phasing out' ODS was technically possible and politically feasible

With climate change we are facing a different kind of problem

Architecture of top down regulation (Kyoto) proved ineffective

- Paris is a recognition of this fact