

An aerial photograph of the United States Capitol building in Washington, D.C. The iconic white dome is the central focus, surrounded by the neoclassical wings of the building. The foreground shows green lawns, walkways, and parts of other government buildings with green roofs. The background features the city of Washington and the Washington Monument on the left. The sky is blue with scattered white clouds. Overlaid on the center of the image is the text "Public Environmental/Energy Policies" in a bold, blue, sans-serif font with a white outline.

# Public Environmental/Energy Policies

# Agenda

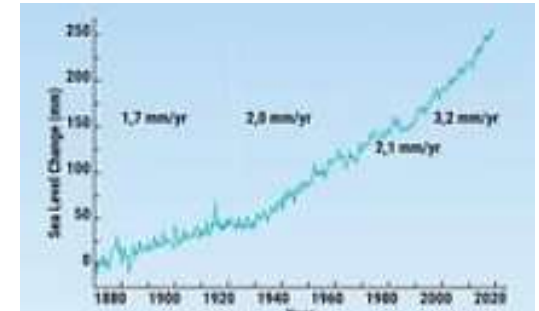
## Summary

Detrimental Climate trends are closely related to recent atmospheric/oceanic GHG contaminations. Feed back effects destabilize global climate.

**Anthropogenic activities = major contributors**

**Supported by state-of-the-art model sim**

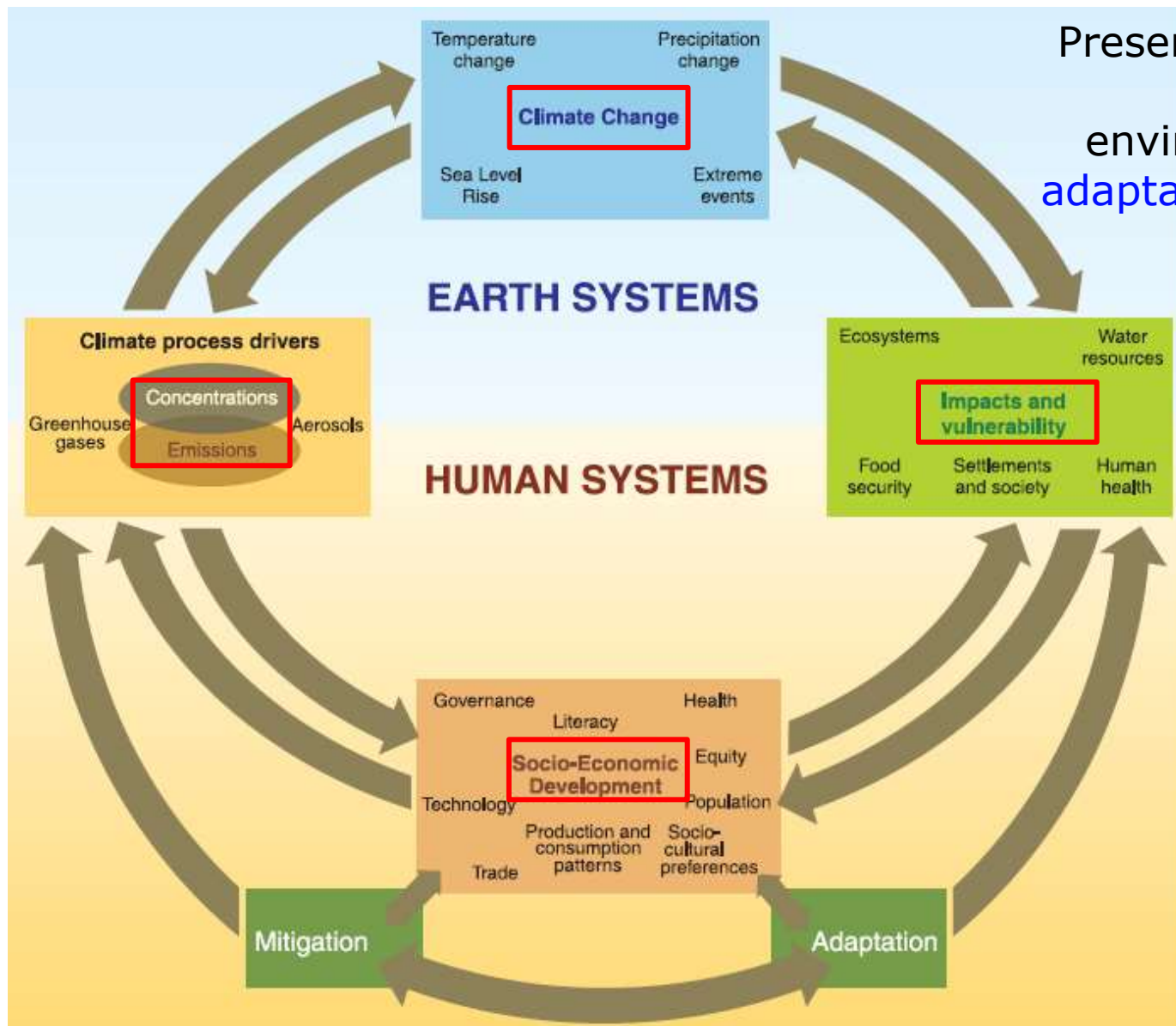
Present levels of GHG (>470 ppm) in environment suggest adaptation + mitigation.



## Public environmental and energy policies

- Feed back on each other,
- Dilemmas (health, climate vs. short-term economy),
- Emphasis on adaptation to or reduction/mitigation of “collateral damage” by economic activity,
- Previous global efforts succeeded in mitigation,
- Survey over US policies, past and stated intentions

# Drivers of Environmental Change Impacts and Responses



Present levels of GHG (>410 ppm) in environment **require adaptation**, in addition to **mitigation**.

Urban environment:  
Pollution → smog, toxic gases, particulates

From IPCC climate synthesis report 2007.

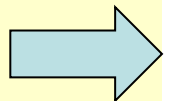


# Ethical and Policy Dilemmas

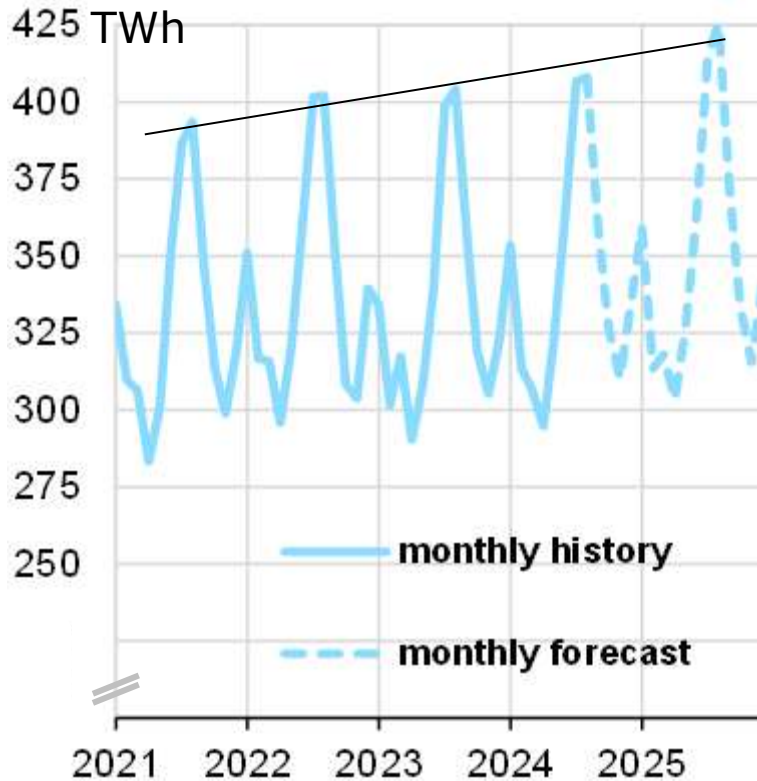
1. Conservation of resources for future generations vs. sustaining larger population & developing capacity to solve future problems.
2. Protection of environment vs. technological progress & economic efficiency.
3. Relative emphasis of current welfare vs. that of future generations.
4. Utilization of powerful new technologies vs. extensive risk/benefit study.
5. Imposition of technology risks/cost without public consent vs. paralysis of decision making. Role of experts vs. public.
6. Public interest vs. individual preferences (eminent domain, mandates ?!).
7. Social and political merits of simple vs. complex technologies (coal/nuclear).
8. Global responsibility of developed nations towards poor/emerging societies. Equitable resource/wealth sharing.
9. Technological possibilities vs. basic human needs (biofuels vs. bio-food).
10. Mitigation vs. adaptation to climate change.

Loosely adapted from: I. Barbour, H. Brooks, S. Lakoff, J. Opie, "Energy and American Values," Praeger Publishers, Nat. Hum. Center, Research Triangle Park, NC, 1982.

Summary of US-global  
environmental policies



# U.S. Electricity Consumption



New, ever-growing U.S. electricity demand, now for supercomputer data centers (cloud services), Bitcoin mining/management,...

→ **Increased collateral pollution.**

## Jevon's Paradox

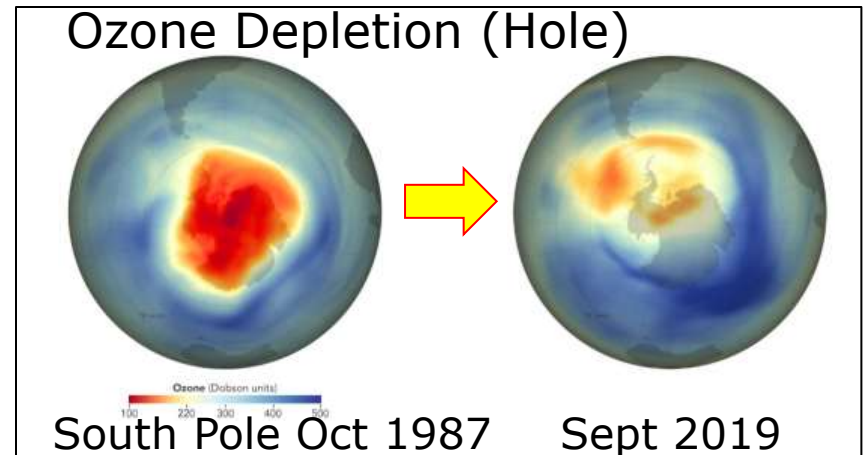
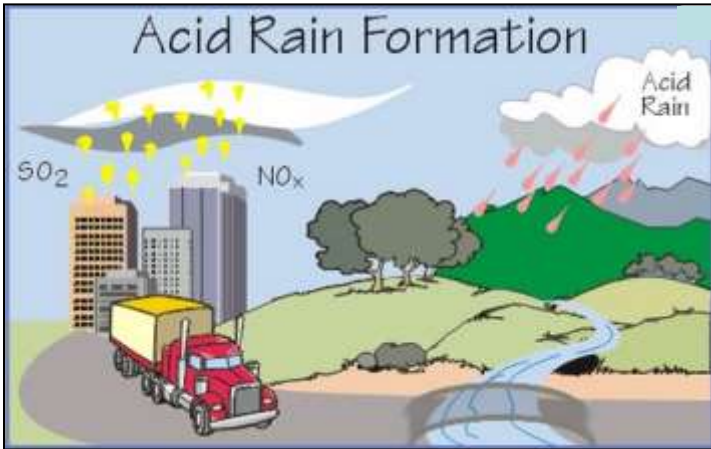
Technological progress in efficiency of resource utilization increases consumption, rather than to decrease its consumption.

Raising living standard of emerging world requires a more equitable distribution of refined energy (electricity) resources.

→ Must increased pollution levels be accepted?



# Important Lessons for Future Action



More examples: Stopped above-ground atomic/hydrogen bomb tests.  
Radioactive dust in atmosphere from 1950s/ 1960s is still (2020) detectable

Anthropogenic activities (pollutions) can cause global changes in atmospheric properties → climate effects.

Man-made pollution effects on (local) atmosphere can be halted and reversed !

Cap-and-Trade programs = examples for solving larger (global) problems: GHG induced Climate Change ?

# Solved (app.): Mitigation of Acid Rain

1980, U.S. Congress passed an Acid Deposition Act.

Initiated an 18-year **assessment and research program** under the direction of the National Acidic Precipitation Assessment Program (NAPAP).

1989: US Congress amended Clean Air Act.

**Established Acid Rain Program**, a **cap and trade program** designed to control emissions of sulfur dioxide and nitrogen oxides.

**Goals:** Reduction of SO<sub>2</sub> emissions from power plants by 10 Mt/a .

Implemented in two phases:

- I) 1995: limited SO<sub>2</sub> emissions from 110 largest power plants to a total of 8.7 Mt.
- II) 2000: extend to most power plants.

**Cap (limit emission) and trade (permits) program** successful:

- 1990s SO<sub>2</sub> emissions decreased by 40%, acid rain levels dropped by 65% (Pacific Research Institute).  
Other (conventional) regulation in European Union → decrease SO<sub>2</sub> emission by 70%
- In 2007, total SO<sub>2</sub> emissions were 8.9 Mt, achieving long term goal early (<2010)

Costs of compliance (2010, EPA estimates), \$(1-2) B/a to businesses and consumers.

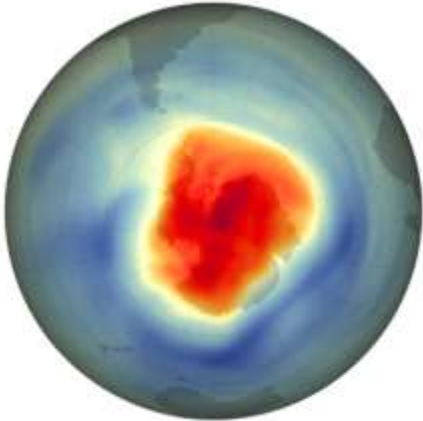
(Technical details see later)

- → **Success = substantial reduction of acidity of rivers and lakes in NY** (and elsewhere)

**Effective cap & trade program in past: Example for attacking larger problem?**  
**Extensive program in US & Europe: Caveats new business, misuse, fraud.**

# In Fact: Mending the Ozone Hole

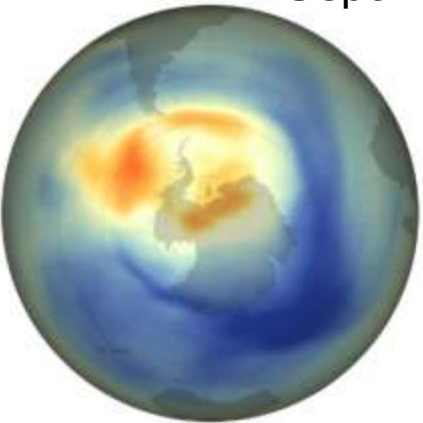
Oct 1987



Ozone (Dobson units)  
100 220 300 400 500



Sept 2019



The beneficial ozone layer lies between about 9.3 and 18.6 miles (15 - 30 kilometers) above Earth's surface. This blanket of ozone ( $O_3$ ) blocks most of the Sun's harmful high-frequency UV radiation.

Ozone is created naturally when sunlight dissociates oxygen molecules ( $O_2$ ) in the stratosphere into 2 free oxygen atoms. A free O atom can then bond with an unbroken  $O_2$  molecule in the environment, making  $O_3$ .

Ozone is unstable and is easily broken up by trace elements catalysts.

CFCs are dissociated by UV and form  $Cl_2$  (chlorine), which is an exceptional problem for ozone in the (dark) polar night regions. As a catalyst, chlorine then effectively destroys  $O_3$ . Re-stabilization occurs slowly in Spring following Winter.

Montreal Protocol (1987) had the effect of world-wide agreement to much reduce use of CFCs.

The acronym **CFC stands for chlorofluorocarbon**. Chlorofluorocarbons, invented in the 1920s, are a type of organic compound that is made exclusively of chlorine, fluorine and carbon.



# Global and U.S. Environmental/Climate Policies

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1. Montreal Protocol (1987): To reduce CFCs world-wide.
2. UN **I**ntergovernmental **P**anel for **C**limate **C**hange (1988)
3. United Nations Framework Convention on Climate Change (UNFCCC)  
Kyoto agreement (1997-2005 rat.), amendments
4. Paris Climate Accord 2015 (eff 2016, 196 countries)
5. UN climate "COP nn" conferences, monitor activities, Dubai 2023: FF phaseout.
6. Decarbonization strategies,  
Cap & Trade Programs, "Green New Deal (2019)," **Caveats relative new business model, misuse, fraud.**

Summary of environmental laws 

# Summary of Relevant U.S. Environmental Policies

- 1955 **Clean Air Act**
  - 1963 Revised Clean Air Act
  - 1964 Wilderness Act
  - 1965 Water Quality Act
  - 1967 Air Quality Act
  - 1968 Wild and Scenic Rivers Act
  - 1970 National Environmental Policies Act
  - 1970 Revised Clean Air Act
  - 1970 Occupational Safety and Health Act
  - 1972 **Clean Water Act**
  - 1972 Marine Mammal Protection Act
  - 1973 Endangered Species Act
  - 1974 Safe Drinking Water Act
  - .....
  - 1976 Resource Conservation and Recovery Act
  - 1980 **Superfund Act** (Acid deposition etc.)
  - 2013 (Climate Action Plan, Clean Power Act, not enacted by Congress)
  - 2017/20 **Withdrawing from Paris Agreement**
  - 2017 Relaxing regulations on emissions
  - 2021 **Rejoining Paris Agreement**
  - 2022 Tighter regulations, funding of infrastructure and renewable energy (IRA)
  - 2023 Propose fast carbonization strategy, \$\$B funding for RE, electrification
- 
- Influenced similar environmental protection laws in Canada and Western Europe. U.N. Conference on Human Environment (Stockholm, 1970)

# Summary of US Environmental/Energy Policies and Choices

Generally accepted, "national" energy policy and choices/steering of energy markets currently tried in Europe, China, India... **Missing in the US.**



**32. President Franklin D. Roosevelt (1933-45):** New Deal energy paradigm, after WWII legislative proposals, institutional reform (rules, regulations), assumptions about future **energy supply & demand**. **Cold War**.  
..... **Truman, Eisenhower, Kennedy, Johnson**

*General "value" shifts in 1950s and 60s societies: Now considering environmental impact of policies, environmental and antiwar movements.*

.....



**37. President Richard M. Nixon (1969-74):** Clean Air Act 1970 , Clean Water Act 1972 (Nixon vetoed !) → "war on pollution" 1960s → era of environmental regulation, emission limits on power plants. **End of era of cheap domestic energy resources**, which had been used while neglecting environment → growing dependence on imports, growing interest in maintaining, or enhancing, valuable environment.

**October 1973 Oil Embargo** by Saudi Arabia, Algeria, Bahrain, Abu Dhabi, Libya. Prompted call for "Project (Energy) Independence" or "energy security." Federal Energy Office (Fed E Admin) to manage **energy crisis**, oil prices. Environmental Resources and Development Admin → R&D, towards **energy independence**.



New energy policy: meet essential requirements consistent with environmental and social goals. Stimulate utilization of all domestic energy resources, including outer continental shelf, remove price and bureaucratic barriers restricting production of gas and oil.

**38. President Gerald R. Ford (1974-76)** continued policy of Nixon/Ford administration.

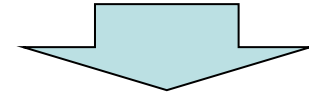
# Obama Administration 2014: Clean Power Plan



Currently national limits on various (metals: As, Hg,..) emissions from power plants, SO<sub>2</sub>, none so far on CO<sub>2</sub> ("carbon").

June 2014, the U.S. Environmental Protection Agency, under President Obama's "Climate Action Plan," proposed plan to cut carbon emission from power plants by 30% by 2030, under umbrella of Clean Air Act (public health, climate, no particular national strategy, leave initiative to states).

(Notice of Proposed Rule Making, public hearings. Congress did not grant approval.)



CCS test plants in Canada, Germany,..  
CCS in Norway Sleipner gas well.



U.S. States opposing proposed EPA ruling:  
Unspecified methods, technological barriers, expense, time span until 2030.



# Energy Policies of US Administrations

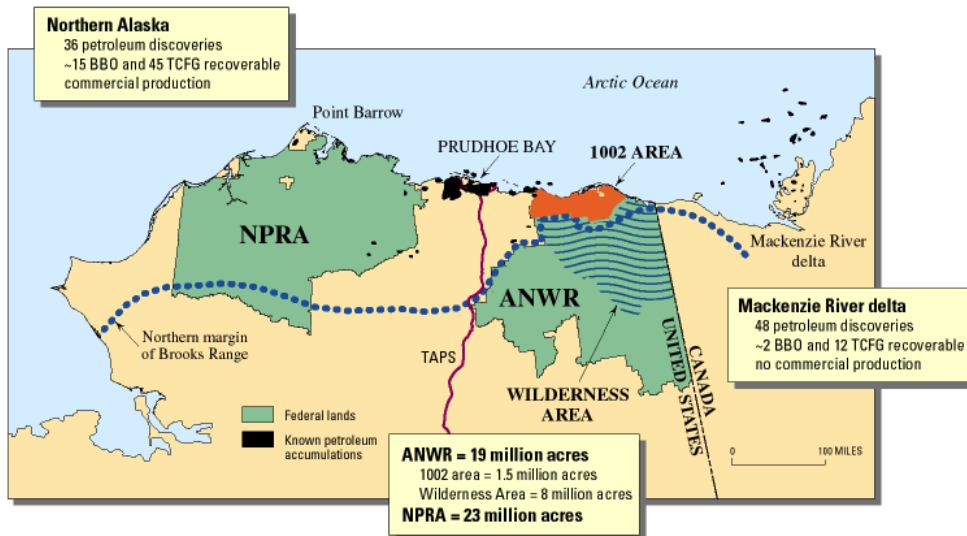


## 45. President Donald Trump (2017 - 2020):

Does not recognize anthropogenic influences on climate change.  
Promotes and invests (incentives, tax credits) in fossil fuels.  
Granted permission for construction of oil pipelines (XL, ND Access).

>2017: Took US out of the 2015 [Paris Climate Agreement](#) (195 countries: voluntary GHG reductions, financial aid to developing countries, report/control/adjust mechanisms). "US pays too much!"  
Directed EPA to revise Clean Water Act.

Rescinded Clean Power Act (Obama admin., 2014). Loosened regulations on power plant emissions, automobile CAFÉ fuel/emission standards.



2021: approved 9 oil and gas leases (430,000 acres) and new prospecting rights for Arctic National Wildlife Refuge.

Reduced area of national parks in favor of commercial development.

# Energy Policies of US Administrations



## *46. President Joseph R. Biden (2021 - 2024):*

Recognizes anthropogenic influences on climate change. Promotes and invests directly and indirectly (incentives, tax credits) in renewable energy technologies.

Granted permission for construction of oil pipelines (XL, ND Access).

2021: Rejoined the 2015 [Paris Climate Agreement](#) (voluntary GHG reductions, financial aid to developing countries, report/control/adjust mechanisms).

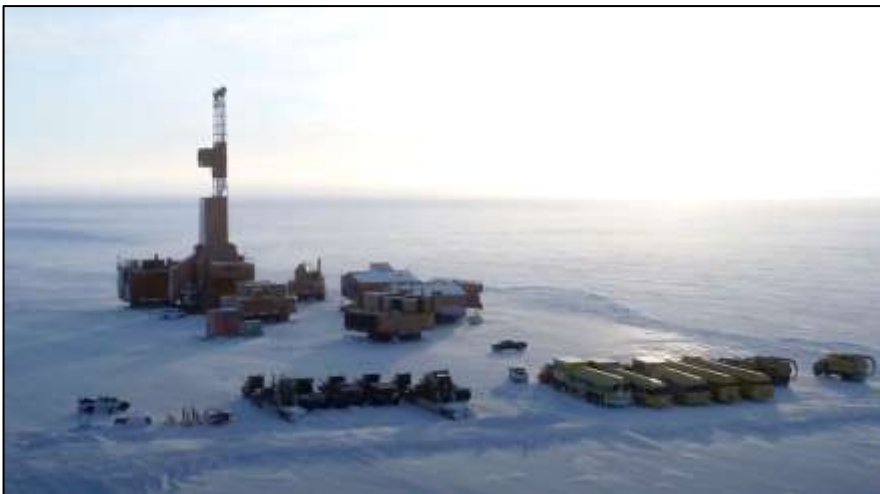
Permits prospective drilling for oil & gas on public lands, including Alaska.

Proposes stricter regulations on power plant emissions.

Directive to transition to complete electric transportation. Phase out production of vehicles with only IC gas or diesel engines after 2035.

Exceptions for large trucks. Promotes research into alternative fuels.

Goal: Cut GHG emission from high 2005 level by 50% by 2030



Biden administration canceled and refunded two of the 2021 oil and gas leases. The state-owned Alaska Industrial Development and Export Authority owns the remaining seven leases from the Trump era, e.g., Willow Project. Use of Thermosyphons (Chillers).

# Fast-Decarbonization Strategies

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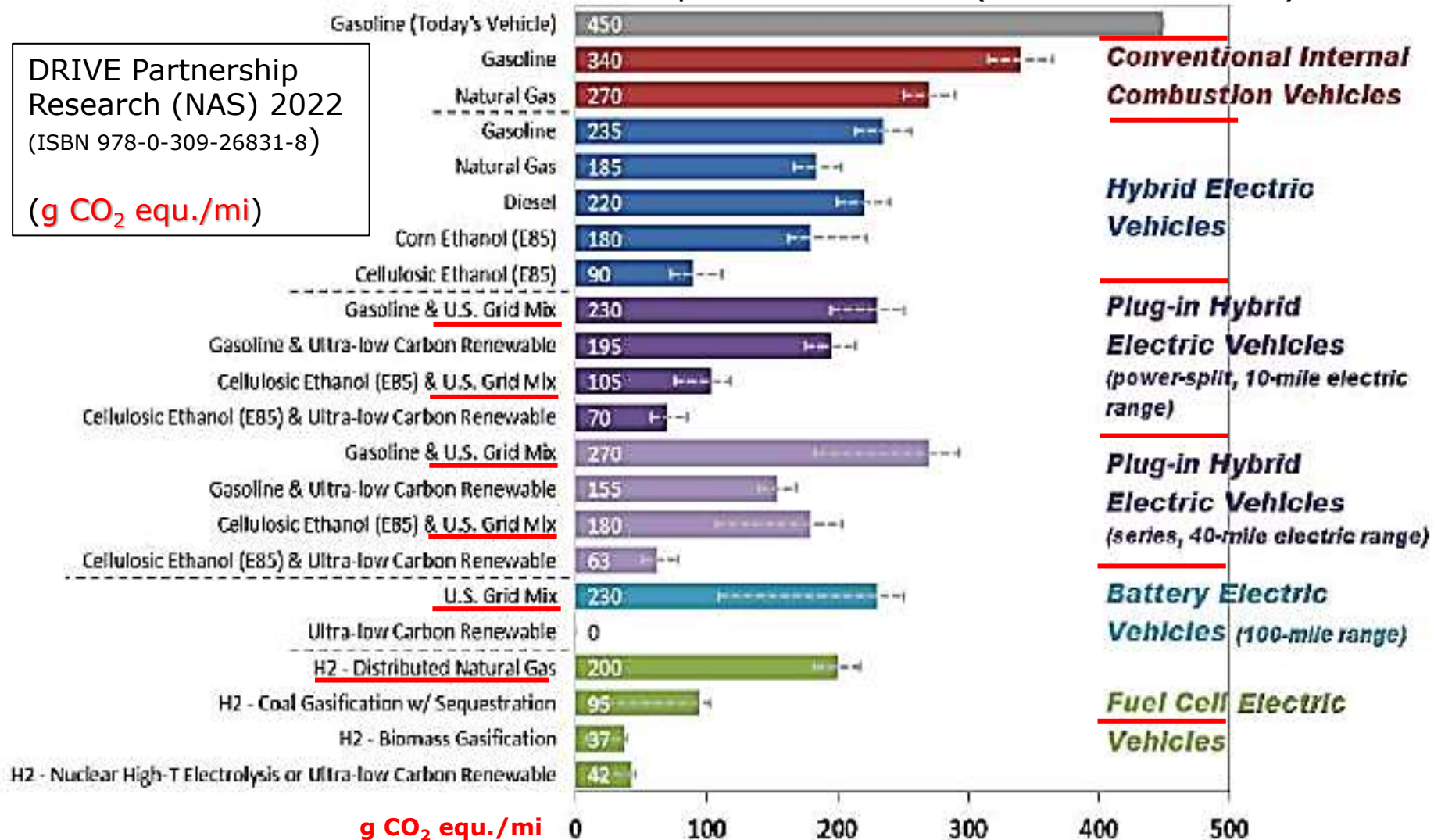
- Save energy & resources, recycle. Subsidize efficient applications.
- Greene/whiten built environment (cities, roads).
- Electrify cities in integral mode with e-grid (buildings, appliances).
- **Electrify transport sector** as reasonably achievable (light duty vehicles), phase out *Internal Combustion Engine* (ICE) → electric engines, electricity supplied by **H fuel cells, batteries**, small nuclear plants.
- **Phase-out coal plants** or retrofit @90%carbon capture (<2030) .
- Reduce natural gas plants by 2030 but keep beyond 2050 as baseload & peak shaving. Replace by grey or **green hydrogen**.
- Preserve, upgrade existing, **nuclear plants**, develop & build GenIV plants, cogeneration heat network.
- Scale up renewable **wind & solar** technologies (production, workforce).
- Improve chemical and physical energy storage technologies (batteries, H2)
- **Upgrade and expand transmission and distribution grids**.
- Develop to scale **carbon capture & sequestration (CCS)**, carbon uses.

# Expected CAFÉ GHG Savings: US Light Duty Vehicles

Present Specific Emissions (28% of total GHG)

DRIVE Partnership  
Research (NAS) 2022  
(ISBN 978-0-309-26831-8)

(g CO<sub>2</sub> equ./mi)

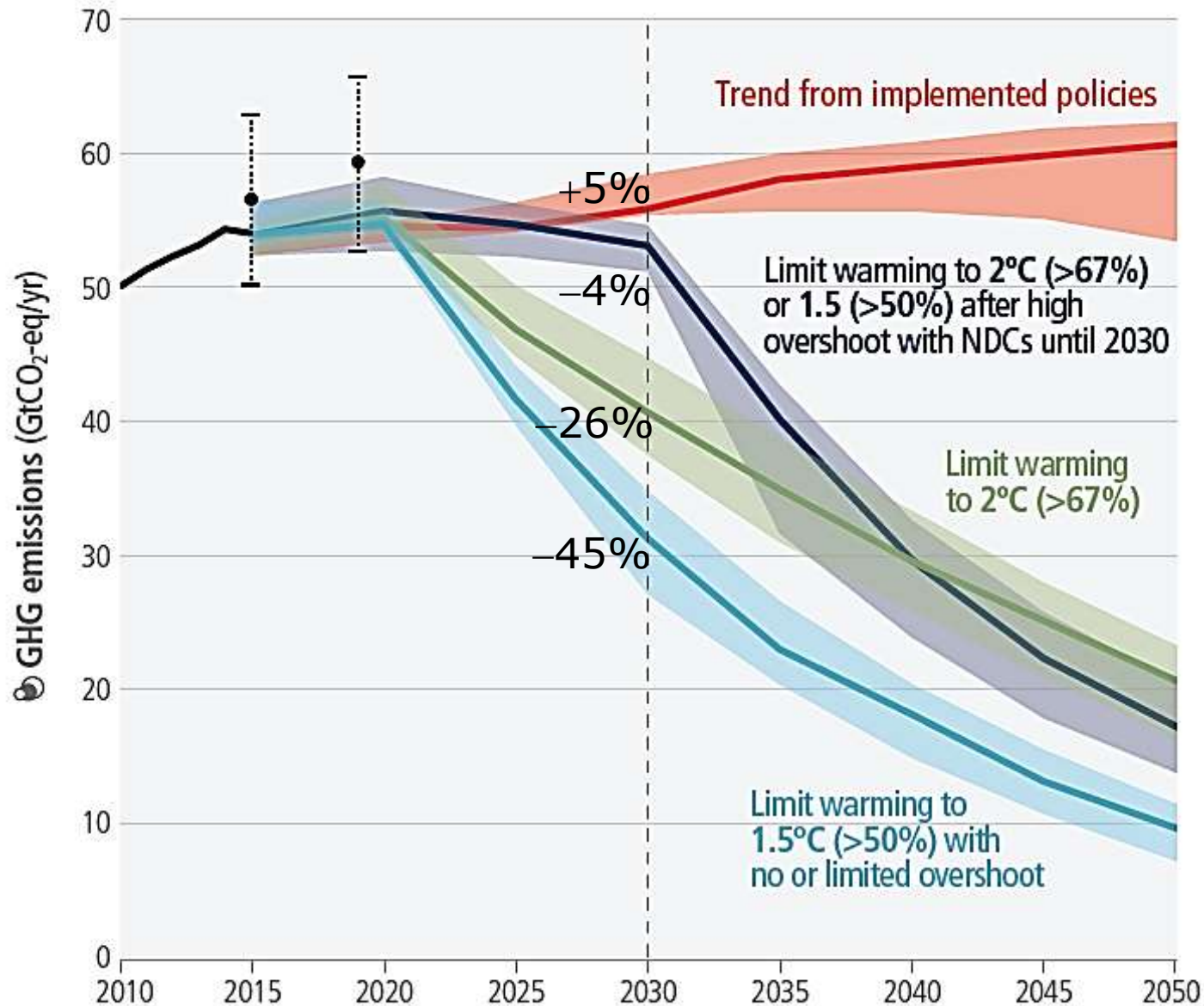


Path forward?

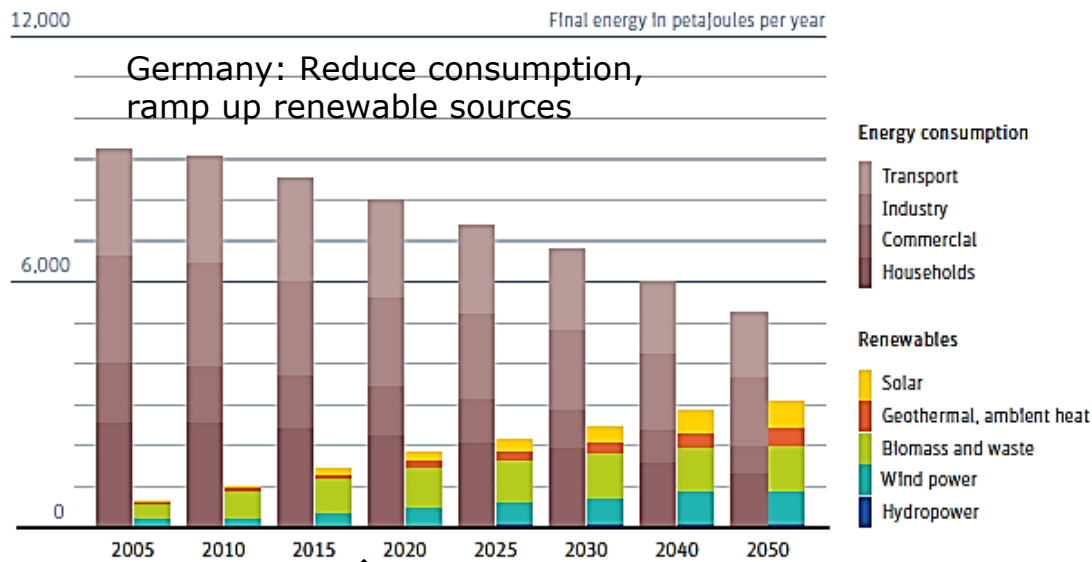




# Net Global GHG Emission Goals



# Grand Experiments Elsewhere



[http://energytransition.de/wp-content/themes/boell/pdf/en/German-Energy-Transition\\_en.pdf](http://energytransition.de/wp-content/themes/boell/pdf/en/German-Energy-Transition_en.pdf)

Experiments in Europe (Germany):  
50% renewables (CO<sub>2</sub> free) in 2050  
Vs. France, Sweden,...

Wind turbines on Samsø/DK  
NYT Jan 18/2015

