

The Inflation Reduction Act (So Far)

- One year after the enactment of the Inflation Reduction Act (IRA), the law's complicated tax increases on large corporations, particularly the minimum tax on book income, have resulted in extraordinary implementation challenges and taxpayer confusion, with many questions left unresolved. Payments for both the minimum tax and the stock buyback tax are currently on hold until the IRS issues further guidance.
- The law's subsidies for green energy, in the form of several tax credits with novel features including transferability and monetization, have proven attractive to taxpayers, leading to escalating budgetary costs approaching \$1 trillion over the next decade. Among other things, this means the IRA likely worsens the national debt.
- Congress should reconsider key elements of the IRA, including the book minimum tax and the green energy credits, with an eye towards simplification and fiscal responsibility.



State the Problem

- Our best guess is that we are emitting 17 more Gigatons of CO2 per year than nature can absorb.
- Increasing CO2 and Methane emissions are warming the atmosphere. There are pros and cons of this warming, but overall, the negative consequences are greater.
- The global population is now at 8 billion and is still increasing (until about 2075). The amount of energy use by person is increasing.
- Non-binding global agreements stating emissions reduction goals are having an impact in the US and EU, but China, India, and the Developing World are increasing emissions rapidly. The stated goals/targets are so unrealistic given existing technology and raw materials that it is now common practice for countries and companies to exaggerate their commitments just to avoid governmental and public scrutiny.
- We need more of almost every energy source just to meet ever increasing demand. But unrealistic global treaties demonize those companies who are providing a vast majority of the world's energy supply, making it harder to raise capital and commit to infrastructure.

A Better Way?

- Move from subsidy-based models (public debt) to a carbon tax model. Make it apply equally to everyone around the globe. Charge everyone even if they refuse to participate/pay. Make them pay in some way (tariffs, boycotts)
- Put a price on greenhouse gas emissions, same price everywhere, tie price to the actual measured level of greenhouse gases in the atmosphere
- Prioritize the measurement of these emissions, punish cheaters
- Levy the carbon tax at the point of emission
- All emissions verified by a science-based international entity who publishes results and keeps accountability
- Collected funds must be used to reduce or capture future greenhouse gas emissions. Provide allowances to invest in projects that have greatest impact on reducing emissions globally, regardless of country. Revenue will also be used to provide an insurance program like Freddie Mac & Sallie Mae

Be mindful that almost all carbon taxes will be borne by consumers through product cost pass throughs.



Our Idea is Not Cap & Trade, It's Pay for Play

- Current cap and trade methods have had mixed success. Emissions credits (and even penalties and fines for exceeding the cap limit) are usually cheaper than converting to cleaner technologies and resources.
- Fraud and cheating run rampant when measurement and monitoring are weak. Corporations looking for the cheapest right now solution results in developing world projects that sound good but are soon forgotten.
- Need to create revenue stream for governments and third parties to undertake scalable projects without the need for the political will to directly confront the problem



Consumers Will Pay Based on Their Choices

- Utilities will see large carbon taxes, and as regulated entities they will simply pass along the carbon tax to their customers
- Manufacturers and Petrochemical Companies will also try to pass along the carbon tax like any other cost. Having everyone in the world paying the same price negates the argument that another country has an unfair advantage
- This tax will be inflationary as it raises the cost of almost everything
- At the consumer level, much of the direct carbon tax will be in the gasoline they buy and the heating fuel they use (which if they use electric heat will be included in their electric bill). Consumers with bigger houses and cars will pay more





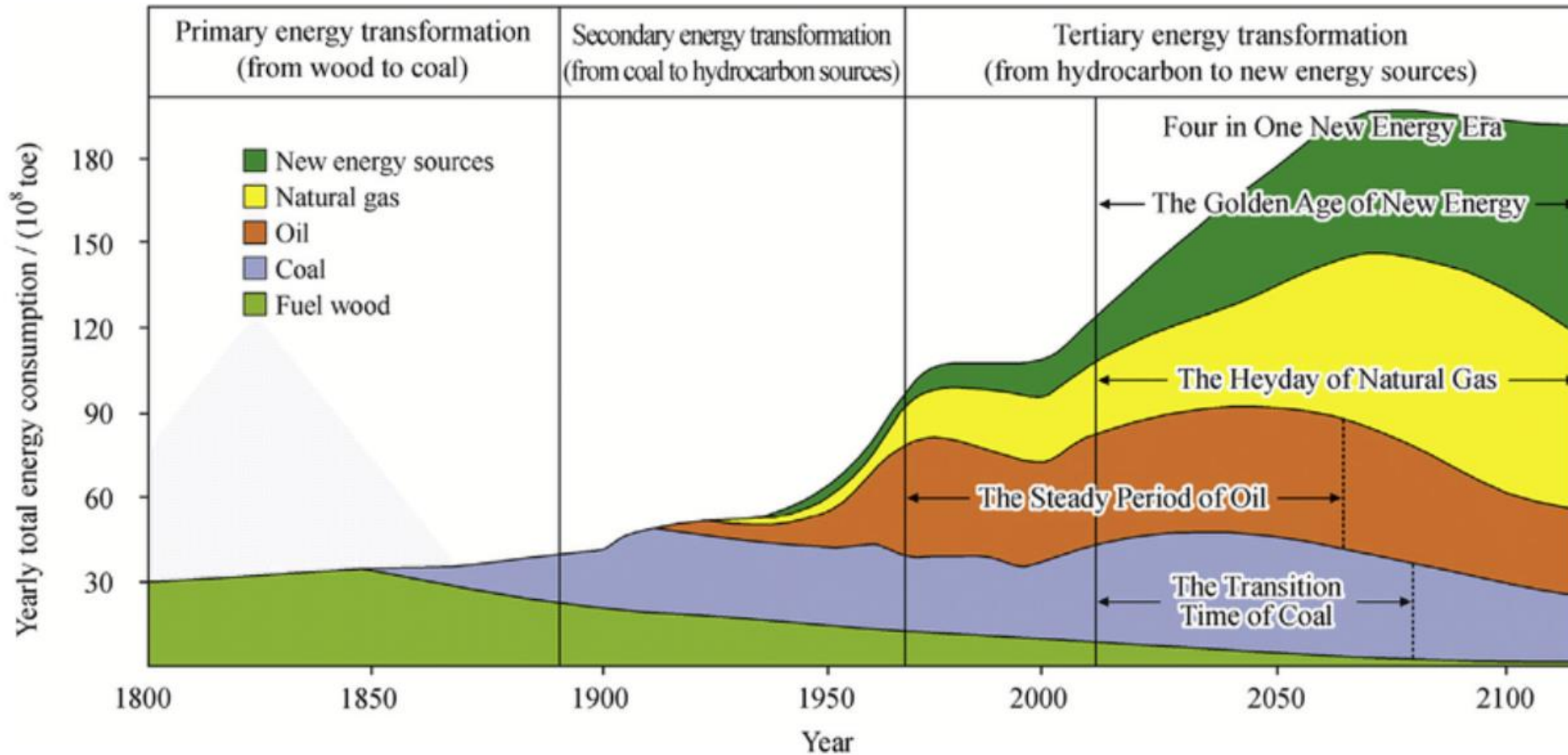
Equitable and fair measurement might not require expensive boots on the ground

The Orbiting Carbon Observatory-2 (OCO-2) is NASA's first Earth-orbiting satellite dedicated to studying atmospheric carbon dioxide from space.

Carbon dioxide is a constituent of the Earth's atmosphere. It is naturally present as part of the carbon cycle but is also being emitted at increasing levels by human activities.

We know that carbon dioxide is one of several gases that trap heat near the surface of the Earth. These gases are known as greenhouse gases.

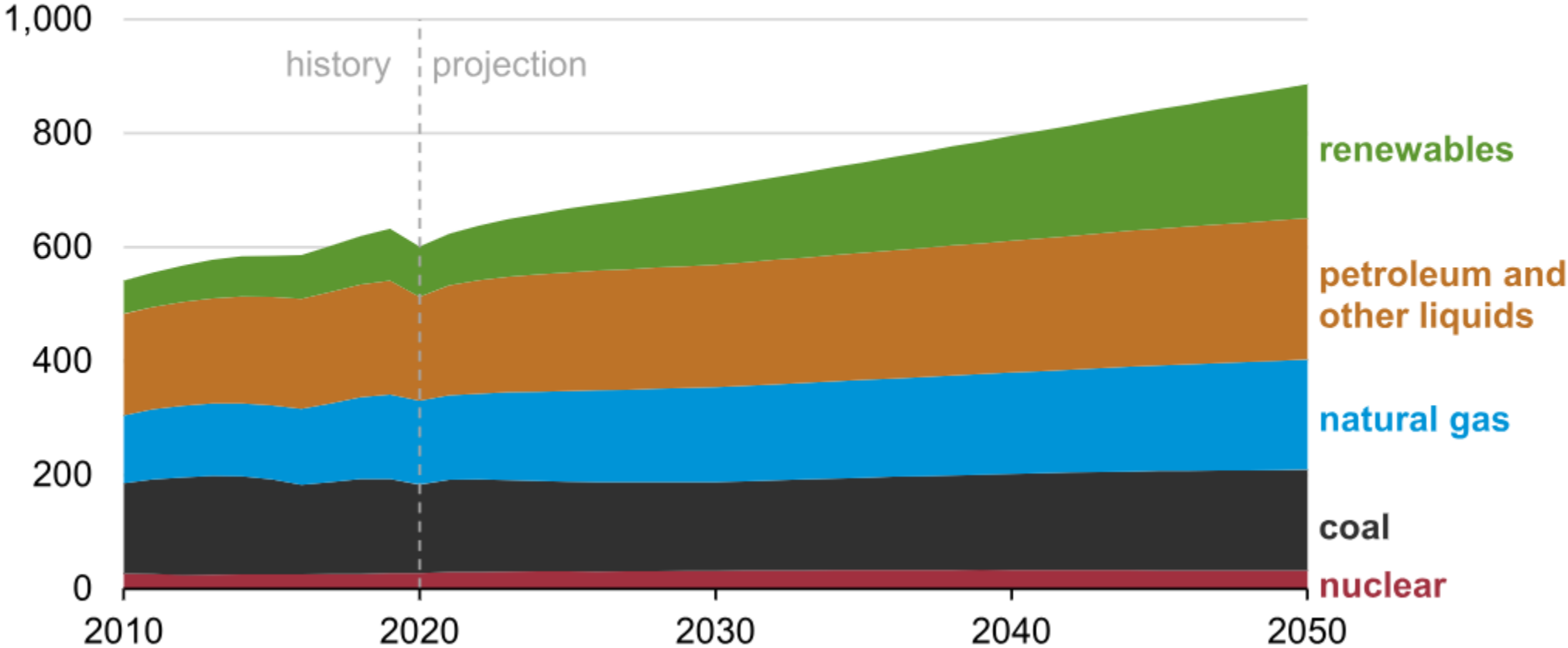
A Realistic View of the Next 75 Years



Trends and forecasts of global energy consumption.

A Realistic View of the Next 75 Years

Global primary energy consumption by energy source (2010–2050)
quadrillion British thermal units



Source: U.S. Energy Information Administration, *International Energy Outlook 2021* Reference case

1/1/2024

But Non-Reality Prevails in the Media

- ‘We oppose Carbon Capture & Storage because it doesn’t address the core issue of eliminating fossil fuels’
- ‘We pledge to make ESG a leading factor in how we invest client’s money’
- United Nations Secretary-General Antonio Guterres told world leaders on Friday that the burning of fossil fuels must be stopped outright and a reduction or abatement in their use would not be enough to stop global warming (Dec 1, 2023)
- ‘Big Oil & Gas knew as early as the 1960s that their products would lead to climate change, and that it could have disastrous impacts worldwide. The only righteous punishment is to shut these companies down’
- ‘As the science became overwhelming and public understanding of climate change grew, companies shifted from denying climate science to portraying themselves as part of the solution’
- ‘Renewables are cheaper, better, cleaner’

What Choices Did People Actually Have in the 1950's-1960's

- Most households were heating with wood or coal. Imagine triple the number of people still primarily using wood and coal to heat their homes.
- Petroleum has a very high energy density. It can store more energy in less space than any other fuel source. It's also safer than pressurized boilers.
- Before kerosene and oil, whales were harvested in mass numbers to provide lighting.
- For most of the 20th Century, fossil fuels were the most important national security asset.

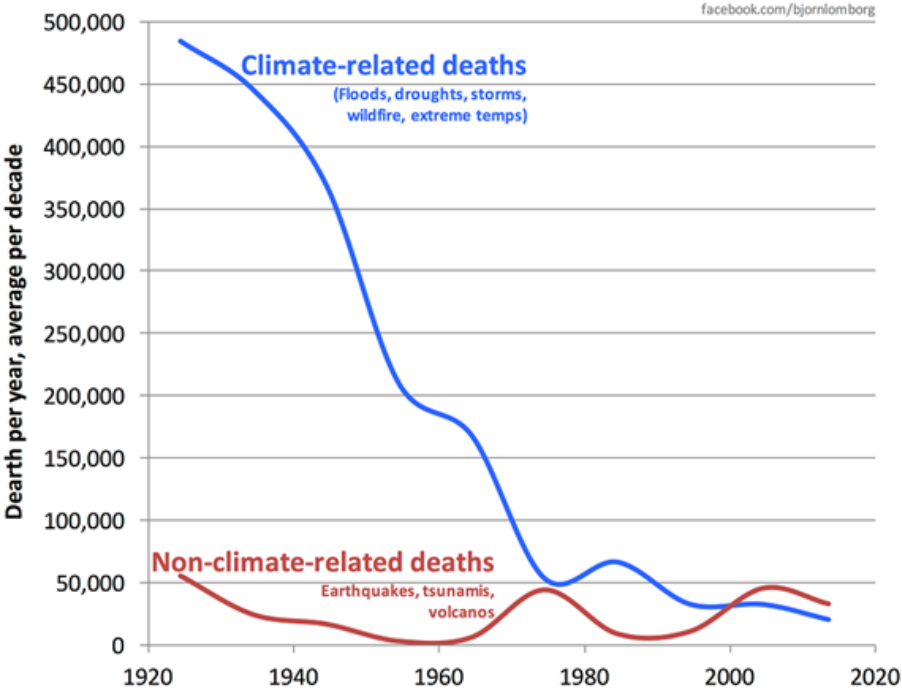


List of Products made from Oil & Petroleum

Adhesives & Sealants	Asphalt	Batteries
Chemicals	Consumer Products	Cosmetics
Detergents & Cleaning Products	Electrical Equipment	Food Additives
Fuel	Inks	Lubricants
Medical Equipment & Supplies	Paints & Coatings	Personal Protective Equipment
Pharmaceuticals	Plastics	Rubber Products
Synthetic Fibers	Synthetic Rubber	Wax

Human Adaptability & Compounding Knowledge

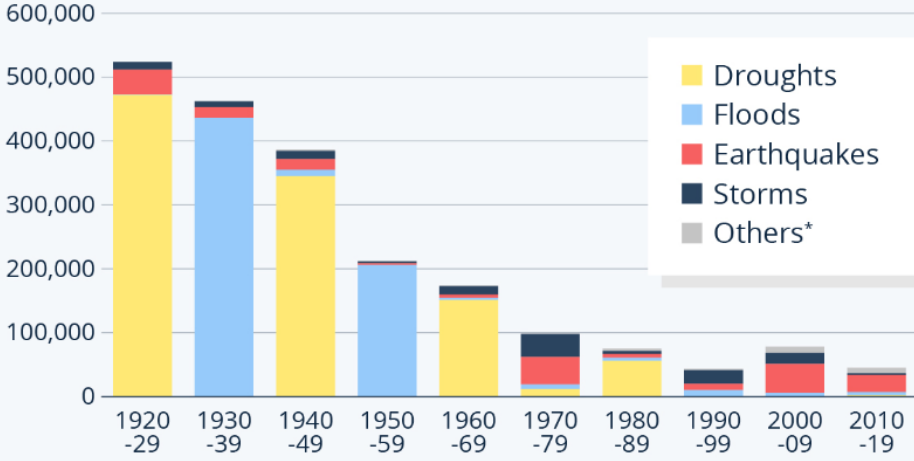
Deaths from Climate and non-Climate Catastrophes, 1920-2017



OFDA/CRED International Disaster Database, www.emdat.be, averaged over decades 1920-29, 1930-39, ..., 2010-2017

Preparedness Drives Down Natural Disaster Death Tolls

Annual average global deaths from the following types of natural disasters, by decade

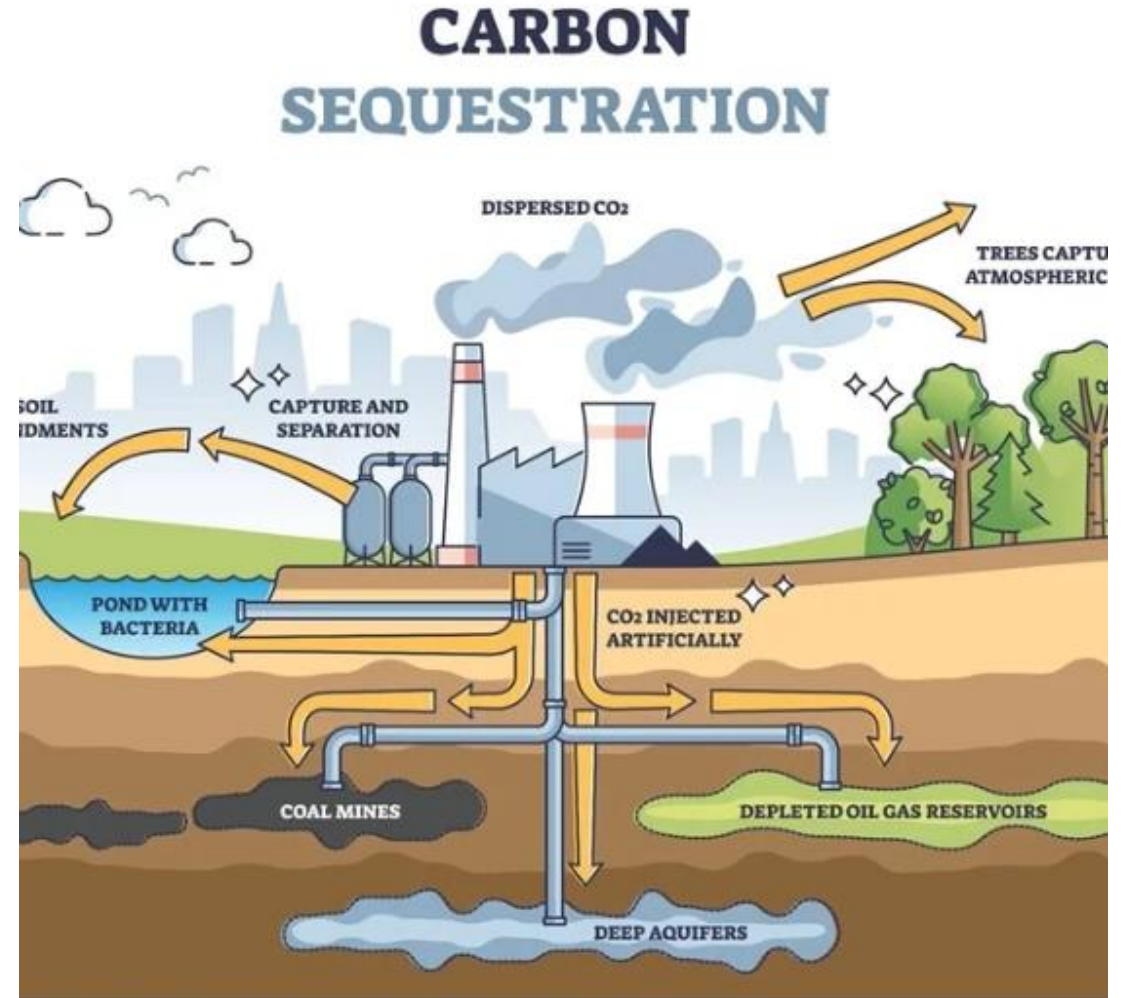


* Wildfires, heat, land & rock slides, volcanic activity
Source: EM-DAT database via Our World in Data



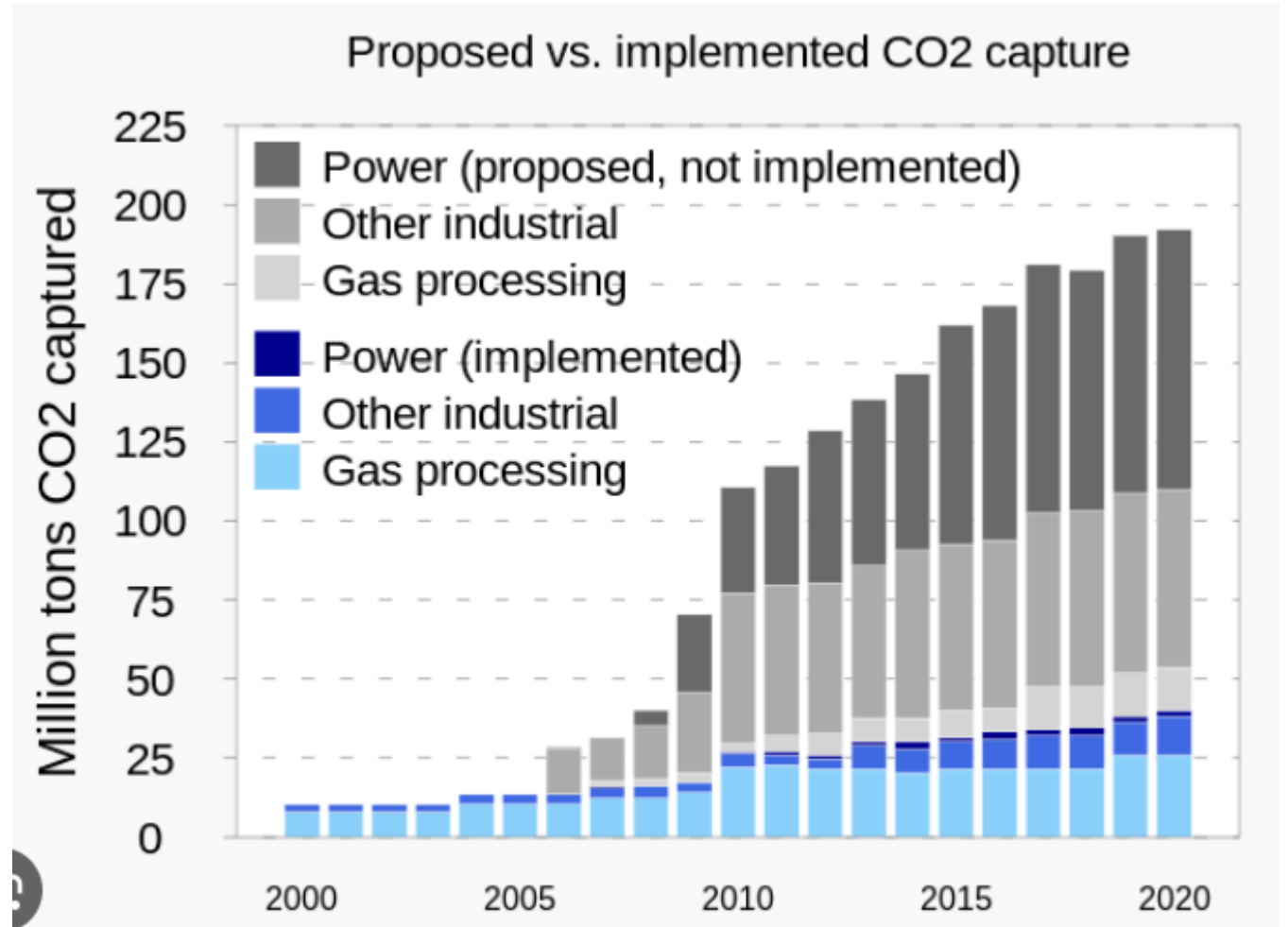
Carbon Capture and Storage

- Carbon capture and storage is a process in which a relatively pure stream of carbon dioxide from industrial sources is separated, treated and transported to a long-term storage location.
- Fossil Fuel companies are ideally positioned for CCS and Blue Hydrogen production
- CCS projects typically target 90 percent efficiency, meaning that 90 percent of the carbon dioxide from the power plant will be captured and stored.
- The largest and most obvious risk of CCS is leakage.



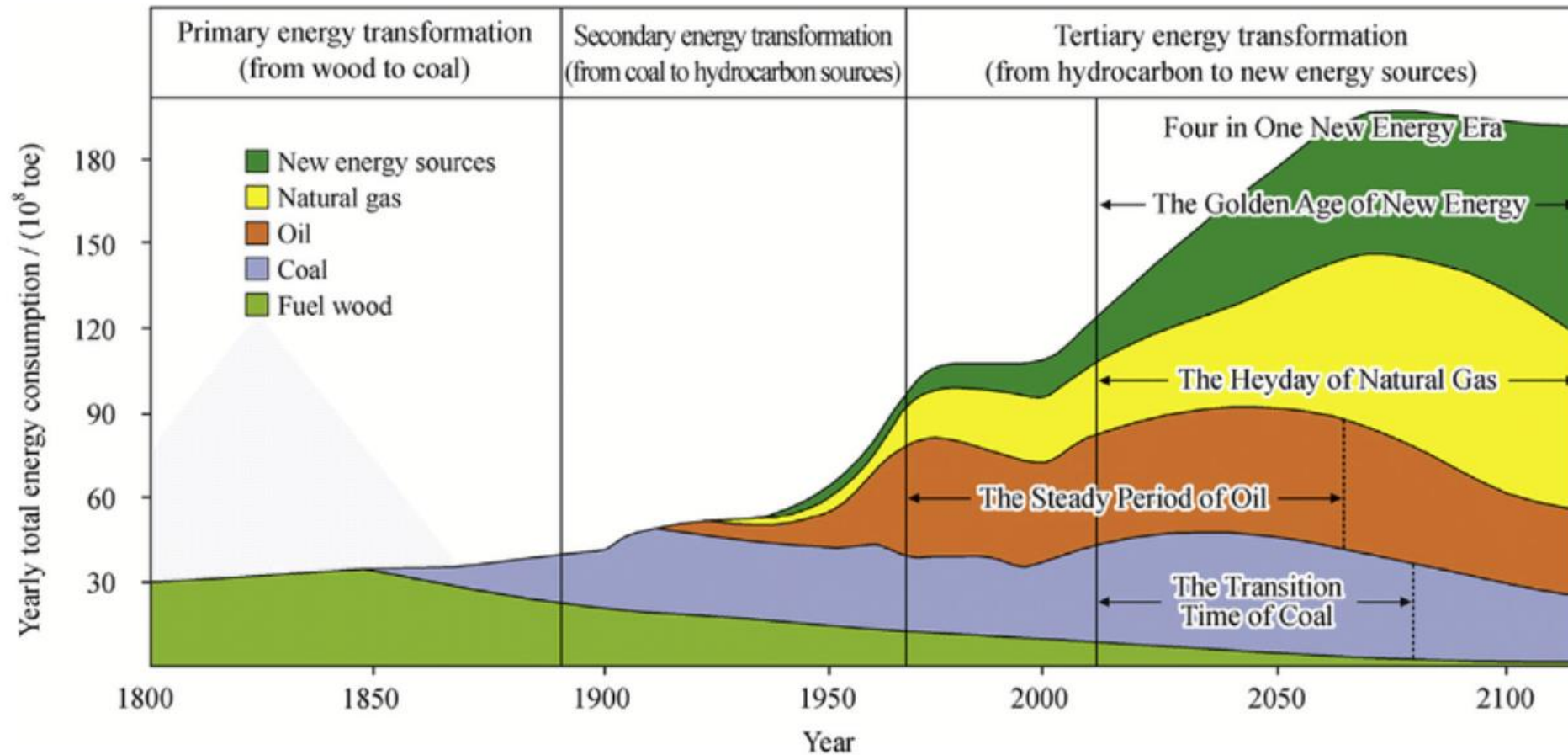
Cost of CCS (From Wikipedia)

- CCS technology is expected to use between 10 and 40 percent of the energy produced by a power station.
- The energy consumed by CCS is called an "energy penalty". It has been estimated that about 60% of the penalty originates from the capture process, 30% comes from compression of the extracted CO₂, while the remaining 10% comes from pumps and fans.
- CCS would increase the fuel requirement of a plant with CCS by about 15% (NG plant).
- The cost of this extra fuel, as well as storage and other system costs, are estimated to increase the costs of energy from a power plant with CCS by 30–60%.
- This makes it more difficult for fossil fuel plants with CCS to compete with renewable energy combined with energy storage, especially as the cost of renewable energy and batteries continues to decline.



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Remember This



Trends and forecasts of global energy consumption.

Environmental Lobby Creates Dysfunction

- Argument – Cost of CCS makes it a trillions of dollars waste of capital when compared to just adding renewable energy
- Argument – CCS should only be used in very select industries in which abating climate pollutants is especially hard, not as a masquerade for continued fossil fuel production and consumption. Industries like cement production and some chemical sector processes will require carbon capture to reach our climate goals, but the problem is that's not where the technology is being used.
- Argument – CCS companies also qualify for massive tax credits known as 45Q with virtually no verification or accountability that they capture carbon emissions, making it rife for fraud and abuse.



Governmental Dysfunction Isn't Helping Either

- The cancellation of a major carbon dioxide pipeline, raising questions about the fate of similar projects and the viability of large-scale carbon capture technology.
- Only certain regions of the country have geology required to sequester CO2 deep underground.
- The legal framework governing CO2 pipelines is heavily fragmented and often uncertain. In many states, it is unclear how existing laws should be applied to these kinds of projects, and many state regulators have very limited experience with CO2 pipelines.
- Outreach and education efforts are being met by no shortage of misinformation being dispersed, largely by organized opposition organizations.



Rational Response

- Even with renewable energy investment occurring at the maximum level of the raw materials and manufacturing limitation needed to build solar panels, wind turbines, batteries, transmission lines, etc., the world will still be >70% dependent on fossil fuels in 2050.
- Since fossil fuels must remain a significant portion of the primary energy mix (even if you don't want them to), and atmospheric CO2 reduction remains a global priority, then it follows that any technology/process to make the production and consumption of fossil fuels cleaner should be a major part of the 2050 'toolbox'.
- Meeting climate goals also means creating an extremely flexible power system that can manage high shares of variable renewable power sources. Fossil fuel fired power plants have been a major source of system flexibility, providing benefits essential to the operation of the electricity grid, such as inertia and frequency control. PJM and other grid operators have voiced their concerns about the Green Energy plan to eliminate thermal fuel sources.
- There will not be enough renewable generation, nor batteries to deal with renewable intermittency, in the next 100 years.

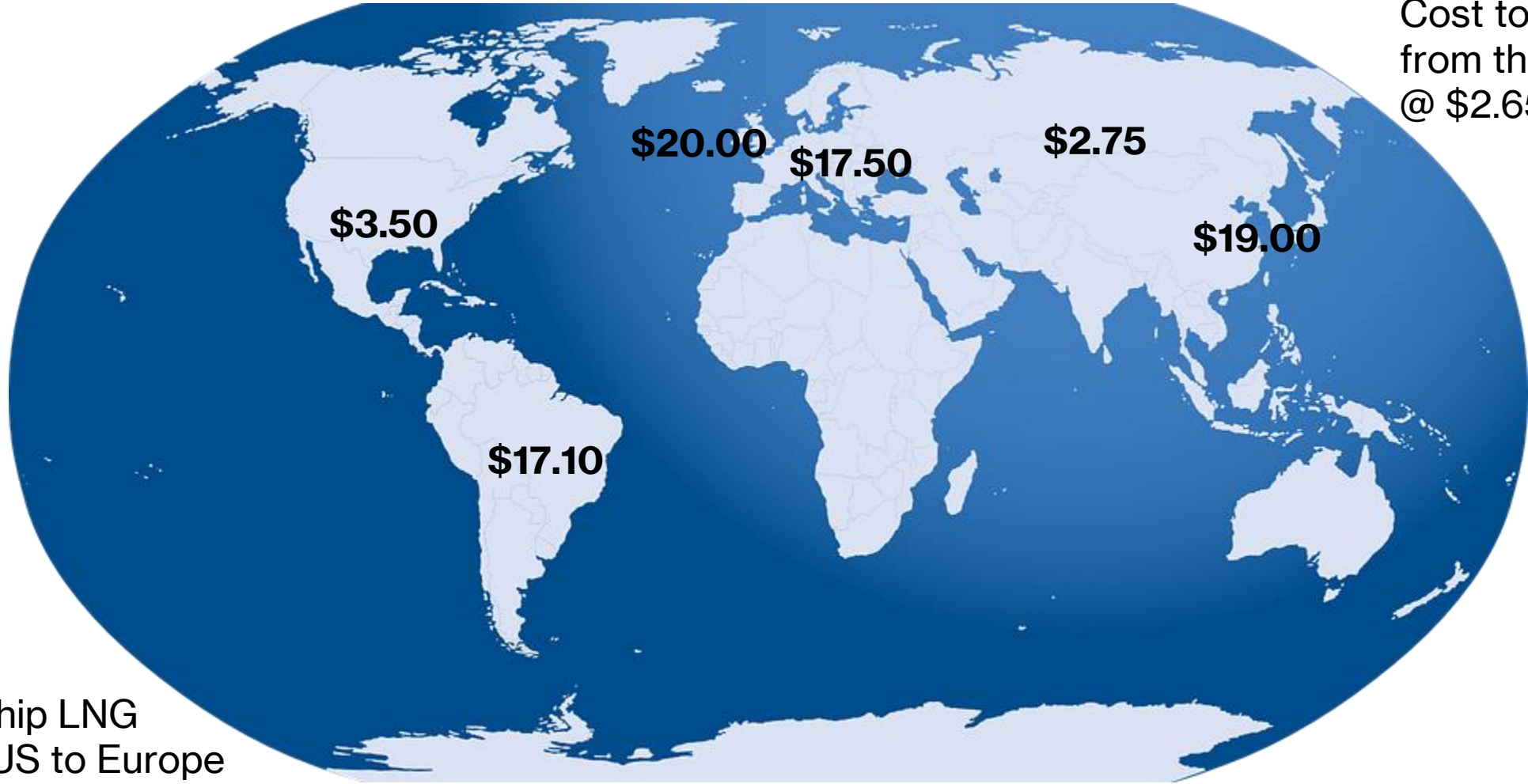


Schisms Among Environmentalists and Progressives

- The trend in the US is for the radical/extreme voices to be heard the loudest
- Groups that essentially advocate for an end to fossil fuels on an aggressive timeline, either ignore the limitations of renewable energy, or welcome a return to the Stone Age (minus the wood campfires)
- The radical viewpoint has spread to the largest investment managers who now have elevated ESG criteria ahead of financial results
- Moderate left leaning people are a silent majority, forced to go along to get along



Global Natural Gas Prices



Cost to Ship LNG
from the US to Asia
@ \$2.65/MMBtu

Cost to Ship LNG
from the US to Europe
@ \$1.75/MMBtu

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Is Thinking Globally Possible?



- Logic/reason tells us that we should reduce greenhouse gas emissions in the most efficient manner possible, which would be to allocate the developed world's capital to transition the dirtiest emitters first. This overriding concept is central to the Cap & Trade system
- But this logic is doomed to failure because as it turns out people are inherently self centered and have learned from thousands of years of experience to group themselves and battle for resources (nationalism, tribalism, protectionism, isolationism, war)
- Winners of the dynamically changing competition for land, resources, and military/cultural supremacy will seek to grow their influence and will fight to preserve their advantages
- The endless cycle of wars fought over land, resources, religion, governmental system, and prestige reminds us that humans will fight for many reasons
- Spain, France, and England went bankrupt fighting to keep their world leadership
- Reagan ended communism in Russia and their place as world superpower by outspending them
- The US maintains the current world order at great expense to itself
- US leaders made globalization possible, but have learned its negative consequences could threaten long-term US supremacy (China didn't convert, Russia willing to fight)

Paying for the Green Energy Transition

- Because almost all the \$4.6 Trillion in renewable energy subsidies spent by the US Government over the past 20 years did not have matching tax revenue, consumers have thus far been immune from paying for the green energy transition so far.
- At some point the baseline national debt of \$33.89 Trillion, or \$98,810 per US citizen, will need to be paid back. Other argue the national debt is much higher when you factor in unfunded entitlement programs.
- It will be interesting to see if lower income people continue to support the Green Energy transition once they are asked to help pay for it.

What the Federal Government Has	
Assets	\$4.96 trillion
What the Federal Government Owes	
<u>Unfunded Medicare promises</u>	-\$64.29 trillion
<u>Unfunded Social Security promises</u>	-\$47.70 trillion
Publicly held debt	-\$24.33 trillion
Pension & retiree health care liabilities	-\$12.81 trillion
Other liabilities	-\$1.88 trillion
Total bills	-\$151.01 trillion

Assets - Bills = -\$146.05 trillion*

Estimated deterioration to date: -\$11 trillion*

THE TRUTH: -\$157 trillion

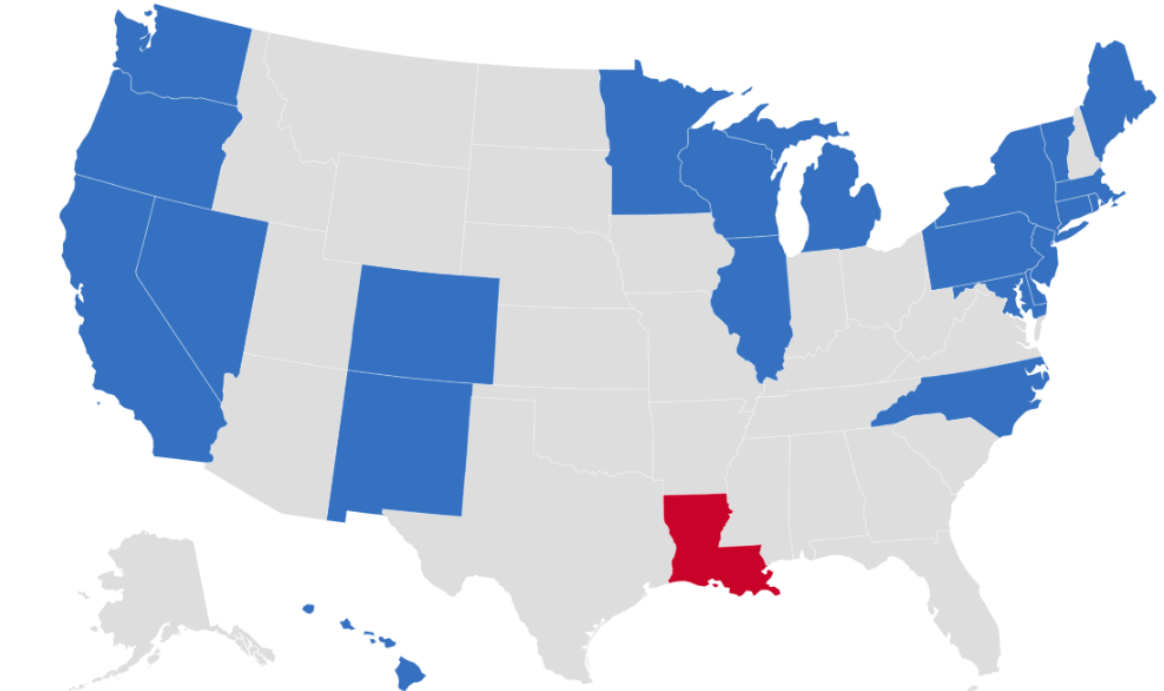
Paying for the Green Energy Transition

- The US market price advantage for both NG and Electricity in relation to the rest of the world (see slide 20) is an incentive for US Manufacturing demand and makes LNG export demand growth almost certain.
- But lower US fossil fuel costs also make comparative economics against unsubsidized Renewable Energy harder to justify.
- US States trying to spur on a faster Green Energy transition are subjecting their residents to materially higher bills for everything. The California cost of living is 42% above the national average and their utility costs are 22% above the national average. The New York cost of living is 30% above the national average and their utility costs are 12% above the national average.

Most states in the U.S. Climate Alliance backed Biden in 2020

23 states in the U.S. Climate Alliance, whose governors have pledged to achieve the Paris Agreement climate goals

■ In U.S. Climate Alliance, voted for Trump ■ In U.S. Climate Alliance, voted for Biden




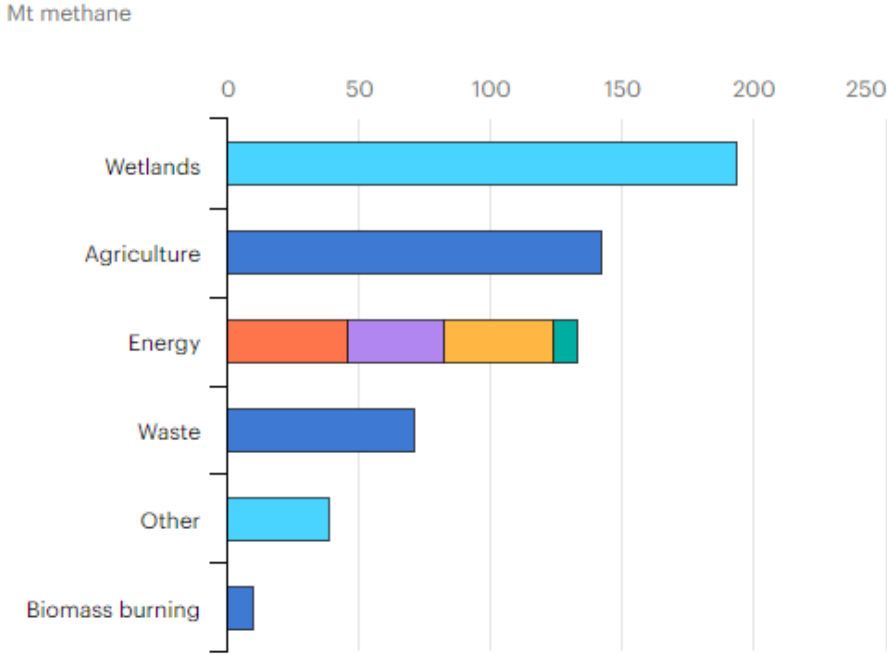
Source: U.S. Climate Alliance

Methane Emissions

- Some say that methane emissions are responsible for more than 25% of the global warming we are experiencing today.
- Due to its structure, methane traps more heat in the atmosphere per molecule than carbon dioxide (CO2), making it 80 times more harmful than CO2 for 20 years after it is released.
- Much of the energy category methane leaking into the atmosphere comes from old wells and pipelines. In many of these cases the owner/operator who originally failed to repair the offending pipes is long gone or bankrupt.
- Part of the IRA included \$1.55 Billion to identify and fix these leaks.

Sources of methane emissions

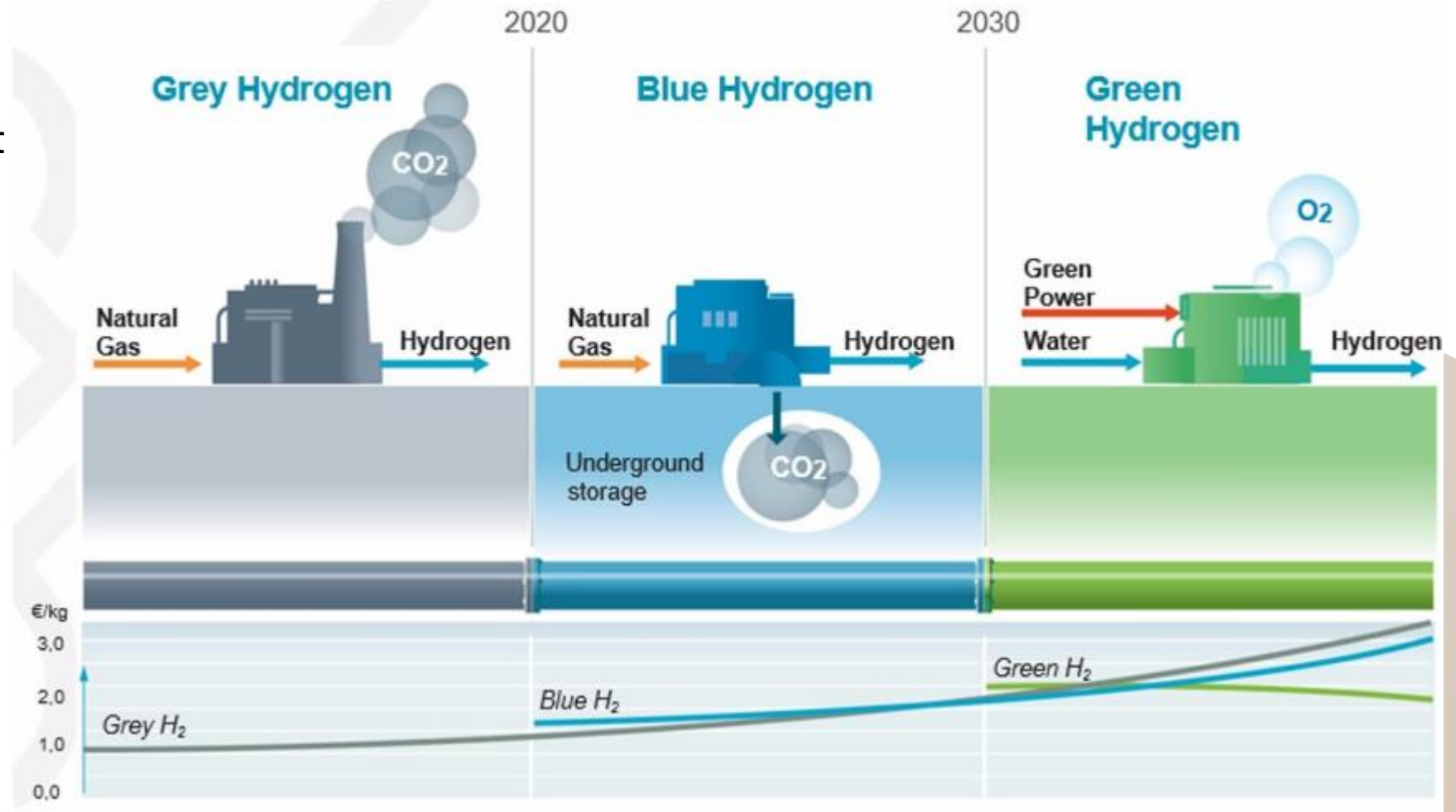
Open 



● Natural ● Anthropogenic ● Oil ● Natural gas ● Coal ● Bioenergy

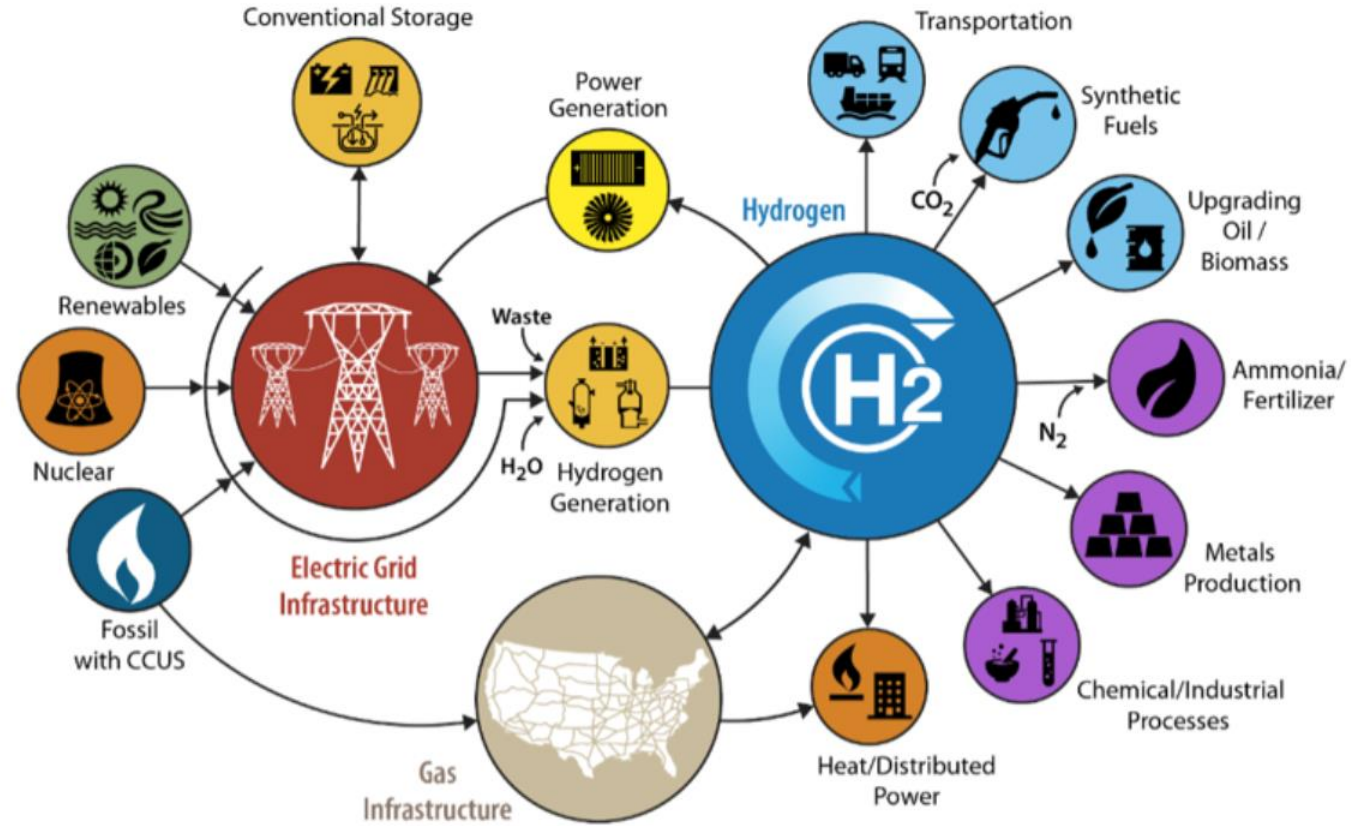
Much Hyped Hydrogen Is Advertised to be Needed to Convert the Hardest Processes

Currently, more than 90% of the world's hydrogen is used for just three industrial applications: to lower sulphur content in diesel by refiners; to produce methanol used by fuel blenders; and to make ammonia for fertilizers and chemicals. Those that want to end fossil fuel use entirely see H₂ as the solution for steel, cement, aircraft, trains, trucks and shipping.



The Hydrogen Dream

Conceptual H2@scale (hydrogen at scale) energy system



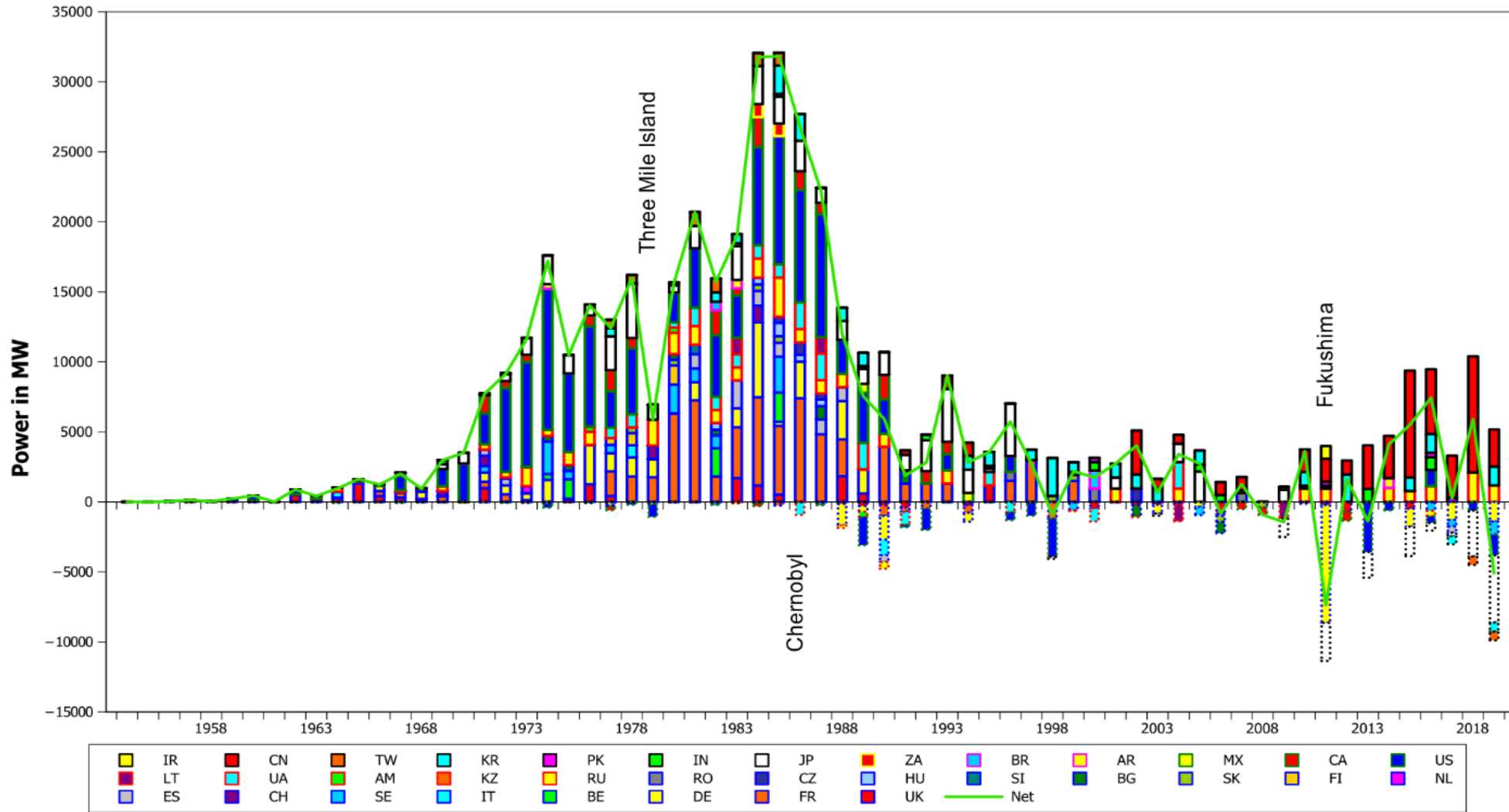
Source: U.S. Department of Energy, *Hydrogen Program Plan*, Figure 3, November 2020

Problems With the ‘Hydrogen Can Replace Fossil Fuels Delusion’

- Most energy experts will tell you that converting clean energy into hydrogen just to use that hydrogen to generate more electricity later is, in most cases, a bad idea.
- The fundamental problem lies in the laws of physics (yes, pesky physics again). Between 50 and 80 percent of the energy value of clean electricity is lost in the process of making hydrogen and then burning it to generate electricity.
- The Green Hydrogen electrolysis process is roughly 70 to 75 percent efficient. The burning of hydrogen to spin a generator is a process which at best is roughly 64 percent efficient using the latest combined-cycle gas turbines and can drop to 35 to 42 percent efficiency in older combustion turbines.
- The list of failed hydrogen-for-energy projects keeps getting longer. These are simply ‘zombie proposals’ sucking time, effort, and willpower away from other proven decarbonization tools.



Nuclear Power from 1950 Until 2020



Is Nuclear Power the Ultimate Green Source?

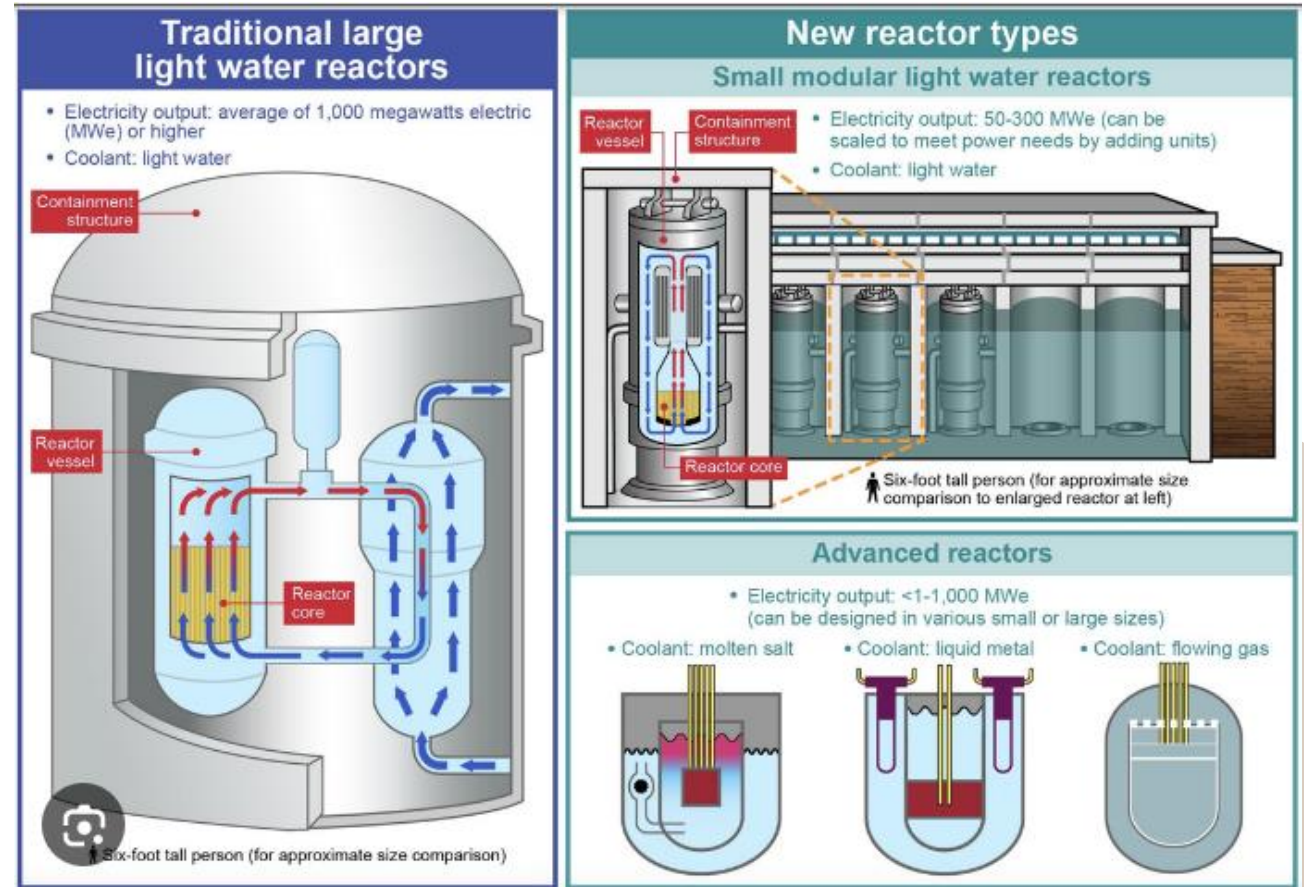
- Engineers love nuclear power. Environmentalists hate nuclear power. Average people fear nuclear power.
- The three major nuclear accidents were all caused by the requirement to have a third-party electric supply source and constant flow of water to cool the reactor. And of course, human error was a factor.
- Russia's invasion of Ukraine also reminds us that nuclear power stations could become targets in warfare.
- Threats such as terrorism and hacking are ever present.
- Nuclear power has become one of the most expensive forms of generation. The main factor leading to high plant construction costs is not the design of the reactors, or various safety features that they employ, but the uniquely strict QA requirements that apply for the fabrication of safety-related nuclear plant components.
- Increased requirements for on-site spent fuel management and elevated design basis threats will raise costs further.
- The leading global companies building new nuclear plants are Russian (Rosatom) and French (Areva).



Can Nuclear Power Make a Comeback?

New Generation IV Reactors Advantages:

- Nuclear waste that remains radioactive for a few centuries instead of millennia
- 100–300x energy yield from the same amount of nuclear fuel
- Broader range of fuels, including unencapsulated raw fuels
- Potential to burn existing nuclear waste and produce electricity: a closed fuel cycle.
- Improved safety via features such as ambient pressure operation, automatic passive reactor shutdown, and alternate coolants
- Modular design can potentially be manufactured off-site to reduce construction time/costs
- Chinese testing actual reactors with plans to build



END OF PART 2 OF THIS PRESENTATION

