



THE CARBON CLOCK IS TICKING

CHILDREN WILL LIVE THE FUTURE THAT BURNING FOSSIL FUELS IS SETTING ON FIRE



THE INTERIM REPORT

Why Investment in Big Oil's Carbon Capture Is a Dangerous Idea

DR. DENNY TAYLOR | APRIL, 2022

“Every
voice can
make a
difference.
And every
second
counts.”



GRETA THUNBERG

I have learned you are never too small to make a difference. The moment we decide to fulfill something, we can do anything. Together and united, we are unstoppable.

**ANTÓNIO GUTERRES, UNITED NATIONS
SECRETARY GENERAL**

Adaptation saves lives. Delay means death. I know people everywhere are anxious and angry. I am, too. Now is the time to turn rage into action. Every fraction of a degree matters. Every voice can make a difference. And every second counts. We are on a fast track to climate disaster.

**DR. PETER D. CARTER & ELIZABETH
WOODWORTH, UNPRECEDENTED CRIME**

(W)e consider the continued financing and production of fossil fuel energy, and the egregious denial of climate change by politicians, as gross violations of basic human rights and therefore as the most serious possible crime against humanity. In particular, it is a crime against children alive today, and against the future unborn.



ABOUT THE AUTHOR

DR. DENNY TAYLOR

“A global scholar whose research is the foundation of projects and initiatives in more than 140 U.N. Member States.”

Denny Taylor is a global scholar whose research is the foundation of projects and initiatives in more than 140 UN Member States that are embedded in laws, policies, and programs. Frequently these projects include partnerships between government agencies, UN Agencies, NGOs, the medical and private sectors, and academia.

She was nominated for the Nobel Peace Prize in 2018 and 2019 by renowned scholars on four continents for concepts and organizing principles that are now ubiquitous throughout the world.

Professor Emerita, she has received many awards including in 2019, Dr. Taylor received Columbia University's Distinguished Alumni Award and also in 2019 the National Council of Research on Language and Literacy (NCRL) Distinguished Scholar Award for her lifelong commitment to research across the social and physical sciences, and with scholars in the humanities to work together to push down the risks and shore-up the future of humanity.

Her research combines anthropology, linguistics, psychology, and sociology and her ethnographic research has included families experiencing mass trauma, mothers and children living in extreme poverty, families who are survivors of armed conflict, and teachers and children struggling in the aftermath of weather-related catastrophes, mass shootings, and public health emergencies.

Dr. Taylor's research on mass trauma and human caused catastrophes incorporates theoretical perspectives from physics, chemistry, mathematics, and engineering, and she has researched, written, and presented on nuclear and chemical disasters, including Fukushima and Bhopal, and on ExxonMobil's Deepwater Horizon Explosion.

Since 2008 Dr. Taylor's research has focused on Earth system science research, and on the Grand Challenges confronting people and the planet. Her presentations, papers and graphics have addressed:

Governing Across Scales; Meeting Global Needs; Transforming our Ways of Living; The State of the Planet.

“When The Temperature Rises More Than 2°C What Will We Do?”

She was an invited participant in the 2009 ICSU/ISSC On-Line Global Visioning Consultation in which more than 1000 renowned scientists from 85 countries contributed to the initial online consultation.

In 2010 she was an invited participant in the 2010 Open Visioning Consultation Forum, UNESCO, Paris. The ISSC, IUBS, SCOPE, UNESCO, UNU, WMO participated in the forum that resulted in the publication of the *Grand Challenges Report*, which is a consensus list of the highest priorities for Earth system science that would remove critical barriers impeding progress toward sustainable development. More than 200 individuals and 46 institutions reviewed the draft of the *Grand Challenges*. Of relevance here is PowerPoint prepared for the 2010 Open Visioning Consultation entitled *Transdisciplinary Organizing Principles for Human Activity in Earth Systems Research: Grand Challenges in global Sustainability*.¹

In 2012 Dr. Taylor was invited to participate in the Planet Under Pressure Global Conference on Earth System Science in London. She had four peer reviewed transdisciplinary research papers accepted:

1. Integrating The Social Sciences And Humanities In Earth System Science To Address The ICSU/ISSC Grand Challenges.²
2. Unpackaging Human Enterprise And Communicating With The Public.³
3. The Great Acceleration: The Anthropocene, Kicks, Dead Zones And Bridging The Abyss.⁴
4. When The Temperature Rises More Than 2°C What Will We Do?”⁵

Since 2018 Dr. Taylor has been a participant observer documenting the U.N. High Level Political Forums on the Sustainable Development Goals. Her current research focuses on the first principles and dynamic complexity of all human societies and the use of the Sustainable Development Goals as a basis of international cooperation and multilateralism in U.N. Member States in projects that focus on peacebuilding and on responding to the climate emergency.

THE AUTHOR’S CARBON FOOTPRINT

Denny Taylor has made a conscious effort to reduce her carbon footprint. In 2012 she downsized to a studio apartment and sold her car. She walks to meetings and has only flown twice in ten years to speak at conferences. She is unaware of any conflict of interest.



ACKNOWLEDGEMENT OF DAVID TAYLOR

“For the price
of CCS/CCUS
we can build
enough
offshore wind
turbines to
shut down all
fossil fuel
plants in the
U.S.”

Denny Taylor recognizes David Taylor for the long conversation on catastrophic events and risk analysis that began in 1966 and has focused on the Three Mile Island nuclear disaster, the Union Carbide Bhopal chemical disaster, the Chernobyl Nuclear Disaster, the BP Deepwater Horizon Explosion, and the Fukushima Nuclear Disaster.

This study of the existential apparatus of the fossil fuel industry has been building on a planetary scale, especially of the gaslighting of politicians and the public by ExxonMobil, Chevron, BP, and Shell has intensified the conversation. Just on CCS/CCUS alone 1,120 scientific papers and industry documents have been read and discussed with the conclusions of the studies used to inform and verify the findings of various analyses of CCUS demonstration installations constructed by fossil fuel corporations analyzed by David Taylor and Denny Taylor and subsequently used to inform Denny Taylor’s writing.

Thus, while Denny Taylor’s research across the sciences supports the finding that “the future hangs in the balance, because of the false narrative constructed by Big Oil dominates global thinking on human survival” and that, “the fossil fuel Industry is exerting undue influence, significantly impairing the decision-making of entire nations on achieving Real Zero,” these interpretations reflect the discussions that have taken place between Denny Taylor and David Taylor.

It is important that readers know that David Taylor had a lead role in the collaborative analysis of CCS/CCUS, CO2 high pressure pipeline ruptures, and blue hydrogen and that the accuracy of the numerical interpretations in the Interim Report has been checked and then rechecked by David Taylor as well as Denny Taylor and that the fine-tuned analysis by David Taylor has strengthened the veracity and legitimacy of the findings.

David Taylor’s professional credentials and experience include chemical, nuclear, structural, materials/corrosion, electrical and mechanical disciplines. He has over 40 years of experience in leading engineering and scientific investigations into failure and risk analysis in chemical plants and fossil fuel/nuclear power plants, both in the U.S. and worldwide.

“Over 40 years
of experience
in leading
engineering
and scientific
investigations”

He led a 16-year effort on the Three Mile Island Unit 2 Accident coordinating a wide range of nuclear, mechanical, corrosion, materials, thermal hydraulic and other experts to conduct numerous investigations into the various aspects of this major accident.

He has also led a 20-year effort coordinating a multi-disciplinary team of experts from mechanical, materials, corrosion, water treatment chemistry, and statistical disciplines in support of overall investigation and analysis of widespread steam generation tube corrosive failures in over 20 nuclear units. One of his last projects was a two-year analysis of the causes and the events leading to the nuclear core meltdowns at three of the Fukushima nuclear plants as a result of the 9.1 earthquake and tsunami.

Thus, David Taylor has had a key role in the mathematical and engineering analysis of CCS/CCUS and Denny Taylor invited him to be recognized as a co-author. David, always analytic and data driven, responded, “No, you wrote the book.”

The long conversation continues. Who knew failure and risk analysis could last a lifetime and be so compelling.



ACKNOWLEDGEMENT OF DR. PETER CARTER

Director of the
Climate
Emergency
Institute, IPCC
expert
reviewer

Denny Taylor is also appreciative for the wisdom, knowledge, and insights of Dr. Peter Carter who is the Director of the Climate Emergency Institute and an IPCC expert reviewer.

Peter is the co-author of *Unprecedented Crime: Climate Science Denial and Game Changers for Survival*, and through his website and videos his guidance has been received by both scientists and the public.

There is room for many more independent scholars to join Peter in calling for a more urgent response to the climate crisis.



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SUPPORT FOR THE FOSSIL FUEL NON-PROLIFERATION TREATY

In September 2021, 2,755 scientists and academics from around the world called for a **Fossil Fuel Non-Proliferation Treaty**.⁶ *The Carbon Clock is Ticking: Children will Live the Future that Burning Fossil Fuels Is Setting on Fire* presents a granular level analysis of the interface between the fossil fuel industry and the climate crisis.

“We call on governments,” these scientists and academics write, “to urgently commence negotiations to develop, adopt and implement a Fossil Fuel Non-Proliferation Treaty.” They call for the global plan to have three aspects:

1. End new expansion in line with the best available science as outlined by the Intergovernmental Panel (IPCC) and the United Nations Environment Program,
2. Phase out existing production of fossil fuels in a manner that is fair and equitable, taking into account the respective dependency of countries on fossil fuels, and their capacity to transition,
3. Invest in a transformational plan to ensure 100% access to renewable energy globally, support fossil fuel-dependent economies to diversify away from fossil fuels and enable people and communities across the globe to flourish through a global transition.

The Carbon Clock is Ticking supports the development of these three aspects of the Fossil Fuel Non-Proliferation Treaty and presents verifiable data at a granular level that is dynamic and often computational on ending the use of fossil fuels. While the Fossil Fuel Non-Proliferation Treaty provides a 30,000-foot view of what governments and the public urgently need to do, *The Carbon Clock is Ticking* provides the detailed information that is needed for governments to act.

Because time is of the essence this Interim Report is being made available in the commons now. The Full report will provide readers with an analysis on which actions can be taken immediately to phase out existing gas and oil production and invest in a renewable, fossil fuel free, transformational plan.

In colloquial terms the scientific analysis focuses on the “nitty-gritty” - the most essential aspects and the most relevant details, not only for governments and the public need to rapidly decarbonize the world’s energy systems, but also to respond to the humanitarian crisis that has been caused by carbon intensive industrialization. Both the Interim Report and the Full Report address the life-threatening inequities caused by the fossil fuel industry that have made human societies unsustainable.



DEFINITION OF TERMS: REAL ZERO REPLACES NET ZERO

Regarding the definition of terms. The most conflated of terms in climate science is “**net zero.**” In drafts of *The Carbon Clock is Ticking* the term was used, but it is problematic because it is used both by climate scientists to highlight the urgency of decarbonization, and by representatives of fossil fuel corporations to gaslight governments and the public into believing we can continue to use fossil fuels and still reach “net zero” CO2 emissions.

In an article entitled, “10 Myths About Net Zero Targets and Carbon Offsetting, Busted,” attributed to 41 scientists, the problem with the term is presented.⁷ The 10 myths presented by these scientists are supported by the research undergirding *The Carbon Clock is Ticking*, and there is agreement that, “unprecedented, rapid and sustained emissions reductions, starting here and now, are essential for tackling the climate crisis and living up to the Paris Agreement.” They also include six actions that need to be taken, and the final action provides us with a replacement term for “net zero.”

We must stop extracting and using fossil fuels, the primary cause of the climate crisis. As well as **real-zero** targets, we need an international treaty for the termination of fossil fuel production.

Real zero does not include “nature-based solutions,” “carbon offsetting,” “technological solutions,” “tree plantations,” and “climate neutral,” which are all misleading and oversimplified “net zero solutions” that do not reduce CO2 emissions.

So here in the Interim Report and in the Full Report, the term **Net Zero** only occurs in quoted texts, otherwise it has been replaced by **Real Zero**. This term is only used to indicate **real reductions** in the use of fossil fuels, **real reductions** in CO2 emissions from the extraction and production of fossil fuels, and **real reductions** in CO2 emissions from hard to decarbonize industries.



NOTE TO READER: CHILDREN WILL LIVE THE FUTURE THAT BURNING FOSSIL FUELS IS SETTING ON FIRE

To the many readers who know my research, and to the new readers who have been sent an electronic copy of this report or have received an open access paper version, I am reaching out to encourage you to join with me and so many other people in civil society who are standing up to the fossil fuel industry for jeopardizing the lives of children and young people by the expansion of the existential apparatus the fossil fuel industry continues to build on a planetary scale. The Carbon Clock *is* ticking. **We must step up. If we do not, children and young people *will* live the future that burning fossil fuels is setting on fire.**

The COVID 19 pandemic that took so many innocent lives will end. We will adapt. We will prevail. Russia's brutal war against Ukraine is profoundly wrong, but the Ukrainian people have risen-up to defend their homeland and the whole world has stepped up to support them. The speed and unanimity of the global response has been a remarkable reflection of the many ways in which our shared desire for peace and justice to prevail is uniting us in almost universal recognition of the indomitable courage of President Volodymyr Zelenskyy and the Ukrainian people will inspire the world to stand up to violent tyrants for many years to come.

But here's the rub. The climate crisis is equivalent to Covid, cholera, the Spanish flue, the plague, and all historic pandemics rolled into one, and we have not risen up. It is the equivalent of Putin, Hitler, Mussolini, and all brutal tyrants of history attacking us, terrorizing our families, and destroying the cities and towns where we live. The tragic truth is that *knowing* the consequences of global warming for children and young people has not united us. It is inexplicable. There is no plan.

In the movie *Look Up* it is an asteroid that annihilates the planet. In *Look Up* the U.S. government had seven months to stop the asteroid from colliding with Earth. They failed. In real life governments have had seventy years to stop the temperature rising and making the planet uninhabitable, and they have failed. Similarly, the fossil fuel industry has known for almost seventy years that burning coal, oil and gas is causing the climate emergency.

There is damning evidence that the top executives of ExxonMobil, Chevron, BP and Shell have known for many years that deriving energy from fossil fuels is making the planet hotter and it will become uninhabitable. Big Oil's own scientists told them so, but not only did they fail to act they instigated climate change denial propaganda campaigns expressly orchestrated to convince politicians and the

public that global warming is not happening. The Secretary General of the United Nations has called them arsonists.

And people? The public? Us? **The fossil fuel industry has spent hundreds of millions of dollars gas-lighting us.** Congress has done the same. We have been bombarded by a morass of mixed messages and many of us stopped paying attention many years ago. It is true we have not kept up with the climate crisis and we are not taking the transformative steps in energy production that are urgently needed for human societies to survive on a much hotter planet.

The passivity with regard to the climate crisis is the equivalent of everyone in the world ignoring that there are vaccines to limit the spread of Covid, refusing to wear masks and even when people are sick and dying of the virus picking up little children and holding them.

And for the fossil fuel industry the obfuscation of the scientific findings that the planet is warming because of the vast amounts of carbon dioxide and methane being released into the atmosphere is the equivalent of Putin using his nuclear arsenal even though he knows it will annihilate the world. The situation is this dire, and even these descriptions are not strong enough. **We are in an existential emergency, and we have got to look up.** But we can change the future now. The window is closing, but it is not too late if we act now.

“Today’s IPCC report is an atlas of human suffering and a damning indictment of failed climate leadership,” Antonio Guterres, Secretary General of the United Nations, states in response to the IPCC report, *Climate Change 2022 - Impacts, Adaptation and Vulnerability*, released February 28th, 2022. “With fact upon fact, this report reveals how people, and the planet are getting clobbered by climate change.”

The IPCC report states, “Any further delay in concerted anticipatory global action will miss a brief and rapidly closing window of opportunity to secure a livable and sustainable future for all.”

“Nearly half of humanity is living in the danger zone – now,” Guterres says. “Many ecosystems are at the point of no return – now. Unchecked carbon pollution is forcing the world’s most vulnerable on a frog march to destruction – now.”

“The facts are undeniable,” Guterres states. “This abdication of leadership is criminal. The world’s biggest polluters are guilty of arson of our only home.”

“Oil and gas giants - and their underwriters – are also on notice,” Guterres continues, “You cannot claim to be green while your plans and projects undermine the 2050 net-zero target and ignore the major emissions cuts that must occur this decade. People see through this smokescreen.”

Still quoting Guterres, “The present global energy mix is broken. As current events make all too clear, our continued reliance on fossil fuels makes the global economy and energy security vulnerable to geopolitical shocks and crises.”

“Instead of slowing down the decarbonization of the global economy, now is the time to accelerate the energy transition to a renewable energy future. Fossil fuels are a dead end – for our planet, for humanity, and yes, for economies.”

“Adaptation saves lives. Delay means death. I know people everywhere are anxious and angry. I am, too. Now is the time to turn rage into action. Every fraction of a degree matters. Every voice can make a difference. And every second counts.”

We responded to Covid, we are acting in support of Ukraine, and now there is a small window still open for the people in the U.S. and the world to save the planet for our children and young people. We cannot fail them. In vulnerable regions the adverse effects of the climate crisis are already locked in. **We cannot go back. We cannot reverse the damage that has been done by the burning of fossil fuels, but we can stop the fossil fuel industry from consciously transgressing the planetary boundaries and making the planet uninhabitable for people.**

If we stand up to the fossil fuel industry right now and rapidly transition to zero carbon energy, we can slow global warming. It is up to us to stand up to the fossil fuel industry. This is a defining moment. We must act with unity of purpose. We must prevail. We cannot allow a polluting industry dominated by ExxonMobil, Chevron, BP, and Shell and all the Big Oil companies represented by the American Petroleum Institute to continue making record profits at the expense of almost eight billion people whose lives are threatened by their intransigent life-threatening behavior.

In keeping with the United Nation’s *Guiding Principles for Climate-Aligned Hydrogen Deployment: Towards Cost-Effective and Equitable Deep Decarbonization to Limit Temperature Increases to 1.5° C*,⁸ the U.S. has the capacity to phase-out fossil fuel use, reject the trillions of dollars in tax breaks and direct subsidies demanded by Big Oil for CCUS/CCS and blue hydrogen, and rapidly advance electrification of the energy supply.

We need unity of purpose to move away from all fossil fuels as quickly as possible, and truly green hydrogen produced by electrolysis driven by renewable electricity can play a major role. Blue hydrogen, though, provides no benefit. Similarly, we can reduce the CO₂ and methane discharged into the atmosphere in the production and use of natural gas and undertake the great transformations that the scientific data makes clear we must make. The challenge is to achieve these transformations within the next seven years. It can be done.

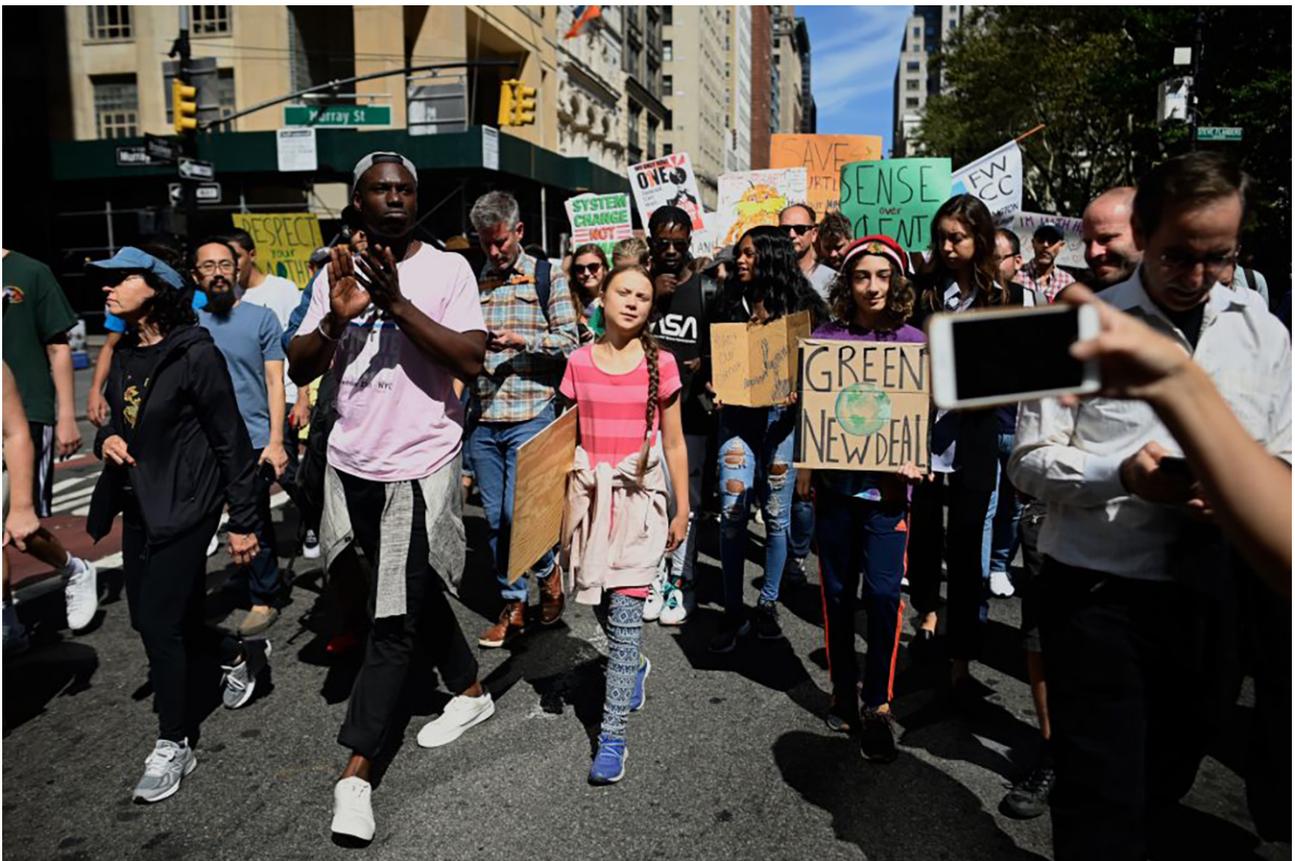
Research from the social, medical, and physical sciences girds this text, including peer reviewed studies in the fields of biophysical-economics, engineering, environmental science, geology, thermodynamics, physics, and sustainability, as well as research from the oil and gas sectors. Please note that coal is the focus of a separate publication. Also included are documents and videos produced by the U.N., policymakers in governments, and environmental organizations, and by scientists and engineers in the oil and gas sectors. The data is rounded out by ethnographic accounts of conversations with many prominent officials, including leaders from government, diplomacy, and academia.

This Interim Report, which is in the commons, will become the first section of the Full Report, *The Carbon Clock is Ticking: Children will Live the Future that Burning Fossil Fuels Is Setting on Fire*. However, it is being made available ahead of the Full Report because the situation is so dire. The Full Report will be published by late May, and it will include in the final section a Fossil Fuel Divestment Plan that it is hoped will mobilize us to take action to protect the future of children and young people and their right to exist in the future.

The Fossil Fuel Divestment Plan to save children and young people from the worst of the climate crisis is grounded in the research findings of the world's most renowned scientists who are focused on pushing down the risks of global warming and the climate crisis. The plan also includes the public. Young people and their families, professionals in the caring professions, civil society groups, environmental organization, can all have a positive impact on the world. We can form partnerships and unite to encourage the U.S. President, the Administration and Congress to reject the fossil fuel industry's misleading claims that we can continue to burn fossil fuels and still decarbonize. We must insist that Big Oil companies, including Chevron, BP, Shell, ExxonMobil, together with API fulfill their ethical obligation to meet the climate challenge and rapidly end the use of fossil fuels.

It is time these planet polluters acknowledge that science has won, and they commit to achieving Real Zero within the next seven years. The Carbon Clock *is* ticking, and children will live the future that burning fossil fuels is setting on fire. Big Oil must change course and have a positive impact on the lives of today's children and young people not only in the 2040s and 2050s, but in the centuries to come. If Chevron, BP, Shell, ExxonMobil, renege on their responsibility to rapidly phase out fossil fuels, it will be a crime against the future of humanity. Children and young people want to live.

THE CARBON CLOCK IS TICKING: THREE CONDITIONS MUST BE MET TO SAVE THE PLANET FOR CHILDREN AND YOUNG PEOPLE



Young people march with Greta Thunberg to call for a system change to save the planet at the Global Climate Strike march in New York City on September 20, 2019. (Photo by Johannes Eisele/AFP via Getty Images).

There are three conditions that must be met to save the planet for our children. First, we must hurry, second, we must go rapidly in the right direction, and third, we must stay alert and recognize that Big Oil, powerful elites, lobbyists, and PACs will try to turn us and make us go in the wrong direction. They are already misdirecting us. We must be strong. There is no time left to dither. We cannot falter. We

must leap forward on the right path to stop the temperature rising so rapidly that the planet becomes uninhabitable.

The stakes are high and involve a lot of risks. If we take a wrong turn, pick the wrong path, or go in the wrong direction, there will be no time to retrace our steps and find the right path. If we make a mistake, show poor judgement, or succumb to Big Oil propaganda, we will lose the last chance we have to protect the children and youth of today from serious harm. We will be unable to safeguard human survival.

At U.N. meetings⁹ there are many prominent officials, including leaders in government, diplomacy, and academia who say that the targets of the 2015 Paris Accord are now unachievable. **There are discussions in which many participants agree that we are going backwards and not forwards, and that governments are disingenuous in their espousing of commitments to reduce CO2 emissions to mitigate the climate crisis and push down the risks of global warming.**

In the U.S. it will be difficult for families to find the path we must take because billions of dollars are being spent on propaganda to deceive us and hoodwink us into believing that Big Oil has our best interests at heart. People are bombarded on a daily basis by climate disinformation and anti-climate campaigns paid for by ExxonMobil, Chevron, BP, Shell, and API as they lead us along the wrong path.

“The pathway remains narrow and extremely challenging, requiring all stakeholders – governments, business, investors and citizens – to take action this year and every year after so that the goal does not slip out of reach,” Fatih Birol, Executive Director, of the International Energy Agency (IEA) writes in the introduction to the IEA Report, *Net-Zero by 2050: A Roadmap for the Global Energy Sector*^{10 11} that was published in October 2021 in advance of COP26.

The guiding principle of the Roadmap is that clean energy transitions must be fair and inclusive, leaving nobody behind.

Birol writes of staying on the pathway. He states, “Doing so requires nothing short of a total transformation of the energy systems that underpin our economies.”

“The world has a huge challenge ahead of it to move net zero by 2050 from a narrow possibility to a practical reality,” Birol writes. **“Global carbon dioxide emissions are already rebounding sharply as economies recover from last year’s pandemic-induced shock. It is past time for governments to act, and act decisively to accelerate the clean energy transformation.”**



PHYSICS IS WINNING: IN 2021 THERE WERE 20 SEPARATE BILLION-DOLLAR WEATHER AND CLIMATE DISASTERS THAT KILLED 688 PEOPLE IN THE U.S.

“The speed at which temperatures are increasing is alarming,” Pascal Peduzzi, the Director of GRID-Geneva, UN Environment Program, states. “At this rate, we may reach +1.5°C in the next 15 years.”¹²

Similarly, in 2020 the World Meteorological Organization (WMO) predicts a 20 per cent probability that temperatures will exceed 1.5°C in at least one year before 2024.¹³

Daniel Quiggin, Kris De Meyer, Lucy Hubble-Rose, and Antony Froggat, state in the Chatham House, *Climate Change Risk Assessment 2021*, that “the world is dangerously off-track to meet the Paris Agreement.” They state, “**the risks are compounding,**” and raise concern that “without immediate action the impacts will be devastating in the coming decades.” Quiggin and his colleagues state, “If policy ambition, low-carbon technology deployment and investment follow current trends, 2.7°C of warming by the end of the century is the central estimate, relative to preindustrial levels.” However, these researchers point out that “A global temperature increase greater than 5°C should not be ruled out.”

Quiggin, Meyer, Hubble-Rose and Froggat emphasize the systemic complexity of the climate crisis and of the potential for domino-like effects between various tipping points, that have the potential to lead to abrupt non-linear responses.¹⁴ In the decades of research on which this report is based such abrupt non-linear responses are referred to as “jolts” and “kicks.” The impacts of such rapid changes are difficult to predict, but many scientists are concerned that while humanity might adapt to a temperature rise of 2.0°C that occurs gradually over decades, the likelihood of human societies adapting to an instant rise in temperature of even 2.0°C is less certain. **The more abrupt the change and the more intense the jolt or kick, the less likely human societies will be able to adapt or to act to minimize societal collapse and the more likely the suffering will be existential.**

Susan Natali, the Arctic ecologist, in her testimony to the Congressional House Foreign Affairs Subcommittee, on the “National Security Implications of Climate Change in the Arctic,” presented slides that raise concern that in the coming years, the Arctic temperatures will continue to rise and will exacerbate climate hazards. One of Natali’s slides forecast a rise of 7.5°C by 2060, which would make it highly likely human life on the planet will be unsustainable by 2050.¹⁵

Natali stated in her written testimony that “permafrost thaw is critically important because the permafrost region stores vast amounts of carbon, roughly twice as much as in the atmosphere.”¹⁶

“Once thawed,” Natali writes, “this previously frozen carbon can be broken down and released into the atmosphere as greenhouse gases, methane and carbon dioxide. The release of greenhouse gases from thawing permafrost can accelerate climate warming, leading to additional thaw, resulting in an amplifying feedback loop.”

Natali raised concern that the International Panel on Climate Change (IPCC) Sixth Assessment Report (AR6), does not include important permafrost thaw processes, such as thaw-induced ground collapse and fire-permafrost interactions. She writes, **“the loss of permafrost carbon is irreversible on a human-relevant timeframe,” and that “currently, the AR6 models likely underestimates the potential of permafrost carbon emissions.”**

“We are not winning against the physics,” Corinne Le Quéré, Royal Society research professor of climate change science at the University of East Anglia, said. “If all countries achieve their commitments the warming of the world will be a temperature rise of 2.4°C by 2030.” Le Quéré also stated, “We have to meet the targets *now* and over the next year (2022). If you go to 2.5 degrees about one billion people will not be able to go outside and work. It becomes extremely serious and honestly I don’t want to live then.”

“U.S. saw its 4th-warmest year on record, fueled by a record-warm December,” the National Oceanic and Atmospheric Administration announced on January 10, 2022. NOAA followed this headline with “Nation struck with 20 separate billion-dollar disasters in 2021.”

“The December contiguous U.S. temperature was 39.3° F, 6.7 degrees above average, making it the warmest December on record and exceeding the previous warmest December in 2015.”

2021 ranked the fourth-warmest year in the 127-year period on record. The six warmest years on record have all occurred since 2012. There were 20 separate billion-dollar weather and climate disasters in 2021 that killed at least 688 people. The disasters included droughts, heat waves, floods, tornadoes, tropical cyclones and 8 other severe weather events.

Soon we will all be familiar with *dry bulb* and *wet bulb heat* indicators. In *Environmental Research Letters*, Dawei Li and colleagues write of the “Escalating global exposure to compound heat-humidity extremes with warming.”¹⁷ These scientists explain that dry-bulb air temperature alone is inadequate as a metric for human heat stress. Healthy, well-adapted humans are able to maintain a normal core body temperature (under 38°C) through evaporative cooling (i.e., sweating), even when the ambient air temperature exceeds their body temperatures.

However, wet bulb heat is different. High humidity reduces the efficiency of the body's evaporative cooling and, when combined with elevated air temperature, can undermine this cooling mechanism, and pose a serious threat to human health.

Li and colleagues note that many scientists have raised concerns on the projected worsening heat stress over the 21st century, taking account of both temperature and humidity due to anthropogenic global warming. They state, and this is important, because most people do not seem to realize that even an increase in temperature of 2°C can have devastating consequences in heat stress and even death.

Li and his colleagues also state, "The significant increase in heat stress from a 1.5°C to a 2°C warming, and from 2°C to higher levels of warming, has clear implications for global policy discourse around temperature targets." They also state, "a world of 1.5°C warming sees less than half the heat stress for a Wet Bulb Globe Temperature (WBGT) threshold of 33° C than a world of 2°C warming, at 1.96 billion people days/year instead of 4.15 billion people days/year."

The important message here is that the temperature is rising faster than the White House, Congress or corporate power are willing to acknowledge. There are many reasons for this dereliction of duty, and they will be presented in *The Carbon Clock is Ticking*. What is most important is that you are reading the science - you are included in the dialogue even if you are not scientists - and that you have access to all the complex reasons why transforming the carbon produced energy systems and the total divestment of fossil fuels is the only way to save the future for children and young people.

There is no doubt that *Children will Live the Future that Burning Fossil Fuels Is Setting on Fire* - unless we step up. Knowing the science is the first step and we have already taken it. Now, is the time to add to your knowledge base and juxtapose the science with the life-threatening propaganda and actions of the giants of the fossil fuel industry. The CEOs of ExxonMobil, Chevron, BP, and Shell have been called the Four Horsemen of the Apocalypse.¹⁸ It is an apt analogy. **There is overwhelming evidence-based research that Big Oil has known for more than 50 years that burning fossil fuels is the death knell for humanity.** That evidence is presented here.



IGNORING THE PHYSICS: THE AMERICAN PETROLEUM INSTITUTE ERRONEOUSLY THINKS BIG OIL HAS WON THE FIGHT

“Back with bravado!” Nicholas Kusnetz declares, writing in *Inside Climate News*, January 12, 2022.¹⁹ “The American Petroleum Institute’s chief executive Mike Sommers said his industry was ready for a fight. Today, it seems those fights have largely gone his way.”

“Today profits have returned, and production is insurgent,” Kusnetz writes, and states that the U.S. Energy Information Administration “expects domestic oil production to reach an all-time high next year, marginally surpassing 2019 levels.”

Kusnetz points out that that “European oil giants have been increasing investments in renewable energy and electric vehicles, in contrast to their American counterparts.”

Kusnetz writes that Sommers spoke of oil and gas demand remaining strong through 2050. And he states that Sommers is betting that the goals of the Paris Accord won’t be met, and that oil and gas demand will still be strong. Kusnetz adds that Sommers failed to mention that **“such a course would send global temperatures soaring past the goals of the Paris Agreement.”**

Like most propaganda there are elements of truth in Sommers’ keynote address that make the mis-statements more believable and more likely to gaslight listeners.

“Suppose that by 2040, every signatory to the Paris Climate Agreement was to meet their commitments,” Sommers states. “Even then, government experts say natural gas and oil will still account for almost half of all energy used.”

Not true. Sommers distorts the facts. The climate crisis is intensifying and changing so rapidly that the data is constantly being updated. The Paris Agreement was seven years ago, and **Sommers knows the climate crisis is considerably worse now than it was then, because he was called before Congress on October 28, 2021, to account for the lies and deceptions his organization has promulgated to distract from global warming and promote the continued use of fossil fuels.**

And so, in his keynote address Sommers deceives his audience by invoking the Paris Climate Agreement, even though all global indicators have been updated, including the Carbon Clock.²⁰

“Fossil-fuel-producing nations must recognize their role and responsibility in closing the production gap and steering us towards a safe climate future,” Måns Nilsson, Executive Director at the Stockholm Environment Institute (SEI) writes in the press release of the *2021 Production Gap Report*.²¹ The report states:

“As countries set net-zero emission targets, and increase their climate ambitions under the Paris Agreement, they have not explicitly recognized or planned for the rapid reduction in fossil fuel production that these targets will require. Rather, the world’s governments plan to produce more than twice the amount of fossil fuels in 2030 than would be consistent with limiting warming to 1.5°C. The production gap has remained largely unchanged since our first analysis in 2019.”²²

One of the key findings of the *2021 Production Gap Report* is that global natural gas production is projected to increase the most between 2020 and 2040 based on governments’ plans. Sommer’s should know that the continued, long-term global expansion in gas production is inconsistent with the Paris Agreement’s temperature limits. Of course, he knows that.



“NET-ZERO” EMISSIONS BY MID-CENTURY REQUIRES THE RAPID REDUCTION IN FOSSIL FUEL PRODUCTION AND CONSUMPTION

The Carbon Clock website states, “The new budgets are now 400 and 1,150 gigatonnes of CO₂ for the 1.5° C and 2° C targets respectively. They are calculated from the beginning of 2020, which is two years later than the previous budgets (420 and 1,170 gigatonnes), and around 85 gigatonnes have been emitted in the meantime.”²³ (A tonne is a metric measurement equal to 1000 kilograms or 2,204.6 pounds; the U.S. ton is equal to 2,000 pounds; a gigatonne is a billion tonnes.)

The Secretary General of the Mercator Research Institute on Global Commons and Climate Change, (MMC) Brigitte Knopf, states, “The (CO₂) budget is extremely tight. This routine update does all but change the basic message of our Carbon Clock.”

Knopf adds, “Extreme weather events around the globe are a vivid reminder of the great pressure to act, and the new IPCC report provides a record of a frightening trend of heat waves, heavy rain, and also on sea level rise. Global climate policy is definitely not yet on the right track; not for the 2-degree target and certainly not for the 1.5-degree target.”

The U.N. 2021 *Production Gap Report* is declarative. “Fossil-fuel-producing nations must recognize their role and responsibility in closing the production gap and steering us towards a safe climate future,” says Måns Nilsson, Executive Director at the Stockholm Environment Institute (SEI). “As countries increasingly commit to net-zero emissions by mid-century, they also need to recognize the rapid reduction in fossil fuel production that their climate targets will require.”²⁴

Returning to Birol and the International Energy Agency (IEA) Report, *Net-Zero by 2050: A Roadmap for the Global Energy Sector*, the peer reviewed report prepared by renowned scientists is declarative. “Net Zero” requires a huge decline in the use of fossil fuels.

The report states that the energy sector is the source of around three-quarters of greenhouse gas emissions today and holds the key to averting the worst effects of climate change, perhaps the greatest challenge humankind has faced.

It is important that the public is aware that the IEA warns that no new oil and gas fields should be approved for development and there should be no new coal mines or mine extensions if humanity is to avert an existential catastrophe.

The situation is grave, and it is for this reason the IEA states that the direct use of low-emissions electricity in place of fossil fuels must be one of the most important drivers of emissions reductions to Real Zero.

It is important for young people and the public to know that Sommers at API, who is ready for a fight, and the CEOs of ExxonMobil, Chevron, BP, Shell, who have enormous power, are out of sync with scientific evidence and with the people who have lost their homes, their livelihoods and even family members to extreme weather events.

The CEOs of ExxonMobil, Chevron, BP, Shell, and API know that burning fossil fuels is causing the temperature to rise. They know Big Oil is making the planet uninhabitable, but still the CEOs of ExxonMobil, Chevron, BP, Shell have made the conscious decision to not only up the gigatonnes of CO₂ they produce but also brag about it.



DENIAL OF GLOBAL WARMING AND THE CLIMATE CRISIS WAS THE FIRST LIE THAT EXXONMOBIL, CHEVRON, BP, SHELL, AND API PROMULGATED

There is irrefutable evidence that ExxonMobil, Chevron, BP, Shell, and API have known since the 1970s that burning fossil fuels has caused global warming. There is also undeniable internal industry documentation that they made a conscious decision to deceive the public by mounting climate denial campaigns that delayed the U.S. response to the climate emergency. Beginning in the 1980s, ExxonMobil, Chevron, BP, Shell, and API paid off politicians and ran well organized media and lobbying campaigns to spread lies in denial of global warming and in propaganda that rejected the climate crisis.

The first lie ExxonMobil, Chevron, BP, Shell, and API promulgated was their denial of global warming and the climate crisis, but there is a second lie that is even more dangerous than the first lie. The second lie which is being promulgated right now is that we can continue to burn fossil fuels in power plants and capture the carbon dioxide that is emitted so that it does not end up in the atmosphere. The second lie is even more pernicious than the first, because the purpose of this lie is to deceive us into believing that by capturing the CO₂ and burying it in the ground, we can continue burning fossil fuels *and* push down the risks of global warming. We cannot.

What is insidious about this second lie is that most people do not have the technical knowledge to decide for themselves whether or not Carbon Capture and Storage (CCS/CCUS) will reduce CO₂ emissions in the atmosphere and stop the temperature from rising to such a degree the planet will become uninhabitable. *The Carbon Clock is Ticking* provides the evidence based technical knowledge you need understand why CCS/CCUS is a last-ditch money-making effort of Big Oil.



THE SECOND LIE EXXONMOBIL, CHEVRON, BP, SHELL, AND API PROMULGATED IS THE DEADLIEST DECEPTION OF THE INDUSTRIAL AGE AND IS POTENTIALLY EXISTENTIAL

The promulgation of the second lie is the deadliest deception of the industrial age and is potentially existential. In an email communication an IPCC reviewer has called it a “planet killing agenda.” The scientific evidence is indisputable, carbon dioxide emissions from fossil fuels are acting as an accelerant to global warming and the speed at which the temperature is rising is rapidly increasing.

The CEOs of ExxonMobil, Chevron, BP, Shell, and API know that the climate crisis is existential and still they are deliberately deceiving us all. They are spending hundreds of millions of dollars to gaslight the public into believing we can continue burning fossil fuels and reduce CO2 in the atmosphere. Once again, we cannot.

The propaganda is so convincing many good people in U.S. society do not realize they are hanging over the edge of the abyss and their children do not have a parachute. If children and youth are to survive, we should be all-hands-on-deck, working together, clear eyed and with a plan to act decisively to reach Real Zero by 2030.

The Carbon Clock *is* ticking and if we do not act now children will live the future that burning fossil fuels is setting on fire. The consensus was that we have until 2050 to reach “net” zero, but many scientists are convinced that this will be too late. **The only option we can take to ensure children have a chance to live long healthy lives is to rapidly eliminate fossil fuels and implement long-term strategies to transform the energy infrastructure.**

There is another and equally compelling reason to call out ExxonMobil, Chevron, BP, Shell, and API and hold them accountable for the lies they are promulgating about carbon capture technology. The analysis in the Full Report will provide the evidence that CCS/CCUS will *not* make it possible for people in the U.S. to go on using fossil fuels and mitigate the impact of global warming on people or the planet now or in the near future.

The equally compelling reason is that ExxonMobil, Chevron, BP, Shell, and API cannot pursue CCS/CCUS without trillions of dollars of public money, and it will be the children and youth of today who will be expected to pay the debt. Big Oil will bequeath to the children and youth of today a very hot unlivable planet, and they will be expected to find a way to survive with trillions of dollars of ExxonMobil, Chevron, BP, Shell, and API debt tied around their necks.

These Big Oil companies are destroying the future of humanity for their own gain. **The second big lie is the greatest deception of the industrial age, some would say of all time.** Politically executed, involving the gaslighting of at least three U.S. Presidents, and multiple Democratic and Republican Congresses, it could almost be called a heist.

The second big lie has taken in politicians who are weak, gullible, and greedy in both political parties. U.S. Presidents of both Democratic and Republican political parties have also succumbed to the lie. The well-planned heist is a trillion handout of public's money for carbon capture - CCS/CCUS - which is still at the small scale "demonstration" stage and is decades away from being established at scale, and even if established will not have the capacity to removed sufficient carbon dioxide to keep the temperature below 1.5°C.



FOLLOW THE MONEY: IT WILL BECOME A RECURRING THEME

The data presented in *The Heat is On: A World of Climate Promises not yet Delivered*,²⁵ the U.N. Environment Program Emissions Gap Report 2021, show that, even if we achieve the Paris Accord/COP26 Nationally Determined Contributions (NDCs) that countries have committed to, by 2030 **we will still be emitting about 53 gigatons of carbon dioxide a year**. Further, the U.N. Emissions Gap Report shows that this will result in a **catastrophic global temperature rise to 2.8°C** and humanity will not survive.

It is important that we all understand that **to save the planet for children and young people**, the 2021 UNEP Gap Report shows that CO₂ emissions worldwide must be reduced by 28 gigatons/year by 2030 (from the projected 53 to 25 gigatons/year) in order to keep the rise in worldwide temperature to 1.5°C. The U.S. 10% portion of that 28 gigatons/year reduction is about 2.8 gigatons/year of CO₂, and *knowing* what proportion of the worldwide CO₂ emissions the U.S. must reduce enables us to consider the viability of the initiatives proposed by Big Oil to meet the targets set by the Paris Agreement and the subsequent updates presented in the UNEP Gap Report.

You will find an in-depth analysis of the failure of the small-scale demonstration plants in the final publication. Here in the Interim Report the remit is to provide a broad sweep of the scientific evidence and factual documentation, especially at the interface of science and the fossil fuel industry.

The current CCS/CCUS small scale demonstration plants have already benefited from jaw dropping taxpayer funding to finance their construction. It is important that the public knows that the one small power generation CCUS plant in the U.S. (the Petra Nova plant in Texas) was a commercial failure and is currently shut down. Predictably, the utility has already taken a tax write-off for 100% of its own portion of the \$1 billion expense on its taxes.

Even so Big Oil is eager to deploy CCS/CCUS plants at scale and the fossil fuel industry has made it clear the government, or more accurately taxpayers, will be expected to provide the enormous financial support they will need to capture the vast quantities of carbon dioxide they continue to expel into the atmosphere. While these potential costs to taxpayers are explored in more detail later, here just the total costs of the “well-planned heist” by the fossil fuel industry will be summarized.

First, capital cost data from both ExxonMobil and from a Columbia University report (described in more detail later) show that the capital cost to install 1 megaton/year CO₂ removal CCS/CCUS plant will be \$1 billion, or \$1 trillion to remove 1 gigaton/year. So, to remove all of the required 2.8 gigatons/year of CO₂ from the power generation and industrial sectors will cost about \$2.8 trillion, or \$350 billion/year every year for the next 8 years. That’s about half the annual U.S. defense budget! And the industry wants taxpayer help in footing this bill.

Second, since these CCS/CCUS plants are expensive to operate due to their large power consumption, Big Oil is lobbying for Q45 tax credits in excess of \$100 per metric ton of CO2 removed, resulting in a cost to taxpayers of at least \$280 billion/year, another \$8.4 trillion of taxpayer money over a 30-year projected life of the plants.

The Net Zero by 2050 Road Map for the Global Energy Sector report highlights that the gap between rhetoric and action needs to close if we are to have a fighting chance of reaching Real Zero by 2050 and limiting the rise in global temperatures to 1.5°C or even 2.0°C. The report states that “doing so requires nothing short of a total transformation of the energy systems that underpin our economies.”



GLOBALLY, THE U.S. IS WOEFULLY BEHIND IN THE ELECTRIFICATION AND THE TRANSFORMATION OF THE ENERGY SUPPLY

The rapid electrification of all sectors makes electricity even more central to energy security around the world than it is today. Electricity system flexibility – needed to balance wind and solar with evolving demand patterns – will quadruple by 2050 even as retirements of fossil fuel capacity reduces conventional sources of flexibility. The transition calls for major increases in all sources of flexibility: batteries, demand response and low-carbon flexible power plants, supported by smarter and more digital electricity networks.²⁶

The U.S. is woefully behind in all these aspects of the electrification and the transformation of the energy. Why? Because Exxon/Mobil, Chevron, BP, Shell, and API are spending billions promoting continued and even increasing fossil fuel use and blocking electrification of all sectors.

China, the world's largest carbon emitter, is on the cusp of a clean energy transition as new solar power becomes cheaper than coal throughout the country. In China 59% of new buses were electric in 2019. In fact, China currently has 99% of the world's half-million electric buses in service and is planning to double the number of electric buses by 2025.²⁷

“China on verge of a solar power tipping point, study finds,” Saul Elbein wrote October 19, 2019, in The Hill.²⁸

“By 2023, China will have the capacity to deploy solar power nationwide at the same price as coal, and currently has that ability in three-quarters of the country, according to a joint study from Harvard, Tsinghua, Nankai and Renmin universities,” Elbein writes.

“But as of 2020,” Elbein continues, “the report found, the Chinese industrial hothouse of solar and storage innovation has created “technical potential” to roll out enough new solar generation to meet twice the nation’s existing energy needs — from residential power to car traffic.”



LOW-COST SOLAR POWER ENABLES A SUSTAINABLE ENERGY INDUSTRY SYSTEM

“Low-cost solar power enables a sustainable energy industry system,” Christian Breyer, School of Energy Systems, LUT University, Finland, writes in PNAS (Proceedings of the National Academy of Sciences).²⁹

“Hothouse Earth is endangering the stability of planetary ecosystems at an unprecedented level,” Breyer warns, “consequently, an immediate phase-out of anthropogenic greenhouse gases is required to restabilize global ecosystems. **The leading economies of the world must, therefore, assume a role of true global leadership in order to develop a strategy for the survival of mankind.**”

Breyer references Xi Lu and his colleagues, stating that these researchers, “show, with analytical precision, how China could not only massively reduce CO₂ emissions but also further boost its economic growth from CO₂ reduction through the utilization of low-cost electricity.”

Lu and his colleagues write, “As the world’s largest CO₂ emitter, China’s ability to decarbonize its energy system strongly affects the prospect of achieving the 1.5 °C limit in global, average surface-temperature rise.”

The paper is entitled, “Combined solar power and storage as cost-competitive and grid-compatible supply for China’s future carbon-neutral electricity system,” and is published in the Proceedings of the National Academy of the Sciences (PNAS).³⁰

Lu and his colleagues state, “Understanding technically feasible, cost-competitive, and grid-compatible solar photovoltaic (PV) power potentials spatiotemporally is critical for China’s future energy pathway.”

An in-depth review of China’s initiatives to reach Real Zero underscores that the information presented to the U.S. public does not reflect the advances in decarbonization that are being made in China, or how far behind the U.S. is because of the unwillingness of the government to stand-up to the Big Oil and stop subsidizing the fossil fuel industry.



THE FOSSIL FUEL INDUSTRY IS BLOCKING THE RESPONSE TO THE CLIMATE CRISIS AND RUNNING INTERFERENCE AGAINST ELECTRIFICATION

Pause for a moment. Not only is the fossil industry blocking the response to the climate crisis and global warming, but they are also running interference against electrification, promulgating the deployment of a nationwide CCS/CCUS technology that is unproven and will not be ready in time, financially strapping the public with a carbon tax they can't pay, and saddling young people and children with a lifetime of debt. The public has got to look up.

But it does not stop here. There is so much human ingenuity being spent working at mitigating climate change and global warming, some of it in the United States but weighed down by political decisions many of which have been paid for by Big Oil.

An example of human creativity and forward thinking is provided by the world's longest under-sea direct-current electricity cable that has begun operation, capable of transferring green power in both directions between Norway and the U.K.

The U.K. National Grid reports that the 450-mile (725km) cable connects Blyth in Northumberland with the Norwegian village of Kvilldal. At full 1,400-megawatt capacity it will import enough hydro-power to supply 1.4 million homes.

National Grid Ventures president Cordi O'Hara said it was a "remarkable feat of engineering". She added: "We had to go through mountains, fjords and across the North Sea to make this happen."

O'Hare also stated that the "North Sea Link (NSL) is also a great example of two countries working together to maximize their renewable energy resources for mutual benefit."

The National Grid said the €1.6bn (£1.37bn) joint venture with Norwegian power operator Statnett would help the U.K. reduce carbon emissions by 23 million tonnes by 2030.

In addition, the U.K. has four other power cables running to Belgium, France and the Netherlands, and has said that 90% of energy imported in this way would be from zero carbon sources by 2030. It is worth highlighting that a **similar direct current power cable could be installed from Niagara Hydropower to New York City (380 miles)** that would be capable of transmitting 1,400 megawatts of clean hydropower without the need for overhead transmission lines for which right of ways are difficult if not impossible to obtain.

Using the North Sea Link, renewable power can be exported from the U.K. when wind generation is high and electricity demand low or be imported from Norway when demand is high and wind generation low.

Business, Energy and Industrial Strategy Minister Greg Hands said NSL enabled both countries to "benefit from the flexibility and energy security that interconnectors provide." He added: "**This pioneering partnership shows first-hand how crucial international cooperation will be in helping us to deliver on our net zero ambitions.**"



Specially designed barges were used in the construction of North Sea Link. (Photo: National Grid).



EUROPE IS FAR IN ADVANCE OF THE U.S. IN ELECTRIFICATION WHEN IT COMES TO REDUCING DEPENDENCE ON FOSSIL FUELS

A comparison between the U.S. and Europe confirms how far behind the U.S. is when it comes to reducing dependence on fossil fuels and how far in advance Europe is in renewable energy electrification. The U.S. had a total of 122 GW of total wind power at the end of 2020, while Europe had 220 GW of total wind power at the end of 2020. Europe has “realistic expectations” for 325 GW total wind power by 2025, while the U.S. expects to have 224 GW of total wind power by 2030. The U.S. (Biden plan) is to have 30 GW of offshore wind by 2030, while Europe already has 25 GW of offshore wind in 2020 and will add 29 GW more by 2025.^{31 32 33}

The Wind Europe website is the best source of information on this subject.³⁴ The website provides “Offshore wind in Europe – key trends and statistics, 2020 and 2021,”³⁵ and “Wind energy in Europe: 2021 Statistics and the outlook for 2022-2026.”³⁶

Also of note, is the Paris, October 5, 2021, announcement on the GE Renewable Energy website, which states, “GE Renewable Energy announced today that its Haliade-X prototype in Rotterdam, a port city in the Netherlands, has started operating at 14 MW. With this new milestone, GE Renewable Energy becomes the first industry player to operate a turbine at this power output.”³⁷

One of these wind turbines can generate up to 74 GWh of gross annual energy production. The ability to produce more power from a single turbine means fewer turbines need to be installed at each wind farm. **In addition to less capital expenditure, this also simplifies operations and maintenance, improving the affordability and accessibility of renewable energy for customers and consumers around the world.**

These new GE wind turbines are not just “development” or “prototype” projects. On December 2, 2021, SSE Renewables and Equinor, the developers of the Dogger Bank Wind Farm located between 130km and 190km from the Northeast coast of England, announced that \$4 billion in funding had been agreed with a group of 28 commercial banks and three export credit agencies for the Dogger Bank 1,200 MW Phase C, which will use 87 of these new GE Haliade-X 14 MW wind turbines.³⁸

Phases A and B, which are already under construction, will each consist of 95 of the previous GE Haliade-X 13 MW wind turbines. At 3,600 MW total Dogger Bank will be the largest offshore wind farm in the world upon completion.

Pål Eitrheim,³⁹ Equinor EVP of New Energy Solutions, said, “The extensive interest from lenders underpins the attractiveness of U.K. offshore wind assets and the confidence in SSE and Equinor as developers. The level of interest achieved reflects the quality of the project and enables strong return on equity.”

There is no government funding for this project, and no U.S. Q45-type taxpayer funded tax credits are required to make the entire \$12 billion wind project attractive to commercial investment. In contrast to the U.K. and Europe, the U.S. has virtually no installed offshore wind capacity, and none of the extensive supporting ships and installation capability that are utilized in Europe.

Unless carbon dioxide emissions are drastically reduced before 2030, the climate risks and the negative consequences for people, for food and water security, as well as national and international security, migration, economies, and trade will already be locked in for the period 2040–50.⁴⁰

Based on the scientific evidence, we know that **what we do today in 2022 will impact the lives of all those alive in 2040**. It is the reason we must act now, because the way we live today will determine how young people will live tomorrow.

And yet there has been no progress toward decarbonization, and CO2 in the atmosphere continues to rise along with global temperatures. This is because those in power delay, deny, and mislead the public, because they are more interested in lining their own pockets than caring what happens to people - mothers, fathers, children. The risks of the climate crisis are metastasizing. Without immediate action the impacts of global warming will soon be devastating, cataclysmic, and if no action is taken, most likely existential.

The Carbon Clock is Ticking is about how the fossil fuel industry, specifically ExxonMobil, Chevron, Shell, BP, and API, have manipulated the public into trusting them, and how their reckless pursuit of profits over people has destroyed the planet as we know it. Scientists tell us we have left the 10,000-year epoch of Holocene and entered the epoch of the Anthropocene, the period during which human activity has become the dominant influence on climate and the environment, causing anthropogenic changes to the geology of the planet, transforming ecosystems, and making the temperature rise.



CLIMATE SCIENTISTS AND EPIDEMIOLOGISTS HAVE LONG WARNED THAT GLOBAL WARMING HAS MADE A PETRI DISH OF THE PLANET

“Fossil fuel interests remain stitched into the global networks of power,” as Adam Tooze writes. “The carbon coalition seems death driven defiant of expert advice.”⁴¹

This means we cannot wait for presidents and prime ministers, for congress or parliaments, for CEOs or presidents of multibillion dollar fossil fuels companies to change direction and stop leading us down the wrong path in the wrong direction. It is up to us, as mothers and fathers, grandmothers and grandfathers, aunts and uncles, sisters and brothers, our families and friends who have seen for themselves forests being consumed by wildfires, who have experienced whole towns burning, or have witnessed or experienced themselves multiple tornadoes ripping through a state, reducing villages and turning towns into Pick Up Sticks with all essential services lost in a pile of rubble. Inexorably the list continues, with families scrambling to higher ground in torrential rains, as their homes filled with a lifetime of cherished possessions are lost in floods and sink into the mud.

The shock of the pandemic has exposed uncomfortable truths about our unpreparedness for the unexpected and even for the expected consequences of the climate crisis. It is important that the public scrutinize the connections between the government and Big Oil, and the financial rewards members of Congress receive for the financial tax credits big Oil receives in return.

Amplifying the urgency to move swiftly is the experience so many of us have had with COVID-19. Climate scientists and epidemiologists have long warned that global warming has made a petri dish of the planet, with the increase in temperatures waking dormant viruses and creating the conditions for new viruses to emerge.

In November 2020, the National Academies of Sciences, Engineering and Medicine, in collaboration with the InterAcademy Partnership, and the European Academies Science Advisory Council, held a conference and a series of workshops entitled *Understanding and Responding to Global Health Security Risks from Microbial Threats in the Arctic*.⁴² It was the first major skill-share focusing on the threat of microbes revived by the Arctic ice melting and the thawing of the permafrost.

Many scientists in the various fields of medicine have warned that rising temperatures due to global warming will lead to ever increasing health emergencies. At the conference on the microbial threats in the Arctic there were discussions on the collective systems that are needed to ensure early alerts to proactively address emergent threats, and a call for more research to understand the survivability and stability of the organisms found in the permafrost. The workshops seemed filled with scientists with nagging doubts, and as one participant stated, although their discussions were focused on the emergence of pathogenic microbes, it is important to keep in mind that **the cryosphere changes taking place might also lead to the loss of entire microbial ecosystems, with uncertain implications for the rest of the biosphere.**

Digging deeper into the complexity of the interconnections between ecosystems, the research indicates a disturbing trend in which the pace at which modern climate change is proceeding vastly exceeds the rate at which *Trebouxia*, a unicellular lichen-forming green alga, climatic niches have previously evolved.⁴³ Covering 7% of the planet's surface these algal symbionts are found in over half of the known lichen associations and fulfill many vital functions, and so the disruption caused by the extinction of lichen-forming algae to the ecosystems of the biosphere is immense.

Knowing that entire microbial and ecosystems are endangered is an important reminder of the complexity of the interrelationships between the state of the planet and all the life forms that inhabit it. **What happens to the planet happens to us, and what happens to us happens to the planet.**

This means we must do everything we can to leap forward and end our dependence on CO2 producing fossil fuels and do everything we can to decarbonize American industry. We can begin by draining the tanks of every gas guzzling vehicle in the U.S. and encourage other societies to do the same on a global scale.

Unfortunately, the forces working against decarbonization and draining our fuel tanks are immense, but they are miniscule compared with the atmospheric, terrestrial, and marine forces that will wreak destruction on all human societies. This means that we must stop producing CO2, and decarbonize by building an energy infrastructure that is not fueled by oil, gas, or coal.



IT IS VITALLY IMPORTANT THAT WE TAKE A DIFFERENT PATH THAN THE CHIEF EXECUTIVES OF THE FOSSIL FUEL INDUSTRY HAVE PLANNED FOR US

The cascading climate impacts that can be expected if we do not decarbonize and CO₂ continues to rise in the atmosphere include higher mortality rates, escalating political instability, greater national insecurity, and regional and international conflicts.⁴⁴

Jem Bendell, in his 2018 Cumbria University, Institute for Leadership and Sustainability (IFLAS) Occasional Paper, takes this further when he writes of seeing scenes of disasters on TV and online. He states, “but when I say starvation, destruction, migration, disease, and war, I mean in your own life.”⁴⁵

Bendell continues, “With the power down, soon you wouldn’t have water coming out of your tap. You will depend on your neighbours for food and some warmth. You will become malnourished. You won’t know whether to stay or go. You will fear being violently killed before starving to death.”

Bendell is convinced we are already too far down the wrong path and that it is too late to make a correction. Not softening the blow, he describes what will happen in the near future. He writes of strategic denial, and he predicts a complete societal collapse within the next decade.

Again, it is vitally important that the public knows it is possible that societal collapse will happen if we do not alter course and take a different path than the one chief executives of the fossil fuel industry have planned for us.

The entire nation and the global community is at risk, because of human induced global warming. There is no time left for a misstep. The rate of change is speeding up. **It is of vital important that governments and the public challenge the fossil fuel industry and call them out for misleading the public, betrayal of our children, and jeopardizing their future.**



THE FUTURE HANGS IN THE BALANCE: THE FALSE NARRATIVE CONSTRUCTED BY BIG OIL DOMINATES GLOBAL THINKING ON HUMAN SURVIVAL

We think in terms of countries, but those who control the planet control the current source of our energy - fossil fuels. They are multi-billion-dollar companies often called “Big Oil,” and they are deeply embedded in the structural architecture of human civilizations. **It is the false narrative constructed by Big Oil that dominates global thinking on human survival.**

In preparation for the October 28, 2021, Congressional Hearings, “Fueling the Climate Crisis: Exposing Big Oil’s Disinformation Campaign to Prevent Climate Action,” Congressional Committee Staff evaluated a decade long record of legislative lobbying by BP, Chevron, ExxonMobil, Shell, and API.⁴⁶

They found that from 2011 to 2021, lobbyists for these four Big Oil companies and for API filed a total of 1,878 quarterly lobbying reports, each of which listed the specific bills the companies or their lobbyists lobbied Congress on during that quarter.

Still quoting, ExxonMobil, Chevron, Shell, BP, and API spent a combined \$452.6 million lobbying the federal government since 2011. The four oil companies employed an average of around 40 lobbyists per year and spent a combined total of \$374.7 million on federal lobbying, while API employed an average of 48 lobbyists per year and spent a total of \$77.9 million.

The Congressional Committee Staff analysis found that Big Oil devoted far more effort lobbying to lower their taxes than on either the Paris Agreement or carbon pricing legislation. They present a litany of deceptive business practices presented below that provided a starting point for the in-depth analysis presented in the Full Report.

The Committee Staff document that since 2011, these entities and their outside lobbyists filed 1,670 lobbying reports, and 938 of these showed lobbying on tax issues. Committee Staff also found that the four oil companies’ public claims about their efforts to reduce emissions have often exaggerated the significance of their actions, while hiding or downplaying their continued excessive investments in fossil fuels.

Exxon/Mobil reportedly invested only 0.22% of its capital expenditures in low-carbon projects between 2010 and 2018. In 2018, the company announced a seven-year, \$210 billion investment plan that would increase oil and gas production and would result in the company's yearly CO2 emissions *increasing* 17% by 2025.

Only 2.3% of BP's total capital expenditures went to low-carbon investments between 2010 and 2018. By 2013 the company had divested itself of all its solar and wind power assets.

Shell's 2020 emissions were nearly twice that of the entire nation of Canada, and the company plans to increase natural gas extraction by 20%, raising questions about its stated "target" to reach carbon neutrality.

The Congressional Committee staff also state that Chevron has touted carbon capture programs that will barely make a dent in its overall emissions. The company said these investments would reduce its emissions by 5 million tonnes per year but failed to note this would amount to a reduction of just 0.7% of Chevron's total carbon emissions, which reached 697 million tonnes in 2019.



THE FOSSIL FUEL INDUSTRY IS EXERTING UNDUE INFLUENCE, SIGNIFICANTLY IMPAIRING THE DECISION-MAKING OF ENTIRE NATIONS ON ACHIEVING REAL ZERO

Many children are already living the future that burning fossil fuels is setting on fire as a result of the fossil fuel industry's dangerously misleading and opportunistic response to the climate crisis. Based on systematic analysis of the evidence, the profit-before-people actions of the fossil fuel industry can reasonably be described as exerting undue influence that is significantly impairing the decision-making of entire nations on achieving Real Zero. And by so doing, **Big Oil, including ExxonMobil, Chevron, Shell, BP, and API are using their enormous power and influence to deny governments and the public the opportunity to make unencumbered, clear-eyed decisions based on the scientific evidence on how to respond to global warming and the climate emergency.**

Keep in mind that the world *as it was* suited the fossil fuel industry well, and it is understandable that Big Oil is reluctant to let go of the golden (for them) industrial age of oil, gas, and coal. Gushing oil wells and coal mines filled with black gold are a part of the country's cultural, economic and social identity. It is a great American story, ideological, and triumphant. It is a Wall Street story too. For Big Oil, achieving Real Zero shatters its identity and leaves fossil fuels in the past. It could bankrupt them. It is not surprising that companies like **ExxonMobil, Chevron, Shell, BP, and API, are willing to risk all, including the planet, to hold on to the past 100 years of industrialization that endowed them with power, privilege, huge profits, and vast wealth.**

Enjoying a huge market share, Big Oil has no reason to change this reality. Thus, their only way forward is to subvert it, to twist the present, distort the truth, and create a false narrative that allows them to maintain the status quo. The only way for the CEOs to retain their annual \$20 million salaries, and for ExxonMobil, Chevron, Shell, BP, and API to retain their privilege and profits, is to use their global influence to build a false narrative that burning fossil fuels can still be continued without setting the world on fire.

Hence, the desperate and dangerous orchestrated global campaign of ExxonMobil, Chevron, Shell, BP, and API, to convince law makers, the media and the public that human societies can continue burning fossil fuels, but still fix global warming by capturing the CO2 produced by burning oil and coal, using the CO2 to enhance oil production or burying it in the ground.

Deep analysis of the evidence leaves no doubt that we cannot. What is taking place is a shell game that will cost us the future of our children if we do not look up.

Big Oil's propaganda willfully avoids the truth. However, compelling the story of holding on to the past might be, the propaganda promulgated by ExxonMobil, Chevron, Shell, BP, and API is pernicious. Countries and the public are persuaded that their citizens can continue driving gas guzzling cars and not heat up the planet. Governments are convinced CCUS will do the trick, and that they do not have to take a different path to ensure their own safe future and that of their children. Once again, we must hurry, and we must go rapidly in the right direction. There is no time left for Big Oil's nostalgia or for their devious and underhand tricks.

"Oil and gas companies are spending millions to convince the public of their social license to operate and deflect from their role in rapidly heating the planet," the lawyer for Client Earth, writes in a lawsuit against BP. "Ideally all fossil fuel advertising should be banned unless it comes with a tobacco-style health warning about the risks of climate change, including the dangers of continuing to extract and burn fossil fuels. The public should not be misled, and fossil fuel companies must be accountable for the damage they do."⁴⁷



BIG OIL'S ORCHESTRATED CCS/CCUS DECEPTION HAS BECOME THE DELUSIONAL OBSESSION OF GLOBAL ECONOMIC AND FINANCIAL POWERS

If we unpackage the written testimony of Mike Wirth, the CEO of Chevron, to the Congressional Committee, further evidence of Big Oil's deceptive false narrative is uncovered. Wirth focuses on Chevron's "massive" investment in using *Carbon Capture Utilization and Sequester* (CCUS) to continue oil production and use. He states:

"Chevron has a unique set of capabilities to develop a profitable CCUS business across the full value chain. We believe that CCUS is a critical enabler of global net zero, and to scale it, our strategy is to deploy CCUS to lower the carbon intensity of our existing assets and grow our CCUS business primarily through hubs targeting third-party emitters as partners and customers."⁴⁸

Wirth and his contemporaries at ExxonMobil, Shell, BP and API are prime organizers of Big Oil's orchestrated CCUS deception of governments, the media and the public. **CCUS has become the delusional obsession of global economic and financial powers. It is a speculative bubble that will inflict a severe jolt to the world when the technology fails to be viable in time and at sufficient scale.**

But still Big Oil pursues CCUS, obfuscating the truth, covering up that the technology is expensive to build and operate, and that commercialization will only be possible with massive taxpayers' subsidies. It is extensively documented that trillions in taxpayers' dollars will be spent unless both governments and the people look up and realize that Big Oil is deceiving them on a global scale.

A quick primer is necessary on CCUS. While Carbon Capture and Storage (CCS) stores the captured CO₂ permanently in secure geological underground formations, Carbon Capture *Utilization* and Storage (CCUS) utilizes the captured CO₂ for other purposes.

The primary intended use of captured CO₂ by Big Oil is for injection into depleted oil wells to allow the recovery of significant “stranded” oil reserves that cannot be removed by conventional methods, a process called “Enhanced Oil Recovery (EOR).”⁴⁹ The International Energy Agency (IEA) estimates the U.S. has 177 billion barrels of oil recoverable by EOR, enough to meet current U.S. oil annual production for more than 40 years.⁵⁰

For large scale deployment of both CCS and CCUS to be viable in the US, the CO₂ captured from power plants and industrial process plants will need to be transported by pipelines and delivered to either the geological storage locations, or to the oil producing regions where it can be used for EOR.

The analysis conducted for the Interim and Full Reports has found this is not the case, which makes the fact that the October 2021 Congressional Research report states that between 2010 and 2020 \$7.8 billion was appropriated from the U.S. government for CCUS-related RD&D hugely problematic.⁵¹ The April 2020 Congressional Research Service report on CCUS states that CCUS is capital-intensive and energy-intensive, and also notes that sources of captured CO₂ are often located far away from where CO₂ may be used or stored, creating logistical and cost challenges related to the pipeline transport of CO₂.⁵² This is still true today. CCUS is capital intensive, energy intensive, and the sources are located far from where the CO₂ can be stored.

Wirth’s written testimony to Congress provides insights into the false narrative the fossil fuel industry has been constructing to secure billions of dollars in tax credits that the public will be forced to pay unless the made-up narratives of the fossil fuel industry are challenged.



CCUS WILL ONLY BE “PROFITABLE” WITH ENORMOUS TAXPAYER BIG OIL SUBSIDIES THAT COULD BANKRUPT THE COUNTRY

Based upon the financial analysis for this report, it is possible to state with high confidence that **CCUS will only be “profitable” with enormous taxpayer subsidies** in the form of the “Q45 tax credits” through which U.S. taxpayers will pay Chevron (and other fossil fuel burning energy and industrial companies) for every tonne of CO₂ captured from burning fossil fuels in power generation and industrial plants.

It should be noted that the fossil fuel industry uses “CCUS” for carbon capture *utilization* and storage and obfuscates the idea of “CCS” carbon capture and permanent storage. **Big Oil wants to utilize the CO₂ by injecting the high-pressure carbon dioxide into existing but non-productive oil wells. Thus, they get tax credits and free oil production. It is dastardly.**

There is no need to speculate here on the cost to U.S. taxpayers. The financial strategy to “scale” CCUS is clearly laid out in the 2019 National Petroleum Council (APC) 12/12/19 report.⁵³

In the “**Activation Phase**” in the next 5-7 years, use tax credits of \$50 per tonne to increase CCS/CCUS from 25 million tonnes per year to around 60 million tonnes per year.

In the “**Expansion Phase**”, in the next 15 years through 2035, increase CCUS tax credits to \$90 per tonne to increase CCUS from 60 million tonnes per year to around 140 million tonnes per year.

In the “**At-Scale Phase**”, to increase CCUS deployment to 500 million tonnes per year in the next 25 years through 2045, increase CCUS tax credits to \$110 per tonne.

Concurrently these three “Phases”, increase government funding for CCUS R&D to \$15 billion over the next 10 years.

Even if it were undertaken, by the time this CCUS effort reached 500 million tonnes CO₂ per year **in 2045**, at \$110 per tonne CO₂ removed, the **Q45** tax subsidies will cost U.S. taxpayers \$55 billion per year to remove just 500 million tonnes per year of CO₂, **less than** 20% of the current U.S. Stationary

emissions and 10% of total U.S. CO2 emissions. **This data shows that even under the fossil energy industry's optimistic projections, CCUS will not work.**

It should be noted that (*unlike the child tax credits which only lasted 6 months*) none of these Q45 tax credits are single year credits. It is intended that they will be paid every year a CCS/CCUS plant is in operation, and so over a projected 30-year plant life that \$55 billion/year adds up to \$1.65 trillion in taxpayer funding to operate these plants. In addition to these enormous Q45 tax credits, the capital cost to install 500 million tonnes/year of CO2 abatement will be around \$500 billion.^{54 55}

The overall goal of this massive public taxpayer investment in CCUS is to maintain fossil fuel use (oil, natural gas, and coal) at current or increasing levels through 2045 and later.

This is what Chevron, and the rest of the fossil fuel industry calls a “profitable CCUS business across the full value chain.” That is at a crippling cost in taxpayers’ dollars.



BLUNTLY, BIG OIL IS LEADING THE WORLD ALONG THE WRONG PATH, AND WE CANNOT LET THIS HAPPEN

The CEOs of Chevron, BP, Shell, ExxonMobil, and API might protest the idea that CCUS is based on multiple false narratives, but these companies have a long history of lying and subterfuge. First, they denied climate change was occurring, even though they knew as far back as the 1970s, because their own scientists were sounding alarms, that the burning of fossil fuels was causing global warming and jeopardizing all life on the planet.

And so, ignoring the dangers to humanity Chevron, BP, Shell, ExxonMobil, and API orchestrated multiple disinformation campaigns in which politicians and academics received funding from Big Oil to sow doubt about global warming. Lobbying campaigns that cost many millions of dollars lasted for more than 30 years. Lobbyists were charged with proselytizing climate change denial with the intent of changing the nation's mind about global warming, so the fossil fuel industry could go on pumping out CO₂ from oil, gas, and coal power plants and industrial processes. There is no doubt that Big Oil's denial of climate change delayed both the response from the government and the public.

Simon Bowers reporting in *The Guardian* recalls that in 2015 Jim Inhofe, “a Republican senator from Oklahoma who has tirelessly campaigned against calls for a carbon tax and challenges the overwhelming consensus on climate change, received \$10,000 (£6,700) from BP's Political Action Committee (PAC).”⁵⁶

Of relevance here is a quote from Senator Inhofe's 2012 book, *The Greatest Hoax: How the Global Warming Conspiracy Threatens Your Future*. He states, “Whenever the media asked me how much I have received in campaign contributions from the fossil fuel industry, my unapologetic answer was ‘not enough’.”

Inhofe is infamously known for his snowball caper, of throwing a snowball across the Senate floor to show global warming is not happening. He lied, but ironically, he chaired the U.S. Senate Committee on Environment and Public Works from 2003 to 2007 and again from 2015 to 2017.

Quoting Bowers again, “The BP PAC is funded by contributions from senior U.S. executives and company staffers who sent in contributions to the PAC totaling more than \$1 million between 2010 and 2014. Over the same period the committee paid out \$655,000 to candidates, with more than 40 incumbent senators benefiting.”

Finally, Bowers writes “According to data compiled from public filings by the Center for Responsive Politics (CRP), Inhofe’s campaign raised \$4.84m between 2009 and 2014, with \$1.77m coming from PACs, many of them sponsored by fossil fuel companies.”

Big Oil deliberately lied about global warming to Congress and the public. Now, a second lie is being perpetrated. Deep analysis of the data on the U.S. Congress’s support of the fossil fuel industry leaves no doubt that Congress has been infiltrated and is being manipulated and even controlled by Big Oil. There are elected Representatives in both the House and Senate who are in debt to ExxonMobil, Chevron, Shell, BP, and API and vote accordingly. In addition, these companies have many highly paid lobbyists who are proselytizing the CCUS lie that we can continue burning fossil fuels without spewing CO2 into the atmosphere, and there is no doubt many people will die because of this lie.

At the 130th Meeting of the National Petroleum Council the NPC Report *Meeting the Dual Challenge: A Roadmap to At-Scale Deployment of Carbon Capture, Use, and Storage* was presented.⁵⁷ One of the slides in the presentation, including the highlighting, states:

CCUS is essential to addressing the dual challenges of providing affordable reliable energy to meet the world’s growing demand while addressing the risks of climate change.

To achieve CCUS deployment at scale:

The U.S. government will need to reduce uncertainty on existing incentives, establish adequate additional incentives, and implement a durable regulatory and legal environment that drives investment.

A commitment to CCUS must include a commitment to continued **research, development, and demonstration.**

At-scale CCUS deployment could create a **new industry, driving job creation and economic growth** across the nation.

Increasing understanding and confidence in CCUS as **safe and reliable** is essential for **public and policy stakeholder support.**

Who could argue with this ambitious attempt to meet the world’s growing demand for reliable energy while addressing the risks of climate change? To be effective propaganda must always seem reasonable. The intent of propaganda is to make us believe a lie. We all want uncertainty to be reduced and for there to be a durable regulatory and legal environment. We want new industry and job creation and economic growth, and it would be great if there was public and policy stakeholder support. CCS/CCUS cannot fulfill these aspirations. The fossil fuel industry cannot deliver. Big Oil and NPI are taking humanity down the wrong path. **ExxonMobil, Chevron, BP, Shell are making the temperature rise and children and young people will be permanently burdened by fossil fuel debt.**



Young children know what is happening to Earth. Many children are aware that powerful grown-ups are doing real damage to the planet and jeopardizing their future. The children in the photograph are joyful because their Elementary School is switching on the school districts new 750kw solar array built at the school. "Renewables rock!" "Love Earth," the children's signs state. (Photo by: Citizen of the Planet/Education Images/Universal Images Group via Getty Images).



THERE ARE SERIOUS AND POSSIBLY INSURMOUNTABLE PROBLEMS WITH THE CCUS DEMONSTRATION PROJECTS

The message is one of artful deception, a lesson in guile. If CCUS could deliver on our hopes of achieving all these national aspirations *and* the fix the country's global warming crisis we would all give a sigh of relief, but it can't and there is no time left for such delusions. Of the CCUS demonstration projects that are touted as "successes", all but one are installed at processing plants such as gas processing, ethanol production or steam methane reforming.

The CCUS technology required for those plants is simply not applicable for the major CCUS problem of removing the CO₂ resulting from the burning of fossil fuels, mainly coal and natural gas, for which only the Petra Nova CCUS system is applicable. Thus, **there are serious and possibly insurmountable problems with CCUS, and the technology cannot deliver in time or at the scale needed to deliver on the promises that are being made by Wirth for Chevron and by the CEOs of ExxonMobil, Shell and BP. Similarly, the National Petroleum Council is gaslighting the President and the Congress who the NPC is supposed to advise.**

Verification of the position taken here in *The Carbon Clock is Ticking* is provided by Thierry Courvoisier, astrophysicist and EASAC President, in the Foreword to a report prepared by the European Academies Science Advisory Council entitled *Negative emission technologies: What role in meeting Paris Agreement targets?*⁵⁸ Thierry Courvoisier warns:

“Whether consciously or subconsciously, thinking that technology will come to the rescue if we fail to sufficiently mitigate may be an attractive vision. If such technologies are seen as a potential fail-safe or backup measure, they could influence priorities on shorter- term mitigation strategies, since the promise of future cost-effective removal technologies is politically more appealing than engaging in rapid and deep mitigation policies now.”

Courvoisier is correct in his warning that the “attractive vision” is politically more appealing than engaging in rapid and deep mitigation policies now. He is also correct when he expresses deep concern and advises governments not to place unrealistic expectations on such technologies:

“Placing an unrealistic expectation on such technologies could thus have irreversibly damaging consequences on future generations in the event of them failing to deliver. This would be a moral hazard which could be the antithesis of sustainable development.”

This statement is central to the thesis of both the Interim and Full Reports. In their report Courvoisier and his colleagues address issues that are explored in depth in the later sections of *The Carbon Clock is Ticking*. They provide verification that the data and analysis presented in both reports are grounded in science, and that the positions stated are irrefutable. In their assessment of the viability of the technological capture of CO₂, Courvoisier and his colleagues state:

“Critical to addressing this challenge is to recognize that each of the individual components of the CCS production chain (capture from the original source, transport of captured CO₂ and long-term storage) are distinct and require different technologies, skill sets and infrastructures. Integrating these elements into project structures and identifying the responsibility for risk at each stage has proved extremely difficult (especially for applications outside the oil/gas sector, notably the electric power sector) and, along with uncertainties over government funding, led to the withdrawal of many projects.”

Again, these are concerns addressed in the later sections of the Full Report, which includes an evidence-based risk analysis of real-world CO₂ pipe leaks and the extreme hazard that pipe ruptures and supercritical CO₂ explosive releases at supersonic speed pose to families in communities within a mile or more radius of a major pipe rupture.

Nevertheless, in the U.S., Chevron, BP, Shell, ExxonMobil, and API continue to present their “attractive vision,” a.k.a. propaganda, spending vast sums of money on CCUS lobbyists, PACs and on Facebook CCUS advertising. These efforts have been successful, or so it would seem, given that past U.S. Presidents and Administrations as far back as Obama, and now the Biden Administration and his Secretary of Energy are on board with spending vast sums of money, in the trillions of dollars, on the idea that the technology will come to our rescue and make it possible for the country to continue and even ramp up the use of fossil fuels *and* reach Real Zero before the temperature rises to such a degree that life on the planet becomes untenable.

Propaganda is insidious. It behaves like an infection spreading like a pandemic to masses of people through all avenues of communication, obfuscating the truth, and replacing it with a false narrative that spreads like COVID because propaganda is so believable. The lie that we can keep burning fossil fuels *and* fix global warming by using technology to extract carbon dioxide from the emissions resulting from the use of oil, gas, and coal, and bury it in the ground or pump it down spent oil wells to force up more oil, is now a ubiquitous idea that is supported by the U.S. government.

The “big lie” about the 2020 election is an example of propaganda that has spread like a pandemic, and it has the potential to end the two-party system of governance in the U.S. **The lie that we can use CCUS technology to reach Real Zero is an even bigger lie.** We have only a 5% chance of the rise in temperature remaining below 1.5° C, and as we get closer to 2030, *if* the government and public don’t *look up*, it is highly likely the temperature will have risen 2.4 - 2.7°C. Still worse, if we do not act now the impacts of the climate crisis will be locked in by 2040 and by then whole regions of the U.S. and the world will be unlivable.



THE BIGGEST LIE OF ALL IS EXISTENTIAL, BUT STILL BIG OIL PROPAGANDA INFECTS THE BODY POLITIC

At the 31st National Petroleum Council meeting the Secretary of Energy, Jennifer Granholm slipped in brief mention of the “long-term threat of climate change to this country” when she spoke with members of the Council about “the state of the energy market and the risks and opportunities that are ahead.” Granholm noted that she had spoken the previous week with the co-chairs coordinating committee.

“It was candid,” Granholm says, “and I am really grateful, and I am all about having candid conversations because it is the only way we can work together to solve some of the biggest problems facing not just our country but our globe, so thank you for that.” She is talking in code. “So, what I heard from our co-chairs last week is that your industry is contending with some serious challenges that is especially true when it comes to increasing production, there are struggles around financing, in permitting and to get infrastructure in place.”

“There are over 9,000 permits for extraction on public land that are sitting unused,” Granholm continues. “And there are over 23 million acres of leases on and offshore that are sitting idle, and so while I understand that you may disagree with some of our policies it doesn’t mean that the Biden administration is standing in the way of your efforts to help meet current demand.”

She puts her hands together as if in prayer. She speaks of “consumers as you know are hurting at the pump” and then continues, “So I hope you will hear me today say, **please take advantage of the leases that you have, hire workers, get your rig count up.**”

She talks of transitioning to a new future and then announces that the Biden Administration is not reinstating the ban on crude oil exports, before returning to the meeting that had taken place with co-chairs the week before. She says, “we want to put that rumor to rest.”

She responds directly to the aggressive stance of NPC co-chairs when they met the previous week. “I was asked last week if this administration wants progress or a fight, and I will reiterate what I said. I do not want to fight with any of you.” She continues carefully. “We do see though some of the things that some of you are saying out there, and some of the organizations are saying that are funded by some of you, and I do think it is much more productive to work together on future facing solutions rather than making this administration a bogeyman.”



MISCALCULATED APPEASEMENT OF BIG OIL: “THE DEPARTMENT OF ENERGY IS READY TO HELP YOU RAISE YOUR AMBITIONS AND WORK TOGETHER”

“I want to focus on the great fortunes that await if we get moving together in the same direction,” Granholm continues. She talks of the global market for clean energy and states, “The potential is enormous and all of you are uniquely positioned to reap the benefits even considering the headwinds that are facing oil and gas.” She speaks directly to Daren Woods, the CEO of ExxonMobil, praising the company for “building the world class carbon capture and storage hub under construction in Houston.”

“We need more,” she says holding her arms wide. “We need more. I’m not lecturing you. We need more. You can see what’s happening. The Department of Energy is ready to help you raise your ambitions and work together.” She talks about the CCUS demonstration projects supported by the bipartisan infrastructure law, and states, “there are huge opportunities there. I know it is going to take some time but there is so much this industry can do to lower emissions in the here and now.”

It is hard not to get caught up in Granholm’s encouragement for companies like ExxonMobil, Chevron, BP, and Shell to produce more oil by taking advantage of 9,000 permits to drill for more oil on the 23 million acres of public land that the industry has leased. Especially if “great fortunes await” if the fossil fuel industry raises its ambition.

In reality great fortunes are more likely to be lost as they already have been in some abandoned CCUS plants. In the United States, economic damages from climate change are projected to be large, with one 2017 study concluding the United States could lose 2.3 percent of its Gross Domestic Product for each degree Celsius increase in global warming. To put that into perspective, that would amount to more than \$446 billion based on U.S. Gross Domestic Product of \$19.39 trillion in 2017. The numbers are solid. They are from the NASA report *A Degree of Concern: Why Global Temperatures Matter*,⁵⁹ in which Alan Buis highlights selected findings from the 2019 IPCC Report on Global Warming.⁶⁰

Contrast Granholm’s rhetoric with that of the Chatham House report, *Climate Change Risk Assessment 2021*.⁶¹ Daniel Quiggin and the scientists who coauthored the report for Chatham House present the findings of peer reviewed science on the impact of the climate crisis in the near future when they

state that the world is dangerously off track to meet the Paris Agreement goals, that the risks are compounding, and without immediate action the impacts will be devastating in the coming decades.

In the summary of the Chatham House report Quiggin and his colleagues write, “Unless Nationally Determined Contributions (NDCs) are dramatically increased, and policy and delivery mechanisms are commensurately revised, many of the impacts described in this research paper are likely to be locked in by 2040 and become so severe they go beyond the limits of what nations can do.”

Juxtapose the following narrative grounded in the climate change research conducted by Chatham House with the false narrative of the National Petroleum Council and the Secretary of Energy Jennifer Granholm. The Chatham Report cautions **“Any relapse or stasis in the emissions reduction policies could lead to a plausible worst case of 7°C of warming by the end of the century.”** If that happens humanity will have transgressed the planetary boundaries for life on the planet. We will have transgressed the boundaries when we reach 2.7°C and that is highly likely to be by 2040 if both governments and the people do not act, and the fossil fuel industry either changes course or gets out of the way. Fact not fiction, truth not propaganda.



THE \$12.1 BILLION DOLLARS ALLOCATED FOR CCUS BY CONGRESS IS CLAIMED BY THE LARGEST PRODUCERS OF OIL AND GAS IN THE PERMIAN BASIN AND THE ULTRA-EMITTERS OF METHANE

Now let's circle back to the 131st NPC meeting. After Granholm had made her presentation, she took questions. The first question was from Darren Woods, the CEO of ExxonMobil, who you will meet again with Mike Wirth, the CEO of Chevron, at the end of Section One and then again when we cover the October 28, 2021, Congressional Hearings on "Fueling the Climate Crisis: Exposing Big Oil's Disinformation Campaign to Prevent Climate Action." Woods was already the Vice Chair of the NPC, and he became Chair at the conclusion of the meeting with Granholm.

Images sampled by the TROPOsphere Monitoring Instrument (TROPOMI)⁶² identify the Permian Basin as one of the locations with the highest concentration of methane leaks in the world. Paul Takahashi, writing in the Houston Chronicle, states that about 30 oil and gas facilities in the Permian basin have released more than 100,000 tons of methane annually over the past three years.

Alarms should be going off in Washington and government financial penalties should be issued, but they are not. Instead, rewards in the billions are being handed out.

ExxonMobil and Chevron are the largest producers of oil and gas in the Permian Basin and are ultra-emitters of methane. Even so, six weeks after the meeting with Granholm, David Blackmon writes in *Forbes*, February 1, 2022, that both ExxonMobil and Chevron are ramping up shale production in the Permian Basin. Blackmon states, "On Friday (January 28) Chevron announced during its investor presentation that it plans to raise its Permian production by 10%, which would amount to another 60,000 barrels per day. Not to be outdone, Exxon detailed plans during its own presentation to raise its own Permian volumes by 25% in 2022, which would increase its overall output by 100,000 barrels per day."⁶³

“Taken together,” Blackmon writes, “**Chevron and Exxon control roughly 20% of overall oil production in the Permian.** On January 18, the EIA projected⁶⁴ that total Permian production will achieve a new record high of 5.076 million barrels per day this month. That production level would rank the Permian region as the 4th largest oil producing nation on earth, behind only the U.S., Saudi Arabia and Russia.”

The idea of Chevron and ExxonMobil being compared with global superpowers should be taken seriously. It is an idea that reoccurs in every section of this document.

“I know in my conversations with industry players we’re very engaged in trying to develop carbon capture and storage,” Woods says, after greeting Granholm at the NPC meeting, and before he asks for government money. “You referenced some of the legislation and some of the money that is being funded into some of these important technologies.”

Woods is low key. Appearing kindly, like a grandfather in a cardigan wearing slippers. “Question,” he says. “Madam Secretary, in terms of the advancing research and looking at ways to lower the costs for some of these critical technologies I wondered if you could share your department’s strategy or approach as to how we can most effectively channel that research money into advancing these technologies so that collectively so that society and industry specifically can lower that cost and deal with the real challenge which is the emissions of our industry. Thanks.”

In response Granholm talks about the Bipartisan Infrastructure Bill. “Our efforts to implement the law are underway,” she says. She briefly acknowledges Jennifer Willcox, the Acting Assistant Secretary for Fossil Energy Recovery Management, who is also at the meeting. Then Granholm says, “When it comes to CCUS for example, the \$12.1 billion dollars that has been set aside in the Bipartisan Infrastructure Law is really unprecedented.”

“Essentially we are looking at technologies and with high potential to reduce costs and trying to find opportunities to test out those new techniques at power plants and industrial facilities,” Granholm states, summing up the administration’s economic climate plan to keep Big Oil burning. “We are going to be working to build hubs for carbon dioxide removal and hydrogen which will similarly work to commercialize some of the advances that are uncovered by the research and development. We will be leveraging two decades of investment in carbon storage for the development of commercial transports and storage facilities and it gives us greater opportunity to partner since we can use power plants and industrial facilities that you operate as sites of our demonstration projects.”



WILLCOX' CONTENTION THAT CCUS DEMONSTRATION PROJECTS ARE "SUCCESSFUL" IS REFUTED BY MULTIPLE SOURCES

Granholtm invites Jennifer Willcox, the Acting Assistant Secretary for Fossil Energy and Carbon Management (FECM), to talk about the implementation side of carbon capture and storage. Willcox begins by stating the U.S. has been investing in carbon capture for two decades. "And we have three successful demonstration scale projects, like the air products project in Texas, like ADM in Illinois that is coupled to the first class six wells for the dedicated CO₂ well storage in the United States, in addition to Petra Nova. So, we have three successful demos, and we need more, we need more of these demonstrations and so we are going to leverage the infrastructure funding in order to broaden the portfolio of approaches not just on coal fired power plants, but also natural gas fired power plants in addition to the industrial sector."

The ADM and Petra Nova plants are discussed in depth in the Full Report, which also focus on supercritical CO₂ gas pipe ruptures and explosive CO₂ releases, and on the data from the U.S. demonstration plant at Petra Nova. But the focus here is on the portrayal by Willcox of ADM and Petra Nova as "successful demonstration scale projects." This positive assessment of the ADM and Petra Nova projects is challenged and is inexplicable unless it is political.

On November 19, 2020, Johnathan Hettinger at the Midwest Center for Investigative Reporting, wrote, "Despite hundreds of millions in tax dollars, ADM's carbon capture program still hasn't met promised goals."⁶⁵

Hettinger uses EPA data on ADM's emissions. The EPA "Facility Information" data on the ADM Decatur Methanol Illinois plant reports that in 2020, the plant emitted a total of 4,428,881 metric tons CO₂ and that only 521,581 tons were sequestered. This is only about 12% of the total CO₂ emitted at the Decatur plant, and only about 3% of ADM's total worldwide CO₂ emissions of 16.8 million metric tons per year from all its facilities. This may be a "success" at removing a small amount of CO₂, but its impact on the total plant CO₂ emissions is minuscule.

Also, in 2020 ADM commissioned a Carbon Reduction Feasibility Study, which was undertaken by WSP, a global sustainable engineering company. The WSP report shows that 95% of ADM's worldwide CO₂ emissions are from the combustion of fossil fuels (mostly from coal and natural gas) at its own plants. While suitable for removing up to 5% of ADM's methanol process plant CO₂ emissions, the type of CCUS process used at Decatur (simple drying and compression) is incapable of removing the

95% of CO₂ from combustion exhausts (which WCP calls “stack emissions”). These emissions require much larger and more complex plants like the Petra Nova plant, which are much more expensive both to build and to operate.

It is likely for this reason that the WSP report states that “the ability to capture stack emissions and sequester them is likely 10 years out, due to the technology and energy needed to separate and process the stack gas sufficiently to inject the CO₂ in the sequestration well.”

Willcox’ contention that the ADM, Decatur, Illinois demonstration project is “successful” is also refuted by multiple sources that have stated that ADM has no plans to install CCUS to reduce CO₂ emissions from onsite fossil fuel combustion CO₂ at the Illinois plant or at any of its facilities worldwide. So “successful” only means that the ADM Decatur CCUS plant removed a small amount of CO₂. Given the size of the problem it is a despicable deception.

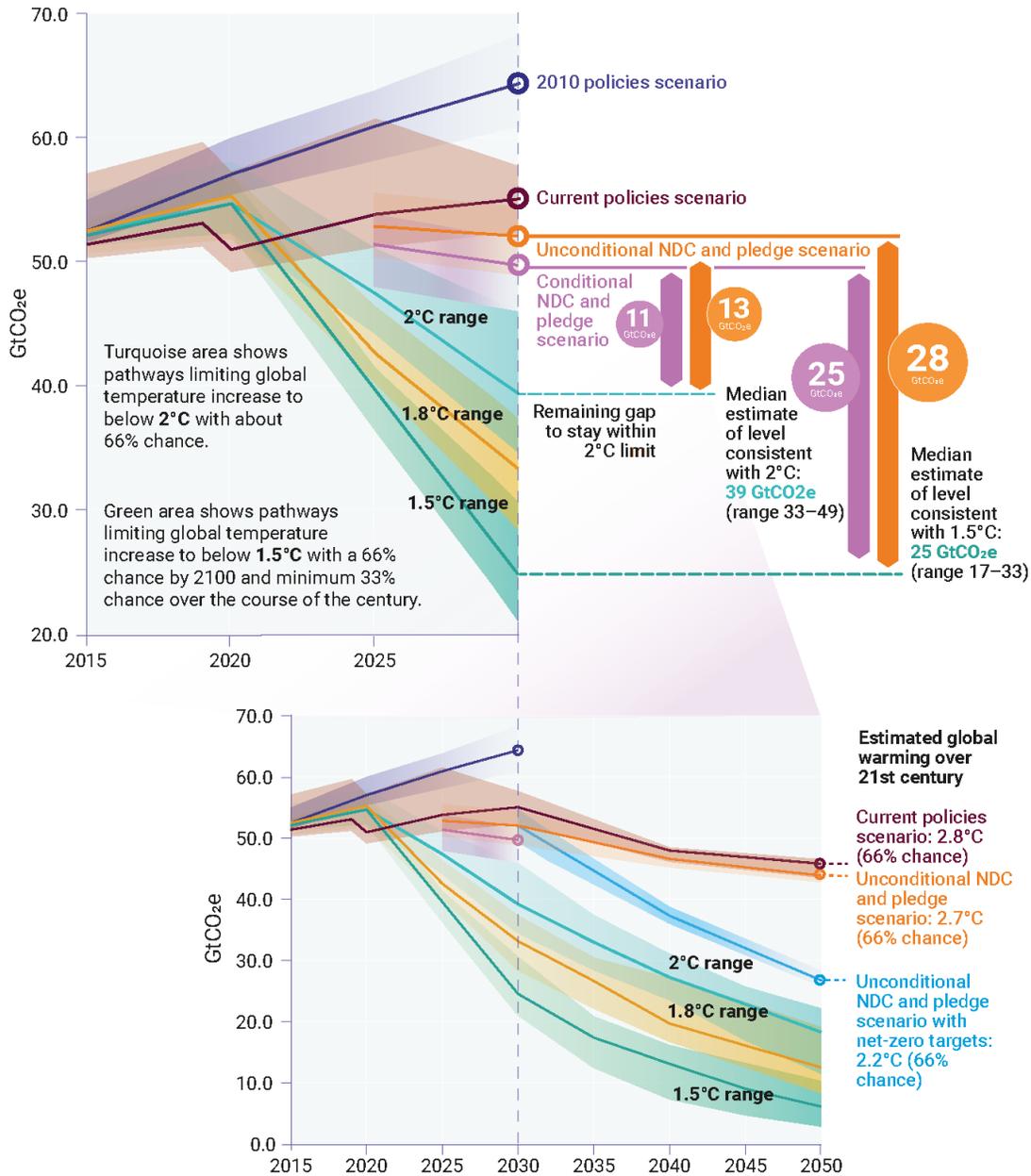
Now this is where the argument challenging Willcox’s assessment gets complicated, and evidence is provided by the UN Environment Program Emissions Gap Report 2021, *The Heat is On: A World of Climate Promises not yet Delivered*.⁶⁶

Figure 4.2, which is included in this interim report, depicts current projected worldwide CO₂ emissions in 2030 and makes clear that even if we achieve the current Nationally Determined Contributions (NDCs) that countries have committed to, the world will still be emitting about 53 gigatons of carbon dioxide a year. It further shows that this will result in a catastrophic global temperature rise to 2.8° C that humanity will not survive.

The problem is clearly articulated in the UNEP’s *The Heat is On*. The report states definitively that for climate change to stabilize, global anthropogenic net CO₂ emissions must decline to zero. To reach Real Zero we must stop burning fossil fuels, but **Big Oil, including ExxonMobil, Chevron, BP, and Shell are holding humanity’s feet to the fire by refusing to acknowledge that CCS/CCUS will not save them or us, and that we are all victims of the fossil fuel industry’s second big lie.**

Most scientific calculations give us only a 5% chance of keeping the rise in temperature below 2.0° C. The UNEP report, *The Heat is On*, shows in Figure 4.2 that CO₂ emissions worldwide must be reduced by 28 gigatons/year from the 53 gigatons/year the NDCs will achieve in order to get down to 25 gigatons/year by 2030 and to keep the rise in global temperature to 1.5° C. **Given there are new reports that CO₂ emissions are actually rising along with temperatures there is most likely zero chance that temperatures will be limited to 1.5° C rise.**

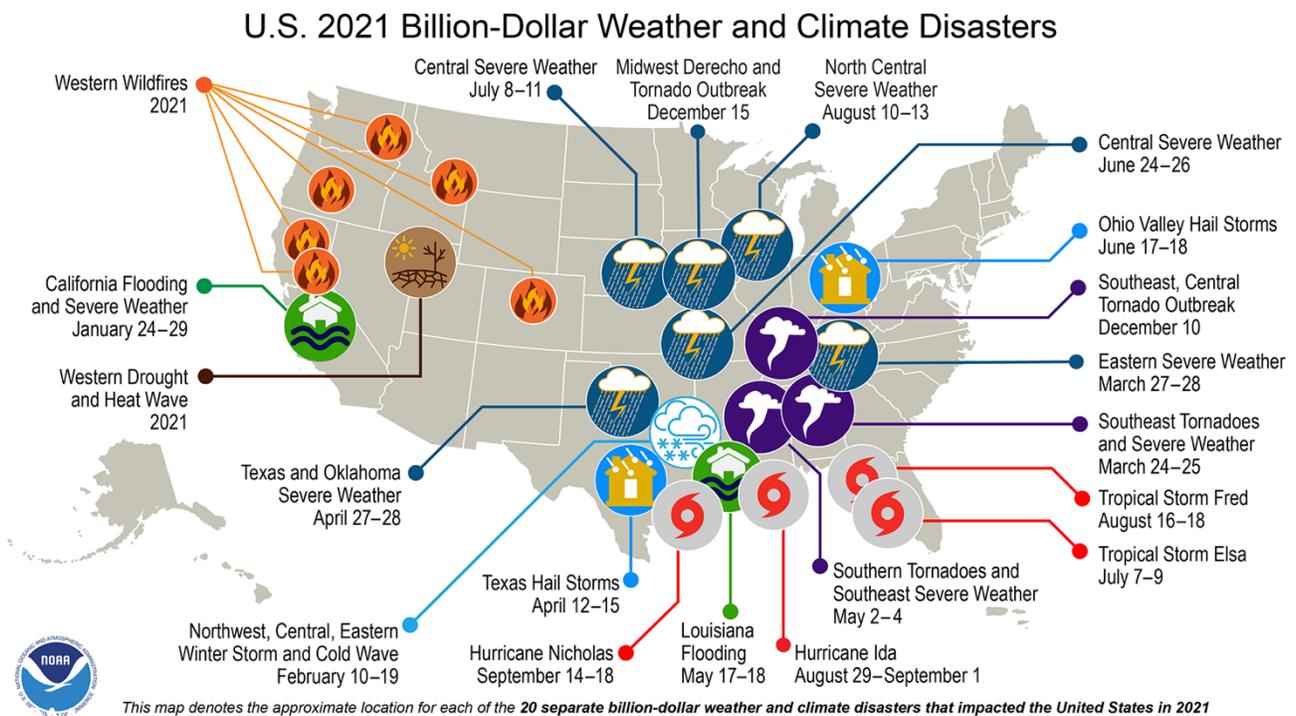
Figure 4.2. Global greenhouse gas emissions under different scenarios and the emissions gap in 2030 (median estimate and tenth to ninetieth percentile range)



WE ARE ALL VICTIMS OF THE FOSSIL FUEL INDUSTRY'S SECOND BIG LIE, AND THE TRUTH IS THAT CCS/CCUS WILL NOT SAVE US OR THEM

The heat *is* on. NOAA has reported that in December 2021 the average temperature in the U.S. was 39° F, that's 6.7°F degrees (3.7° C) above average, making it the warmest December on record.⁶⁷ NOAA also reports that for 2021, the average contiguous temperature was 54.5°F, which is 2.5°F (1.4°C) above the 20th century average and ranked as the 4th warmest year in the 127-year record.

This graphic from NOAA depicts the 2021-billion-dollar weather and climate disasters.”



Alabama, Arkansas, Kansas, Louisiana, Mississippi, Missouri, Nebraska, New Mexico, Oklahoma, and Texas also had their warmest December on record and temperatures in these states will continue to rise. By 2030 these states, and in fact the entire country, will be experiencing record breaking extreme weather events that will also consume whole regions of the planet if we do not begin a rapid phase out of fossil fuels now. In the final section of the Full Report there are recommendations on how life saving decarbonization can be accomplished.

The February 28, 2022 IPCC Working Group II reports that, “Field evidence shows that anthropogenic climate change has increased the area burned by wildfire above natural levels in western North America from 1984-2017 by double for the Western USA and 11 times higher than natural in one extreme year in British Columbia (*high confidence*).”⁶⁸



Flames rise during Dixie Fire near Chico in Greenville, California, United States on August 5, 2021. The Dixie Fire took a turn for the worse on August 11. Shortly after 1 PM the winds picked up and the fire broke out of the containment lines that firefighters had established south of the town of Greenville. In a matter of hours the fire swept through the small community leaving almost nothing in its wake but ash. (Photo by Neal Waters/Anadolu Agency via Getty Images).



THE SCOPE AND SCALE OF THE CCUS PLANT CONSTRUCTION REQUIRED TO REMOVE 28 GIGATONS OF CO₂ A YEAR CANNOT BE ACHIEVED

There's more. Since the U.S. portion of the projected worldwide 53 gigatons/year of CO₂ emissions in 2030 will be about 5.3 gigatons/year, the U.S. portion of the required 28 gigatons/year reduction will be about 2.8 gigatons/year.

The enormity of the scope and scale of the task of reducing worldwide emissions by 28 gigatons/year is difficult to grasp. To accomplish this feat the power generation and industrial sectors would have to install enough CCS/CCUS plants to remove an additional 3.5 gigatons a year of CO₂ removal each year for 8 years. To get a better handle on the task let's do the math first on the ADM plant in Decatur Illinois as an example of what this means.

The ADM CCUS demonstration project removes about 0.5 megaton a year of CO₂ from ethanol plant emissions. To achieve 28 gigatons a year of CO₂ emissions reduction by 2030 would require the equivalent of **56,000 ADM capacity CO₂ removal plants**. To achieve this goal, these CO₂ removal plants would have to be installed at a rate of **7,000 per year each year for 8 years until 2030**.

It's worth repeating. To reach the goal of an additional 28 gigatons a year of CO₂ removal the world would have to build the equivalent of 56,000 ADM sized plants by 2030. It is a farcical ploy, a well-orchestrated plan of action undertaken by Big Oil to keep pumping oil throughout the 21st century, and the U.S. government bought it. Literally, and while it might be farcical that so many in high places are really that gullible it is also a deadly ruse because while the U.S. government is saying "Yes, let's do that!" the planet is getting hotter, and no serious action is being taken to end our dependence on fossil fuels.

And the ADM "demonstration" project is not the only comparison we can make. Using the Petra Nova plant CO₂ removal capacity from power plant emissions as a metric, **it would require the world to build 20,000 Petra Nova capacity plants by 2030, at a rate of 2,500 each year for 8 years through 2030**.

Parenthetically, in her National Petroleum Council presentation of “successful” demonstration plants Willcox did not mention that the CCUS plant at Petra Nova is mothballed, or that the NRG utility company has already taken tax right-offs (“impairments”) of its entire \$300 million investment described in the next section.

Perhaps when Willcox was a scientist, before she became a part of the political establishment, she would have given a different account of carbon capture and the Petra Nova plant. “Sounds pretty easy, pulling CO₂ out of the air,” she said in her TED talk in 2028. ***“It’s actually really difficult. But I’ll tell you what is easy: avoiding CO₂ emissions to begin with. But we’re not doing that.”***

These were wise words, and for kids’ sake we should do that now. The last section of the Full Report will describe how we can lower CO₂ emission by lowering our dependency on fossil fuels and establishing zero carbon economies, irrespective of political structures and affiliations.



BIG OIL, THE U.S. PRESIDENT, THE ADMINISTRATION, AND THE CONGRESS ARE BETTING THE PLANET, AND THEY ARE LOSING

It must be clear by now that Big Oil, the President, the Administration, and Congress are betting more than the farm on a few small unsuccessful CCUS demonstration projects that were 20 years in the making. **They are betting the planet and losing, but it will be children and young people who pay the price for the “bet” will be paid with their lives.**

Dennis Wamsted and David Schlissel of the Institute for Energy Economics and Financial Analysis (IEEF) published a report August 2020 entitled *Petra Nova Mothballing Post-Mortem*.⁶⁹ The 240-megawatt Petra Nova carbon capture and storage project at Unit 8 of NRG Energy’s W.A. Parish Generating Station near Houston is the only operational coal-fired power plant CCUS facility in the U.S. As such, it is frequently cited by promoters of CCUS retrofits at other coal-fired power generation projects as proof that the process works, and that it is an economically viable option for cleaning up coal-fired power generation.

Wamsted and Schlissel disagree and challenge this assumption. They describe the closure of Texas Petra Nova CCUS plant as a warning sign and a red flag for investors on coal-fired CCS/CCUS projects. A red flag to readers evaluating the information presented in the Full Report is that Wamsted and Schlissel write of potential subterfuge by the Department of Energy. They state:

“Petra Nova’s owners, the U.S. Department of Energy (which funded a substantial portion of the cost of building the facility), and the manufacturer of the carbon capture equipment all have failed to provide any information to the public to support the claims that it was operating as planned and was capturing 90% or more of the CO₂ it processed.

“To the contrary, Petra Nova was originally expected to capture at least 1.4 million metric tons of CO₂ annually, or a total of 4.2 million metric tons in its 3 years of operation from 2017-2019.”

These analysts conclude that overall, Petra Nova captured 662,000 fewer metric tons of CO₂ than projected during its first three years of operation. That is a serious shortfall that merits investor caution. The promise for investors considering putting money into CCS projects is that in return for funding a project’s construction, they will recover their investment through a steady stream of payments via the federal government’s 45Q tax credits, which offer \$35 per metric ton for plants like Petra Nova

that use the captured CO2 for injection into depleted oil wells for enhanced oil recovery, and \$50 per metric ton for CO2 sequestered permanently underground.

Finally, in case there is any doubt that Willcox is inaccurate in her assessment of the “success” of Petra Nova, Wamsted and Schlissel hammer it home:

“Over the past four years, NRG recorded three separate impairment charges related to the plant and to Petra Nova Parish Holdings, the subsidiary that operates the facility. These charges have totaled \$310 million. The first charge, in 2016 before the project was even complete, totaled \$140 million. At the time, NRG cited declining oil prices as the reason for the impairment. NRG took a second impairment of \$69 million on Petra Nova in 2017 based on a revised view of oil production expectations. The third impairment, for \$101 million, was taken in 2019.”

Nothing was accomplished to address the climate crisis at the 131st meeting of the National Petroleum Council except that the Secretary for Energy promised Big Oil a whole lot of money and reassurances that she is their friend. But before we leave the meeting it is worth one last stop to unpack the question Darren Woods, CEO of ExxonMobil asked Granholm about the proposed Texas CCUS Hub.

Earlier, in her presentation Granholm had praised Woods and ExxonMobil for the “world class carbon capture and storage hub under construction in Houston.” Like Willcox, Granholm is inaccurate in her assessment of the ExxonMobil “Houston hub.” In December when the meeting took place it was a \$100 billion dollar pipe dream expected to be fully up and running by 2040. By then it will be too late.



THE CEO OF EXXONMOBIL ASKS THE SECRETARY OF ENERGY FOR MONEY FOR THE HOUSTON CCUS HUB

We are still in the Permian Basin, which could be described as the fiefdom of the most powerful polluters on the planet, contaminating the atmosphere and the environment, transgressing the planetary boundaries for life on Earth, and directly impacting the lives of families in poor communities, predominately Black and Brown families, who experience high incidence of respiratory illnesses and cancer.

ExxonMobil is promoting the concept of multi-user CCUS “hubs” in industrial areas located near geologic storage sites, such as depleted oil and gas reservoirs in the Gulf of Mexico. How convenient it would be to be able to pipe CO₂ and pump it down depleted oil wells so that ExxonMobil could recover the oil in the wells that cannot be recovered without substantial CO₂ injection. If this is the case, there are many reasons for concern.

In the question time at the 131st NPC meeting Woods asked Granholm about the proposed Houston hub. “How can we most effectively channel that research money into advancing these technologies?” Woods asked. “So that collectively,” he paused, “so that society and industry specifically can lower that cost and deal with the real challenge which is the emissions of our industry? Thanks.”

Granholm responded by talking about the \$12.1 billion dollars that has been set aside for CCUS in the Bipartisan Infrastructure Law, which she described as unprecedented. She is right but for the wrong reason. The math reveals why.

Joe Blommaert, president of ExxonMobil Low Carbon Solutions puts the investment cost of a 100 million metric tons a year of CO₂ removal “Houston Hub” at \$100 billions of government and industry money.⁷⁰ He states, “early projections indicate that if the appropriate policies were in place, infrastructure could be built in Houston to safely capture and permanently store about 50 million metric tons of CO₂ annually by 2030. By 2040, it could be 100 million metric tons.”

Again, it is important to do the math: \$100 billion in investment by government and industry is estimated by ExxonMobil to result in 100 million tons of CO₂ captured by 2040. We can use this calculation to arrive at a cost of \$50 billion to remove 50 million metric tons/year of CO₂ by 2030, the date when the UNEP report shows the world needs to have decreased CO₂ emissions by 28 billion metric tons/year (28 gigatons).



A HOUSTON HUB MEGATON OF ANNUAL CO2 ABATEMENT WILL COST A GIGADOLLAR - ONE BILLION DOLLARS

Verification of these ExxonMobil cost estimates is provided by Columbia University's Center on Global Energy Policy. In a report published June 2021, entitled *Evaluating Net-Zero Industrial Hubs In The United States: A Case Study Of Houston*,⁷¹ Julio Friedmann, Mahak Agrawal, and Amar Bhardwarj provide an analysis of such a CCS/CCUS hubs, and they include an in-depth analysis of the proposed ExxonMobil Huston Hub including detailed cost estimates.

They conclude, "In short, a megaton of annual CO2 abatement capacity costs a gigadollar." Note, a "gigadollar" is \$1 billion dollars, and if installing a megaton a year of CO2 abatement capacity will cost a billion dollars, a gigaton a will cost a trillion dollars.

In the Columbia study, as we would expect, Freidmann and his colleagues raise concerns about the substantial infrastructure costs, and they write that they are unlikely to be met through voluntary markets or by existing policy measures.

They also write of the importance of public engagement - which is the objective of both the Interim and Full Reports - and they highlight that the communities that might "host" the infrastructure and the communities close to existing industrial structures in vicinity of the planned hub. They state, **"Increasingly, the recognition of the high health and environmental burden paid by communities near industrial facilities has elevated the subject of environmental justice and the need for greater equity."**

"Commonly, and as is the case in the Greater Houston area, these communities are homes for economically disadvantaged populations comprising underserved minorities," Friedmann and his colleagues write. **"These communities are subjected to safety failures as well, including facility explosions and release of highly toxic substances."**

They conclude, "There is a deficit of trust that will likely prevent or limit hub development."⁷²

In later sections of this work the environmental damage caused by ExxonMobil, Chevron, BP, and Shell in their worldwide operations will be addressed in depth. Human rights and social justice violations run through every section of the Interim and Full Reports. The lived experience of human rights violations caused by oil extraction and CO2 transportation, as well as by the scientific evidence on

present and future illness and death caused by the fossil fuel industry, hangs on the page. Here in *The Carbon Clock is Ticking* for the sake of our children we hold ExxonMobil, Chevron, BP, and Shell accountable.

But in this section, we continue to follow the money and do the math to work CO2 abatement capacity costs in gigatons and gigadollars.

Using both the ExxonMobil and Columbia CO2 removal and capital cost estimates, we can conclude that to achieve the UNEP goal of 28 gigatons/year of CO2 reduction by 2030 will require the equivalent of 560 "Houston Hubs," each with a capacity of 50 million metric tons/year of CO2 to have been built and in use worldwide by 2030, and that this will cost in the order of \$28 trillion. This will require building 70 such hubs a year, every year for the next 8 years at an annual cost of \$3.5 trillion a year.

For the U.S. share of 2.8 gigatons a year of CO2 reduction by 2030, 56 "Houston Hubs" would need to be built, at a capital cost of \$2.8 trillion. That's 7 such hubs a year for the next 8 years at a capital cost of \$350 billion a year. Added to this cost is the Q45 tax credits presented in the following section.

You get the idea. We do not have to be rocket scientists to know this is untenable. Big Oil knows this too. Granholm and Willcox also speak as if they do not but that is not possible. If we know they know, and their behavior is reckless and indefensible.



THE ENERGY IMPROVEMENT AND EXTENSION ACT OF 2008 IS A BAD IDEA. WHY? BECAUSE IT ENSURES THAT BIG OIL RECEIVES Q45 TAX CREDITS FOR CO2 CAPTURED BY CCS/CCUS

It doesn't end with the need for enormous capital investment. The Energy Improvement and Extension Act of 2008 ensures that Big Oil receives tax credits for CO₂ captured by CCS/CCUS from power generation and industrial plants and sequestered in either secure underground storage or injected into depleted oil wells to increase oil production. These credits are known as “Q45 tax credits.”

After some changes, this tax credit currently stands at \$50/metric ton of CO₂ permanently sequestered, and \$35/metric ton if the CO₂ is injected into depleted oil wells. Because the bills and their provisions have long names, this tax credit is referred to as the “Q45 tax credit,” after Section Q45 of the IRS regulations that implement the provisions of the bills.

A 2020 analysis by the University of Houston of the proposed “Houston Hub” shows that CCS/CCUS can provide a 12% return on investment as long as both oil prices stay above \$40/barrel and the Q45 tax credits for CO₂ removal are high enough.⁷³

It's instructive to see what these Q45 tax credits earned by the power generation and industrial sectors will cost U.S. taxpayers. Just at the current \$50 per metric ton of CO₂ tax credit, if the U.S. increases CCS/CCUS capacity to remove the 2.8 gigatons/year CO₂ that are needed by 2030, **the cost at \$50 per metric tonne to U.S. taxpayers will be about \$140 billion per year, every year for the useful life of those CCS/CCUS plants.**

But as the mothballing and capital write-off of the unprofitable Petra Nova plant demonstrates, these \$35 and \$50 per metric ton of CO₂ tax credits aren't enough for the producers and industrial users of fossil fuels to make a profit. So, the fossil fuel industry lobbyists have been hard at it again for several years, and there are currently pending in the U.S. Congress a total of seven legislative proposals—four standalone bills and three additions to broader energy bills.

It is important to keep in mind that the price of gas at the pump does not reflect the true cost of a gallon of gas paid by taxpayers, because of the multiple slights of hand that make it impossible for taxpayers/car drivers to know how much it actually cost. The bottom line is that tax credits and subsidies should be computed in the true price of gas and the public should know.

“Bipartisan proposals are vying in Congress to increase the Section 45Q tax credit for carbon capture and sequestration,” Jeff McMahon writes in Forbes, “which has itself been credited with jumpstarting CO2 capture technologies.”

“Section 45Q of the Internal Revenue Code offers a tax credit that varies from just under \$12 up to \$50 for each metric ton of carbon captured and sequestered, depending on the timing and type of project,” McMahon states. “Proposals now in Congress could boost it as high as \$175 per ton.”⁷⁴

Summing up, the tax credit increases in these various Congressional bills range from \$50 per metric ton for CO2 used for Enhanced Oil Recovery (EOR), and \$85 per metric ton for CO2 permanently stored, all the way up to a whopping \$150 per metric ton for CO2 used for EOR, and \$175 per metric ton for CO2 permanently stored. Both Democrats and Republicans support these credits and so does the President and his Administration.⁷⁵

There’s more. The tax credits included in the bills before Congress originate in the 2019 report prepared by the National Petroleum Council (NPC) discussed earlier. Just a reminder here, the NPC analysis shows that a \$110/ton Q45 tax credit will be needed just to get to 0.5 gigatons per year of CO2 removal by CCS/CCUS. At that level, the Q45 tax credits for 2.8 gigatons per year of CO2 removal would balloon to \$308 billion/year.

To get up to the needed 2.8 Gigatons/year of CO2 by CCUS/CCS removal, the NPC analysis shows that the Q45 tax credit would have to at least double again to \$220/ton. That's \$616 billion/year, every year for the useful life of the plants.

Once again, a spending comparison is helpful. The 2022 U.S. defense budget is \$705 billion. The bills in Congress will award 87% of the defense budget to the U.S. fossil fuel industries so they can continue, as the Chevron CEO said in his written Congressional testimony, “to develop a profitable CCUS business across the full value chain.”

“We also need a safe place to put the CO2 and so we need to expand our carbon safe program,” Willcox states, confounding science with politics. “Today in the United States we have five projects associated with carbon safe. We need more than five. We need to look at regions like the Ohio River Valley, more in North Dakota and Wyoming, and also the Gulf Coast and in Texas, where there is existing infrastructure that can be leveraged from the oil and gas industry to reverse the flow of carbon back into the earth. And so, looking at leveraging all the expertise we have invested in.”

We've done the math. We know the enormity of the crisis and that five projects associated with "carbon safe" is irrational and irresponsible. Propaganda unravels when the false narrative falters, when the threads that must be truthful for the propaganda to work begin to fail.

According to the Global CCS Institute,⁷⁶ there is currently only one power station in operation in the world that captures some of its CO2 emissions. The vast majority of global CCS capacity is, in fact, applied to natural gas processing rather than CO2 emissions.

Analysis of public data shows that this one power station, Boundary Dam in Canada, has missed its original target of capturing 90% of the carbon emissions from one of its generators and is now aiming to capture just 65% of CO2 emissions.⁷⁷

Speaking to *Unearthed* about the various pathways available for reducing carbon emissions, Siân Bradley, a Senior Research Fellow at Chatham House, told *Unearthed*: "CCS/CCUS is a critical technology, but there has never been any credible suggestion that it could deal with the bulk of fossil fuel related emissions as they stand today."

"Delivering the Paris Agreement", Bradley continued, "requires the transformation of global energy and industrial systems, which means phasing out the vast majority of fossil fuel use *and* rapidly scaling CCS in 'hard to abate' sectors."

Verification of Bradley's position comes from Robert Howarth of Cornell University, who states declaratively that there is no scientific evidence that humanity can rely on carbon capture or direct air capture in this way.

"There's no objective information out there which would suggest that this is a well proven, functioning, affordable technology," Howarth told *Unearthed*. "All the information is to the contrary."

"Clearly if a nation has huge reserves of fossil fuels, they may feel some national interest to protect that interest and try to encourage the world to use them, Howarth continues. "But that's not in the global interest, you'd hope that countries would have a broader perspective than that."

In the U.S. there is only one perspective, and it is controlled by Big Oil and the industry's determination to continue at all costs the burning of fossil fuels. **At the time that I write, child tax credits to families have been stopped and many young people are saddled with hundreds of thousands of dollars of student debt. Yet Congress has seven bills to provide the trillion-dollar fossil fuel industry with an increase in the tax credit for carbon dioxide sequestration (Internal Revenue Code [IRC] Section 45Q).**⁷⁸ 45Q is intended to incentivize investment in carbon capture and sequestration technologies (CCUS) *and* also carbon capture and storage (CCS), but the real intent is to provide Big Oil with "a profitable CCUS business across the full value train," as the Chevron CEO clearly articulated.

In the U.S. the “American Dream” and Big Oil are inseparable. The oil wells of ExxonMobil, Chevron, BP, Shell pump the lifeblood of the country, so much so as Granholm points out, there are 9,000 permits for extraction on public land that are yet to be used and over 23 million acres of leases on and offshore, just waiting to be used.

It's worth repeating here that the Secretary of Energy told the titans of Big Oil at the 131st meeting of the NPC that “great fortunes await.”

“So, I hope you will hear me today say,” Granholm said. “Please take advantage of the leases that you have, hire workers, get your rig count up.”

In Europe the perspective is broader, and countries are less entrenched in Big Oil ideology. Nations are unencumbered by the American dream and the ethos of many countries runs counter to it.

Policy Report 35 of the European Academies (EASAC), focuses on *Negative emission technologies: What role in meeting Paris Agreement Targets?*⁷⁹ Quoting from the report:

“Since European plans to develop and apply CCS to power generation and other fossil-fuel point sources have stalled, CCS is not contributing to CO₂ emission reduction; nor is it developing to the point where it can offer an ‘off-the-shelf’ technology to be applied in some NETs (Negative Emission Technologies). Research and development on remaining technical challenges and new business models are required if CCS is to contribute to mitigation in the short term and NETs in the longer term.

“Having reviewed the scientific evidence on several possible options for CO₂ removal (CDR) using negative emission technologies (NETs), we conclude that these technologies offer only limited realistic potential to remove carbon from the atmosphere and not at the scale envisaged in some climate scenarios (as much as several gigatonnes (one billion tonnes) of carbon each year post-2050). Negative emission technologies may have a useful role to play but, on the basis of current information, not at the levels required to compensate for inadequate mitigation measures. Implementation is also likely to be location-, technology- and circumstance- specific.

“Moreover, attempts to deploy NETs at larger scales would involve significant uncertainties in the extent of the CDR that could be achieved, as well as involving high economic costs and likely major impacts on terrestrial or marine ecosystems. The dominant role assigned in IPCC integrated assessment models to NETs (in particular bioenergy with carbon capture and storage: BECCS) has yet to take fully into account these limitations. Scenarios and projections of NET’s future contribution to CDR that allow Paris targets to be met thus appear optimistic on the basis of current knowledge and should not form the basis of developing, analysing and comparing scenarios of longer-term energy pathways for the European Union (E.U.).”



WE MUST ASK, WHY IS THE U.S. SO FAR BEHIND IN RESPONDING TO THE CLIMATE CRISIS?

CCUS will make the fossil fuel industry a lot of money in subsidies and tax credits, but the temperature will keep rising and eventually there will be no Big Oil because people will no longer inhabit the planet. **While other nations address the climate crisis neither the President nor Congress are showing any vision or foresight or imagination in responding to what is now the equivalent of a meteor heading for Earth that will destroy the planet in the next seven years.**

We hear a lot about China's CO2 emissions, but that CO2 comes from coal fired power plants that are being built to power the factories that fulfill orders for goods from the U.S. And, while the U.S. government is acquiescing to the titans of Big Oil, China has developed clearly articulated plans to reduce its CO2 emissions. China drove about 40% of the world's electric bus-miles in 2020, while in the U.S., lobbyists for ExxonMobil, Chevron, BP, Shell, and API erected roadblocks and aggressively opposed the establishment of charging stations for electric vehicles in many states. In Part Two of *The Carbon Clock is Ticking* an account is presented of the CEOs of these immensely powerful fossil fuel companies' passive aggressive refusal to stop funding lobbyists to negatively influence federal and state legislatures against electric cars and to block public funds for charging stations.

While the international community has many legitimate concerns about China's national and international human rights violations, that does not negate the importance of China's proactive stance on reducing CO2 from the production of fossil fuels. Even though China would not agree to the inclusion of "phasing out coal" in the COP26 Glasgow Climate Pact, the country does have a clearly defined strategy to transition to alternative energy sources and eliminate fossil fuels. The U.S. does not. **The U.S. plan is to ramp up burning fossil fuels, and there is no plan to save the planet for our children.** However, in the last section of the Full Report you will find one.

"We need more," Granholm said at the 131st meeting of the NPC talking about oil production. She held her arms wide. "We need more. I'm not lecturing you. We need more. You can see what's happening. The Department of Energy is ready to help you raise your ambitions and work together."

It is important the public knows that the U.S. is dangerously off track. Even with the dire warnings of scientists that temperatures are rising much faster than expected, the U.S. has no cohesive, short- or long-term plan to reduce fossil fuels and CO2 emissions, even knowing that the temperature in whole regions of the U.S. will increasingly be off-the charts by mid-century. To the contrary, the U.S. fossil fuel industry plans to ramp up production and burn more fossil fuels. Hence the subtitle: *Children will Live the Future that Burning Fossil Fuels Is Setting on Fire.*



DENYING THE DATA AND DEFYING THE SCIENCE TO PROMOTE BLUE HYDROGEN

Time's up for the Interim Report of *The Carbon Clock is Ticking*. It ends with multiple evidence-based accounts of the scientific rejection of another Big Oil deception that removing the CO₂ generated by reforming methane from natural gas, ExxonMobil, Chevron, BP, and Shell can generate enough "blue hydrogen" to decarbonize the production of cement and steel, which currently burn natural gas for the required heat. A science note: hydrogen (H₂) is the lightest element. It is not blue. It is colorless, odorless, tasteless, non-toxic, and highly combustible. **The "blue" in blue hydrogen indicates the H₂ is derived from natural gas.**

Uncovering the blue hydrogen deception deepens our understanding of the fossil fuel industry's global spheres of dark power. Decisions are being made about the future of humanity in the offices of the upper echelons of ExxonMobil, Chevron, BP, and Shell that impact the future of all life forms on the planet. There are many official documents, scientific reports and research studies that conclude that these Big Oil companies are destroying the biosphere. Further, it is evident from the research analysis undertaken for this Interim Report that, behind the scenes, the U.S. President, the Administration, and the U.S. Congress are collaborating with the fossil fuel industry on initiatives to ramp up oil and gas production and keep the industry generating CO₂ emissions at least until 2050.

In Section Two further evidence will be presented that provides documentation that governments around the world, together with many national and international organizations, and universities in multiple countries on multiple continents are also complicit, working with companies like ExxonMobil, Chevron, BP, and Shell to promote the myth that human societies can continue to burn oil and gas without exacerbating the climate crisis and accelerating global warming. But right now, at the end of the Section One we will follow the thread of lies that defy the science that defines blue hydrogen, which will provide insights that will be of use when we go to Glasgow for COP26 and then to Washington for the Big Oil Congressional Hearing.

Here's the back story. Hidden from public view, "pre-scoping" papers by the National Petroleum Council have been requested by the Department of Energy.⁸⁰ On March 16, 2021, a letter outline of potential topics was sent via email from Marshall Nichols, the NPC Executive Director, to all members of the NPC. Attached to the letter was a copy of a report on "Potential NPC Study Topics." Nichols states in the letter that the council "looks forward to working with the Secretary to plan how best to provide the advice of the Council membership through the study process." The NPC Study Topics include:

1. Hydrogen Energy: Opportunities and Challenges for At-Scale Deployment
2. Optimizing the Role of Oil and Natural Gas in Meeting the Dual Challenge
3. Responsible Natural Gas Development and Production.

The glaring omission is any reference to the climate crisis, global warming, the rise in CO₂ emissions, or the transition to clean renewable energy. There are no pre-scope papers focused on reaching Real Zero, or on reducing and eventually phasing out the U.S. reliance on oil and gas.

The dynamics of the complex multifaceted relationship between the government and Big Oil are evident from the questions asked at the 131st Meeting of the NPC about carbon capture and hydrogen

Secretary Granholm is asked, “How the DOE and the NPC can work together to ensure that federal support and investment in hydrogen is inclusive of all hydrogen production pathways in order to advance the overall hydrogen ecosystem?”

One more science note on blue hydrogen, sometimes referred to as fossil fuel hydrogen, is that hydrogen is produced from natural gas by the process of steam methane reforming, where the natural gas is mixed with steam and passed through a catalyst at high temperature and pressure. Some carbon monoxide (CO) is produced by this process and is converted into CO₂. All of the CO₂ is then removed and discharged to the atmosphere to leave a pure hydrogen stream. “Carbon capture” in this context is employed to capture that CO₂ so that it is not released into the atmosphere.

“If we’re trying to get to zero, when we say “clean”, Granholm says, “we’re talking about zero carbon, right? So that means,” she hesitates, “um, if it is natural gas,” again she hesitates, “uh, if it’s steam methane reforming, we have to make sure that both CO₂ is captured as well as methane leaks are addressed.”

Granholm is fidgeting. She knows scientists have written many technical papers that conclude it is not possible to reach Real Zero and also keep using natural gas in the production of hydrogen.

“You’ve probably seen some of these studies that have come out recently about blue hydrogen and, um, there’s a lot of blowback about it so I want to be able to prove them wrong, that we can button it up and that we can do,” again she hesitates, “um, you know, hydrogen that has, um, you know, natural gas as the feed, but we’re going to do it in a way that is zero carbon.”

Granholm is between a rock and a hard place. She has admitted she has read the research and so she knows that burning natural gas and reaching zero carbon in blue hydrogen production is not scientifically possible, which suggests her authoritative “button it up” comment is a signal to the NPC that the Biden Administration and Department of Energy support the blue hydrogen initiatives of Big Oil, even though they run counter to the findings of science.

Whether Granholm is “buttoning up the science” or “buttoning up the scientists” who are conducting the science and giving her “a lot of blowback” she makes it clear she stands with the NPC and the fossil fuel industry.

The dialogue becomes more complicated when Mike Wirth, CEO of Chevron, also asks Granholm a question about blue hydrogen hubs, which Chevron is interested in establishing. Understanding the weight of Wirth’s hydrogen question requires some background information about the CEO asking the question.

A few pages back you read about Darren Woods, CEO of Exxon/Mobil, asking Granholm for money for Exxon/Mobil’s proposed Houston Hub. Now Wirth is the one raising the question of federal grants and tax credits for hydrogen hubs. You will meet both Wirth and Woods again when we attend the October 28, 2021, Congressional Hearings on “Fueling the Climate Crisis: Exposing Big Oil’s Disinformation Campaign to Prevent Climate Action.” These ultra-emitters and super-polluters will keep turning up.

At the 131st NPC Meeting both Woods and Wirth present themselves as respectful and low key, however, both men have immense power as the CEOs of Exxon/Mobil and Chevron. The decisions they make directly impact the world’s access to energy and thus in some spheres they have more power than Presidents and Prime Ministers. **Woods and Wirth are affable, even banal, but they are described in *The Guardian* as two of “America’s top climate villains,” and as “enablers and profiteers” who “have unimaginable sway over the fate of humanity.”**⁸¹ The findings of the research presented in *The Carbon Clock is Ticking* support *The Guardian’s* view.

Wirth is accused of using greenwashing tactics to coverup Chevron’s pollution of the planet. Chevron is described in *The Guardian* as “a notorious corporate polluter responsible for one of the highest total carbon emissions of any private company worldwide.” And Wirth, who is quoted as stating “let them plant trees,” is called out for spreading climate denial and heading lobbying tactics to delay or abort any legislative efforts to curb carbon dioxide emissions.

And so, when Wirth asks the Secretary of Energy for money for hydrogen hubs there are a lot of smiles and congenial talk, but he has far more power than Granholm and from her comments about “buttoning up science” it appears she knows it.

Wirth says, “As you know the department is poised to play a key role in advancing the deployment of low carbon hydrogen as are many member companies.” He asks about the infrastructure act and the support for hydrogen hubs, and he wants to know more about DOE’s hydrogen strategy and road map and to support hydrogen projects at scale.

Granholm talks about “regions of the country already organizing around this, you know Darren (Woods) I am looking at you.” She diverts the discourse into talking about “different colors” of hydrogen - pink and green -- but she then returns to blue hydrogen from natural gas. The conversation is

banal, but there are power plays taking place and decisions being made to which the public is not privy that have enormous consequences for the future of humanity.

Willcox adds some substance to the discussion when she states, “we just need to make sure we understand if we’re locking in the infrastructure that we’re locking it in not just for blue but for other opportunities as well.”

In the perilous circumstances of the climate crisis and global warming, Chevron, BP, Shell, ExxonMobil, and API are operating in an opaque world, wielding enormous power that if unchecked, will “lock-in” government support for the fossil fuel industry for decades to come without public consultation.

“Market actors seeing avenues for profit have launched ventures in mechanical–chemical carbon dioxide removal (CDR), seeking government support for their methods,” June Sekeral and Andreas Lichtenberger state in a research paper on Industrial Carbon Removal, (ICR) entitled, “Assessing Carbon Capture: Public Policy, Science, and Societal Need,” published in *Biophysical Economics and Sustainability*.⁸²

Sekeral and Lichtenberger state, ““Governments are acting, and many are adopting policies and establishing subsidies to support mechanical–chemical methods.”

“While legislative activity to support and incentivize commercial Industrial Carbon Removal (C-ICR) has advanced steadily, there has been almost no public dialogue about these methods,” these researchers write. “Nor has there been a policy-related examination of whether the methods reduce atmospheric carbon dioxide.”

The chief policy finding of Sekeral and Lichtenberger is that “there is no biophysical basis for governments to incentivize or subsidize current commercial ICR because there exists no operational, commercial process that results in net carbon removal. Moreover, no public subsidy of point-source capture is justified based on the polluter pays principle, a long-standing tenet in environmental law.”

Granholm, Willcox, Wirth, and Woods must be fully cognizant of the science, and they must also know that industrial carbon removal is not viable at the present time, and that any financial incentives or subsidies are a handout of public funds to the fossil fuel industry for other political and economic reasons that are not directly associated with carbon capture.

In some social science disciplines, the interactions between Granholm, Willcox, Wirth, and Woods, would be considered an enactment of a scene in which all the actors know the script. For example, Sekeral and Lichtenberger use the concept of “market actors.”

The only problem is that the public does not have the script and people have no opportunity to interrogate Granholm, Willcox, Wirth, and Woods to gain a deeper understanding of the long-term consequences of the decision-making process for children and young people.



RENEWABLE ELECTRICITY WOULD BE BETTER USED TO PRODUCE GREEN HYDROGEN THROUGH ELECTROLYSIS

Chemical stoichiometry is non-responsive to the dark spheres of power. Thermodynamics are impervious to persuasion, which is the reason this entire report is grounded in the certitude that we can use science - the laws of physics, chemical stoichiometry, thermodynamics, and deep knowledge of the biophysical parameters for life - to expose and call out Big Oil's gaslighting of the public into believing that we can continue to burn oil and gas and reach Real Zero and still be carbon free.

We can use science to show how ExxonMobil, Chevron, BP, Shell, and API are lying about the fossil fuel industry being able to capture CO₂ emissions in time to save the future for children and young people, and *The Carbon Clock is Ticking* provides the evidence. We can also use the scientific evidence to show how Big Oil for profits, and the Biden Administration for political power, are collaborating behind the public's back, defying science, in their attempts to lock-in the use of natural gas until 2050 and beyond.

The Secretary of Energy stated that Chevron, BP, Shell, ExxonMobil, and API are ready for a fight, but they can't fight science. Big Oil cannot argue with the science that is inherent in making blue hydrogen by the steam reforming process that produces CO₂ as the byproduct. Blue hydrogen will accelerate global warming.

In the evaluation of CCS/CCUS for the removal of CO₂ from the Steam Methane Reforming (SMR) process there is essentially no uncertainty in the estimates of how much methane is consumed, nor of how much carbon dioxide is produced. Both are set by chemical stoichiometry and are not influenced by Big Oil propaganda.

The thermodynamics of the chemical processes involved define how much methane must be burned for the process to work, and the stoichiometry defines how much methane is needed to produce the H₂, and this is not susceptible to political persuasion. For these reasons alone, it is important that we understand the science, and that we are comfortable using primary source scientific papers to counter Big Oil's lies that jeopardize young people's inalienable right to exist.

The Grantham Institute at Imperial College, London picked up on the blue hydrogen issue, in the *Weekly Update*, January 25, 2022, by highlighting a Sky News report by Helen-Ann Smith, with the heading, “Climate change: Shell carbon capture facility “secures just 48% of hydrogen production emissions.”⁸³

The facility is in Alberta Canada, and Smith writes, “Emissions at one of the only sites in the world that uses carbon capture and storage alongside hydrogen production raises questions about so-called ‘blue hydrogen’, according to a new report.”⁸⁴

She explains, “In just a few years, hydrogen has shot into mainstream conversations about tackling the climate crisis. It is now one of the most hotly discussed energy topics, and a very particular form of hydrogen known as fossil hydrogen (or ‘blue hydrogen’) is being pushed by the fossil fuel industry for government backing.”

By now you have an evidence-based understanding of the lie-stacking rhetoric of Big Oil, the Biden Administration and Congress that denies the data and denies the science, which will provide you with a framework to follow the thread of reports on the failure of CCS/CCUS to capture CO₂ at the scale required, and now the lie stacking gets higher with the addition of blue hydrogen.

Smith writes in her *Sky News* report, “They claim it (blue hydrogen) is climate friendly and can help with efforts to decarbonise our energy system, as it involves the use of carbon capture technology to trap and store emissions. One of the very few plants of this type, “Quest” is owned by Shell in Alberta, Canada.”

“Experts say that more modern, ‘purpose built’, blue hydrogen facilities can capture over 90% of a plant’s emissions,” Smith writes. **“The report found that this facility captures just 48% of its on-site carbon dioxide emissions. Once you include other emissions, such as from the fossil gas supply chain, only 39% are captured.** Despite this, the plant has been subsidised by the Canadian government to the tune of \$US654 million.”

Smith quotes Dominic Eagleton, senior campaigner and report author at *Global Witness*.⁸⁵ “Carbon capture is definitely part of the problem,” Eagleton states. “Because it has a history of failure, almost 80% of government funded large scale, carbon capture projects have failed over the years.”

“Instead of investing in this dirty, climate-wrecking fuel,” Eagleton is quoted as saying, “governments should promote and boost investment into renewable energy sources like wind power, solar power, that can take us to a genuinely more sustainable future and a safe climate for all.”

Moving now to the January 20, 2022, *Global Witness* report, where Eagleton states, **“Shell’s fossil hydrogen plant in Canada found to be emitting more climate-wrecking gases than it is capturing.”** Eagleton continues, “Shell have boasted about the project as an example of how it is tackling global heating, claiming that the project demonstrates that carbon capture systems are “safe and effective” and is a “thriving example” of how this technology can significantly reduce carbon emissions.”

“But our new research reveals that Quest is in fact emitting more than it is capturing,” Eagleton states, and here he is quoted at length.

“Despite having captured 5 million tonnes of carbon dioxide across a five-year period, it has emitted a further 7.5 million tonnes of climate polluting gases during the same time. Each year, Shell’s plant has the same carbon footprint as 1.2 million petrol cars.

“This research delivers a serious blow to proponents of fossil hydrogen who are pushing for more public funds to support its use,” Eagleton continues, “with \$654 million of the \$1 billion cost of Quest having come from Canadian government subsidies. Yet despite this vast expense, Shell’s project has failed to deliver anywhere near the cut in emissions are needed to tackle global heating.

“The lesson from Quest should be loud and clear for governments all over the world. Do not invest in a technology that is not only failing to deliver any effective action in tackling the climate crisis – but is in fact contributing to it.”

Following the thread to the primary research - a process that occurs throughout this document - two scientific papers are presented that support the findings of *Global Witness*.

The first is published by the Pembina Institute in August 2021, by Jan Gorski, Tahra Jutt, and Karen Tam Wu, entitled “Carbon intensity of blue hydrogen production. Accounting for technology and up-stream emissions.”

Gorski and her colleagues explain, “Steam methane reforming (SMR) uses steam to separate the hydrogen from natural gas. Most SMR facilities in current operation produce hydrogen for use as a feed-stock to other processes such as oil refining, fertilizer, or chemical production.”

They explain how the few SMR plants presently in operation with CCS only capture the CO₂ contained in the SMR process stream, but *do not* capture the CO₂ in the flue gas resulting from the burning of methane required for the SMR process to work.

Here is the critical point that these scientists make. “**SMR plants in operation today do not capture carbon from this flue gas stream.** The carbon intensity of hydrogen produced from existing facilities is sometimes reported as the percent of the process carbon that is captured, rather than a percentage of the total carbon emissions from the hydrogen plant.”

Just like in a natural gas fired power generation plant, **this CO₂ is discharged to atmosphere in the flue gas.** This CO₂ emission rate is about the same as in the process stream, hence the overall CO₂ capture in these plants is less than half of the total CO₂ generated - 43% at the Quest Canada SMR plant.

Importantly, to remove the CO₂ from this flue gas requires the installation of a separate Petra Nova type of flue gas CO₂ removal plant, which does not exist at any of the few plants currently using CCS for the SMR process generated CO₂.

The second primary research paper, by Robert W. Howarth and Mark Z. Jacobson, was published in 2021 in *Energy, Science and Engineering*, presents the modelling and analysis to respond to the question, “How green is blue hydrogen?” The complexity of this paper would challenge most readers, but here is the gist.

These researchers explain, “We undertake the first effort in a peer-reviewed paper to examine the lifecycle greenhouse gas emissions of blue hydrogen accounting for emissions of both carbon dioxide and unburned fugitive methane.”

“Perhaps surprisingly, the greenhouse gas footprint of blue hydrogen is more than 20% greater than burning natural gas or coal for heat,” Howarth and Jacobson state. “As we have demonstrated, far from being low emissions, blue hydrogen gas emissions are as large as or larger than those of natural gas used for heat.”

These researchers state, “renewable electricity would be better used to produce green hydrogen through electrolysis.” and the scientific data on which they base their conclusions that are quoted here at length.

“This best-case scenario for producing blue hydrogen,” Howarth and Jacobson write, “suggests to us that there really is no role for blue hydrogen in a carbon-free future.”

“We believe the renewable electricity could be better used by society in other ways, replacing the use of fossil fuels.”

“Society needs to move away from all fossil fuels as quickly as possible, and the truly green hydrogen produced by electrolysis driven by renewable electricity can play a role. Blue hydrogen, though, provides no benefit. We suggest that blue hydrogen is best viewed as a distraction, something that may delay needed action to truly decarbonize the global energy economy, in the same way that has been described for shale gas as a bridge fuel and for carbon capture and storage in general.”

“In fact, there is no experience at commercial scale with storing carbon dioxide from carbon capture, and most carbon dioxide that is currently captured is used for enhanced oil recovery and is released back to the atmosphere.”

One final blue hydrogen document confirms that Woods, Wirth, Granholm, and Willcox are hoodwinking the public. *Guiding Principles for Climate-Aligned Hydrogen Deployment: Towards Cost-Effective and Equitable Deep Decarbonization to Limit Temperature Increases to 1.5°C*,⁸⁶ was facilitated by the U.N. High Level Champions for Global Climate Action and developed through a multi-stakeholder engagement process. This 2021 U.N. document states that the guiding hydrogen principles were developed “to help inform the production and use of hydrogen in ways consistent with avoiding unintended consequences for public health, climate, and economy.”

The unintended consequences are addressed by Rachel Fakhry in a piece she wrote for her Natural Resources Defense Council (NRDC) “Expert Blog” entitled *UN Guiding Principles: Redressing the*

Hydrogen Train Tracks.⁸⁷ Fakhry writes, **“the reality (is) that some in the oil and gas industry, with vested interests in an expanded hydrogen economy, are pushing agendas that serve their interests. Policymakers are advised to be aware of this disconnect, cut the noise, and ground hydrogen-related decision-making in independent assessments and scientific facts.”**

It will come as no surprise at this juncture that one of the chilling findings of the research presented in *The Carbon Clock is Ticking* is that the fossil fuel industry has become an existential risk to humanity, but the evidence-based finding that the U.S. government is complicit in shoring up the fossil industry is an equally consequential finding of the study.

Remember what António Guterres, the U.N. Secretary-General, said in his response to the IPCC February 2022 publication. “The present global energy mix is broken. As current events make all too clear, our continued reliance on fossil fuels makes the global economy and energy security vulnerable to geopolitical shocks and crises.”

“Instead of slowing down the decarbonization of the global economy,” Guterres said, “now is the time to accelerate the energy transition to a renewable energy future. Fossil fuels are a dead end – for our planet, for humanity, and yes, for economies.”

It is time for the President, the Administration, Congress, *and* ExxonMobil, Chevron, BP, Shell, and the American Petroleum Institute to change tack to save the future lives of children and young people. And, if they do not? Many lives will be shortened.



DARK SPHERES OF GEOPOLITICAL POWER: BIG OIL LYING AND GOVERNMENTS COMPLYING, JEOPARDIZING THE FUTURE EXISTENCE OF CHILDREN AND YOUNG PEOPLE

In “White knights, or horsemen of the apocalypse? Prospects for Big Oil to align emissions with a 1.5°C pathway,” published in 2021, *Energy Research & Social Science*,⁸⁸ Dario Kenner and Richard Heede present their research on ExxonMobil, Chevron, BP, and Shell. They conclude, “Like previous energy transitions the shift to low-carbon energy is contested.”

They reason, “As public awareness of worsening climate impacts grows, each of the companies is dealing with heightened social and political pressure, as well as economic pressures that are accelerated by the Covid-19 pandemic. **Despite these pressures we conclude it is unlikely that the executives and directors at these four companies will decide to proactively phase out exploration and extraction of oil and gas in line with a 1.5°C pathway, or even invest aggressively in zero-carbon energy sources or CCS to reach net zero by 2050.**”

Still quoting from the conclusions reached by Kenner and Heede, they state, “The findings of the present study underscored the importance of placing these companies’ positions on what they say they are doing to address climate change, such as support for carbon pricing, or to reach net zero emissions in the case of BP and Shell, in the context of their overall goal of continued oil and gas production, the compensation executives and directors receive, and the concomitant incentive to perpetuate both.”

And finally, Kenner and Heede write, “BP, Shell, Chevron, and ExxonMobil have all stated they expect to be pumping oil and gas out of the ground well beyond 2050. This would indicate that *to phase out oil and gas, a vital step in decarbonising economies to keep global average temperatures below 1.5°C, will rely on national governments initiating this process.*” (Emphasis added.)

Their evidence-based conclusions are supported by the research in *The Carbon Clock is Ticking*, except for the disappointing last sentence. **You know from reading this text that the U.S. government is not going to initiate the process of phasing out oil and gas. To the contrary, the U.S. government is supporting Big Oil and you have reliable evidence of their collusive relationship.**

For example, you know from the Secretary of Energy Jennifer Granholm's interactions at the December 2021, 131st meeting of the National Petroleum Council that the U.S. President, the Administration, and the Congress are betting the planet by supporting Big Oil, and that it is children and young people who are losing.

"The Department of Energy is ready to help you raise your ambitions and work together," Granholm told the chief executives at the NPC meeting. Darren Woods, the CEO of ExxonMobil, asked for funding for the Houston Hub in the Permian Basin and Mike Worth, the CEO of Chevron, asked for funding for the hydrogen hubs Chevron is planning.

Recall Granholm told the titans of Big Oil at the 131st meeting of the NPC, "Great fortunes await. So, I hope you will hear me today say please take advantage of the leases that you have, hire workers, get your rig count up."

The "Summary of Key Findings" of the 2021 UNEP *Production Gap Report* provides supporting evidence for the conclusion that the US. Secretary of Energy has willfully abandoned her responsibility to the American people. The following statement highlights the government's dereliction of duty and abandonment of children and young people to a challenging future on a much hotter planet:

According to our assessment of recent national energy plans and projections, governments are in aggregate planning to produce around 110% more fossil fuels in 2030 than would be consistent with limiting global warming to 1.5°C, and 45% more than would be consistent with limiting warming to 2°C, on a global level. By 2040, this excess grows to 190% and 89%, respectively.⁸⁹

The production gap is a dire warning of the even more extreme threat of the climate crisis that governments around the world are ignoring, even though they know people are vulnerable and in harm's way. In subsequent sections of *The Carbon Clock is Ticking* the depth of the deception will become self-evident as we uncover the many nefarious ways the U.S. government many democrats as well as republicans are in cahoots with the fossil fuel industry.

Readers be prepared. A shift is taking place. You are not only readers *of* the research. You are now also *in* the research. Some of the findings will be disturbing as well as surprising, but **the overriding message is that if children and young people are to survive the fossil fuel industry burning their future it will be up to the public to stop them - that's you and me -- working together, in unity, peacefully.**

How we collectively respond to the climate crisis will decide the future of children and young people. Do not be deceived into thinking otherwise. If we do not step up the Carbon Clock *will* strike the death knell for humanity. Our species will be finished. We do not have an option. We must have a positive impact on the world, become child protectors, knowledgeable evidence-based climate communicators, insist on decarbonization and a rapid transition to Real Zero energy sources, develop coping and survival strategies. We must be willing to reimagine our own lives, as the protectors of future generations from the aftermath of the 200 years of burning fossil fuels and from the continuing use of toxic energy sources that have the potential to end human life on the planet.

It is important that we understand the reality of the threat, that we are critically conscious of the profit-over-people power brokers in both the public and private sectors who are controlling the narrative. The research confirms that in both sectors there is a concerted effort to hide the facts and restrict access to the knowledge we need to act. **For children and young people to survive, a life sustaining plan is needed that challenges the dominant narrative of the bad actors of the apocalypse, the arsonists as Guterres calls them, who are impeding people's response to the climate crisis.** And so, a life sustaining plan will be presented in the final section of this research project that will be available shortly.

The Fossil Fuel Divestment Plan to protect the future of children and young people, draws on the studies by world renowned scientists and scholars across the sciences - social, physical, biological, political, economic, and applied energy sciences and engineering. The plan takes into consideration the most prescient research available on the biosphere and the transgression of the planetary boundaries by human societies. The Real Zero Plan includes the latest thinking by eminent scholars who study the tipping points that might lead to sudden catastrophic ecosystem collapse and other existential risks. Make no mistake we're in the fight of our lives and this fight must be won. It will take everything we know to save the planet for children and young people, and it is hoped that this work will in some small way contribute to that effort.



POSTSCRIPT NOTE TO READER: IF WE REMAIN SILENT, WE WILL ALL BE GONE TOMORROW

In the *NOTE TO READER* at the beginning of this Interim Report I encouraged people to stand up to the fossil fuel industry and insist that we rapidly transition to zero carbon energy. Since I wrote this sentence, not so long ago, the brutal war President Putin is waging against the people of Ukraine has sent shock waves through the world community. Putin's war is cataclysmic for both the Ukrainian people and the planet.

War is a global warming accelerator. Armed conflict intensifies the climate crisis, not only because of the ecological devastation, but also because of the huge increase in CO2 from military armament shot up into the atmosphere. And so, making connections here seems essential.

Right up until the day Putin invaded Ukraine many leaders and members of the public did not think he would start a hot war. We had difficulty *thinking forward* to imagine such a lethal campaign of state terrorism. Perhaps for our own mental health and well-being we were willing to give Putin the benefit of the doubt, and not allow the nagging suspicions we had about his extreme alienation and his capacity for brutalizing, pathological behavior.

In denial, we wanted Putin to see reason. We hoped that the meetings with President Macron and the telephone calls with President Biden would fix the problem, and that Putin would stop the madness. It was not going to happen. Putin was impervious to all attempts to "fix" the problem.

To understand Putin's lethal campaign of terror, I returned to the writings of Hannah Arendt, whose treatise on *The Human Condition* has influenced my philosophical work for many years. But it was to her controversial thesis on Adolf Eichmann and the concept of the *banality of evil* that I turned. I reread her original essay in the *New Yorker*, read notes I had written years ago in her book on Eichmann, but I am still on the fence about Putin's state of mind and the concept of "evil" remains ineffable - beyond my capacity to define, except in a visceral sense in the experience of fear.

In denial, presidents and prime ministers equivocated about Putin's intentions in the recognition that from the perspective of the Western Alliance it is a war Putin cannot win, but from Putin's perspective it is a war he cannot lose. The world wanted Putin to turn his military convoys around and send them home, but that did not happen. On March 2nd, 2022, the International Criminal Court, in the Netherlands at the Hague, opened an investigation into possible war crimes, crimes against humanity, and genocide in Ukraine dating back to 2013, but also covering the conflict sparked by Russia's invasion. And, on March 4th, 2022, the UN Human Rights Council established an Independent International

Commission of Inquiry to investigate all alleged violations of human rights in the context of the Russian Federation's aggression against Ukraine.

No longer in denial that Putin could commit monstrous crimes of aggression against humanity, NATO, the E.U., the U.K., and the U.S. rapidly severed economic, cultural, and sporting ties with Russia. This includes the Nord Stream 2 gas pipeline being put on hold by Germany, because of Putin's invasion of Ukraine. The pipeline between Russia and Germany would have given Russia even more of a stranglehold over gas supplies to Europe, and the fate of the pipeline provides us with an opportunity to consider more deeply the politics of energy which are at play during war *and* peace.

Ukrainian President Volodymyr Zelenskyy has called Nord Stream 2 "a dangerous political weapon," while the U.K. Prime Minister, Boris Johnson, has said Europe needs to "snip the drip feed into our bloodstream from Nord Stream." The BBC reports that in 2006, Russia shut off gas supplies going through Ukraine, because of a financial quarrel between the two countries. It caused acute energy shortages during winter in Central and Eastern Europe.

The idea presented in *The Carbon Clock is Ticking* that the fossil fuel industry has established dark spheres of power that rival and often eclipse the power of governments is made visible by the centrality of the control of oil and gas in conflict and war. The segue here to this investigation into the exacerbation of the climate crisis by the fossil fuel industry is that ExxonMobil, BP, and Shell have held financial stakes in Rosneft, which is owned by the Russian State.

According to Yan Anthea Zhang, in an article published by The Conversation, "Shell, BP, and ExxonMobil have done business in Russia for decades." 90 Zhang reports that BP's stake in Rosneft is worth US\$14 billion, Shell has about \$3 billion in assets in Russia, and ExxonMobil has over 1,000 employees and more than \$4 billion in assets there. The Wall Street Journal reported that Shell issued the week-end statement after buying 100,000 metric tons of Russia's Urals crude at a bargain price on Friday, paying \$28.50 a barrel less than benchmark crude prices, which was described the biggest discount on record.

In response to Shell's advantageous transaction Dmytro Kuleba, Ukraine's foreign minister, wrote on Twitter, "One question to Shell: doesn't Russian oil smell of Ukrainian blood for you? I call on all conscious people around the globe to demand multinational companies to cut all business ties with Russia."⁹¹

Shell is now reported to be divesting of investments and involvements with Russia, and is following ExxonMobil, Chevron and BP in severing ties with Putin, but the insights the information provides on the relationships between the fossil fuel industry and governments is of vital importance as we address the climate crisis and global warming.

The 2022 IPCC WGII Sixth Assessment Report, Summary for Policymakers states, "Societal choices and actions implemented in the next decade determine the extent to which medium- and long-term pathways will deliver higher or lower climate resilient development (*high confidence*)."

Essentially, the IPCC makes it clear that what we do now is of paramount importance in determining if children and young people's lives will be shortened by global temperatures. There is high confidence in the report that if we stay on our present path, by 2100 the temperature will rise by +5° C and children born at the beginning of the 21st century will be long gone.

It is devastating to us that so many children and young people's lives are being shortened in Ukraine by a world leader and superpower committing a lethal campaign of state terrorism. What is hard for us to appreciate is that it will happen again in the future on a global scale if we do not stop the temperature from rising, and the only way we can do that is by rapidly reducing CO2 emissions by building an energy infrastructure that is not fueled by oil, gas, or coal.

The 2022 IPCC report describes the shock waves and deprivations people will experience in the coming decades due to the climate crisis, and I am proposing here that Putin's war is a window on the future of human suffering on a global scale. The projections for Ukrainian people being displaced and becoming refugees because of Putin's war is 5 million. The projection for climate refugees by 2050 is 1.2 billion people.

If governments do not step up and Big Oil continues to mislead the public there will be an intensity of adverse heat effects including severe risks to health that are amplified in urban areas, and the proportion of deaths attributable to extreme heat will also rapidly rise. The harmful health impacts for children and young people, who by then will be in their thirties, forties, and fifties, will be extreme. Children today are also going to be confronted by financial burdens that they cannot meet. Risks to the aggregate economic output will become severe on a global scale. Economic losses are highly likely to exceed the worst country-level losses during historical economic recessions, but unlike past recessions climate change impacts will be continuous and never ending.

If ExxonMobil, Chevron, BP, and Shell had stepped up forty, thirty, or even twenty years ago, Russia would have no hold over Germany and Europe, and the U.S. would be fossil free. Many power relationships between governments and Big Oil would already have been realigned. The violent cascading horrors of global warming would not have taken place and the future for children and young people would have been secured.

In the section of the report that focuses on "Enabling Climate Resilient Development" the IPCC states:

"SPM.D.2 Climate resilient development is enabled when governments, civil society and the private sector make inclusive development choices that prioritise risk reduction, equity and justice, and when decision-making processes, finance and actions are integrated across governance levels, sectors and timeframes (*very high confidence*)."

The documentation presented in *The Carbon Clock is Ticking* draws back the curtain on the dysfunctional relationships of the fossil fuel industry with the U.S. President, the Administration, and Congress, and exposes the corrupt underbelly of Big Oil. It's a matter of "give us what we want, or you won't be able to pump the gas."

“We Ukrainians are a peaceful nation,” Volodymyr Zelenskyy, President of Ukraine said. “But if we remain silent today, we will be gone tomorrow.”

If we remain silent, we will all be gone tomorrow. It is hard to take in the fact that by 2050 1.2 billion people will be displaced by extreme weather and other climate crisis catastrophes. Billions more will be decimated by a lack of food, water, medication, and sanitation, living without light, heat, or water.



By April 1, 2022, more than two million children in Ukraine had been forcibly displaced by Putin’s war, with no end in sight. Children and their families have violently lost their homes and become refugees. By 2050 the IPCC states one billion people could be displaced by the impact of the climate crisis. It is important to remember that before Russia invaded Ukraine, children and young people participated in a “School strike for climate” and marched in Kiev “for the climate in Ukraine,” September 20, 2019. Hundreds of thousands of children and young people around the world have been marching and protesting. Unless we act now, hundreds of millions of children and young people will also be displaced. (Photo by Sergei Supinsky/AFP via Getty Images).

Putin has reached into the body politic to tear out our hearts. But he has also ignited our shared consciousness, how we think, care, love each other, and he has sparked the flame of outrage and dissent at how others are being violated.

We must do all we can to support the people of Ukraine, but we must also alter course to stop the assault that is already taking place due to the climate crisis and will intensify to 1.2 billion people becoming displaced by the climate crisis in the next 28 years.

This *is* a defining moment. “Let’s build a country of opportunities, where everybody is equal before the law and where the rules of the game are honest and transparent, and the same for everyone,” Zelenskyy says. He helps us get it.

We do get it. To save the people and the planet from a *Look Up* meteoric cataclysmic disaster occurring within the next twenty to thirty years, we must take responsibility and stand up to the fossil fuel industry. We must *act* with *unity of purpose*. We must prevail. Our humanitarian response cannot be controlled as it is now by the geopolitics of oil

We need the government to turn off the gas taps as soon as possible. We cannot allow a polluting industry dominated by ExxonMobil, Chevron, BP and Shell and all the other Big Oil companies represented by the American Petroleum Institute to continue making record profits at the expense of almost eight billion people whose lives are threatened by their intransigent life-threatening behavior.

Do you remember I began this Interim Report by stating there are three conditions that must be met to save the planet for our children? First, we must hurry, second, we must go rapidly in the right direction, and third, we must stay alert and recognize that Big Oil, powerful elites, lobbyists, and PACs will try to turn us and make us go in the wrong direction.

In Part Two we will move on to an account of the Congressional Hearings that took place on October 28, 2021, entitled, *Fueling the Climate Crisis: Exposing Big Oil’s Disinformation Campaign to Prevent Climate Action*. The Congressional Hearing was historic, because it is the only occasions on which the CEOs of ExxonMobil, Chevron, BP and Shell were held accountable. An account of COP26 is then presented, and this evidence-based account, written at the time of the 26th climate summit, is used to provide a verifiable explanation of why *all* 26 COP Summits have failed.

In these perilous circumstances, when ExxonMobil, Chevron, BP, Shell, and API are denying the future of children and young people, you will have the opportunity to read evidence-based accounts and a disciplined and systematic analysis of how Chevron, BP, Shell, ExxonMobil, and API lying to governments and the public about the fossil fuel industry’s capability to reduce CO2 emissions while expanding fossil fuel extraction transgressing the most dire predictions for humanity.

Why decades of human rights violations have taken place with impunity both in the U.S. and around the world. Why CO2 gas pipeline explosions have taken place without the public knowing about them. Why direct capture of CCS/CCUS will not work in time and at scale. As one chemical engineer said, “It will never happen. It’s a silly extreme.”

Finally, a Fossil Fuel Divestment Plan is presented because, as Zelenskyy said, “if we remain silent today we will be gone tomorrow.” It is imperative that we transform our vulnerabilities of dependence on CO2 producing fuels and transition to renewable energy as soon as we can. We will need to

balance dire urgency with scientific realism and if we can do that the transition to renewable energy will lead to a new era in geopolitics that will not be welcomed by many with power, wealth, and privilege. The massive shuffle in economic and social relationships will take time and efficient organizing, but the alternative for children and young people is extreme deprivation and for many, death.

Before Putin's war, ExxonMobil, Chevron, BP, and Shell were orchestrating an all-time-high resurgence of production with profits exceeding those in 2019 prior to the pandemic.

Profits from oil production were surging in the U.S. and around the world, and that puts Nicholas Kusnetz back on the page, as we remember where we were at the end of the pandemic and before Putin's war. Writing in *Inside Climate News* on January 12, 2022, Kusnetz wrote, "The American Petroleum Institute is back with bravado." He stated, "But after a bruising year, the administration seems to have abandoned its effort to halt new leasing for oil and gas development, breaking a campaign promise."

Kusnetz profiled Mike Sommers, the CEO of API, who you will meet again at the Congressional Hearings in Part Two of *The Carbon Clock is Ticking*. According to Kusnetz, Sommers stated that the industry was expanding investment and production of oil and gas and they anticipated the demand would be strong through 2050, but that Sommers "failed to mention that those same projections show that such a course would send the global temperatures soaring past the goals of the Paris Agreement."

My hope is that the information presented in this Interim Report will provide you with the knowledge you need - we *all* need - to raise the alarm and act, and that Part Two will deepen your knowledge so you can be sure your arguments are based on science and are fact checked.

"I am not a politician," Zelenskyy said. "I am just a simple person who has come to break down this system." Igor Novikov, a former adviser, is reported in *The New Yorker* to have said of Zelenskyy, "In a time of crisis, he is a lens that channels the energies of the people into a single beam of light."

We need to do what we can to position ourselves in a similar way to Zelenskyy. Big Oil is killing the future of children and young people and we must work together with a single purpose to replace the system of which Sommers speaks. **Our analysis of the science has left no doubt that for the sake of children and young people we must face the future now, before it is too late.**

Our choices are Shakespearian, to be or not to be, like Zelenskyy said the choice is for Ukraine. He says Ukraine chooses to be. "To be" is a given for us too. We will do everything we can for children and young people to be.

Another path is possible. Together we can break the life-threatening hold big oil has on geopolitics. Zelenskyy is already doing this by providing leadership and guidance. In a genocidal war and against all odds he has helped us imagine the impossible and know it is possible to be. We know with certainty that the climate crisis will cause global devastation that is even more life threatening than Putin's killing war.

It doesn't have to happen. There are viable energy options other than CO2 producing fossil fuels. We can participate in the establishment of a new era of geopolitics in which fossil fuels are not a negative influence. If we all step up a massive shuffle in economic and social relationships can be established that include energy policies that are environmentally *and* geopolitically sustainable.

A data driven analysis confirms that it is financially viable to make the transition to clean energy, and that it is much more feasible than giving trillions in tax dollars to the fossil fuel industry. Do not let ExxonMobil, Chevron, BP, and Shell fool you with their big lies and unrealistic pie in the sky expectations for carbon capture, utilization, and storage.

In Part Two of *The Carbon Clock is Ticking* you will have an opportunity to consider the scientific evidence and the analysis of lived experience that has gone into the development of the Fossil Fuel Divestment Plan to save the planet for children and young people. It is time.



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