

Carbon Capture, Utilization and Storage

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Abstract

Many innovative people are looking for ways to not only keep Green House Gas (GHG) emissions out of the atmosphere. They are trying to find ways to take the accumulated GHG emissions out of the air. Many think the simplest solutions to eliminate GHG emissions are to stop burning fossil fuels, stop the construction of concrete buildings, eliminate the use of fertilizers, electrify transportation, reduce population, curtail the movement of people travelling on jet planes and rid ourselves of our consumer lifestyle that depends on cheap goods produced in and imported from China and other nations that still rely on unabated coal power. Conversely, many people are looking for innovative effective and economical ways to revolutionize fossil fuel power generation to use carbon dioxide (CO₂) captured from oil and coal refineries, the cement industry and the air. In my presentation presented at Ecothee 2022 at the Orthodox Academy of Crete I presented an abridged talk based upon the idea presented in full in this paper. With this talk, I introduced and showed selected videos to lift up innovative companies who are committed to finding ways to capture and use GHG emissions to reduce, reuse and recycle Carbon and other GHG to help poor and rich nations transition to a net zero emissions economy and even create human habitats on Mars. With this paper I explain how my Christian faith gives me the foundation and the enthusiasm to promote Carbon Capture, Utilization and Storage.

Keywords: Carbon, Carbon Capture, Utilization and Storage, Christians, Coal, Fossil Fuels, Innovative Technologies, The Black Rock, The Cyclical Economy, Zero Emissions Economy.

1. Introduction

The black rock we call coal can be faithfully viewed as a gift of God, at least if one considers how important coal was for the ancient Hebrew prophets Moses and Isaiah. According to Midrash Rabba, Exodus 1:26, the Baby Moses chose a live coal over a shiny piece of gold and by doing so saved his life ¹ [Shemot 2023]. The Book of Isaiah records how Isaiah's "iniquity was removed" and his "sin was atoned for" when a live coal kissed his lips and how then the King the Lord of Hosts sent him to call people to

¹ And some of the observers sitting among them were the magicians of Egypt that said, "We are wary of this, that he is taking your crown and placing it on his head, that he not be the one we say (i.e. prophesy) that will take the kingship from you." Some said to kill him, and some said to burn him. And Jethro was sitting among them and said to them, "This child has no intent [to take the throne]. Rather, test him by bringing in a bowl [a piece of] gold and a coal. If he outstretches his hand towards the gold, [surely] he has intent [to take the throne], and you should kill him. And if he outstretches his hand towards the coal, he [surely] does not have intent [to take the throne], and he does not deserve the death penalty." They immediately brought the bowl before him (Moses), and he outstretched his hand to take the gold, and Gabriel came and pushed his (Moses') hand, and he grabbed the coal. He then brought his hand along with the coal into his mouth and burned his tongue, and from this was made (Exodus 4:10) "slow of speech and slow of tongue." https://www.sefaria.org/Shemot_Rabbah.1.31?lang=bi

turn back to God and believe the “earth is full of His glory” (Isaiah 6: 1-10).² For people of faith, that should mean, every child, every adult and every rock, even the black rock is a gift of God. Further more, anthracite is a dark black form of old coal, “having formed from biomass that was buried 350 million years ago” and this old dark black coal is one of the cleanest types of coal to burn—producing less smoke than other types” being that it is almost pure carbon [University of Calgary: Energy Education 2018]. More importantly, the second most abundant element in the human body is carbon, oxygen is the first [Helmenstine 2020] and according to scientists, carbon is the backbone and the building block of all life [Austin 2023; Dirk 2005].

In this paper Carbon Capture: Storage and Utilization, I first remind readers of how Christians have viewed Christ as the Rock of Ages that empowered Moses and Isaiah. Moses and Isaiah used live burning coal to speak about God and who they believed sent them out “kissed” to call people to turn back to God. Secondly, with this link between Christ and live coal, I discuss how the rise of secularism appears to be causing many people to have “calloused hearts and deaf ears” as they fail to understand the significance of a live burning coal kissing the prophet Isaiah’s lips and causing him to liken the King, the Lord of Hosts to this live coal (Isaiah 6:10). Thus I call people of faith to reconsider the demonizing of Coal and his oily bride—the fossil fuel industry. I present 3 videos that explain how Carbon Capture can create a carbon loop: to reduce, reuse and recycle carbon as well as industrial, agricultural and human waste to cleanse, restore and sustain the earth so that everyone will eventually see, believe and declare the “earth is full of God’s glory. In conclusion, I assert that I believe coal and fossil fuel are gifts of God that can be used sustainably to transition world nations from the old Iron Age into a new Carbon Age.

2. The Building Block of All Life

Firstly, I would like to remind Christians, the concept of Christ being the Rock, the Stone upon which their Church and faith are built, is biblical and no empty claim. Christians all over the world claim this Rock is a divine gift and that this Rock is the building block of all life and in the fullness of time, according to divine plan, this Rock became human, took human form filled with the building block of all life and will come again at the end of the age so that the faithful will shine like the sun (Matthew 13:43).

Down through the centuries, many people have stumbled over the concept of a rock grasping the nature of God and man. Jesus must have seen Christ the Everlasting Father coming to life in a man called Simon bar Jonah as the prophet Isaiah foretold because upon declaring his faith in Christ as the son of the living God, Jesus replied, “Blessed are you, Simon son of Jonah! For this was not revealed to you by flesh and blood, but by My Father in heaven. And I tell you that you are Peter, and on this rock I will build My church, and the gates of Hades will not prevail against it” (Isaiah 9:6; Matthew 18:16-19).

Later, thinking like a man and not like God, Peter did not want to get behind Jesus and lift up the Cross that would bring an end to Jesus’s life, so Jesus said this Simon bar Jonah a.k.a. Peter had become Satan, a stumbling block (Matthew 16:23). Perhaps Peter did not want Jesus to stop breathing or himself to stop

² In the year that King Uzziah died, I saw the Lord seated on a throne, high and exalted; and the train of His robe filled the temple. Above Him stood seraphim, each having six wings: With two wings they covered their faces, with two they covered their feet, and with two they were flying. And they were calling out to one another: “Holy, holy, holy is the LORD of Hosts; all the earth is full of His glory.” At the sound of their voices the doorposts and thresholds shook, and the temple was filled with smoke. Then I said: “Woe is me, for I am ruined, because I am a man of unclean lips dwelling among a people of unclean lips; for my eyes have seen the King, the LORD of Hosts.” Then one of the seraphim flew to me, and in his hand was a glowing coal that he had taken with tongs from the altar. And with it he touched my mouth and said “Now that this has touched your lips, your iniquity is removed and your sin is atoned for.” Then I heard the voice of the Lord saying: “Whom shall I send? Who will go for Us?” And I said: “Here am I. Send me!” And He replied: “Go and tell this people, ‘Be ever hearing, but never understanding; be ever seeing, but never perceiving.’ Make the hearts of this people calloused; deafen their ears and close their eyes. Otherwise they might see with their eyes, hear with their ears, understand with their hearts, and turn and be healed.”

breathing, captured in the “bladder of a fish”³ or a dark, dank cave because earlier Jesus had said. “For as Jonah was three days and three nights in the belly of the great fish, so will the Son of Man be three days and three nights in the heart of the earth”(Matthew 12:39-40). In John’s Gospel, after visiting the tomb and seeing for himself that the tomb was empty, Peter perhaps feeling the need to secure an income, returns to fishing. After fishing all night and catching nothing, Peter hears the voice of Jesus, telling him to cast his net on the right side of the boat. Peter does and miraculously nets a great catch of fish numbering 153. When his band of followers bring this catch safely to shore, they roast the catch over hot coals (John 21:4-17)

The Cross of Christianity and the Golden Lamp Stand of Israel are Holy. For Israel, the Golden Lamp Stand like the Cross for Christians, conveys God’s everlasting message and promise of rebirth and restoration [JJ Travel in Israel 2015]. Furthermore, the Good News, the message of the Cross, is firmly anchored in the faith that comes out of the Hebrew testament that God is the Rock of Salvation (Psalm 18:2 and the Rock Eternal whom Christians claim is the anchor of their soul, their eternal breath (Hebrew 6:19)

Yet what may not be evident for many is the likely possibility that the hammer Moses used to forge the golden Lamp Stand would have been made by burning coal. Moses and his smiths hammered this Lamp Stand to resemble an amygdala, an Almond Tree (Exodus 25;Numbers 17). In the first century, this Amygdala, this beautiful flowering Almond Tree, originally forged and hammered to convey the eternal light and the beauty of the “tree of life” Moses encountered on the Lord’s Holy Mountain (Exodus 25:40; Psalm 15:1;24:1-3) was cut off from her roots and used as a Cross, a non-living stick by the Romans to execute the lawless. Yet even though with this stick this branch Christians preach Christ crucified, a stumbling block to Jews and foolishness to Gentiles...to those called by God to salvation, both Jews and Gentiles—Christ is the power of God and the wisdom of God (1 Corinthians 1:24). Standing up on this Tree, Jesus the Light of the World (John 8:12) calls those watching and listening to turn back to God [to salvation] and put their trust in God as their Rock...saying “Father into your hands I commend my spirit, my eternal breath” (Genesis 2:7; Psalm 33:6; Luke 23:46).

Today the idea of King Coal, the Black Rock, being a good source of energy is an anathema among many faith groups “greening” their churches by divesting from fossil fuels [Tyler-Davies 2019]. Coal mines and coal generating stations are being closed down in western nations even though many scientists agree that coal is an abundant economical source of carbon [Energy at a Glance 2023] and that carbon is the building block of all life [Austin 2023; Dirk 2005]. The belief that excess carbon in the atmosphere is causing the planet to overheat has some scientists looking for carbon substitutes [Dirk 2005]. Human bodies contain carbon and expel CO₂ with every breath. So it could become very dangerous to think of CO₂ as the big bad wolf that a vast majority of scientists now claim and some claim is a reason to limit human population [Climate Change 2023]. There are other so called pollutants associated with the combustion of coal and fossil fuels such as sulphur, nitrogen and fly ash. These are being addressed and regulations for cost-effective control of these so called pollutants are helping to clean up the coal and gas industry [Tungeon 2022].

3. The Rejection and Demonization of Carbon

The Paris climate talks are based on the premise that CO₂ is the Devil Incarnate, the big bad wolf that must be eliminated and chained up permanently [Mac Dowell 2022]. Environmental activists are even protesting celebrations of Black Pete accompanying St. Nick as he traditionally did in some parts of Europe giving coal to naughty boys and girls. This is an example of how secular values have crept into a Christmas tradition equating poor children who are naughty, who have nothing to wear, nothing to eat and nothing but sugar plums dancing in their heads to be viewed as bad children [Little 2018]. Yet in Europe

³ Vesica Pisces latin for Fish Bladder see <https://symbolsage.com/vesica-piscis-pisces-symbolic-meaning/>

where this Christmas tradition originated, a gift of coal would have meant a warm meal and the promise of employment.

Here in Canada, the Boundary Bay Coal Fired Generating Station in Saskatchewan, is still keeping people employed, and supplying homes with heat and light to give children a warm meal at Christmas. This Generating Station is a success story. It has been capturing 90% of all its flu gases since 2014. This success, is the equivalent of taking 900,000 cars off the road for a year [Mac Dowell 2022].

The Boundary Bay Coal Generating Station is just one proven example demonstrating that Coal and Fossil fuels can be retrofitted with abatement technology and trusted as reliable sources of energy capable of delivering safe clean energy. According to research fellows at the Heartland Institute, “coal generated 35 percent of the world’s electricity in 2022...and new advanced technologies “have reduced particulate matter emissions from coal plants by 99.8 percent, nitrogen oxides have been reduced by 83 percent, and sulfur dioxide has been reduced by 98 percent, when compared to older coal plants with no controls.” [Energy at a Glance 2023]. Vijay Jayaraj a research associate with CO2 Coalition says, “saving the planet must not mean rejecting fossil fuels to meet such needs. Otherwise, the clarion call of environmental activists is the death knell for the billions they would condemn to energy poverty”[2022]. Jayaraj also stresses how Africa is lifting itself out of poverty through the development of coal and fossil fuel and claims Africa doesn’t need western elitist climate policies [2023]. Like the Heartland Institute, the CO2 Coalition seeks to dispel the myths and exaggerations of the so-called “climate crisis and its demonization of CO2.”⁴

4. Three Selected Videos

The first selected video, CCm Technologies can be viewed at <https://www.re-tv.org/articles/reusing-captured-waste>.

Here, “CCm Technology’s Chief Executive Officer, Pawel Kisielewski and Chief Technical Officer, Professor Peter Hammond explain how they capture carbon dioxide, ammonia, nitrogen and other waste streams, and either store the captured material or convert it into valuable resources like fertilizer” that can be carbon zero or carbon positive.

In the second selected video, <https://www.youtube.com/watch?v=dTulpfiwG8Y> Jennifer Holmgren, the CEO of LanzaTech, a biotech startup company explains the goal of her company. LanzaTech wants to reduce global carbon emissions by making everyday consumer products with carbon captured from industrial chimneys. Their primary goal is to capture and use carbon in a circular economy to reduce the need for using “virgin fossil fuel” by reusing it over and over again, rather than burying it underground or in the ocean.

The third video asks why Elon Musk offered 100 million dollars to the first team of engineers who could figure out how best to use and capture carbon. Tommo Carroll, the narrator of the video, suggests that Elon Musk wants to use carbon to make the fuel to put people on Mars and then use and capture the carbon dioxide on Mars to make a human habitat on Mars and fuel their return to earth. This video can be watched at <https://youtu.be/Q5Knq0wNMUQ>.

As you watch the videos I have selected, ask yourself. If carbon is the building block of life on earth, why are World Leaders and Global Corporate Elites demonizing Carbon? Did you hear Pawel Kisielewski quote Mahatma Ghandi who said “waste is only a resource in the wrong place.” Did you hear Pawel Kiselewski also say that CCm has found a way to use the “Devil Incarnate, ie Carbon” to give farmers the fertilizer they want with a zero carbon footprint. Thus ask yourself. Why are Christians and other people

⁴ Much of what our children are taught about carbon dioxide in school and exposed to outside of the classroom is based on the flawed acceptance that human’s emissions of CO2 are leading to planetary doom. <https://co2learningcenter.com/>

of faith going along with this demonization? Why aren't more nice Christians lifting up their voices in support of the Black Rock and poorer nations that have an abundance of coal and fossil fuel? The prophet Isaiah claims his, "iniquity was removed" and his "sin was atoned for" when a live coal kissed his lips.

Recently, young global leaders reporting from the World Economic Forum disclosed that Africa must pay \$2.8 Trillion dollars to meet its obligations under the Paris Agreement. Yet Africa has the lowest emissions [Galma 2022]. Is this just? Are not African nations entitled to develop their coal and fossil fuel resources and lift themselves out of poverty—even if this means relying on unabated fossil fuel until such time as they can afford abatement technologies?

5. Conclusion

Why have so many Christians and people of other faiths joined in the chorus of secular voices demonizing coal and fossil fuel? The video clips I presented clearly show the need for faithful stewardship of the planet and its precious resources. Are Christians afraid they will be persecuted and censored if they take a stand for Carbon Capture, Utilization and Storage (CCUS)? Or are they simply ill equipped, under funded and unaware of the science the research fellows and associates from the Heartland Institute and CO2 Coalition are publishing to educate, the public, world leaders and even children. It is expensive to hire teachers who can connect their congregations with sacred texts showing how people of faith from the three Abrahamic faith traditions and other world religions have historically used metaphors of trees and rocks and even live burning coal to empower prophets to give glory to God and to talk about eschatology [Landes 2022].

Carbon Capture (CC) is expensive and many nations are ill equipped and underfunded to take a stand for CCUS at the moment. This is where people of faith can step up and empower underfunded nations richly endowed with coal and fossil fuel. Yet many people insist CC must be generated by renewable power or by planting more trees. They argue a wind farm that can power a Direct Air Capture plant takes a huge amount of land, resources and energy [Tommo 2021]. So does planting crops and growing trees. Thus, to manage the space and cost of CC, it makes sense to capture carbon and other flu gasses of hard to abate industries such as the coal industry [CCm Technologies 2022].

Moreover it makes biblical sense to utilize the CO₂, many environmental lobby groups perceive as the enemy and the Devil Incarnate. With carbon capture and storage technologies and innovative companies such as Clime Works, Carbon Engineering, Lanza Tech, and CCm Technologies, humanity has the potential to redeem and use CO₂ and other so called pollutants for good to help renewables such as Solar and Wind to provide electricity, especially on cloudy or windless days. With redemption and utilization of what many see as garbage, pollution or waste, people all over the world will realize the Holy City—the New Heaven and Earth, coming down out of heaven John the Divine envisioned two thousand years ago (Revelation 21:2).

The end of the Bronze and Iron Ages has arrived. The Carbon Age is imminent. It is time for the righteous to rise and shine like the sun in the kingdom of their Father and their Mother as ONE Son, as ONE DIVINE FAMILY (Matthew 13:43).

References

Austin, Ara, (2023), Advanced Materials, Processes And Energy Devices. Retrieved on November 9, 2023 from <<https://sparks.learning.asu.edu/videos/carbon-molecules-the-building-blocks-of-life>>

CCm Technologies (2020), Capturing and recycling carbon dioxide from industrial waste streams. Video uploaded by RE:TV September 2020. Retrieved on December 30, 2022 from <<https://www.re-tv.org/articles/reusing-captured-waste>>

CO2 Coalition, Home (2023). Retrieved on November 8, 2023 from <<https://co2coalition.org/>>

Carroll, Tommo (2021), Why Elon Musk is Actually Obsessed With Carbon Capture. YouTube. Retrieved on December 30, 2022 from < <https://youtu.be/Q5Knq0wNMQ>.>

Climate Change - Population Connection. Retrieved on November 8, 2023 from <<https://populationconnection.org/why-population/climate-change/>>

Dirk, SM., Irwin, L.N. (2005), *Building Blocks of Life*, in: Life in the Universe. Advances in Astrobiology and Biogeophysics, vol 3. Springer, Berlin, Heidelberg. (Retrieved on December 30, 2022 from <https://link.springer.com/chapter/10.1007/10825622_5>

Energy at a Glance (2023), Coal Power. (Retrieved on November 8, 2023 from < <https://energyataglance.com/2023/10/27/energy-at-a-glance-coal-power/>>

Energy Education, University of Calgary (2018), Coal Types. (Retrieved on December 30, 2022 from <https://energyeducation.ca/encyclopedia/Coal_types>

Galma, Kulé (2022), *Here's How African Leaders Can Close the Climate Finance Gap*, in: COP World Economic Forum. Retrieved on December 30, 2022 from < <https://www.weforum.org/agenda/2022/11/heres-how-leaders-close-climate-finance-gap/>>

Helmenstine, Anne Marie (2020), What Are the Elements in the Human Body? Retrieved on November 10, 2023 from <https://www.thoughtco.com/elements-in-the-human-body-p2-602188?utm_source=emailshare&utm_medium=social&utm_campaign=shareurlbuttons >

Jayaraj, Vijay (2022), *CO2 Coalition Research Associate Vijay Jayaraj quoted*, in The Popular in the Pipeline. Retrieved on November 8, 2023 from <<https://co2coalition.org/?s=Vijay+Jayaraj>>

Jayaraj, Vijay (2023), Africa Doesn't Need Western Elites' Meaningless Climate Policies. (Retrieved on November 8, 2023 from <<https://co2coalition.org/2023/11/06/africa-doesnt-need-western-elites-meaningless-climate-policies/>>

JJ Travel (2018), *The Emblem of Israel – Rebirth and Restoration*. (Retrieved on November 4, 2023 from <<https://www.jjtravelinisrael.com/almond-blossom-and-the-golden-lampstand/>>

Landes, Richard (2022), Eschatology, Religion. Britannica Online. Retrieved December 30, 2022 from <<https://www.britannica.com/topic/eschatology>>

Little, Becky (2018), *This notorious Christmas Character is Dividing a Country*, in: National Geographic Culture Online. Retrieved on December 30, 2022 from <<https://www.nationalgeographic.com/history/article/black-pete-christmas-zwarte-piet-dutch>>

Mac Dowell, Niall (2022), *Boundary Dam Unit 3 CCS Facility: Celebrating Success and Sharing Lessons Learned* in: International CCS Knowledge Centre Blog. (Retrieved on December 30, 2022 from <<https://ccsknowledge.com/blog/boundary-dam-unit-3-ccs-facility-celebrating-success-and-sharing-lessons-learned>>

Now Earth (2022), Startup Turns Carbon Emissions Into Clothing. YouTube uploaded by UpcycleThis. Retrieved on December 30, 2022 from < <https://www.youtube.com/watch?v=dTulpfiwG8Y> >

Shemot, Rabbah 1 (2023), Sefaria Community Translation of the Child Moses Tested with the Choice of Gold or Coal. Retrieved on November 9, 2023 from <https://www.sefaria.org/Shemot_Rabbah.1.31?lang=bi&with=all&lang2=en>

Tyler-Davies, Monica (2019), A new fossil free milestone: \$11 trillion has been committed to divest from fossil fuels. Retrieved on November 9, 2023 from < <https://350.org/11-trillion-divested/>>

Turgeon, Andrew and Morse, Elizabeth (2022), *Coal*, in: National Geographic Resource Library, edited by Jeannie Evers, Emdash Editing, produced by National Geographic Society. (Retrieved on December 30, 2022 from <<https://education.nationalgeographic.org/resource/coal>>