

Going for ‘Broke (Pembroke) - The Keystone XL Pipeline in Global Petroarchitecture

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All life is carbon-based. With its remarkable capacity to link in four directions, the carbon atom provides the skeletal framework of every living creature. Carbon-based energy comes from the architecture of carbon-rich life, whether food, fuelwood, peat, natural gas, coal, or petroleum.¹ As the word “keystone” is used for keystone species and architecture of houses, bridges, and cathedrals, it also appears in the name, Keystone XL—the proposed petroleum pipeline under consideration by the U. S. Department of State and Congress. Architecturally, a keystone locks together two legs of an arch. If completed, the Keystone XL pipeline would do much the same.

The Alberta-to-Port Arthur Arch.— Of Keystone XL’s legs, the Canadian one, is the most apparent—on conspicuous display in the devegetated expanses in Athabasca, Cold Lake, and Peace River landscapes of northern Alberta. Spanning bogs, fens, peatlands, and marshy conifer ecosystems of the circumpolar taiga, these landscapes reside above carbon-rich peatlands and soils they helped create from carbon they extracted from the atmosphere.² Beneath these peatlands and forest soils also reside sands impregnated with carbon-based bitumen. Bitumen, like most carbon-structured depositions, was also extracted from the atmosphere—ages ago by earlier aquatic life that thrived in and around myriad tidal estuaries at the interface of land and an epi-continental sea. Here, ancient life took carbon dioxide from the air, transforming and sequestering its carbon in organic sandy silts—reducing high atmospheric concentrations of this greenhouse gas, unthinkingly helping to maintain a supportive atmosphere and a habitable Earth.

Carbon accounts for some 82 to 84% of this bitumen,³ and if extracted, could make some 1.7 trillion barrels of heavy sour crude, at 42 gallons per barrel, of which an impressive 169 billion barrels can be tapped based on present economics and technology.⁴ And the carbon it sequestered from the atmosphere and other carbon-based fuels used to extract it are sooner or later returned to the atmosphere⁵ with great losses of loss of naturally-sequestered carbon.⁶

The Canadian leg of this petroarchitecture connects with the U.S. international Port of Morgan, Montana—the north face of the keystone. If scribed across the U.S. it would meet its south face on the Texas coast, at Port Arthur. Here is the Port Arthur Refinery, established by the Texas Company in 1902, later called Texaco.⁷ In 1989 it sold half its interest to form a Texaco-Saudi joint venture. Today two giant companies remain. One is Motiva, a joint venture of Royal Dutch Shell and Saudi Refining, formed to secure a petroleum outlet for Saudi Arabia and a reliable stream to Shell. The other is Valero, a participant with TransCanada’s Keystone,⁸ whose sizeable enterprises place it in the top 10 Fortune 500 companies.⁹ Both Motiva and Valero have in recent years developed the capacity to process heavy sour crude at Port Arthur.

In 2012 Motiva completed a five year project that more than doubled its capacity to 600,000 barrels of crude per day.¹⁰ And the recent expansion of Valero’s Port Arthur refinery increased its heavy sour crude throughput capacity to 310,000 barrels per day.¹¹

The Port Arthur-to-Pembroke Arch.—Valero owns 16 refineries, 15 in the Americas.¹² Its only across-the-Atlantic enterprise is Pembroke Refinery on the coast of Wales. Purchased from Chevron in 2011, this is one of the largest refineries in Western Europe and resides in the sheltered deepwater Port of Milford Haven. Calling itself “the energy capital of the UK”¹³ this port has impressive depth due to flooding of an earlier river valley by a rising sea. It handles over 29 per cent of Britain’s oil and gas trade, serving the energy terminals of Valero, Murco Refinery, South Hook Liquefied Natural Gas, Dragon LNG (Liquefied Natural Gas) and SemLogistics—the last being the U.K.’s largest independent petroleum tank farm.¹⁴ Its oil refineries operate on the basis of crude oil imports.¹⁵ Valero’s eight berths for super-tankers, and its location along the Pembrokeshire Coast National Park are impressive.¹⁶

Its linkages with the rest of the U.K. are also impressive, because it also has purchased interests in four major U.K. pipelines, 11 fuel terminals, an aviation fuel business of 14,000 barrels per day, and a network of over 1000 Texaco-branded dealer sites across the U.K.¹⁷

In the larger petroarchitectural picture, carbon in bitumen sands was extracted from the atmosphere of an ancient warmer earth by living creatures when its carbon dioxide concentration was over three times today’s. As they died and decayed, their carbon-based remains were sequestered in sandy estuary bottoms.¹⁸ These remains, called bitumen or asphalt cement, is what we combine with sand and crushed stone to form the concretion we call bituminous concrete.¹⁹ And bitumen can be separated from oil sands the same way bituminous concrete is recycled, by heating using natural gas. This produces oil sands bitumen that has between 2 to 4 and sometimes up to 5 times more energy than what was used to produce it, a figure that compares with 35 for conventional world oil production,²⁰ making its production wholly uneconomic when oil prices drop much below \$65 or \$75 per barrel.²¹ One extracted, the viscous bitumen, it is diluted with other hydrocarbons forming “dilbit” and to the international Port of Morgan.²² And then to Port Arthur via Keystone XL. This is the first of two arches—bridging from Canada to the Gulf of Mexico—whose keystone is Keystone XL.

This first arch is followed by a second arch—this time bridging from Texas to Wales, 15.3 days away.²³ The keystone of this second arch is the Atlantic Ocean across which petroleum super tankers sail. And so we find not one arch, but two. Not one keystone, but the Keystone XL, and the “Keystone Atlantic.” When we “connect the dots” we discover two linked keystone arches linking Canada, the United States, and the United Kingdom. It is no wonder that the U.S. State Department rather than the EPA has been assigned analysis of this international petroarchitecture.

This “connecting the dots” generates some key questions:

Is Keystone XL being pushed by TransCanada to gain U.S. independence from foreign oil? Is Keystone XL aimed at increasing U.S. jobs (Valero recently told its stockholders that Pembroke refinery operates at 25% less than average)? Does the Royal Dutch Shell-Saudi venture, and the Kingdom of Saudi Arabia enter the picture and how? And the crucial question before the State Department: Is Keystone XL in the national interest of the United States?

But there is more. A keystone locks the two legs of an arch together—if it is bi-faceted. But is our petroarchitectural keystone multi-faceted, with many legs as in an architectural dome? There are the bitumen sands of Utah²⁴ and the Bakken shale of North Dakota.²⁵ And factoring in here are more legs formed to re-route increased oil and gas supplies realized from increased fuel efficiency vehicles and buildings, and reduced petroleum use due to increasing solar and wind energy.

Discovery of other legs is easily accomplished by finding their key supporters, proponents, propagandists, lobbyists, beneficiaries, and protesters.²⁶ What is found is a developing multifaceted Keystone XL, supporting many legs of a petroarchitectural dome. A multi-faceted Keystone XL is developing into a *Keystone Dome*—developing capacity to move petroleum wherever it brings the highest price.

Yet, the owner of Keystone XL, TransCanada, says that “This pipeline is a critical infrastructure project for the energy security of the United States and for strengthening the American economy” and “Along with transporting crude oil from Canada, the Keystone XL Pipeline will also support the significant growth of crude oil production in the United States from producers in the Bakken region of Montana and North Dakota.”²⁷

This disclosure of a *Keystone Dome*, coming as it does from “connecting the dots,” adds a few more questions:

Will Keystone XL move U.S.-produced petroleum to overseas ports? Will the current ban on export of U.S. crude be lifted?²⁸ Is U.S. energy independence a driver of what is happening, and how? In times of increased efficiency of energy use, what can keep up the U.S. price of oil and gas for the producer? What can hold petroleum prices high enough to keep dilbit competitive? And again, the crucial question under consideration by the U.S. Department of State: Is Keystone XL in the national interest of the United States?

Reflecting on this topic, we find on the one hand that earth’s biosphere produces carbon dioxide; on the other it extracts it, sequestering it in vegetation, soil, peat, bitumen, shale, coal, oil, and gas. Going both directions: not too much; not too little. This is the balance that must be understood and appreciated.

As for seeing this topic in the context of a sustainable biosphere, Secretary of State John Kerry, in a published address delivered in Indonesia on February 14, 2014, said, “We just don’t have time to let a few loud interests groups hijack the climate conversation. And when I say that, you know what I’m talking about? I’m talking about big companies that like it the way it is that don’t want to change, and spend a lot of money to keep you and me and everybody from doing what we know we need to do.”²⁹

In the name of gaining U.S. petroleum independence, more jobs for American workers, keeping U.S. oil at home, reducing injection of carbon into Earth’s atmosphere, and supporting the national interest—the Keystone XL does just the opposite. We know what we need to do.

1. See for example, T.C. Chamberlin, 1898, at: <http://www.jstor.org/stable/30054731>
2. See: Worldwide distribution of the boreal forest - a map showing its circumpolar dominance at <http://www.ramp-alberta.org/river/boreal/distribution.aspx>
3. These percentages of 82 to 84 per cent are rounded to whole numbers from O.P. Strausz, at: http://web.anl.gov/PCS/acsfuel/preprint%20archive/Files/22_3_MONTREAL_06-77_0171.pdf in an article entitled “The Chemistry of the Alberta Oil Sand Bitumen.”
4. From page 5, “The continental and global context” of Canada’s Oil Sands, Third Edition, November 2011, accessible at: <https://www.centreforenergy.com/Shopping/uploads/12.pdf> (Figures rounded to even numbers.)
5. The various amounts by source are published by the Environmental Protection Agency at: <http://www.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2012-Annex-2-Emissions-from-Fossil-Fuel-Combustion.pdf>
6. See Rooney et al. “Oil sands mining and reclamation cause massive loss of peatland and stored carbon” at www.pnas.org/cgi/content/short/1117693108 and click on pdf Supplement for full download.
7. See: <http://www.texacohistory.com/History/>
8. See the announcement from *Business Wire*: SAN ANTONIO--(BUSINESS WIRE)--Valero Energy Corporation (NYSE: VLO) today affirmed that it has agreed to participate as a prospective shipper, subject to regulatory approvals, on the 500,000 barrel per day expansion of the Keystone crude oil pipeline system from Western Canada to the U.S. Gulf Coast at Port Arthur, Texas. Earlier today, TransCanada and its partner, ConocoPhillips, announced plans to increase the commercial design of the Keystone pipeline to 1.1 million barrels per day by 2012. <http://www.businesswire.com/news/home/20080716006199/en/Valero-Receive-Canadian-Crude-Oil-Gulf-Coast>. Subsequent to this announcement, TransCanada bought the share of ConocoPhillips in Keystone, and now is the sole owner.
9. See: <http://money.cnn.com/magazines/fortune/fortune500/2013/snapshots/10620.html>
10. See Motiva expansion comes on line in Texas at <http://www.aramcoservices.com/News-Events/Motiva-expansion-comes-on-line-in-Texas.aspx>
11. See Valero Port Arthur Overview at <http://www.valero.com/ourbusiness/ourlocations/refineries/pages/portarthur.aspx>
12. See: <http://www.reuters.com/finance/stocks/companyProfile?symbol=VLON>
13. See: Port of Milford Haven at <http://www.mhpa.co.uk/>

14. See the Wales Enterprise Zones, set up by the Welsh Government to attract new business: <http://business.wales.gov.uk/enterprisezones/enterprise-zone-locations/haven-waterway/business-environment/who%E2%80%99s-already-here>
15. See p. 6 of University of Cardiff (2012), “An analysis of economic activity dependent on the Milford Haven Waterway, at: http://www.mhpa.co.uk/uploads/MHPA_Cardiff_Uni_Report.pdf
16. See Pembrokeshire Coast National Park at <http://www.pembrokeshirecoast.org.uk/default.asp?PID=4>
17. See Valero’s news on purchasing Pembroke refinery and other assets in the U.K. & Ireland: http://www.valero.com/NewsRoom/Pages/PR_20110311_1.aspx
18. See http://www.ags.gov.ab.ca/publications/abstracts/ESR_2000_07.html where the Executive Summary gives good detail, and where the full report can be accessed. A much earlier geological study by Mellon et al. (1956) has photos of aquatic creatures that lived here and can be accessed at: http://www.ags.gov.ab.ca/publications/REP/PDF/REP_72.PDF. Besides the photos, pages 13, 31 & 38 are especially interesting.
19. Specifications for making bituminous concrete from bitumen are given at: http://www.ct.gov/dot/LIB/dot/Documents/dform815/M_04M.pdf
20. The figure of “2 to 4” come from David J. Murphy and Charles A. S. Hall 2010 “Year in review—EROI or energy return on (energy) invested” Table 2, accessible at: <http://onlinelibrary.wiley.com/doi/10.1111/j.1749-6632.2009.05282.x/abstract> (I have a copy of the complete paper if you would like a copy.
21. See page ES-12 of the Final Supplemental Environmental Impact Statement at <http://keystonepipeline-xl.state.gov/documents/organization/221135.pdf>
22. Morgan, Montana is also the Port of Morgan as shown here for a natural gas pipeline: <http://www.tcpipelineslp.com/northern-border-pipeline.html>
23. This can be computed for the distance from Port Arthur to Pembroke of about 5,280 miles with a typical oil tanker speed of 12 - 13 knots. Various websites are available to help make this calculation.
24. See: Utah’s Oil Sands at http://www.usoilsandsinc.com/index.php?page=utahs_oil_sands
25. See: Bakken Shale Formation at <http://bakkenshale.com/>
26. See: <http://www.no-tar-sands.org/2013/04/watch-out-valero/> (Wales); <http://www.tarsandsresist.org/> (Utah); <http://www.no-tar-sands.org/> (UK); <http://www.tarsandsblockade.org/> (Texas)
27. See: TransCanada - A proposed oil pipeline from Alberta to Nebraska at <http://keystone-xl.com/about/the-project/>

28. See: “New Senate Energy head will need time to lift U.S. oil export ban” -Reuters 11-7-14 at <http://www.reuters.com/article/2014/11/11/us-usa-elections-oil-exports-analysis-idUSKCN0IU0W120141111>

29. The full text of John Kerry’s speech is at “speeches” at the State Department website, of which I have a copy if you would like it, but the part I quote was also repeated on NPR at: <http://www.npr.org/blogs/thetwo-way/2014/02/16/277938409/kerry-warns-indonesia-climate-change-threatens-entire-way-of-life>

30. This piece was completed on November 13, 2014. An earlier version of this article was published in *Sojourners* magazine, written in language that hopes to enlist conservative Christians to address the proposed Keystone XL pipeline project from a perspective that corresponds with their beliefs. The editor of this magazine selected a title for this article accordingly, but unfortunately this diminished its alert to the international setting of Pembroke and overseas export of Canadian and U.S. petroleum for which markets are being developed to compensate producers for reducing sales in the U.S. due to increased efficiencies being realized in the U.S. (See <http://sojo.net/magazine/login?nid=54129>). A copy of this article, as a pre-print is available by writing cbdewitt@wisc.edu.

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