Comments on the Keystone XL Final Supplemental EIS

http://keystonepipeline-xl.state.gov/finalseis/index.htm

Preface

My name is Milt Hetrick, my home is in Centennial, CO. I am a retired engineer/physicist who has worked professionally in the aerospace and energy sectors.

> **Personal Experience**. In the summer of 2010, we transitioned our home away from burning ancient hydrocarbons. We no longer ask our utility company to burn coal to make our electrical power. We now operate our home and all our appliances solely on **inexhaustible**[1] energy harvested from solar photovoltaic modules on our roof. We no longer buy and burn natural gas. Our gas furnace was replaced with a GeoExchange heat pump operated by the solar electricity we harvest. In 2012, we purchased a plug-in hybrid vehicle (Chevy Volt) that, thanks to about 10 of the 40 solar PV panels on our roof, provides 10,000 miles of zero emission transportation per year using energy from the Sun (not energy sold by ExxonMobil). For details see…. We no longer require the burning of ancient hydrocarbons for a significant portion of our energy needs.

I attended the KXL Public Hearing in Grand Island, NE on 4/18/2013; and submitted my comments on the Draft EIS to the U.S. Department of State (DoS) back in April, 2013.

> Our challenge today is **reducing our addiction to oil.** Because it is obvious that **another oil pipeline does absolutely nothing to lessen human addiction to burning finite reserves of ancient hydrocarbons**, in my written comments to the DoS in 2013, I also included an example of how we could spend the $7 Billion dollars expected to be invested in this Canada to Texas pipeline on sustainable alternatives instead that would actually reduce our dependence on coal, oil, and natural gas, etc. – for example, a project we might call America XL: A Rooftop Solar Electric Project – One step toward energy security and oil independence.
>
> > **America XL:** This example project illustrated that with the same amount of money as this pipeline from Alberta, Canada to the Texas gulf was projected to cost ($7 B), we could convert ½ million (or more) homes to 100% solar and actually reduce U.S. dependence on fossil fuel plus create 50,000 direct jobs – 10 times more jobs than a pipeline creates.
>
> **Another pipeline is simply "more of the same, hoping things change."**

Now nearly a year later, I see things a bit differently. I am herein forwarding my new comments to the Final Keystone XL EIS that focus on sustainable vs. unsustainable living. Building another pipeline is clearly unsustainable.

[1] We use the term 'inexhaustible' to replace the obsolete term "renewable." "Renewable" is probably a term invented by Big Oil to create the frame that non-carbon based energy somehow gets old/worn out and then must be re-newed. Nothing could be further from the truth. There is nothing 'renewable' about the solar energy coming to Earth. It has been providing Earth with Life sustaining energy consistently and continually for the past 4.5 billion years. And this energy flux will continue for several more billion years. Solar, wind, geothermal, tidal, hydro, wave energy sources are more appropriately put into a frame called **inexhaustible sources of energy** – whereas ancient hydrocarbons (as well as nuclear fissionable sources) are finite/ limited/exhaustible. The finite reserves of Ancient Hydrocarbons on the planet will be consumed in less than 100 years. Our finite supply of yellow cake Uranium used in nuclear power plants may last 200 years.

We suggest a path that will help us transition to a sustainable civil society by simply updating our economic system and eliminating externalities. This EIS now takes on a broader role. It serves to describe the Environmental Impact Statement of pipeline AND serves as the Externality Inventory Summary. In these 2014 comments, we offer an example of how eliminating a few key externalities provides a clearer picture of the true (Real World) cost of this proposed pipeline project. Using this more accurate pricing of tar sands products, you can predict how the market will respond.

Summary

I remain opposed to the construction of the Keystone XL Pipeline.
I urge the Department of State to deny this permit for the reasons explained below.

- Despite this comprehensive assessment of the environmental impact of the Keystone XL pipeline project, the Final EIS does not offer any rational reasoning to support the conclusion that this project is in our national interest.
- Another pipeline does not help reduce our dependence on burning ancient hydrocarbons for our energy needs.
- This pipeline has no positive impact on America's Energy Security.
    - Only efforts to transition to inexhaustible sources of energy (solar, wind, hydro, hydrogen based fuels, geothermal, tidal, wave) will make us more secure.
    - Constructing another pipeline is not such an effort.
- The pipeline would perpetuate and promote "cidal" human behavior (suicidal, homicidal, genocidal, ecocidal behavior) – more burning.
- Constructing this pipeline would be 'aiding and abetting' the further assault on the global environment and hence life on our planet.
- Instead of building another pipeline, we would be better off updating our lifeline – our economic / political /legal social system.
- We suggest a path that will help us transition to a sustainable civil society by simply updating our economic system and eliminating the ignored costs – the "externalities."
- Using the EIS as both the Environmental Impact Statement of pipeline AND the Externality Inventory Summary helps us eliminate the ignored social costs of this project, makes a Pigovian correction to our economy and lets a more informed market decide our energy future.
- In a "sustainable world" **Reparation Costs** (in excess of $40 / barrel) and **Energy Replacement Costs** (in excess of $190 / barrel) are embedded in the price of the tar sands products – in addition to the customary **Production Costs** (~$30 / barrel) plus a **Profit.**
- **Having a better informed market makes a (sustainable) world of difference.**

Reasoning

Introduction

The Keystone XL pipeline Final Environmental Impact Statement (EIS) describes "Environmental Impacts" of a proposed 875 mile long oil pipeline project. Although significant effort has gone into the preparation of this EIS document, unfortunately it was based on and written from an **unsustainable** frame of reference as will be explained.

This unsustainable frame of reference assumes that burning ancient hydrocarbons (e.g. tar sands oil) to meet our energy needs is acceptable human behavior. **It's not**.

The Stakeholders in this Department of State decision tend to fall into one of three groups as indicated in the table below.

Stakeholder Perspective / Frame	Stakeholder Group	Human Behavior	State Dept. Decision
More of the Same; Hoping Things Don't Change.	Oil & Gas Corporations	Unsustainable / "cidal"	APPROVE KXL PERMIT
More of the Same; Hoping Things Change.	Addiction Enablers	Unsustainable / "cidal"	APPROVE KXL PERMIT
It's Time to Change. No More of the Same; It's the Only Way to Change	Concerned Citizens	Sustainable	REJECT KXL PERMIT

We urge the Department of State to decide that it is time to help our nation change so that as a country we begin to exemplify sustainable living. Approval of this pipeline simply enables our addiction, continues to deplete this precious finite one-time-only resource, contributes to the increase of greenhouse gases in the atmosphere, and quickens our pace to the bottom of the barrel. Approval of the pipeline does nothing to help us transition from burning ancient hydrocarbon to harvesting **inexhaustible** sources of energy (solar, wind, hydro, geothermal, tidal, wave, hydrogen-based technology,…) for our energy needs.

For the sake of our children and all future generations, we have a responsibility to leave our planet in better shape than we were given – and we can if we change a few things. We can change, if we begin to make different choices. There are sustainable alternatives to burning ancient hydrocarbons to meet our energy needs (as we have demonstrated on a personal basis by transitioning our home from fossil energy to solar energy). We will make different choices if we update our human-created social system that influences those choices.

To help America move beyond our addiction to burning ancient hydrocarbons, we start by deciding "No more of the same" because that's the only way to initiate change. Take it one step at a time.

We start by having the Department of State reject this pipeline now; that's the first step.

Additional reasoning and an outline of a possible roadmap for this viable albeit challenging endeavor is provided below.

Unsustainable Living is "cidal" Behavior – Not in our Nation's Interests

. As a result of our evolving human collective consciousness, we are now aware that ANY further burning of one-time-only ancient hydrocarbons (coal, petroleum, natural gas, tars sands oil, shale oil) must be acknowledged as "cidal"[2] human behavior (i.e. suicidal, homicidal, genocidal, ecocidal behavior). In other words, our current burning behavior is doing irreparable harm to ourselves, our species, and our interdependent network of Life. Any further "cidal" behavior is no

[2] Latin *-cīda* killer, *- cīdium* act of killing, derivatives of *caedere* to cut down, kill

longer acceptable for the sake of the 7 billion people living today, for the sake of all future generations and for all Life on the planet. It certainly is not in our nation's interests.

It's Time to Change. Permitting another pipeline is just "More of the Same."

Why is Constructing another Pipeline Unsustainable Human Behavior?

- Constructing another oil pipeline is 'aiding and abetting' a more fundamental unsustainable behavior – burning ancient hydrocarbon.
- Constructing another oil pipeline itself expends / requires burning and consuming remaining reserves of this precious ancient hydrocarbon. Energy is required to scrape, trench, weld, install a pipeline, backfill, and restore the Earth to health. Energy is required to operate the pipeline with its 20 pumping stations along the route just from Morgan, Montana to Steele City, Nebraska.
- Constructing another oil pipeline introduces the very real risk of a pipeline rupture that transforms previous livable local soil, water, and air into a toxic no-complex-life-grows-here land.

  A major pipeline failure is actually a certainty (See Appendix A for a few recent tar sands oil pipeline failures). By definition, the pipeline will be operated by its 'for-profit' owner until it is no longer "cost effective" – i.e. it will be operated until the cost of repairs and remediation of oil spills, and litigation to recover damages from these spills exceeds the profit margin of the operation. Only then, after numerous pipeline failures, will the operation cease and be abandoned. The owner of the pipeline at that point in time will restructure under bankruptcy laws and/or walk away leaving the aftermath to the public. 'We the People' will have to clean up the mess, deal with the rotting carcass of a 1661 mile long rusting steel casing buried 5 feet underground that still holds residual toxic dilbit or SCO. The residual abandoned oil will eventually permeate the soil and in those areas where the pipeline is over the Ogallala aquifer, the oil will float on this ancient water and be pumped to the surface by local residents / farmers to irrigate their crops, feed & water their animals, and raise their families.

Why Is Burning Tar Sands Oil Unsustainable Human Behavior?

Extracting and burning our finite reserves of ancient hydrocarbons (e.g. coal, petroleum, natural gas, tar sands oil, shale oil) is unsustainable human behavior from several perspectives:

1) Consuming Finite Ancient Hydrocarbons is Unsustainable Physically. Do the Math (No Science Involved).

The "Great Burning" of ancient hydrocarbons started about 200 years ago.[3] At our current rate of consumption, first grade arithmetic tells us humans will have burned all the remaining "one-time-only" finite reserves of ancient hydrocarbons[4] (thereby making them unavailable for future generations) within a mere 100 years– unless we change our current behavior. That's 4 human generations.

[3] The "Great Burning" began in the early 1800s if you consider our past obsession with killing and rendering whales for oil to burn. As whales were nearing an anthropogenic extinction, chemists discovered how to refine petroleum, and Drake's oil well in PA is credited as being one of the first deliberate (and successful) attempts to drill for oil in 1856. In a sense petroleum saved our whales.

[4] Ancient hydrocarbons, we think of as something to burn, are also referred to as ancient sunlight. Ancient hydrocarbons embody energy stored by living systems over 300 million years ago during the 60 million year long Carboniferous Era. This was a period in the Earth's deep history when autotrophs, living systems that derived their energy directly from the Sun prospered. CO_2 levels were 5 times what they are today. Temperatures were probably 10 degrees C (20 deg F) hotter, living systems were concentrated in the ocean and beginning to use flipper/fin to crawl on land. As plant life on land thrived and pulled CO2 out of the air

My great granddaughters born last year (2013) will likely live to see the practical end of coal, oil, natural gas – unless we transition to inexhaustible sources of energy (solar, wind, hydro, hydrogen-based fuels, geothermal, tidal, wave) as soon as possible - not in 2020, not in 2050. Now, because we can. Now, because it is our responsibility as adults to leave the planet a better place than we inherited from our parents. Now, because it is the least we can do for future generations.

Many people believe 4 generations is plenty of time for magic to provide a solution, so what's the urgency? Drill baby drill. For perspective, without anthropogenic influences, the natural aging of our planet is expected to maintain a habitable home for life as we know it for at least another 500 million years - that's 20,000,000 more human generations. We don't need magic and 4 generations. The alternatives sources of energy are already available. We just have to stop doing "more of the same" like constructing another pipeline, and use that effort to transition to inexhaustible energy sources.

The sooner we transition away from burning ancient hydrocarbons, the less traumatic this change will be. To transition today is actually quite easy (as our personal experiment mentioned earlier has demonstrated.) Waiting 50 – 100 years will be more painful - when there is less remaining ancient hydrocarbon required to make the transition; with price gouging by those who retain the mineral rights for the remaining hydrocarbon resources; with extreme damage to our environment and personal health, and with profit-taking by those sensing the state of emergency.

Just simple arithmetic (subtraction). The reader should note that this assessment of our unsustainable human behavior with respect to energy has nothing to do with global warming, climate change, the environment, EPA regulations, liberal vs. conservative, Christian vs. Muslin, capitalism vs. socialism, Fox "News" vs. MSNBC, or any other displacement issue/conflict you can think of. This conclusion that the "Great Burning" will end within 100 years (one way or another) is based on simple arithmetic.

Burning (consuming) a finite resource is clearly unsustainable behavior. A transition to other forms of energy is inevitable in the foreseeable future. And a transition sooner is better than later for many reasons.

Postponing the inevitable is immoral. Clearly if we continue our current consumptive behavior today, knowing the effects of our behavior on future generations, we are only postponing the inevitable. We are knowingly shifting the full burden of this transition to inexhaustible energy sources onto the backs of our children and grandchildren - hardly moral behavior for self-proclaimed responsible adults. Some would go so far to say, "Once you are conscious of your unsustainable behavior, and you continue with that destructive violent behavior, your actions become a crime against humanity."

Although we can now see the end of burning, that does not mean the end of happy, productive, joyful living. Quite the opposite. Fortunately there are several viable (and inexhaustible) alternative energy sources already available. Actually the transition to known inexhaustible energy sources **eliminates** a myriad of other problems: further climate change; fracking issues; mercury contamination; carbon particles in atmosphere; CO2, Methane & other greenhouse gases; coal ash; acidification of ocean, glacial melt; contamination of rivers & streams; deforestation, benzene release; etc.; mountain top removal; holding pond failures;

Even thinking about constructing another oil pipeline to facilitate the burning of ancient hydrocarbons is borderline insanity. Another pipeline is certainly NOT sustainable human behavior – basic arithmetic tells us that.

2) Burning has Become Detrimental to Living Systems - (Some Science & Systems Perspective Required.)

From a systems perspective, building another pipeline that supports the "Great Burning" is unsustainable human behavior. As a fact not intended to embolden misguided egos, the burning behavior of 7 billion humans is now having a detrimental effect on all Life in our Solar System.

Energy drives Living systems. Living systems have been emerging (evolving) on planet Earth for the past 3.5 billion years. By the grace of the energy from our 5 billion year old Sun – a heavenly concentration of primordial hydrogen & helium – an energy source expected to gravitationally fuse its captive finite fuel and emit light for several more billion years – we are alive today. Without this consistent inexhaustible source of energy, Life as we know it on Earth would not be possible.

It takes a 'Solar System' for life to emerge, thrive, perpetuate and evolve in consciousness. Earth alone is necessary but not sufficient.

Living Systems Emerged on Earth. Based on limited exploration of our Solar System, it appears that living systems are confined to planet Earth. There are nearly 2 million documented examples of diverse living systems (species)[5] that now thrive within our interdependent network of Life on our planet. This interdependent network of living systems is embedded within a more complex system of non-living Earth systems. The complete Earth system is often called Gaia. Earth and its Moon in turn are tucked into the middle of a family of protective planets within our even more complex Solar System.

We homo sapiens are in turn a complex system of systems of systems – totally dependent on the healthy presence of our non-human cousins to collect, transform, concentrate and convey the Sun's energy to us so we too can live.

Emergence of living systems. The fossil record and DNA research continue to uncover how living systems on planet Earth emerged (evolved) during the past 3.5 billion years. Our Story (Everybody's Story) is a tale of Emergence: the creation of something more (complex) from nothing but (something that already exists) as a result of new relationships (brought together by a source of energy.)

Emergence of Homo sapiens – one of the more capable living system (species). With the emergence of our species, homo sapiens, some 200,000 years ago from eastern Africa, we appear to be among the more complex and conscious living systems alive today. With our current consciousness we, together with the interdependent network of all life on planet Earth, provide the ability for the Solar System to look back upon itself and say, "Wow! What an incredible (13.7 billion year) journey this has been – so far." We can look around us and appreciate the complexity of our supporting systems. And we can look ahead to wonder what can be, based on what already is.

[5] David Suzuki estimates there are 10-30 million living system on the planet today. We know 1.9 million have been identified, classified, and documented.

Our ancestors were adaptable and survivors. Evolution self-selects behavior that promotes Life and is adaptable to the changing environment of an expanding Universe. We are here today because for the past 3.5 billion years our direct ancestors followed a path that sustained Life – obviously they were survivors.

As a result of evolution, we humans are amazingly capable of a wide range of behaviors: some of our actions serve to promote Life – some actions end Life. We have the freedom (opportunity) and responsibility (obligation) to choose.

So for long term survival in an ever changing world, we seem to have learned to respect diversity and to protect individual freedoms because these characteristics contribute to adaptability in the face of change. We also learned that collective cooperation of connected individuals seems to result in a more adaptable survival strategy than rigid disconnected individualism. In other words, humans have learned to protect their individual freedoms while experiencing the beneficial bonds of community.

Limits on behavior using Social Systems. But we also realize that total freedom or anarchy on a crowded planet is not necessarily life serving. Rather than having loose cannons on the deck of a rolling ship, we agree that some human-created social contracts /systems are appropriate to provide reasonable limits on human behavior. These human-created social systems are thoughtfully designed and intended to protect our individual rights. These human-created systems are supposed to assure each of us can enjoy our freedom of expression and creativity but not harm others (human and non-human) as we follow our bliss.

Being embedded in and swearing allegiance to these human-created systems, we tend to see them as our "real world." Actually they are only a simplified version of the complex Real World presented to us by the Universe. When the human-created "real world" comes in conflict with the Real World, the Real World trumps; this is not an issue of winning or losing – it just is. Despite philosophical debates, there are absolutes in the Real World – try stepping off a cliff in arrogant defiance of the law of gravity – hopefully you thought to bring along some technology that slows your descent just before gravity body slams you into the ground below.

Human-Created Systems have become emasculated / broken. Unfortunately these revered freedoms can quickly be lost if we are not diligent. Predators swoop in, exploit our vulnerabilities and feast on our hard earned harvests. They have learned how to exploit our basic instincts and distort our social systems to their advantage in too many ways to enumerate here. We will mention two to illustrate.

1) Currently the ancient hydrocarbon burning industry has managed to damage our civil society with worm holes like the "Halliburton Loophole"[6] that makes the fracking industry conveniently exempt from the Clean Air and Clean Water regulations. Apparently we are supposed to believe that their unique use of toxic chemicals (e.g. benzene) magically makes these carcinogenic materials no long dangerous to humans and other living systems when their fracking process introduces these materials into our common air and water. Predators contend that this emasculation of sound there-for-a-reason EPA regulations – regulations intended to protect the health of Americans - is justified because America desires to be "energy independent." The oil and gas industry is spreading mis-information that fracking shale to extract more natural gas is going to enhance our energy security. Yet we know that it is only when we transition to inexhaustible energy sources

[6] http://stateimpact.npr.org/pennsylvania/2011/12/05/burning-question-what-would-life-be-like-without-the-halliburton-loophole/

will we become energy independent and no longer addicted to the predator owned finite supplies of ancient hydrocarbons.

2) Currently the ancient hydrocarbon burning industry is enjoying the benefit of significant externalities in their economics. They seem unable to grasp the wisdom in concepts such as: biomicry or cradle-to-cradle or Zero Waste or "Borrow what you need / Return Everything you Borrow" or "any consumption/damage/loss of Earth's resources is unsustainable" with respect to future generations of Life.

   The market costs of their products does not reflect the Real World costs – the costs that ultimately 'We the People' and the non-human elements of our interdependent network of Life pay indirectly.

Broken Social System Influence Us to Make Unsustainable Choices. Tragically we are allowing our broken human-created political /economic / legal /agricultural/ educational/ religious/ informational social system to influence us to make unsustainable choices.

How is it we are not living sustainably? We seem to be embedded in a Greek tragedy where those outside the system can clearly see our folly. However as actors inside the system, obediently enacting our script, we see ourselves as politically active, financially responsible, law abiding, careful about the food we eat, educated, spiritual if not religious, plugged in and informed – in other words, we see ourselves as righteous people living well within the boundaries of our civil society.

So, how is it we are not living sustainably if we are following the rules?

System is broken - Rules are outdated. It's simple. The rules we are living by are outdated. The Universe continues to expand; The world continues to change; but our rules of right behavior have not. The system we ourselves have created to influence our choices and provide order and direction in this complex world is now broken. Our social system, the one we pledge allegiance to (and some of us worship) needs to be updated to reflect the realities of living on a finite planet – of living with mutual benefit within an interdependent network of human and non-human living systems for at least another 500 million years.

System has been compromised. We have allowed our social systems to be skillfully skewed to benefit the 1% at the expense of the 99% - to benefit our generation's gratification at the expense of our children's and grand children's well being – to benefit specific homo sapiens at the expense of the other 2 million species in our interdependent network of Life.

"Great Burning" is changing atmosphere. Scientific observations indicate we 7 billion strong are changing the composition of our Earth's atmosphere by adding more heat trapping 'green house gases' (e.g. Carbon Dioxide-CO_2, Methane-CH_4,…) as a result of our unsustainable "Great Burning" behavior. The CO_2 concentration in the atmosphere has changed from 300 ppm to 400 ppm during my lifetime – a level never before seen by homo sapiens.

Tar Sands Extraction introduces toxic materials. With our current awareness, we know that the processes of extraction, transport, refining and burning of these finite ancient hydrocarbons include the introduction of toxic materials into our common soil, water and air.

Our addiction to burning things is having detrimental effects on the health and well being of both human and the non-human living systems we depend on for our own existence.

In summary, our well intentioned social system has become broken – has been broken. There are alternative sources of energy. Why aren't we choosing these alternatives?

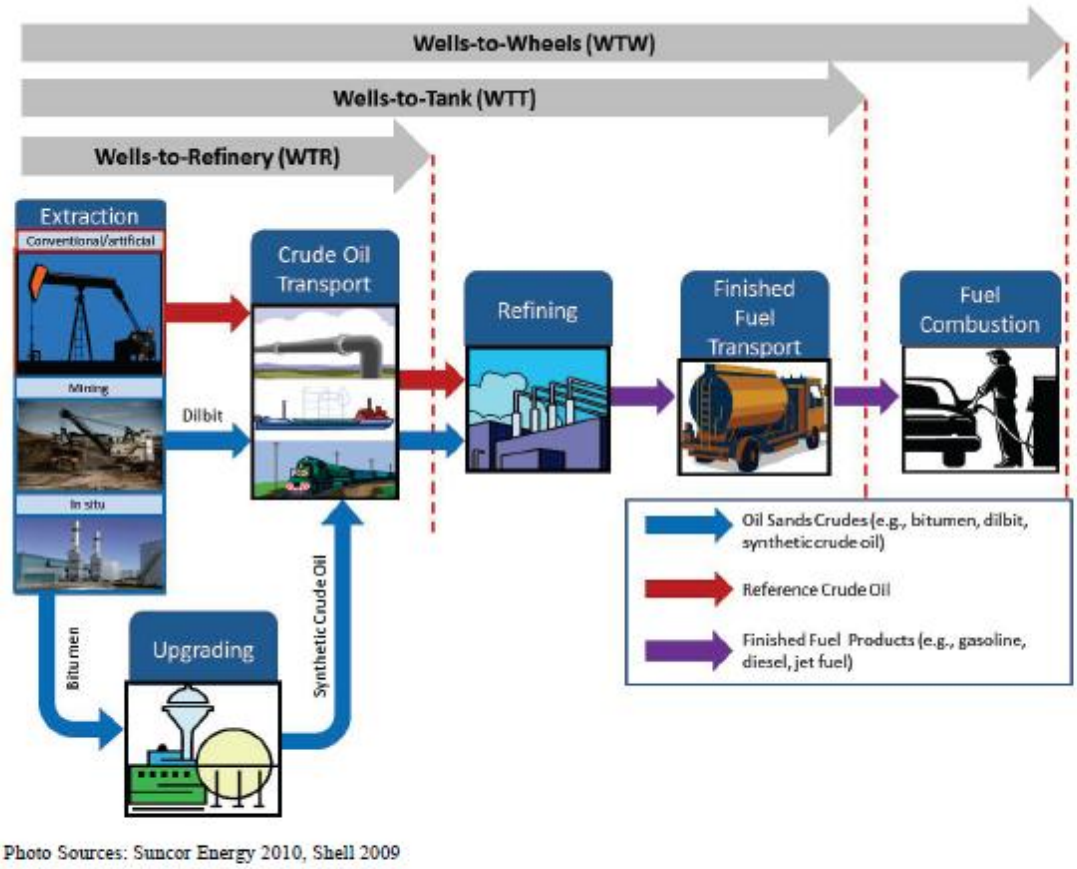

Photo Sources: Suncor Energy 2010, Shell 2009

Figure 4.14.3-2 Crude Oil Lifecycle Boundaries

Excerpts from the Final EIS Chapter 4 Greenhouse Gases and Climate Change

The total lifecycle emissions associated with production, refining, and combustion of 830,000 bpd of oil sands crude oil is approximately 147 to 168 $MMTCO_2e$ per year. [Ref: Pg 36] 2.5% of U.S. total; 0.6% of global total

The **incremental GHG emissions** associated with production and consumption of 830,000 bpd of oil sands crude oil compared to the reference crudes is estimated to be up to 27.4 $MMTCO_2e$ annually.

…This is equivalent to annual GHG emissions from combusting fuels in approximately 5,708,333 passenger vehicles, the CO_2 emissions from combusting fuels used to provide the energy consumed by approximately 1,368,631 homes for 1 year, or the annual CO_2 emissions of 7.8 coal fired power plants. [Ref: pg 39] [x 6.1 to get total]

… In 2010, total U.S. GHG emissions (CO_2e from anthropogenic activities) amounted to approximately 6,822 million metric tons (USEPA 2012), Globally, approximately 30,326 million metric tons of CO_2 emissions were added to the atmosphere via the combustion of fossil fuels in 2010 (IEA 2012).

…To put these emissions into context, the annual CO_2e emissions from the proposed Project are equivalent to CO_2e emissions from approximately 300,000 passenger vehicles operating for 1 year, or 71,928 homes using electricity for 1 year.

Humans are changing the global climate. The higher concentrations of carbon dioxide alter a precarious heat balance between Earth and Sun. By changing this balance of energy the Earth absorbs from the Sun and re-radiates into space, our human burning activities can indirectly affect the natural atmospheric and oceanic circulation patterns that in turn affect local weather fluctuations.

The Fifth Assessment Report of the Intergovernmental Panel on Climate Change was prepared by a total of 209 Lead Authors and 50 Review Editors from 39 countries and more than 600 Contributing Authors from 32 countries. In their Working Group I AR5 report (Sept 2013) they indicated the following:

> **"Warming of the climate system is unequivocal**, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased"[7]

"Developed Cultures" are the least sustainable. It is only some humans, particularly us so called developed cultures, that have chosen a behavior that is based on consuming finite rapidly dwindling energy sources (rather than on inexhaustible sources such as sunlight, wind, water, geothermal, tidal, etc….).

These same humans engage in consumptive "mine-ing" practices that extract a resource, pretend it is "theirs" and then "lose" this resource (i.e. fail to recycle it but cavalierly dump it into an unmarked land fill) so it is no longer available to future generations. This too is unsustainable behavior and "mine-ing" must transition to "our owe-ing /returning" behavior.

6th Mass Extinction. We know that as we humans continue to populate the planet and live unsustainably, we are callously, often unconsciously eliminating the niches of a growing number of our cousin species at an alarming rate – so dramatically that biologists indicate humans are now contributing to the Sixth Mass Extinction the planet has seen since life began 3.5 billion years ago.

The Fifth Mass Extinction occurred 65 million years ago when an asteroid ½ the size of Manhattan impacted the Yucatan and wiped out 70% of species living on Earth then – including the most dominate land creatures – dinosaurs.

Obviously we need to re-examine willful human behavior that contributes to the extinction of living systems and creates gapping holes in the fabric of our interdependent network of Life on the planet.

> *Death is the end of the life of an individual;*
> *extinction is the end of the birth of a species.*

[7] IPCC, 2013: Summary for Policymakers. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. http://www.climatechange2013.org/images/report/WG1AR5_SPM_FINAL.pdf

3) **Any Consumption is Unsustainable**. Consuming ANY finite resource with no intention of ever paying it back for use by future generations is unsustainable behavior – particularly resources that are sources/stores of life sustaining energy.

Ancient hydrocarbons are too valuable to burn. There are many other applications for this hydrocarbon resource (other than as a "fuel to burn") that can be recycled (e.g. use the source of sequestered carbon to transform iron into steel that can be recycled; convert the hydrocarbon into recyclable plastic; use the hydrocarbon to make carbon fibers for recyclable lightweight materials, use the tar/bitumen as recyclable material for paving roads, etc. …)

Extracting, transporting, refining and **burning** tar sands oil is unsustainable behavior.

Pipeline Perpetuates Burning/Consumption. Another oil pipeline, such as Keystone XL, simply perpetuates the burning of ancient hydrocarbons and our unsustainable addiction to this source of energy. True, smoking one more cigarette is not going to make a noticeable difference in our health; but it is not going to be the first step off the path of a destructive addiction either. One step at a time, one day at time, one rejection of an oil pipeline permit at a time.

Consumption is a Crime against humanity. Do we want the history written by our grandchildren to record our current self destructive behavior, "Great Burning," as a crime against humanity and all Life on the planet?

What do the future (e.g. 19,999,996) generations do beyond the Great Burning era? What resources will future generations have to cope with extreme weather, rising sea levels, acidified oceans, chemically contaminated soil, water and air?

Consumption with chemical blowback is a hardened Crime against Humanity.

Why is building another simple pipeline to transport this tar sands oil (bitumen) such a heinous crime?

Because it is like driving the getaway car for an armed bank robbery where we know beforehand that innocent by-standers are going to die.

Building a pipeline to transport this tars sands product to refinery to be transformed into products to be burned is 'aiding and abetting' further burning / consumption of one-time-only ancient hydrocarbon resources. The immoral behavior is "consumption of Earth's energy reserves with no intention of ever paying it back in equal or like kind for future generations." But it is even worse. The extraction/transportation/refining/burning of ancient hydrocarbons introduce toxic materials into our interdependent network of Life; there is a chemical blowback as described in the EIS. The EIS is to be credited with a comprehensive compilation of these "emissions" associated with building the pipeline and with the tar sands "Well to Wheels" life cycle. Great job. But not a pretty picture.

Because we **know** before building this pipeline (intended to enable further burning of ancient hydrocarbons) that it will do some harm to us and other Life on the planet, now and in the future, the act of moving forward to actually construct the Keystone XL pipeline is a premeditated crime (albeit still legal under human-created law). And even worse, it is a violent crime. The indiscriminate burning of ancient hydrocarbons and subsequent release of toxic materials (particularly in the extraction and refining stages) is an action that prevents living beings around the globe from reaching their full potential. Future generations will look back on our current behavior and without prejudice say our current behavior is a crime against all Life on the planet based on the Natural Laws of the Universe (despite what the prevailing legal system said).

From a sustainable living perspective, we must state up front that this pipeline project (and any other pipeline built to transport ancient hydrocarbons) is fundamentally unethical / immoral with respect to future generations of Life on this planet.

> Note: This statement is grounded in the laws of the Universe. It is unrelated to any human-created social system. This statement is not tied to any political, economic, or religious belief. It applies equally to Americans, Canadians, Chinese and Congolese.

ANY project, corporation or industry that supports, contributes to, promotes, condones, or in any way furthers the continued burning of ancient one-time-only reserves of hydrocarbons (coal, oil, natural gas, shale oil (kerogen), tar sands oil (bitumen) with no intent whatsoever of ever paying these resources back must be considered as unsustainable / immoral human behavior. In a truly developed/advanced civil society of the 21st century, with today's awareness of the Real World, this burning behavior would be considered illegal. For now, acquiescing to the current human-created legal system, constructing another pipeline for the transport of oil is not "illegal" even though it is logically unethical and immoral to get the conversation started.

With the collective consciousness we have today, we know that burning one more lump of coal, one more drop of oil, one more cubic foot of natural gas is inappropriate if not immoral (and unnecessary) human behavior. Extracting and burning the Earth's finite reserves of one-time-only ancient hydrocarbons, with no intention of ever paying this energy resource back for future generations (or paying the true cost of burning) is clearly an injustice against all future generations yet to come.

Aiding and Abetting Consumption is a Crime. Constructing another pipeline to transport this hydrocarbon resource to where it can be refined for subsequent burning is **aiding and abetting** a crime against humanity. It's as simple as that when we view our current behavior from outside the Big Oil tar sandbox.

What Does Sustainable Living Look Like?

The Sustainable Living Frame / Sandbox

This frame of reference is grounded in the Real World – a frame documented in the Universe Story.

It is a frame where humans continue to expand their awareness of this Universal Story by extending their abilities to sense, and observe the Real World, then describe new revelations using the concepts already within their simplified human-created "real world." We seem to be limited in what we can know by what we do know – limited in what we can create by what has already been created.

It is a cosmic frame where 'emergence' is the norm – where *emergence is the creation* (and sustenance) of *something more* (complex) *from nothing but* (something that already exists) *as a result of new relationships* brought together by a source of energy.

It is a frame where we humans are aware of (conscious of) the fact that Life on planet Earth has emerged /evolved to be an interdependent network of living and non-living systems. We acknowledge we are all one family - the United Stakeholders (People, Non-Humans and Places).

For those familiar with Thomas Berry's "The Great Work," our sustainable Real World frame utilizes his view of a planet where the human species enjoy their creative spirit while being present with mutual benefit to all Life. In this sustainable Real World, we humans have learned to see ourselves as we really are – *not as a collection of* random *objects* on a flat world of infinite resources *but as a communion of* creative, concerned, collaborating *subjects* on a

finite planet of reusable resources, bathed by the inexhaustible flow of energy from our dedicated Sun, as a family of star stuff within the Orion spur of a massive spiral galaxy, within an ever expanding Universe. As such, in this communion, we contribute to an ever evolving collective consciousness.

In this frame, we are a part of a 5 billion year old Solar System, itself a child of a spent Supernova star and primordial Hydrogen and Helium. In this frame we are an integral part of a Solar System that consists of a gravitational center, we call the Sun that provides the force/energy to hold our family of planets together while patiently fusing Hydrogen for the gift of life-supporting light /energy.

In this frame, we belong to the Earth's gravitational family, a 4.5 billion year old planet of over 100 basic building blocks, chemical elements that fill the "Period Table" in support of the creation/emergence of complex living systems.

Finite planet. Ours is a finite planet where Life has been evolving for 3.5 billion years according to the fossil record - where over 2 million interdependent life forms (species) now share common finite resources – a world where all (except homo sapiens) have evolved to live sustainably within this interdependent network that supports the flow of inexhaustible energy of the Sun from light to consciousness and recycles finite materials of the Earth needed to sustain Life.

Looking forward with a purpose. It is cosmic frame where human consciousness allows us to look back in time 13.7 billion years, then be in the present moment to acquire a sense of direction, and then project ourselves into the possible future. Through this frame we can see a future world where the Sun has enough Hydrogen fuel to radiate for several more billion years, where our planet should remain habitable with life evolving as we know it for at least another 500 million years. We can envision pathways ahead paved with endless opportunity for intellectual, emotional, and spiritual growth (not physical or material growth) – for expanding awareness and evolving collective consciousness – assuming we choose from the many possible options available for sustainable living.

But that's not where we are headed because today's predominate human-created "real world" is influencing many of us to make unsustainable choices.

Real World wins. When we step outside our current unsustainable frame of reference to examine our behavior – often a behavior motivated by our human-created political/economic/legal system, we find our human-created "real world" is not consistent with the Real World presented to us by the Universe. In the event there is a conflict between the "real world" of humans and the Real World of the Universe, the Universe always wins.

> **Example #1.** We didn't place humans on the surface of the moon by defying gravity (or any other law of the Universe); in fact, the opposite is true. We were able to accomplish this feat only by precisely obeying all the relevant laws of the Real World.
>
> > We lost three brave astronauts early in the Apollo Program because our human-created simplified "real world" indicated it would be a great idea (i.e. cheaper) to design a spacecraft using a pure oxygen environment instead of one that replicates Earth's atmosphere with oxygen and nitrogen. In the human-created "real world" everybody knew that nitrogen was just an inert gas and really didn't do anything meaningful in a life support system. The human-created "real world" influenced designers to get rid of the nitrogen to save weight and more importantly money. When a fire erupted during a routine ground training exercise in the first Apollo crew module design filled with pure oxygen, the Real World prevailed and we lost three souls. This tragedy was caused by humans who attempted to defy basic Real World laws of combustion.

And when there is conflict between the human-created "real world" and the Real World, let there be no doubt, the Real World will trump[8] the human-created "real world."

Example #2: The human-created "real world" indicates a person should choose to burn natural gas as a source of energy because it is obviously the cheapest option available today. Our current (albeit broken) economic system indicates producing electrical power by burning natural gas is less expensive than producing electrical power by harvesting sunlight with solar PV modules.

In the Real world, despite what the 'not so attractive blond actor' says about natural gas (methane) on TV, it is a hydrocarbon, and the Real World laws of chemistry tell that when we burn it, methane (CH_4) is transformed into CO_2 and H_2O. In the human-created "real world" natural gas is a clean fuel. In the Real World, the drilling, fracking, retention ponds for evaporating fracking chemicals into the atmosphere, transporting and burning processes are not so clean. In the Real World, these processes associated with natural gas alter the integrity of the Earth's geology; the purity of ground water aquifers, soil, nearby streams; the quality of air, and the concentration of greenhouse gases in the global / common atmosphere. These anthropogenic alterations affect the health of Real World living systems starting with human beings, animals and plants (land and aquatic). These alterations also affect other global systems such as the Earth's heat balance, weather, air and ocean circulation, ocean acidification, and the list goes…. In the Real World, there is a cost associated with each of these alterations caused by the extraction / burning of natural gas. All of these Real World costs are knowingly and deliberately ignored (externalized) by the gas producer operating within the human-created "real world" that spews out misinformation about clean natural gas. As a result it appears to the "real world" marketplace that natural gas is the "least expensive" energy option currently available. False advertizing confirms this illusion.

When these externalities are no longer ignored (are internalized) and included in the price of the natural gas, the inexhaustible energy options (solar, wind, etc.) emerge as the least expensive (as well as the moral) choice.

Energy – Essential to Life

Energy is an essential element of all living systems (Life). For the human, energy can be put into two basic categories:

- energy for self-existence (food);
- energy for self-extension (tools/technology).

Incoming energy for self-existence (food) is essential to sustain life. And we all learn about the "food chain" early in life. Without an ongoing flow of energy cascading through a living system, at best this arrangement of elemental building blocks will be transform into a fossilized version of its living self – or perhaps be transformed back into a randomized pile of star stuff – to mere ashes of its former self.

The second category of energy we humans now need / depend on for our quality of life is needed to operate our "tools/technology" – our human-created extensions of ourselves. To move an object from one place in time and space to another place in time and space, requires energy. We can propel ourselves using abilities encoded in our DNA (our own mobility) powered by energy we ourselves take in as food. So we may be able to walk, run or to extend our abilities by peddling a bicycle or employing a scooter, skateboard, etc. to move from point A to point B (or do other work: typing, digging, writing, speaking, etc.) Or we can look beyond our own supply of energy and use external

[8] As in pinochle not real estate

sources of energy. For example, we can have some other living system carry us (e.g. a friend, a non-human) or we can use a human-created tool to extend our inherent abilities and hop on a form of public transportation or motor around in a vehicle – using an external source of energy.

Life uses current sunlight as energy source. These diverse forms of life have evolved to live directly or indirectly using current (or recent) sunlight – energy from the Sun. Humans are the exception. As if in a mad suicidal frenzy, we homo sapiens are currently drilling, fracking, digging and blowing the tops off mountains in a diabolical quest to consume these one-time-only finite reserves of ancient sunlight that we have learned to eat and to burn for powering our "tools."

Energy for self-existence (Food).

Within the past century, humans have creatively, but unsustainably, learned how to transform ancient hydrocarbons into fertilizer, herbicides, pesticides to support today's unsustainable agricultural system - ostensibly for the goal of increasing production (i.e. bushels per acre) to feed the exploding global human population (and the insatiable quest for more profit by corporate agriculture).[9]

> So today perhaps 5% of the natural gas (methane- CH_4) extracted from the Earth is used as a source of hydrogen to make Ammonium Nitrate (NH_4NO_3)[10] – a source of nitrogen fertilizer that enhances plant growth (i.e. the assembly of Earth's elements into a living system). The carbon from the methane generally ends up as CO_2 and dumped into the atmosphere – in that sense (from a carbon perspective), using natural gas to produce fertilizer is the same as burning it.

Energy for self-extension (tools/technology).

Humans have learned to burn ancient hydrocarbons for a number of purposes: warmth, and food preparation are certainly life sustaining – however there are alternative ways to stay warm and prepare food without burning.[11]

In addition, over the past several centuries, human have been engaged in what future generations will call the "Great Burning." We learned how burning hydrocarbon materials produces heat/thermal energy that could then be transformed in mechanical energy by human-created engines. And there is no end to the ideas humans can generate for uses of more mechanical energy.

Burning ancient hydrocarbons is presently a primary method of generating thermal energy (heat) to power tools/technology including:

- heat to convert liquid water into steam to drive various types of engines / turbines – particularly electrical generators;
- internal combustion engines / turbines for sea, land, air transportation.

There is a great deal of profit being derived from the hydrocarbon extraction/burning industry that motivates corporations to do whatever is not blatantly illegal to assure status quo. Despite the rhetoric of these hydrocarbon corporations, there are alternative inexhaustible sources of energy available now. As in the

[9] Advocates of organic Permaculture question the long term efficacy of this unsustainable agricultural practice.

[10] Of course, ammonium nitrate can also be used by humans as a source of explosive energy for blowing living and non-living systems to smithereens.

[11] As an example, we personally use rooftop solar PV to generate all our electrical energy that in turn provides power for an electric cooktop/oven and a geoexchange heat pump for heating and cooling. No burning is required. The electric meter runs backward and the gas line is shut off.

agriculture sector, the insatiable quest for more profit is blocking our transition away from burning ancient hydrocarbons.

Transitioning now is easy. Transition to inexhaustible energy sources is relatively quick & easy at this point in time. It will become quite a challenge for later generations with dwindling reserves of ancient hydrocarbons to burn. Each day we continue to burn ancient hydrocarbons is leaving the planet less habitable for future generations.

The majority of us humans still choose to live unsustainably. This behavior paints a gloomy, albeit real picture of our future. Fortunately, we do have choices that allow us to live sustainably. There are viable alternatives that enable us to enjoy a happy and prosperous life into the foreseeable future.

"Great Harvesting" to replace "Great Burning" Amory Lovins and RMI have written an excellent book, "Reinventing Fire" that illustrates ways we can transition away from burning. But it is not a matter of waiting until technology reinvents fire, because such "inventions" already exist. The "technical" solutions for sustainably providing our energy needs are already out there in front of us; it is just a matter of choosing not to burn - of choosing to move into a new era we might call the "Great Harvesting" of inexhaustible energy (i.e. solar, wind, hydro, geothermal, tidal, wave).

No pipelines in a sustainable world. In a sustainable world, there would be no financial incentive to invest in an oil pipeline to transport this resource 2000 miles to be "refined" for burning because the economic system (the free market) would not find it profitable. It would not be "profitable" because all externalities would be internalized and embedded in the price of the end products.[12] If any "tar sands" bitumen were to be extracted from Alberta, it would not be for the purpose of burning it, but rather for some recyclable purpose use such as asphalt for road construction or as carbon to convert iron to steel or….

No consumption in a sustainable world. In a sustainable world, living systems use the Earth's resources they need but there is no consumption because every atom is recycled. "Borrow and Return" is an inviolable ethic.

Burning to not burn. The only possible justification (that we can muster with today's consciousness) for further burning/consuming this precious one-time-only resource of ancient hydrocarbons is if this resource is required to permanently transition away from such burning.

> **Example Justification:** Burning coke/carbon in a electric blast furnace to convert iron ore into carbon steel. The steel would then be used to manufacture the support tower of a wind-driven electrical power generator. The energy used in this steel production process would be derived from inexhaustible sources (solar, wind, geothermal, hydro, tidal, wave,…) A portion of the energy then generated by the wind turbine (equal to the amount of energy consumed) would be re-stored (re-deposited in the Earth's stored energy account) for later use by future generations. This "burning" could be considered a justifiable use of ancient hydrocarbon - particularly since the carbon becomes embedded in the steel and can be recycled indefinitely.

Sustainable Frame – supports a new path we can/must be on.

We can take Lakoff's advice and stay grounded in what we believe is a sustainable frame / sandbox and discuss the issues from our "sustainable living" frame of reference.

[12] We discuss the concept of a Pigovian correction to the current economic system in the form of a Market-Based Revenue-Neutral Carbon Fee-Dividend program later in this document.

Contrary to the messaging of Big Oil, we really do not need to burn their ancient hydrocarbon products to meet our human energy needs because there are viable alternatives (most are not well publicized for obvious reasons.)

> **Example.** Coincidentally when 'we the people' habitually buy, consume and buy more of their hydrocarbon products, Big Oil corporations receive enormous profits for the individuals who guide them and "invest" in them. But corporations affect more than stockholders – they affect their stakeholders that happen to be all living and non-living systems on the planet. How fortunate for Big Oil's short term gratification. How unfortunate for our grandchildren and all future generations of Life.

Viable sources of inexhaustible energy. There are viable alternatives sources of energy we can use to meet our daily energy needs that are **inexhaustible** (solar, wind, hydro, geothermal, tidal, wave) – if our social systems influenced us to choose these alternatives. We can (and must) tap into these inexhaustible sources of energy now, while we still have some of the "easy fossil energy" to help us make the transition.

NOT All of the Above. Contrary to the messaging of Big Oil, an "All of the Above" energy policy is neither sustainable nor moral in a finite Real World with today's viable alternatives. An "All of the Above" policy does assure the Burning Industry continues to maintain a place at the trough. Let's be perfectly clear - burning ancient hydrocarbons of any kind is not an acceptable option for a sustainable energy policy.

Too valuable to burn. For over a century, people have known these hydrocarbon resources are simply too valuable to burn.[13]

"Burning petroleum as a fuel would be akin to firing up a kitchen stove with bank notes."

...Dmitry Ivanovich Mendeleyev, 1877 [14]

But the economic system we created does not reflect that same value. The economic system we have been using is broken. It fails to tell us, the market, about certain social costs associated with burning ancient hydrocarbons.

No more CO2. Plus we are now aware of the obvious fact that this carbon can no longer be burned and turned into CO_2 and dumped into the atmosphere with impunity.

> There is no doubt whatsoever that the increase in atmospheric CO_2 from 300 ppm to now 400 ppm during my lifetime is linked to human's burning hydrocarbon. There is no doubt among scientists that such an increase in this greenhouse gas has affected the Earth's energy balance – that's basic physics known since the mid 1800's. Last year's report by the IPCC indicates over 200 climate experts around the world agree humans are affecting a change in the Earth's climate – how much and how fast is still being evaluated. But looking into the future, none (not even the best) of the projections look very attractive for our grandchildren.

Other uses for hydrocarbons. Actually there are many other uses for hydrocarbons once we stop seeing them as a fuel to burn for heat. For example, carbon converts iron into steel that can be recycled indefinitely. Carbon fibers are commonly used to fabricate light weight materials so essential for modern transportation. Hydrocarbons are the feed

[13] Emory Lovins suggests, we "Reinvent Fire." He and the staff of the Rocky Mountain Institute propose ways to do just that.
[14] D.I. Mendeleyev, Russian chemist and father of the periodic table of basic elements, recognized the importance of petroleum as a source from which to make valuable carbon compounds and not as a fuel to burn/consume. In 1876, on visiting the oil fields of Pennsylvania and Azerbaijan, he supposedly made the above remark about "burning petroleum." Reference: "Chemistry: The Molecular Science, Volume I", John W. Moore, Conrad L. Stanitski, p 546.

stock for plastics. Although this sounds heretical, transforming the ancient hydrocarbon into a form of safe non-toxic plastic that could be recycled indefinitely would be a sustainable application for this presently sequestered carbon.

Problems Eliminated.

Envision a future where humans have made the transition away from burning ancient hydrocarbons and have learned to live using inexhaustible energy sources (solar, wind, hydro, geothermal, tidal, wave). Think of all the current issues that will disappear: oil spills, mercury contamination, fly ash induced respiratory illness, many cancers, air / water / soil toxification, smog, acid rain, ocean acidification, coral decimation, wars for oil, …

After the Earth's systems have equilibrated, we should see less global warming/climate change/ sea level rise/glacial and polar ice melt, species extinction, coastal inundation, weather extremes, ….

Path of Change from Unsustainable to Sustainable Living

People are Generally Law Abiding and Live within the System.

Generally speaking, we live their lives in what we consider to be legal / ethical / moral ways. We are law abiding, caring and concerned about our family and friends. We want to do what is right. We are frugal. We often sacrifice our personal pleasure so our children can have a better life than we had. We want our children to have more opportunities than we had – fewer difficulties and setbacks – etc.

We are trying do what is expected of us or stay within the law or do what we are told is right and not waste money, etc. and still have some fun and entertainment - and leave the world a better place for our children, grandchildren.

So why are we living unsustainably if we are so law abiding?

Our Social System is Broken. People live in an unsustainable manner because they are rightfully influenced by the social system they are embedded in. That's a good thing. Social systems are in intended to protect individual freedoms while providing appropriate boundaries on acceptable behavior. Broken human-created social systems however can influence us to make choices that result in unsustainable behavior. And that appears to be what's happening.

We are living unsustainably, especially in developed countries, not because we are bad people but because our social system – our political / economic/ legal / agricultural / educational / informational / religious & spiritual / ethical / moral system is broken & influencing us to live unsustainably.

Good People in a Bad System = Bad Behavior

Focus on Fixing a Broken System – Avoid Blaming Other People.

First we fix the system so that it will influence us to make sustainable choices. For example, don't make an unsustainable alternative the cheapest option – because obviously in the Real World it isn't the least expensive choice when all things are considered. If the unsustainable choice is the least expensive option – wonder why? How can "cidal" behavior ever be the least expensive alternative in a sustainable world? We can fix our broken social systems by bringing them more in line with the Real World. For example, we can and must "Stop Externalizing Real World Costs"

"How do we change our social system so that we are influenced to make choices that help us transition away from burning ancient hydrocarbons and move toward harvesting inexhaustible sources of energy (e.g. solar, wind, geothermal, hydro, tidal, etc.)?"

Pave a Path to Sustainable Living. The path to more sustainable living might start with a re-examination of our basic guidelines to living– our values - our ethics. Having established an updated ethic/morality that is consistent with the Real World and agreeable to most, we can then begin to repair any broken human-created social systems.

Update Ethics for a Finite Interdependent Planet (Ecomorality)

Ethical / Moral – population management – zero consumption/zero waste – harvest own energy – 100% recycling – all living systems get a vote (by proxy) – each of us become a proxy vote for each and every living system we are connected with/interdependent on: from bacteria, archea, eukaryotes [microbes, plants, animals (human & non-human)], plus all systems of nature (land, water, air).

Fix Broken Social Systems based on the new ethics
Political system – eliminate legal bribery, change concept of tax / tax code, public funded elections,
Economic system – eliminate externalities, eliminate growing separation of wealth
Legal system – protect rights of existence of all living systems
Agricultural system – transition to sustainable food production and non-GMO
Educational system – lifelong learning - pre-natal to death
Informational system - restore freedom of press – eliminate corporate media profit motivation – no tax deduction for non-informational advertising
Health / wellness system – eliminate profit from health care, focus on wellness maintenance
Religious/Spiritual – practice tolerance, focus on heaven here on earth – Religions can tell their "members" what to do, but no one else – membership is by invitation not coercion – promote an appreciation of grace, mystery, "the yet to be known"

Conclusion

Department of State: REJECT the Keystone XL Pipeline Permit.

- This project does NOT serve the national interests of the United States of America.
- This project does NOT serve the national interests of Canada, or any other country in the world.
- This project does not serve humanity or the interdependent network of Life on our planet.
- The decision to REJECT this tar sands oil pipeline permit is a no-brainer for humans who value Life on our planet.
- Constructing yet another oil pipeline is a non-value added human effort – in fact it is worse. Permitting this project is acting as an accessory to a crime against humanity.

Burning is Unsustainable. Using the collective consciousness that has now accumulated thanks to previous generations, we are now aware that continuing to burn one-time-only finite reserves of ancient hydrocarbons (e.g. coal, petroleum, natural gas) to produce our food and to power our technological extensions of ourselves is unsustainable behavior – particularly for a global population exceeding 7 billion souls. These ancient hydrocarbon resources are finite. How finite? First grade arithmetic (i.e subtraction) tells us that in less than 100 years, we will have consumed the known and potential reserves of coal, oil, and natural gas on the entire planet –unless we change our current behavior. Burning ancient hydrocarbons converts sequester carbon into CO_2 that is then dumped into

the atmosphere – CO_2 levels have increased from 300 ppm to 400 ppm during this writer's lifetime – and at our rate of burning, it continues to climb.

> The Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) was prepared by a total of 209 Lead Authors and 50 Review Editors from 39 countries and more than 600 Contributing Authors from 32 countries. In their Working Group I AR5 report (Sept 2013) they indicated the following:
>
> **"Warming of the climate system is unequivocal**, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased"[15]

Changing to a "clean" hydrocarbon is cruel joke being played on the public by the natural gas industry – just another displacement issue so the burning industries can continue doing more of the same. Burning coal laced with heavy metals ends up dumping mercury, arsenic, etc. into the atmosphere, rivers, oceans and land around the world. Our interdependent food chain/energy network ends up returning these toxic materials to us in our food. Irony or poetic justice?

Constant Withdrawals - No Attempt to Pay Energy Back for Future Generations. Yet we continue to make withdrawals of ancient hydrocarbons from our Earth's finite Energy Account – with no intention of ever paying back this loan – with no intention of every replacing this energy for the future 20,000,000 generations that could/should find this a habitable planet.

Robbing our grandchildren of a healthy prosperous future. We adults living today are robbing our children and grand children of a healthy prosperous future. We continue to do so with impunity coated over with pitiful excuses based on the pseudo logic of a broken human-created "real world" social system that tells us "Burning is the cheapest choice."

Aiding and Abetting Burning is Unsustainable. Permitting the proposed oil pipeline is aiding and abetting the "cidal" behavior (i.e. suicidal, homicidal, genocidal, ecocidal behavior) of a small but powerful few of mentally ill homo sapiens who place a high value on hoarding (wealth, power, resources, property, ….).

Permitting this proposed pipeline is "legalizing" their unsustainable "cidal" behavior – behavior known to be detrimental to all humans and 1.9 million other species of life on Earth.

Permitting this pipeline to cross the heartland of America is condoning unsustainable human behavior.

No More of the Same. Constructing yet another pipeline is simply more of the same, hoping our "cidal" addiction to burning hydrocarbons will magically disappear – without any effort on our part.

- **No** to the Keystone XL pipeline project.
- **Yes** to alternative projects that support the transition to renewable energy.

[15] IPCC, 2013: Summary for Policymakers. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. http://www.climatechange2013.org/images/report/WG1AR5_SPM_FINAL.pdf

Recommendations for Government:

1) **Reject Permit – Do Not Enable our Addiction to Burning.** Executive Branch/Department of State: Reject the permit to build the upper portion of this pipeline connecting the tars sands oil source in Canada to the U.S. refineries in the Gulf region of Texas. As a leader in human rights and responsibilities, another oil pipeline is not in nation's interest. The pipeline does nothing to help us secure energy independence – transitioning to inexhaustible energy sources does however.
2) **Update / Fix Our Social System.** Legislative Branch: Enact legislation that updates our country's economic/political/legal/agricultural/health care/educational/religious & ethical system to reflect our interdependent network of life living on a finite planet with finite resources but with inexhaustible sources of energy (solar, wind, hydro, geothermal, tidal, wave) that can be harvested daily.
    a. **Put a price on carbon**. Update our economic system with a much needed Pigovian Correction that eliminates all known externalities – particularly those associated with burning hydrocarbons. Pass legislation to initiate a market-based revenue-neutral carbon fee-dividend program design to reflect the Real World costs in the market price of hydrocarbons destined to be refined into fuels to be burned. The Pigovian correction would include not just the cost of Extraction, Transportation and Refining, but also the cost of Reparation and Replacement in determining the market price of hydrocarbon "fuels." The Carbon Burning Fee would begin at $15 / ton of CO_2 produced per unit of the hydrocarbon burned and increase $10 / ton /year until the full cost of Reparation and Replacement is reached. It would then continue at that level. All Fees collected would be returned to taxpayers annually as a "Dividend Check." People who lower their carbon footprint would receive more in their annual Dividend than they pay in during the year in the carbon burning Fees. The Carbon burning fee would be assessed at the source (mine, well head, or border if the hydrocarbon is imported or exported). Every barrel of Canadian Tar Sands oil that crosses the U.S. Border (i.e. in Morgan, Montana), would initially be assessed a Carbon Burning Fee of $7 per barrel of SCO (corresponding to $15 /ton of CO_2) and increase slowly, $10/ton, each year until the Fee reaches the Real World Cost of at least $235 / barrel. (see calculations in the last section of this paper).
    b. **Put a price on nuclear "accidents" and waste management**. Update our economic system with a much needed Pigovian Correction that eliminates all known externalities in the nuclear industry – particularly those associated with Reparation from "accidents" and perpetual waste management. Pass legislation to initiate a market-based revenue-neutral nuclear fee-dividend program designed to reflect the Real World costs of producing electrical power using nuclear fission. The Pigovian correction would include not just the cost of Extraction of the raw materials (e.g. Yellow Cake Uranium Ore), Transportation and Enrichment, but also the cost of Reparation of inevitable "accidents" and Replacement of this finite energy source with like-kind in the market price of nuclear-generated electrical power. The nuclear power industry is notorious for its "externalities." Much work to done here.
    c. **Change what we think about.** As a nation, we must now be thinking about more efficient ways to harvest inexhaustible energy sources. There is so much potential for sustainable development if we use an ethic based on Ecomorality.

    It's time to stop wasting human effort on the exploration /extraction /refining /transport of ancient hydrocarbons for the purpose of burning these one-time-only resources to satisfy our energy needs.

It's time to stop exploring for Uranium and building more nuclear reactors and bombs until we have a better understanding of how to control nucleosynthesis and the resulting unstable elements we seem to inconveniently create – those pesky radioactive isotopes that must be stored safely far away from fragile life system (like ourselves) for millions of years.

Comments on the Final EIS

EIS Overview from an Unsustainable Frame of Reference. So here 'we the people' are. We are being asked by our government to stand in the unsustainable frame/sandbox of Big Oil & Gas corporations, read, review, and comment on their environmental impact statement for a tar sands oil pipeline. This document includes a 44 page "Executive Summary" plus 11 Volumes including 26 Appendices of additional detail. Impressive.

Standing in Big Oil's unsustainable frame of reference, the Final EIS is a well written comprehensive document with a few exceptions mentioned below. This reviewer had reviewed the Draft EIS back in April 2013 and now re-examined the updated "Final" EIS, and would acknowledge those areas that have been extended as the Fact Sheet indicates,

- expanded the analysis of potential oil releases;
- expanded the climate change analysis;
- updated the oil market analysis incorporating new economic modeling; and
- expanded the analysis of rail transport alternative to the pipeline.

Focusing on the climate change chapter, as a scientist myself, I was pleasantly surprised to see what appears to be a forthrightness in providing actual data that can be verified related to CO_2 e emissions of tar sands products relative to a "baseline" crude oil such as Mexican Maya. That the **incrementa**l increase of 830,000 bpd of dilbit or SCO is equivalent to over 5 million vehicles or 7.8 coal plants was actually shocking. Of course when you add in the emissions from the baseline product itself, the 830,000 bpd translates to putting around 30 million vehicles on the road. Staggering.

Corporate Media assessment of EIS. According to the talking heads working for our 'for-profit' media, the Final EIS concludes, there is "No Impact." Another pipeline isn't going to make any significant difference. If burning 830,000 bpd of tar sands products translates to putting around 30 million vehicles on the road is no impact, what does it take? How anyone from corporate media can say (and they did) that "if the Keystone XL pipeline is brought on line, it won't make a measureable different" is absolutely astonishing.

It should be pointed out that the independent media (e.g. viewer supported rather than corporate supported) do paint a more truthful picture that as expected is not so rosy.

Comments on Final EIS. Our April 2013 comments on the Draft report remain valid because the "Final" version of the EIS still does not address a significant issue:

- **End-of-Life: How / If the Pipeline will be Decommissioned.**
  - There still is no mention of how or if the residual dilbit/SCO in the pipeline will be flushed out or just left in place at the end-of-life.
  - There is no mention about plans to either abandon the pipeline in place or to dig it up, properly deal with the residual still in the pipeline and recycle the steel.
  - There is no mention of what will become of the hundreds of pumping stations and access roads along the pipeline when it is abandoned.

As with all pipelines, operation will continue beyond its intended design life "until it is no longer cost effective." This is a euphemism for "until the reparation costs incurred by repeated failures/leaks/ruptures/attempted cleanups exceed its profitability."

With no plan for decommissioning, we can assume that after 25-50 years of operation, there will a number of significant leaks / spills/ruptures that become increasingly costly to litigate. At that time, the pipeline operator will either sell the remaining assets to a LLC and dissolve, file for bankruptcy and walk away, or simply dissolve and leave the abandoned pipeline in the ground to continue rusting away with the residual tar sands oil plus sludge left in the (1661 miles of) pipe.

We can assume from the silence of the EIS that the pipeline operator has no plan to dig up the pipe after its end-of-life, has no plan to recycle the steel, but instead plans to abandon it in place. Eventually the steel casing will disintegrate sufficiently to allow the residual oil to leak into the surrounding soil. The diluents and bitumen left in the line and the iron oxide will diffuse into the local soil. Eventually the ground above the 36" diameter disintegrated pipe will collapse into what was once the internal volume of the pipe. Where the pipeline sits over an aquifer, the residual oil abandoned in the decaying pipeline can be expected to enter the aquifer 50-100 years from now.

We must assume the lack of discussion about decommissioning means those costs have been "externalized." We can assume the cost of dealing with future issues after end-of-life will be borne by local taxpayers or the landowners at that time.

EIS Overview from a Sustainable Frame of Reference.

Let's step out of Big Oil unsustainable sandbox and into a sustainable frame of reference. Now the Keystone XL project looks completely different. Further burning of these ancient hydrocarbons, with no intention is paying this energy account back is a crime against all future generations for as long as Earth remains habitable – expected to be at least 20,000,000 generations.

The only defense for this current irresponsible unsustainable behavior is magical thinking, for example:

> "When the coal, oil and gas run out, some Super Geek will show up and invent a new energy technology that taps into an unknown force for our energy." Plus, Fox News TV reports every day that "Climate change is a hoax. Global warming is a conspiracy perpetrated by those 209 IPCC climate scientists from 34 countries around the world."

From a sustainable frame of reference it is imperative that we transition away from burning ancient hydrocarbons to harvesting inexhaustible sources of energy now. No more investment in pipelines. No more investment in coal or oil fired power plants. Natural gas fired plants might be acceptable because there could easily transition later to hydrogen based fuels. No more development of new IC vehicles – only plug-in hybrids with regenerative breaking – preferably with biofueled IC engines or hydrogen fueled range extenders. And no more wars in the middle east to control their oil reserves.

And perhaps more importantly, future "Environmental Impact Statements (EIS)" will be used as to assure our economic system remains consistent with the Real World and captures all costs in the price of products. The EIS will be used as the "Externality Inventory Summary" to be sure all costs are internalized. In this way the marketplace is not distorted and 'we the people' can make informed decisions about the most efficient sustainable products.

Rather than use the EIS as justification for criminal behavior, we will use this important assessment of the Keystone XL pipeline project as a tool to help identify significant **externalities** that Big Oil is using to obscure the true cost of extracting, transporting, refining, and burning this ancient hydrocarbon product. To us, EIS will also be an acronym for **Externality Inventory Summary** (EIS)

We will use the EIS as a means to identify externalities and begin the cost estimate of ignored costs that must be added to the tar sands oil to provide the free market with a true cost. If the market is not being deceived by a fictitious "cost" of tar sands oil, its "invisible hand" can then select the most efficient alternative.

In a "sustainable world" humans would not be thinking about or even considering the construction of another pipeline to transport ancient hydrocarbons for the end purpose of refining then burning / consuming this valuable Earth resource, *because*:

> In a "sustainable world" humans would not be cutting down/decimating the Canadian Boreal Forests, displacing if not destroying the local non-human life, polluting the pristine water and air of Alberta just to extract this ancient one-time-only hydrocarbon resource (tar sands / bitumen) to be burned, *because*
>
> > In a "sustainable world" the human-created social system used to influence people's choices requires ALL human-created "products" assume the full and true cost of their production **without externalities**, *because*:
> >
> > > In a "sustainable world" there are no "externalities" (conveniently ignored costs deceptively deferred to someone else so the "producer" can fraudulently make a larger financial profit). In a "sustainable world" products are assigned their true cost, so the free market can then be used to find the most efficient option.
> >
> > **When the market is deceived by externalities, shysters get rich and people get screwed.**

EIS Repurposed. From a "sustainable living" frame, the Keystone XL pipeline "Environmental Impact Statement" (EIS) is nevertheless a valuable exercise because it serves as an "Externality Inventory Summary." Externalities distort the free market and must be eliminated if we hope to make appropriate choices consistent with living sustainably.

> **Externality Inventory.** This "Environmental Impact / Externality Inventory" for the Keystone XL pipeline begins to identify the Real World costs we typically allow producers to exclude from the market price of tar sands final products. These conveniently ignored social costs – so called "externalities" – are deliberate distortions of the market in an attempt to make a particular endeavor appear profitable within the human-created "real world" frame. The Final EIS does identify and internalize (identify plans to mitigate) a number of these social costs that would otherwise be borne by the general public instead of the producer.

Identifying and Eliminating Externalities

Background / Economic Principles

In 1920, economist Arthur C. Pigou [16]observed that:

- "Industrialists will seek their own private interest."

[16] Arthur C. Pigou, *The Economics of Welfare*. London: Macmillan. 1920. http://en.wikipedia.org/wiki/Pigovian_tax

- "When the social interest diverges from the private interest, the industrialist has no incentive to internalize the social cost"
- As a result there are "**incidental uncharged disservices**" embedded in the free-market system (using Pigou's terminology)
- Today's economists call these disservices "**externalities**"
- Pigou recommended a tax on the 'offending product' to adjust the market and bring the economy back to a healthy equilibrium.
- A Pigouvian correction can be justified if it represents the actual (Real World) cost of the "incidental uncharged disservice."
- A Pigouvian Correction covers costs of repair and/or restoration.

N. Gregory Mankiw, professor of economics at Harvard and former Chair of the Council of Economic Advisors to President George W. Bush addresses the externalities of the fossil fuel industry and asks:

> *"…how do we, as a society, ensure that we all make the right decisions, taking into account both the personal impact of our actions and the externalities?"*[17]

Mankiw suggests there are three approaches:

1) "One approach is to appeal to individuals' sense of social responsibility…..unrealistic."
2) "Use government regulation to change the decisions that people make… huge bureaucratic nightmare."
3) **"Internalize the externality"** by charging a fee (commensurate of the disservice)for burning carbon,

> *"that fee would be built into the prices of products and lifestyles… people would naturally look at the prices they face and, in effect, take into account the global impact of their choices."* (a **Market-Based** correction)

According to Mankiw, "*I am confident that the economics profession has it right. The hard part is persuading the public and the politicians.*"[18]

Market-Based Approach

A market-based solution is favored by a number of conservatives:

- Art Laffer, Reagan's economic advisor
- Greg Mankiw, advisor to George W. Bush and Mitt Romney
- George Shultz, Secretary of State under Reagan

[17] N. Gregory Mankiw "A Carbon Tax That America Could Live With,", New York Times, August 31, 2013, http://mobile.nytimes.com/2013/09/01/business/a-carbon-tax-that-america-could-live-with.html?emc=edit_tnt_20130831&tntemail0=y&

[18] Ref: "A Carbon Tax That America Could Live With," N. Gregory Mankiw , New York Times, August 31, 2013, http://mobile.nytimes.com/2013/09/01/business/a-carbon-tax-that-america-could-live-with.html?emc=edit_tnt_20130831&tntemail0=y&

These conservatives embrace a revenue-neutral carbon tax because it asks fossil fuel sector to be responsible for their externalities. It corrects the distortion in the free market that gives carbon-based energy an edge over alternative technology. Once this correction is in place, the market will move away from fossil fuels and towards other sources of energy, (and incidentally reduce greenhouse gas emissions as well.)

Returning the carbon burning fee revenue to households will enable Americans to make this transition without economic pain. A market-based approach is preferable to more EPA regulations

According to Mankiw, "Among economists, the issue is largely a no-brainer." In December 2011, the IGM Forum[19] asked a panel of 41 prominent economists about this statement: "A tax on the carbon content of fuels would be a less expensive way to reduce carbon-dioxide emissions than would a collection of policies such as 'corporate average fuel economy' requirements for automobiles." Ninety percent of the panelists agreed.

Mankiw established the **Pigou Club** to identify those who support a Pigouvian correction, an "elite group of pundits and policy wonks with the good sense to advocate higher Pigouvian taxes."

> Anne Applebaum, William Baldwin, Gary Becker, David Brooks, Clive Crook, Greg Easterbrook, Christopher Farrell, Martin Feldstein, Fred Foldvary, Robert Frank, Bill Frenzel, Thomas Friedman, David Frum, Jason Furman, Jane Galt, Ted Gayer, Al Gore, Alan Greenspan, Tim Harford, Kevin Hassett, William Hoagland, Joe Klein, Morton Kondracke, Charles Krauthammer, Paul Krugman, Arthur Laffer, Tony Lake, David Leonhardt, Brink Lindsey, Ray Magliozzi, Greg Mankiw, Dan McFadden, Gilbert Metcalf, Mike Moffatt, Paul Mulshine, Bill Nordhaus, Richard Posner, Jonathan Rauch, Ken Rogoff, Nouriel Roubini, Robert Samuelson, Andrew Samwick, Isabel V. Sawhill, George Schultz, Robert Shapiro, Charles Stenholm, Andrew Sullivan, Nicholas Stern, Joe Stiglitz, Rob Stavins, Larry Summers, John Tierney, Hal Varian, Paul Volcker

Pigovian corrections. An economic system that allows externalities is a broken system with a distorted market. Pigou recognized that "industrialists" will always put their private interests above the public interests and attempt to **externalize** costs associated with their products to make their product appear more affordable, more profitable. When this occurs, Pigou suggested that the public respond (via government) by adding a fee/tax to the product to correct for any externalities should they exist.

A 'carbon burning fee' has been suggested by economists as a means of internalizing the externalities in the 'ancient hydrocarbon' burning industry. This proposal in the form of legislation is a market-based, revenue-neutral carbon fee-dividend program designed to be a Pigovian correction to our broken energy-related economic system.

Basis for a Pigovian Correction. For this pipeline project, the major elements of a Pigovian correction would be to add the **Reparation Costs and the Replacement Costs** to all ancient hydrocarbons that henceforth are extracted from Earth for the purpose of burning.

Pigouvian Correction = Reparation Costs + Replacement Costs

Recycle Exception. If the end application is something other than burning, the burning fee would not be assessed.

[19] **IGM Forum asked a panel** http://www.igmchicago.org/igm-economic-experts-panel/poll-results?SurveyID=SV_9Rezb430SESUA4Y

> **Example:** If an extractor removes a ton of tar sands from Alberta (using energy derived from inexhaustible sources), and that bitumen is processed to be used as recyclable asphalt to pave a road or parking lot, it would be exempt from the carbon burning fee – because it remains available for future generations.

Although this idea of a Pigovian Correction has not yet seen very much light in the U.S., it has taken the form of a carbon tax and has already been initiated in a number of other countries.

British Columbia, CA Carbon Fee Example. British Columbia already has a "Carbon tax" in place. Although this requires further research, it is quite possible that if TransCanada were to not use a pipeline across the U.S to get their product to refineries in the Gulf (where U.S. tax sheltered corporations can reap their profits), the pipeline would have to be constructed across Canada through BC to west coast refineries. As a result BC may require a Carbon Tax as the tar sands oil crosses their border. Depending on the future escalation of the BC carbon tax, this could add a significant financial burden on the profitability of the Alberta tar sands oil.

U.S. Carbon Fee (proposed). TransCanada is undoubtedly aware that the U.S. is starting to consider legislation to enact a Carbon Fee-Dividend program that levels the playing field for alternative energy sources. TransCanada (and the tar sands extractors) would hope to get this pipeline permitted now and constructed before such a U.S. carbon fee might be imposed on their Canadian imported oil. An escalating carbon tax imposed upon this acknowledged "dirty oil" might significantly slow or even stop the current extraction of this valuable hydrocarbon resource.

We examine a U.S. Carbon Fee for the dilbit/SCO that would be transported across America by the proposed Keystone XL Pipeline in the next section.

Pigovian corrections associated with Keystone Pipeline. The Keystone Pipeline EIS begins to identify where our broken U.S. economic system requires immediate Pigovian corrections for this project. Only when these economic corrections are in place can the market influence us to make choices consistent with sustainable living in the Real World. Only when the market is properly informed of the total cost of a product can we make the sustainable choices.

At a minimum, if the U.S. permits the pipeline to cross our nation's heartland, there must be a Pigovian correction imposed on each barrel of dilbit/SCO. The fee must internalize costs to compensate for tangible and intangible damages:

Encroachment on sacred tribal lands,
Risk of contaminating the critical Ogallala aquifer it sits atop,
Cost of disrupting or losing access to valuable farmland,
Aiding and abetting a crime against humanity (further burning of ancient hydrocarbons so they are no longer available for future generations),

Contributing to further air, soil and water pollution in the Gulf region.[20]

So rather than review the EIS as a means of justifying why it is ok to behave unsustainably, let's view the EIS as a means of identifying what needs to change, **what externalities need to be internalized to properly evaluate this human project.**

Unfortunately, tragically, humans have not yet learned how to live sustainably. We insist on using economic systems that externalize (ignore) real costs and distort the market place. As a result, the distorted market influences people to make choices that benefit the producer and hurt the people (buyers). For example, our human-created economic system in the U.S. continues to influence us to choose to burn finite one-time-only resources for our energy needs (because with externalities they "appear" to be less expensive) rather than transitioning to inexhaustible sources of energy (solar, wind, hydro, tidal, geothermal,…).

There are two categories of costs that are commonly "externalized" – **Reparation Costs and Replacement**

In a "sustainable world" Reparation Costs and Replacement Costs are embedded in the price of the tar sands products – in addition to the customary Production Costs and Profit.

Let's examine each of these costs in more detail.

Reparation Costs.

In a "sustainable" world, projects are completed, products are produced, services are rendered, systems are created, with little or no violence to the interdependent network of Life. So Reparation Costs are minimal to none.

However In the case of burning tar sand oil (and other refined products), there are significant Reparation Costs, as illustrated by the sheer size of the "Environmental Impact Statement" that must be included in the price of this product before it enters the marketplace. Let's examine four subcategories in the life cycle of this product: **Extraction, Transport, Refinement, Burning**

Extraction

The Extraction process causes significant impact to the Earth as well as human and non-human living systems. There are numerous Reparation Costs: restore the landscape, top soil, vegetation, wild life that occupied the forest before the extraction began; detoxification of the land and river of the chemicals used or spilled during the extraction process. Removal of CO_2 and other greenhouses gases in particular from the atmosphere. The extraction /process require significant energy. Diesel fuel for behemoth earth moving equipment – natural gas is then consumed to heat the tar sands to extract the bitumen. The spend sands are then moved for reclamation. Water is used and contaminated in the extraction process – then stored in holding ponds to evaporate – leaving toxic residual behind as sediment in the ponds.

[20] Refineries in the Gulf Coast region of Texas will process the dilbit /SCO, remove the diluents from the bitumen, and refine the hydrocarbon into diesel fuel for export and consumptive burning. Refining this tar sands material results in further endangering the health and well being of workers, neighbors and particularly developing children in the area.

The EIS does provide data that allows us to begin to estimate any extraction-related externalities, but we will not include these social costs at this point.

Transport

The solid material is removed / surface mined and transported locally to where the bitumen is separated from the sand. Chemical diluents are added to thin the tar substance to decrease its viscosity so that it will flow into tankers or pipelines for transportation to a refinery. Again energy is required – fossil fuel – either for tanker trucks, tanker rail cars, or to operate the pumping station long the pipeline. Energy is required to manufacture all the mining and processing equipment. Energy is required to make the chemicals used in the processing.

The EIS does provide data that allows us to begin to estimate any transportation-related externalities, but we will not include these social costs at this point.

Refinement

At some in the life cycle, the bitumen is refined into the end products for burning. This process requires energy and creates waste products that must be recycled.

Again, the EIS does provide data that allows us to begin to estimate any refinement-related externalities, but we will not include these social costs at this point.

Burning

We will however include in our example externalities related to consuming/burning the tar sands products that move through the Keystone XL pipeline.

When a barrel of oil is burned, it produces about 0.43 metric tonnes of CO_2.[21] To sequester the CO_2 from a coal-fired electrical generating plant requires between $50 / ton of CO_2 for a gas-fired plant to $168 / ton of CO_2 for a coal-fired plant.[22] We will use $100 / ton of CO_2 for this example.

With these groundrules and assumptions, the calculated "Reparation Cost" (i.e. to "repair" the damage to the atmosphere) for burning a barrel of dilbit/SCO, would be about **$43 / barrel.**

Replacement Costs

We acknowledge that tar sands are a finite, one-time-only resource. When these resources are burned / consumed, they are no longer available to future generations. As a result, in a sustainable world, the extractor would be required to add the replacement cost (for a like-kind and amount of energy) of this item to the price before it gets to the market.

How does one arrive at a replacement cost for a barrel of dilbit (diluted bitumen) or synthetic crude oil made from the tar sands bitumen? By using the current cost to harvest an equivalent amount of energy from inexhaustible sources.

[21] EPA http://www.epa.gov/cleanenergy/energy-resources/refs.html

[22] Jeremy David and Howard Herzog, THE COST OF CARBON CAPTURE, Massachusetts Institute of Technology (MIT), Cambridge, MA, USA http://sequestration.mit.edu/pdf/David_and_Herzog.pdf

For this simple example we will estimate the replacement cost of one barrel of dilbit or SCO using the cost to harvest energy using a simple rooftop solar photovoltaic system.

- Assume a barrel of dilbit or Synthetic Crude Oil (SCO) contains about 5,800,000 BTU (1700 kWh)[23]
- Assume that the cost of harvesting sunlight using solar PV modules to make electrical power is $0.113 / kWh. (personal experience with no subsidies included)

With these groundrules and assumptions, the calculated "Replacement Cost" for extracting/burning one barrel of tar sands dilbit or SCO would be around **$192 / barrel.**

CONCLUSION: To fix our current economic system by using a Pigovian Correction to internalize just two of the several known externalities associated with the extraction / burning of tar sands oil, we would add a carbon fee of at least **$235 / barrel** when that barrel of oil crossed the Canadian – U.S. border at Morgan, Montana. This fee would be added to the direct costs of extracting a barrel of SCO that may be in the $30 / barrel range.

So the market price of a barrel of SCO would have to exceed $265 before the extractor could realize a profit.

The market will probably pay between $75-$100 today.

In the Real World all costs are Real. In a sustainable human-created "real world," no legitimate cost is ignored (externalized) and deferred to the public to shoulder. Instead all costs are added directly to the price of the end products for the market to see. At this point, in a sustainable social (economic) system that avoids externalities, we would not be evaluating an EIS of a tar sands oil pipeline. The tar sands project would most likely still be on the drawing boards (or in the trash can).

> **Note:** the carbon burning fee applies only to materials that are extracted to be consumed. If the bitumen was being extracted for paving asphalt and recycled over and over, the carbon burning fee would not apply. Such use of the Earth's resource would be considered sustainable.

The astute reader will notice that when the industrialist is not allowed to externalize costs associated with the extraction/burning of ancient hydrocarbons, but instead is required to shoulder the cost of replacing this energy with an equivalent amount of energy for future generations, then it no longer makes financial sense (or cents) to burn these materials for energy. The industrialist is already paying the cost of harvesting the same amount of energy from inexhaustible sources in the burning fee.

Comments prepared by:

Milt Hetrick
Centennial, CO
3/7/2014

[23] http://en.wikipedia.org/wiki/Oil_sands

APPENDIX A: Examples of a Few Tar Sands Oil Pipeline Failures.

I attended the public hearing in Grand Island, Nebraska on the Draft Keystone XL EIS in April 2013. I was opposed to this pipeline back then – particularly after hearing comments from the hundreds of people who spoke at the public hearing About 10% of the speakers were pro-pipeline (e.g. pipeline welders union members) and the remainder were opposed (e.g. Nebraska farmers, indigenous people, physicians, and other concerned citizens affected by the pipeline along its route.)

There were also two unexpected speakers at the Draft EIS public hearing who spoke about recent tar sands oil pipeline failures.

MI tar sands oil spill. One, a resident of Marshall, Michigan described how her community was still cleaning up three years later after an Enbridge Energy pipeline leaked/ruptured and dumped possibly 1 million gallons of tar sands crude into their Kalamazoo River in 2010. [24]

AR tar sands oil spill. Another unexpected speaker traveled from Mayflower, Arkansas, and described how the ExxonMobil Pegasus tar sands pipeline had just ruptured a month earlier spilling 5000 barrels (210,000 gallons) of tar sands dilbit (diluted bitumen) into her neighborhood – 3000 barrels (126,000 gallons) of that crude were never recovered and may have found a way into adjacent Lake Conway. [25]

SunCor tar sands oil spill. Denver, CO

Lessons Learned from DILBIT Spills (Ref: http://en.wikipedia.org/wiki/Dilbit)

Separation and oil spill risks.

"Unlike conventional crude, dilbit floats briefly in water but then sinks as the light components evaporate, leaving the heavy components behind. This makes cleaning up a dilbit spill much more difficult than a conventional oil spill, particularly if dredging is considered too ecologically damaging.[13] During the Kalamazoo River oil spill, the heavier components sank to the bottom of the water column, making cleanup difficult.[14] Cleanup of the spill is still underway three years after the event, and officials at the Michigan Department of Natural Resources' Fishery Division expect that it will "be many more years before the agency can measure the full impact on fish and other animals' reproductive cycles."[15]

In 2013, opening on the Keystone XL pipeline proposal, the EPA recommended to the State Department that pipelines that carry dilbit (such as the proposed Keystone XL) should no longer be treated just like pipelines that carry any other oil. "We have learned from the 2010 Enbridge spill of oil sands crude in Michigan that spills of diluted bitumen (dilbit) may require different response actions or equipment from response actions for conventional oil spills. These spills can also have different impacts than spills of conventional oil. […] We recommend that the Final EIS more clearly acknowledge that in the event of a spill to water, it is possible that large portions of dilbit will sink and that submerged oil significantly changes spill response and impacts. We also recommend that the Final EIS include means to address the additional risks of releases that may be greater for spills of dilbit than other crudes. For example, in the Enbridge spill, the local health department issued voluntary evacuation notices based on the level of benzene measured in the air."[16]"

---

[24] Enbridge Energy tar sands oil pipeline ruptured and was reported on Monday, July 26, 2010, near Marshall, Michigan. The release of oil, estimated at 843,000 gallons, entered Talmadge Creek and flowed into the Kalamazoo River, a Lake Michigan tributary. Cleanup has cost over $1 Billion, recovered an estimated 1.15 million gallons of crude and is still ongoing over three years later according to the EPA. http://www.epa.gov/region05/enbridgespill/ .

[25] ExxonMobil's 66 year old Pegasus **tar sands** oil pipeline burst on 29 Mar 2013 and spilled 5000 barrels of diluted bitumen into a cove of Lake Conway, **Arkansas**. 83 people were evacuated from their homes. http://thinkprogress.org/climate/2013/05/02/1952171/exxon-spills-tar-sands-oil-again-in-missouri-cant-find-126000-gallons-spilled-in-arkansas/

Table of Contents

Preface 1

Summary 2

Reasoning 2

Introduction 2

Unsustainable Living is "cidal" Behavior – Not in our Nation's Interests 3

Why is Constructing another Pipeline Unsustainable Human Behavior? 4

Why Is Burning Tar Sands Oil Unsustainable Human Behavior? 4

1) Consuming Finite Ancient Hydrocarbons is Unsustainable Physically. Do the Math (No Science Involved). 4

Just simple arithmetic (subtraction). 5

Postponing the inevitable is immoral. 5

2) Burning has Become Detrimental to Living Systems - (Some Science & Systems Perspective Required.) 6

Energy drives Living systems. 6

Living Systems Emerged on Earth. 6

Emergence of living systems. 6

Emergence of Homo sapiens – one of the more capable living system (species). 6

Limits on behavior using Social Systems. 7

Human-Created Systems have become emasculated / broken. 7

Broken Social System Influence Us to Make Unsustainable Choices. 8

How is it we are not living sustainably? 8

System is broken - Rules are outdated 8

System has been compromised. 8

"Great Burning" is changing atmosphere. 8

Tar Sands Extraction introduces toxic materials 8

Excerpts from the Final EIS Chapter 4 Greenhouse Gases and Climate Change 9

Humans are changing the global climate. 10

"Developed Cultures" are the least sustainable. 10

6th Mass Extinction. 10

3) Any Consumption is Unsustainable 11

Ancient hydrocarbons are too valuable to burn. 11

Pipeline Perpetuates Burning/Consumption 11

Consumption is a Crime against humanity 11

Consumption with chemical blowback is a hardened Crime against Humanity 11

Aiding and Abetting Consumption is a Crime 12

What Does Sustainable Living Look Like? 12

The Sustainable Living Frame / Sandbox 12

Finite planet. 13

Looking forward with a purpose. 13

Real World wins. 13

Energy – Essential to Life 14

Life uses current sunlight as energy source. 15

Energy for self-existence (Food). 15

Energy for self-extension (tools/technology) 15

Transitioning now is easy. 16
"Great Harvesting" to replace "Great Burning" 16
No pipelines in a sustainable world. 16
No consumption in a sustainable world. 16
Burning to not burn. 16
Sustainable Frame – supports a new path we can/must be on. 16
Viable sources of inexhaustible energy. 17
NOT All of the Above. 17
Too valuable to burn. 17
No more CO2. 17
Other uses for hydrocarbons. 17
Problems Eliminated. 18

Path of Change from Unsustainable to Sustainable Living 18

People are Generally Law Abiding and Live within the System 18

Our Social System is Broken. 18

Focus on Fixing a Broken System – Avoid Blaming Other People. 18

Pave a Path to Sustainable Living. 19
Update Ethics for a Finite Interdependent Planet (Ecomorality) 19
Fix Broken Social Systems 19

Conclusion 19

Department of State: REJECT the Keystone XL Pipeline Permit. 19

Burning is Unsustainable. 19
Constant Withdrawals - No Attempt to Pay Energy Back for Future Generations 20
Robbing our grandchildren of a healthy prosperous future. 20

Aiding and Abetting Burning is Unsustainable 20
No More of the Same. 20

Recommendations for Government: 21

1) Reject Permit – Do Not Enable our Addiction to Burning. 21

2) Update / Fix Our Social System. 21
a. Put a price on carbon 21
b. Put a price on nuclear "accidents" and waste management 21
c. Change what we think about. 21

Comments on the Final EIS 23

EIS Overview from an Unsustainable Frame of Reference. 23
Corporate Media assessment of EIS. 23
Comments on Final EIS. 23

EIS Overview from a Sustainable Frame of Reference. 24

EIS Repurposed. 25
Externality Inventory. 25

Identifying and Eliminating Externalities..... 25
Background / Economic Principles 25
Market-Based Approach..... 26
Pigovian corrections. 27
Basis for a Pigovian Correction. 27
Recycle Exception 27
British Columbia, CA Carbon Fee Example. 28
U.S. Carbon Fee (proposed). 28
Pigovian corrections associated with Keystone Pipeline. 28
Reparation Costs. 29
Extraction 29
Transport..... 30
Refinement 30
Burning..... 30
Replacement Costs 30
APPENDIX A: Examples of a Few Tar Sands Oil Pipeline Failures. 32
MI tar sands oil spill. 32
AR tar sands oil spill. 32
SunCor tar sands oil spill. 32
Lessons Learned from DILBIT Spills (Ref: http://en.wikipedia.org/wiki/Dilbit) 32
Separation and oil spill risks. 32