The Great Transition

Dr. Alan K. Betts

Atmospheric Research, Pittsford, VT 05763

akbetts@aol.com

http://alanbetts.com

(Talks and background material)

Eastview

Middlebury, VT

August 27, 2013

The Great Transition

- ***Climate change driven by increasing greenhouse gases, primarily from fossil fuels, amplified by increasing water vapor and shrinking ice***
- **Growing population and industrialization putting pressure on all resources and oil reserves**
- **Increasing vulnerability of globalized economic and financial system**

- ***Large technical challenges***
- ***Huge social challenges***

What Lies Ahead?

- **Accelerating change, increasing extremes**
- **Increasing adaptation and rebuilding costs**
- **Environmental damage that will transform or destroy ecosystems- locally and globally**
- **Freely dumping waste streams from society into atmosphere, streams, lakes and oceans is unsustainable – long term costs now exceed $1000 trillion**
- ***Will need fossil carbon tax (a "waste" tax) to incentivize mitigation and pay for the long-term costs***

We Promised to Stop "Dangerous Climate Change"?

- **1992 Commitment** ***(http://unfccc.int/)***
  - **UN Framework Convention on Climate Change**
- **Must stabilize atmospheric CO_2**
  - **This means an 80% drop in CO_2 emissions!**
- **This is very difficult**
  - **Fossil fuels have driven our industrial, agricultural and population growth for 200 years**
  - **Our "lifestyle" has become dependent on fossil fuels**

Managing Our Relation to the Earth System

- **Our technology and our waste-streams are having large local and global impacts on the natural world**
  - **They must be carefully managed**
  - **They must be properly costed**

  — ***because we are dependent on the natural ecosystems***

- **We need new planning 'rules' because**
  - **Our numbers and industrial output are so large**
  - **Maximizing consumption and profit have led to present predicament**
- **We need a long time horizon**
  - **Generational to century *(Forest timescale)***

Guidelines to Minimize Impacts

- ***Planning a trajectory for sustainability***
- **Minimize the lifetime of human waste products in the Earth system and eliminate waste with critical biosphere interactions**
- **Maximize recycling and re-manufacturing to minimize waste-streams and the use of non-renewable raw materials**
- **Maximize the efficiency with which our society uses energy and fresh water**
- **Maximize the use of renewable resources**

Energy Efficiency Critical

- **We need to double or triple our energy efficiency because…**
  - **We cannot replace current fossil fuel use with biofuels & renewable energy**
  - **Oil and gas reserves are limited, but coal, shale-gas & shale-oil reserves are sufficient to push CO_2 to 1,000 ppm—and <u>in time</u> melt icecaps and raise sea-level 150 ft**
    - **Can we "sequester" CO_2 (put it back in the earth)?**

The view from Exxon

- **Exxon CEO Tillerson acknowledged (Wednesday, 6/27/2012) that global temperatures are rising. "Clearly there is going to be an impact," he said.**

- **But he questioned the ability of climate models to predict the magnitude of the impact. He said that people would be able to adapt to rising sea levels and changing climates that may force agricultural production to shift.**

- **"We have spent our entire existence adapting. We'll adapt," he said. "It's an engineering problem and there will be an engineering solution."**

Surely Technology Can Save Us?

- **We have lost sight of the critical distinction between the human-made world and the natural world**
- **We understand the human-made world, the world of computers & technology—because we made it—it is predictable and controllable, except when we are careless (& earthquakes)**

  [E. F. Schumacher (1977). *A Guide for the Perplexed*]
- **The same is not true of the natural world – which is far more complex and alive. Our understanding is limited; prediction & control are not possible**

Surely Technology Can Save Us?

- **Now our world of technology is having a global impact on the natural world**
- **Our technology must be carefully managed**
  - **because we are dependent on the natural world**
- **A huge ideological challenge for us!**

Social Challenges

- **Our resistance to change…**
- **Needs holistic approach**

Transition Strategy

Conventional Environmentalism	The Transition Approach
Individual behaviour	Group behaviour
Single issue	Holistic
Tools: lobbying, campaigning and protesting	Tools: public participation, eco-psychology, arts, culture and creative education
Sustainable development	Resilience/relocalisation
Fear, guilt and shock as drivers for action	Hope, optimism and proactivity as drivers for action
Changing National and International policy by lobbying	Changing National and International policy by making them electable
The man in the street as the problem	The man in the street as the solution
Blanket campaigning	Targeted interventions
Single level engagement	Engagement on a variety of levels
Prescriptive – advocates answers and responses	Acts as a catalyst – no fixed answers
Carbon footprinting	Carbon footprinting plus resilience indicators
Belief that economic growth is still possible, albeit greener growth	Designing for economic renaissance, albeit a local one

- ***Hopkins – The Transition Handbook***
  (http://www.transitionnetwork.org/)

The Future Is Not Our Past

- **Collectively, we create the future, so we need to plan for a transition to a sustainable and resilient society**
  - ***Youth are not stuck in the past***

- **Efficient society that manages all waste**
- **Renewable technologies to replace fossil fuels**
- **Localized control**

- **Needs deep community discussion/vision**
  - ***Because the political system cannot do this***

Why Is It Difficult for Us?

- **The "American dream" is crumbling**
  - **"Economic growth" based on fossil fuels, debt, and consumerism is unsustainable — and a disaster for the planet!**
- **Individual "rights" and the needs of humanity must be balanced against the needs of the earth's ecosystem**
- **We don't know how to guide and manage technology — so the result is tremendous successes and catastrophic failures**

Why Is It Difficult for Us?

- **Fossil fuels reserves are worth $20-30Trillion**
  - **Regulating emissions of CO_2 is an "unfair cost" to the "free market"**
  - **Yet we are still subsidizing fossil fuels**
- **Politics lost in fantasy world**
  - **Lost in old beliefs (and so are we all!)**
  - **Protecting the interests of the status quo**
  - **Ignoring Earth system and climate issues**
  - **Ignoring future costs to save $ now**
    - **Manhattan within 1-ft of flooding with Irene**
    - **Did they put waterproof doors on tunnels? No**

‘Anti-Global Warming’ Tactics [*confuse, deny and delay*]

- **Fabricate ‘data’ or cherry-pick the science for unsolved issues and ignore the big picture. ‘This disproves global warming’ *or* ‘Science isn’t resolved; we need more science.’**
- **Models can’t predict the future with certainty, so the models are ‘unreliable’, ‘can’t be trusted’. Given this uncertainty, *we cannot be held responsible for the future*.**
- **If climate change were real, it would require collective government regulation of the ‘free market’, which we oppose; so *climate change must be a ‘hoax/conspiracy’***
- **It is too costly to make structural changes to our society, and it would affect profit margins.**

- **[We will wait till China and India take action]**
- **[The poor in Africa need energy]**

What Do We Need?

- **So we need honest, truthful, smart pathways forward**
  - **That will not frighten people into paralysis**
  - **That will spread hope, not anger or despair**
  - **That sidestep ideological barriers with new language**
  - **That develop adaptive governance**
    - **The US Constitution gives no rights to the Earth**
  - **That respect Earth system processes & limits**

What Do We Need To Do?

- **The transition to a sustainable society will take decades and a community effort**

- **Food: local agriculture & gardens**
- **Energy: Double energy efficiency ….**
  - home heating – district heating + cogen
  - renewable electricity mix
  - efficient transportation system
  - careful forest management
- **Finance: relocalization in real world**

Agricultural planning

- **Warming climate a boost to agriculture**
  - **Frozen period shrinking: 7 days/decade**
  - **Earlier melt, earlier spring leaf-out: 3 days/decade**
  - **Frost-free growing season: 4 days/decade**
  - **Greenhouse, row cover seasonal extenders**
  - **Extreme minimum temperatures increasing +2-3^{o}F/decade**

- **Climate extremes increasing**
  - **Winter extremes increasing with variable snow**
  - **Summer precipitation changing**
  - **Heavier rain-rates, longer storms, longer droughts**
  - **Manage to reduce soil erosion, maximize soil water infiltration, water storage**

Develop Local Food System

- **Local control, keeps $ in community**
- **Less energy intensive**
- **More diverse, more resilient**
- **Reduced petrochemical inputs and ecosystem damage**

Housing, Buildings etc

- **Need ‘net-zero’ building codes**
  - **Tight shells with heat, vapor gas exchange**
  - **With ground source/geothermal heating systems on new buildings**
- **Need retrofit on (all) old housing stock in Vermont to double energy efficiency**
  - **Germany is retrofitting 10% per year – why can’t we?**
- **“Smart Growth” (!) with transit**
  - **or we will get more rural living with more single occupancy vehicles**

Trucks or Efficient Transport?

30 mph Danish electric tricycle:

with 150 mile range

Photovoltaic power

- ***Halve home electrical use first!***
- **Supplies summer daytime peak loads**
  - **Decentralized power – less transmission needs, smaller losses**
  - **Now cheap: long lifetime for panels**
  - **But less consumption to pay utilities overhead**
  - **Needs smart grid (which we don't have)**
  - **Still need storage or conversion to liquid fuels**
- ***Panels are disturbing my rural views***
  - ***From my hill-top home***


Sheffield, VT - September 2012

Wind in Vermont

- **Is this renewable local power or an eyesore on our precious mountains?**

- ***Is it properly regulated; and are those impacted properly compensated?***
- ***Have we built a smart grid to handle the power from distributed systems?***

- ***What are our fossil fuels alternatives?***

Pipelines for Natural Gas (Methane: CH_4)

- **US has large new sources from fracking and US has large energy demand**
  - **CH_4 is more powerful greenhouse gas than CO_2 but has shorter atmospheric lifetime (20 years)**
  - **Burning it from Coventry landfill – good**
  - **Burning CH_4 better than burning coal (C)**
  - **Mining it with leakage (poor regulation), and then burning it is questionable**
  - **Waste water pollution issue (poor regulation)**
  - **Lifetime of gas-fields/wells is finite**

  - ***All fossil fuel better left in ground***
  - ***But US has large energy demand***

Purchased Silence?

- **When drilling company Range Resources offered the Hallowich family a $750,000 settlement to relocate from their fracking-polluted home in Washington County, Pennsylvania, it came with the restriction.**
  - **Chris and Stephanie Hallowich, and their two young children, ages 7 and 10, would be forbidden from ever speaking about fracking or the Marcellus Shale for the rest of their lives**
  - **So the choice is between receiving compensation for damage done to one's health and property, or publicizing the abuses that caused the harm**
- **With no public record of contamination, companies can then say**
  - **"They never produced evidence of any health impacts"**
  - **"There are no documented cases of contamination" in testimony to Congress**
- **A 2012 Pennsylvania law requires companies to tell doctors the chemical contents of fracking fluids, so long as doctors don't reveal that information to anyone, even to patients they are treating for fracking-related illness.**

(Web information subject to dispute and legal interpretation!)

Alberta Tar-sands Oil

- **Tar-sands are huge fossil reserves, so mining them is threat to the planet**
- **Very energy intensive, so costly to extract and costly to climate**
- **Massive water use/pollution**
  - **More (free) water use than Toronto (2.8m people)**
  - **Free dumping of waste water into aquifers and tailings ponds**
  - **Leaks contaminate downstream watersheds and their communities**
- **Being driven by our thirst for oil**
  - **Driving new pipelines to get to markets**

N. Dakota shale-oil

- **Being driven by our thirst for oil**

- **Comes with methane: 30% is burnt at well-head, because far from markets!**
  - ***Permissive rules - and gas is cheap because of fracking***
  - ***Greenhouse gas emissions in 2012 equivalent to nearly one million cars***

Our Choices Are Bounded

- ***Whether we use technical, social or religious language***
- **Humanity is an integral part of the earth system and dependent on its stability**
- **We do not have the freedom to do what we wish, whatever our economic or theological doctrine**
- **The response of the Earth system to our human-centered arrogance will be so large this century that we will rethink our doctrine**
- **We would be wise to rethink sooner rather than later**

As Climate Changes….

- **Everything is interconnected**
  - **Human society and waste streams: people's choices and actions**
  - **Precipitation, seasons, streams, and forests; habitat and wildlife**
- **Keep your eyes open to the big picture**
  - **Ground yourself in relation to the Earth**
  - **Realize that hope opens doors, frees your creativity and connects you to each other**
  - **What can our community do?**
    - **Create solutions that will help our children**

Discussion

- ***Building a resilient society will take time and community action***

  (http://www.transitionnetwork.org/)

- ***Something for everyone***
- ***Technical, social and spiritual challenges!***

(http://alanbetts.com)