



# Dealing with Climate Change: Pt 2



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# Outline

- **Science of climate change: Part 1**
  - Global scale: actual and future
  - What is happening to Vermont
- **The transition we face: Part 2**
  - **Managing the earth system**
  - **Why is it difficult?**
  - **How to deal with it**

**Discussion**

# 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***

# Our Present Challenge

- **How to reintegrate  
all that we know and understand**
  - ***given the deep interconnectedness  
of life & climate on Earth***

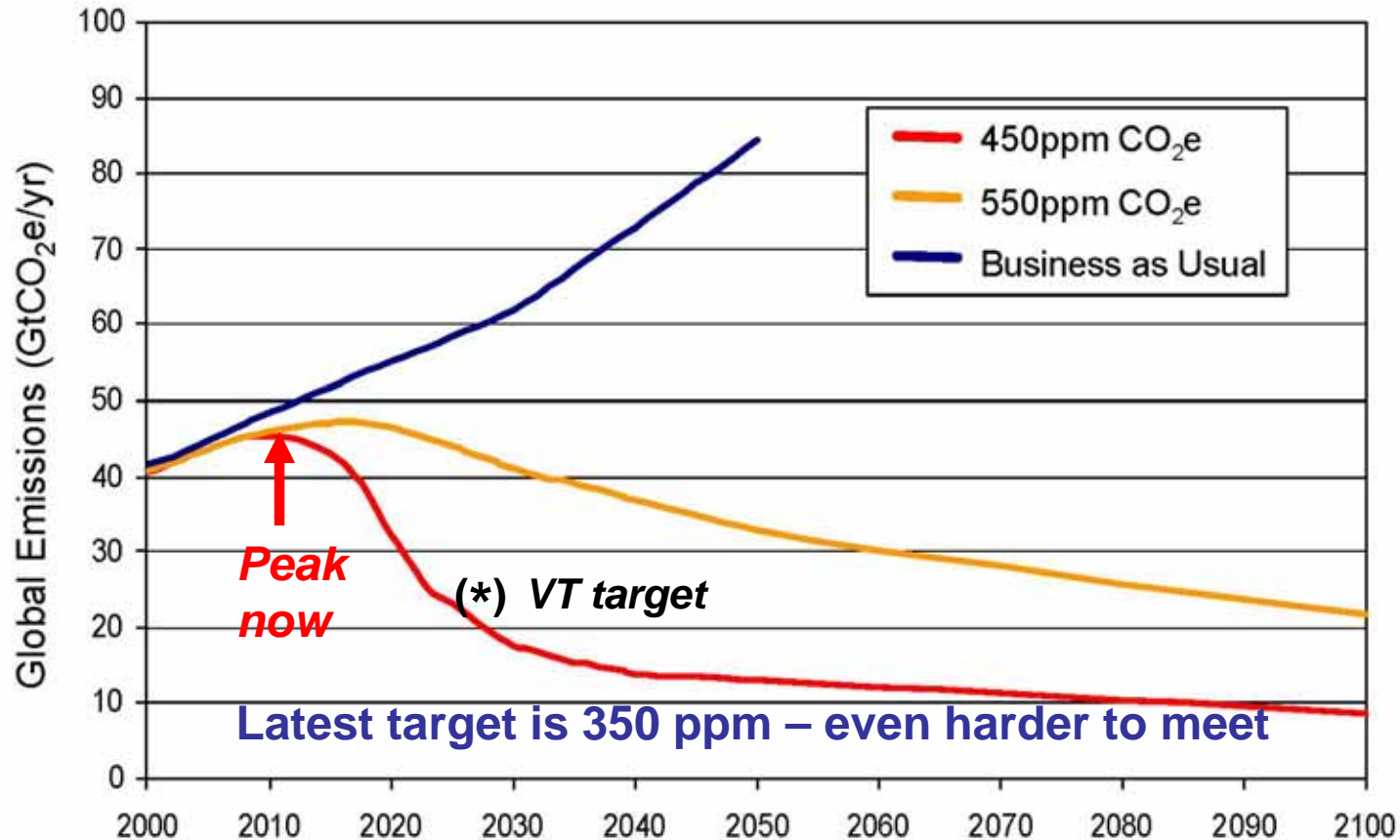
# Can We Stop “Dangerous Climate Change”?

*(UNFCCC 1992)*

- **Yes: Quickly stabilize atmospheric CO<sub>2</sub>**
- **This means an 80% drop in CO<sub>2</sub> emissions!**
- **This is very difficult**
  - **Fossil fuels have driven our industrial growth and population growth for 200 years**
  - **Our “lifestyle” has become dependent on fossil fuels**

# Avoiding “Dangerous Climate Change”?

Emissions Paths to Stabilisation [*Stern, 2006*]



# Managing Our Relation to the Earth System

- Our technology and our waste-streams are having large local and global impacts on the natural world and **must be carefully managed** — *because we are dependent on the natural ecosystems*

# How Do We Manage the Earth?

(When there is so much we don't know)

- **Need a long time horizon:**
  - **Generational to century (*Forest timescale*)**
- **We need some new rules / guidelines**
  - **Our numbers are so great**
  - **Our industrial impact is too large**
  - **Maximizing profit as a guiding rule has failed us**
- **Re-localize to regain control / responsibility and minimize transport**



# A Path Towards 'Sustainability'

- *Necessary to:*
- **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**

# Examples of Long-Lived 'Waste'

- **CFCs** – refrigerants – very stable – lifetime centuries - broken down by sunlight in stratosphere – catalyze ozone destruction, which protects earth from UV
- **CO<sub>2</sub> from fossil fuels** – lifetime centuries – a greenhouse gas that traps earth's heat radiation – pushing earth to warmer climate
- **Nuclear waste** – plutonium-239: half-life 24000 years – nuclear weapons

# Efficiency Comes First

- **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 & oil shale reserves are sufficient to push CO<sub>2</sub> to 1,000 ppm—and in time melt icecaps**
    - **Can we “sequester” CO<sub>2</sub> (put it back in the earth)?**

# 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

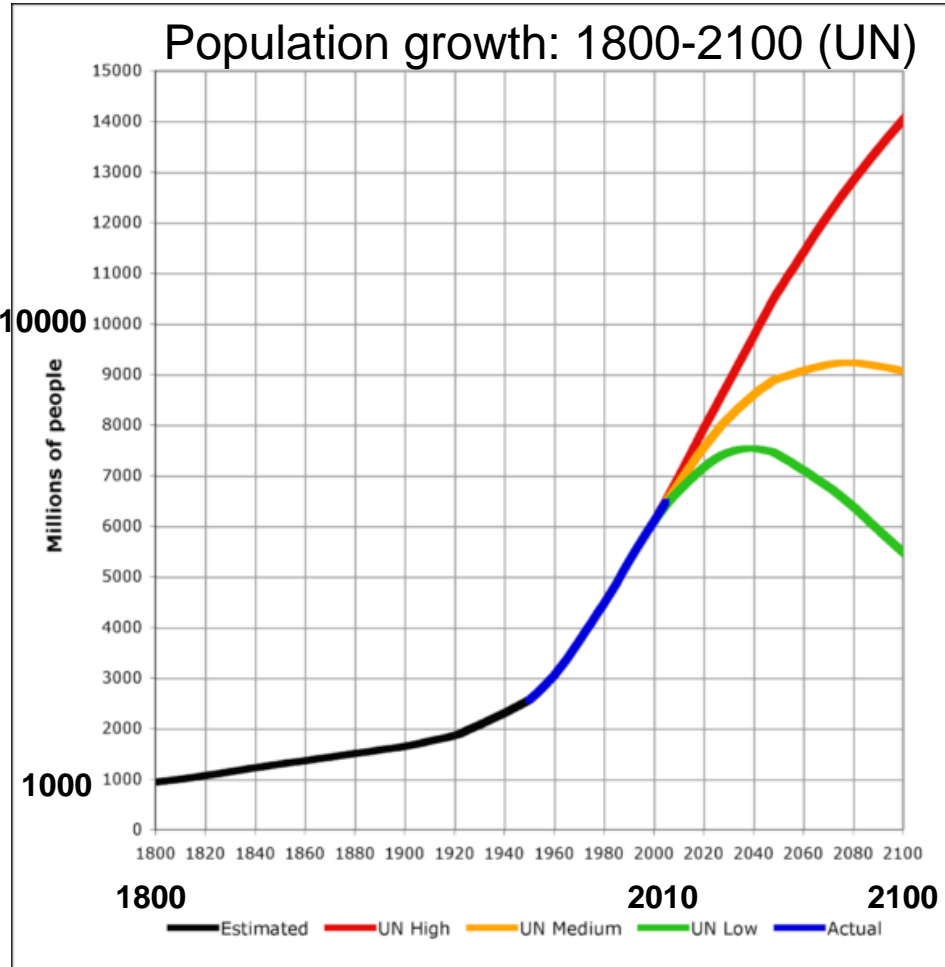
# Why Is It Difficult for Us?

- **Fossil fuels reserves are worth \$20-30T**
  - Regulating emissions of CO<sub>2</sub> is an “unfair cost” to the “free market”
  - Yet we are still subsidizing fossil fuels
- **Politics lost in fantasy**
  - Ignoring Earth system and climate issues
  - Ignoring future costs
    - Manhattan within 1-ft of flooding with Irene
    - Did they put waterproof doors on tunnels? No

# We Passed the Carrying Capacity of the Earth in the 1980s (?)



- Population is still rising
- Consumption still rising
- Fossil fuel use still rising
- *We still 'believe' in Growth*
- *Global poverty & suffering are growing: the future looks bleak for billions*
- *In a finite world, growth leads to overshoot & collapse*



# Surely Technology Can Save Us?

- Critical for transition but real issue is
- Our world of technology is having a global impact on the natural world, which is alive, complex and beyond our 'control'
- **So technology must be carefully managed — particularly our waste-streams — because we are dependent on the natural world**
  - **But this is challenging with our ideology**

# Technology can be Useful *Trucks or lightweight Trikes!*



**30 mph Danish electric tricycle:  
with 150 mile range**





- **Strengths of science:**
  - integrity, honesty and communication
  - *particularly valuable in a society lost in ignorance and deceit*
  
- **Limits of science:**
  - tangible, measurable and communicable
  - *hard to deal with the complexity and interconnectedness of the living natural world*

# Perspective for the 21<sup>st</sup> century

- Much of western philosophy and theology formed when humanity had a limited understanding of its place in the natural world; but the structures of belief didn't matter too much  
*because our impact was small.*
- All this started to change with the industrial revolution powered by fossil fuels. Now humanity has a *global impact on the natural world*, and understanding our place in it is paramount.
- *Science and technology created this situation*, and must help us find a way out, by helping us understand the earth as a global system, now out-of-balance.

# But science has become 'valueless'

- Centuries-old split of science from ethics/religion
- Science preserved its factual integrity, but makes no value choices
- Theology & political society feel free to choose doctrine over understanding 'reality'
- *No-one accepts responsibility for the Earth*
- *So collapse of our 'human system' is possible*

# Our Choices Are Bounded



- **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, political or theological doctrine**
- **The response of the Earth system to human-centered arrogance will be sufficiently large this century that we will rethink our doctrine**
- **We would be wise to rethink sooner rather than later**

# Can't Avoid the Big Issues!

- **Regulation is good – Reagan, G.H. Bush and Riley (EPA) pushed through the Montreal Protocol and the Clean Air Act Amendments over business opposition**
  - saved the Earth from an ozone catastrophe
- **Technology must be managed to minimize human impacts on the Earth**
- **Impacts have to be fully costed**
- **People need a vote, so they need to be informed**

# 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 Will This Mean For Us?

- **Society needs to rethink its relationship to the natural environment and its ecosystems in less than one generation**
- **Our 'lifestyle' is disconnected from what the earth can sustain and the large inertia of the earth system is masking the extent of the crisis we face**
- **Individual can rethink priorities but societal changes are needed: from towns to global**
- **At present, State level more productive than Federal!**

# The Future Is Not Our Past

- **Collectively, we create the future, so we need to plan for a transition to a sustainable society**
- **Face the future with an attitude of**

**“Bold Humility”**

*(Frances Moore Lappé: RAFFL, Rutland, 2007)*

- **Efficient society with renewable technologies**
- **Balance community solutions and government interventions**
- **Ask**
  - **Is this an efficient and sustainable way of doing this?**
  - **Do I have a deep understanding and connection to Earth?**



# Health Issues

- **Higher temperature extremes**
  - Offset by wet summers in Northeast
- **Winter survival of pests**
  - **Blacklegged Tick (Deer Tick):** A warming climate, combined with the spread of the invasive shrub Barberry, has allowed this pest to expand its range to the entirety of Vermont. This invasive is responsible for the spread of Lyme disease throughout New England.
- **Mosquito-borne diseases – EEE/West Nile**
  - Increased summer breeding: *nine out of ten recent summers have had well-above 'average' rainfall*

# Food Issues

- **Milder winters and longer growing season in Northeast**
  - Over-winter more crops
  - Increasing variability of weather
  - Increasing precipitation extremes
  - Flood-plain and soil water management
  - Possible increase in summer pests
- **Increasing drought in southern, central and western US**
  - Critical fresh water issues world-wide
  - Many pumped aquifers near exhausted

# Community-Transition

- **The transition to a sustainable society will take decades and a community effort**
  - [www.transitionnetwork.org](http://www.transitionnetwork.org)
- **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**

# Simple Suggestions

- **Reeducation of society and its ‘systems’**
  - The transition we face is huge
  - What will raise awareness/change paradigm?
  - Reduce human stress...
- **Examine food system waste-streams**
  - Compost all organic waste
  - Aim to recycle everything
  - Limit phosphorus loads on streams/lakes
  - Fresh water not critical in VT, but is elsewhere
- **Default energy use should be ‘OFF’**
  - Group net metering for solar electricity
- **Reconnect with natural world**
  - Fundamental if we are to accept transition
  - Grow food inside in winter?

# What are Key Issues in Vermont for Sustainability and Resilience?

- **Energy efficient housing**
  - Passive solar, net-zero, (geothermal)
  - Efficient lights, appliances
  - End-to-end recycling/remanufacturing
- **Landscape management of water and waste-streams**
  - Flood/drought extremes, runoff
- **Community gardens and composting**
  - Local food and waste management
- **Renewable energy supplies/microgrids**
- **Efficient transportation/transit**

# Discussion

- <http://alanbetts.com>
  - this talk <http://alanbetts.com/talks>
  - articles at <http://alanbetts.com/writings>
  - papers at <http://alanbetts.com/research>
- ***Vermont Climate Change Indicators***
- ***Seasonal Climate Transitions in New England***

# Media Resources

- **Sunday Environment page in Rutland Herald/Montpelier Times Argus:  
*2008-2012 – 50 articles***  
**<http://alanbetts.com/writings>**
- ***Environmental Journalism Revisited***
- **Media Commentaries: VPR/PEG-TV**  
**<http://alanbetts.com/talks>**

# Attitude Matters

## *(Hope versus Despair)*

- People ask “Why are you so hopeful?”
- This is a deeper question than understanding and responding to climate change
  - For human beings, hope expands our vision, hope connects us to each other and deepens our sense of communion
  - Hope opens doors and frees us to be creative and work joyfully with each other and with the Earth
  - Hope is a spiritual connection
- *Despair closes us off from the real world of possibilities into a dark and isolated world*