

Climate Change and the Public Interest

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March for Science

Rutland Free Library

April 22, 2017



Climate Science is Critical

- **Climate change is accelerating**
 - *Shifting energy system away from fossil fuel is only way to slow down changes*
 - **Science and technology are critical**
 - Social issues go far beyond science
 - **Honesty is critical**
 - Remember Earth wins not us!



Fundamentals

- ***Burning fossil fuels: transforming climate***
 - *Many water cycle amplifying feedbacks*
 - *Heading for high CO₂ “Carboniferous era climate”*
 - *Climate extremes increasing*
 - *Decadal to centennial - long timescales*
- **Avoidance of responsibility for decades**
 - Politicians, professionals, public
 - Climate change: Incompatible with business-as-usual
- **Linked to unmanaged technology**
 - Soluble by changing system guidelines
 - Create efficient society, based on renewable energy
- **Choices are value based**
 - Science and economics need guiding
 - Resilience incompatible with exploitative model

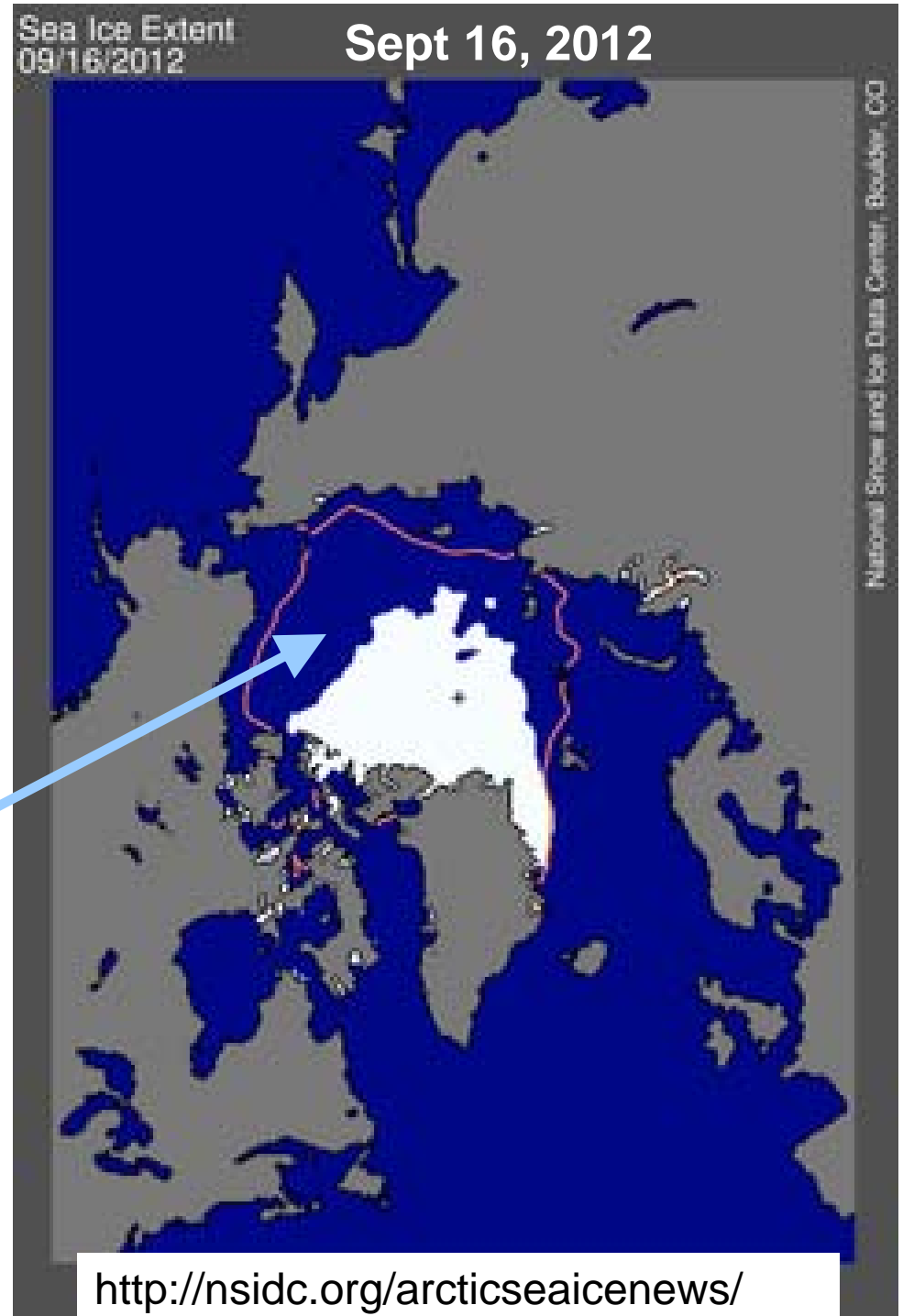
Our Present Challenge

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

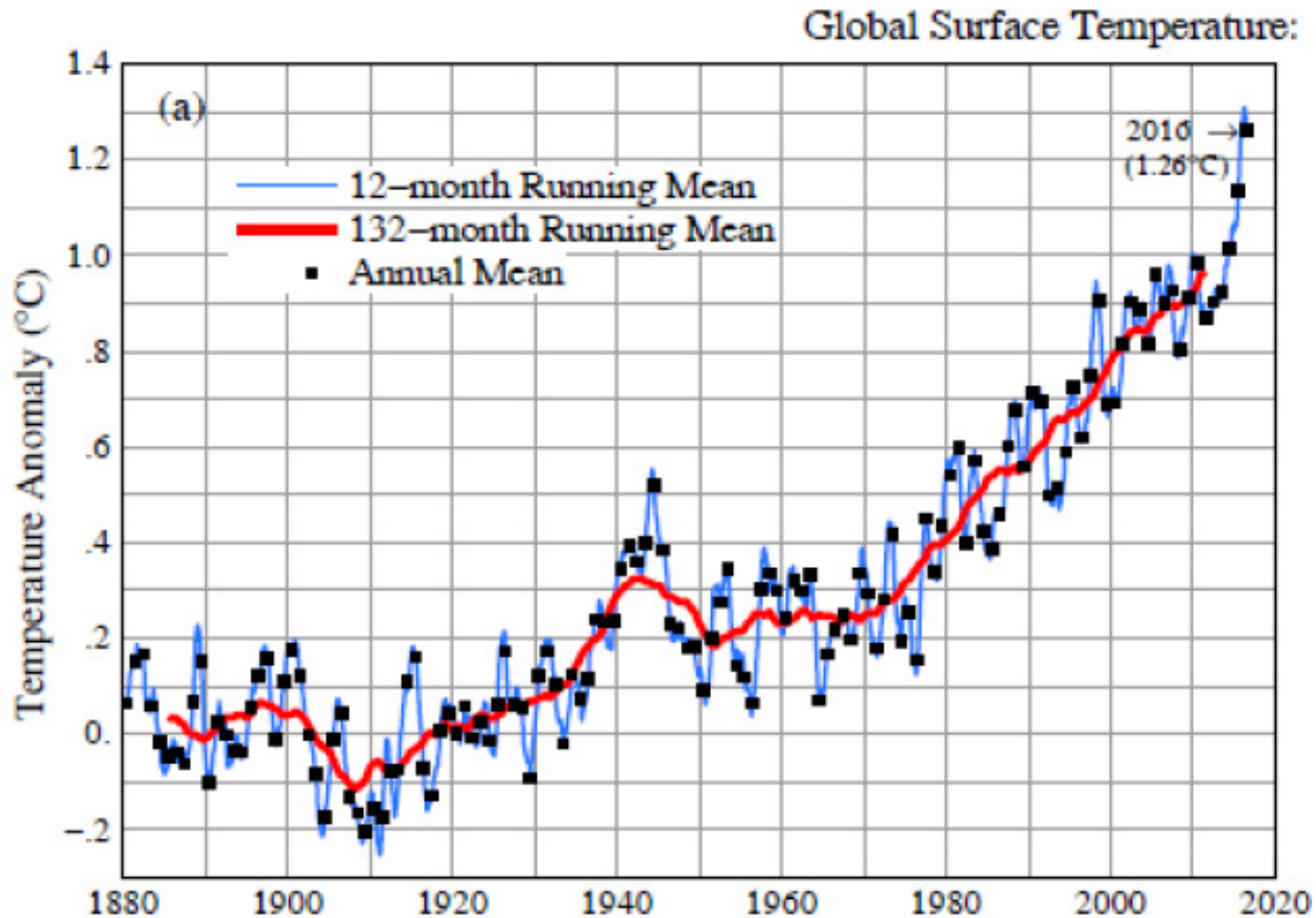
- **Half the Arctic Sea Ice Melted in 2012**
- **Open water in Oct. Nov. gives warmer Fall in Northeast**

- Feedbacks amplify:
- **Less ice, less reflection of sunlight**
- **More evaporation, larger vapor greenhouse effect**
- Same feedbacks as in our winters

(This past winter, Arctic sea-ice reached new record lows)



Long-term Global Mean Trend 1880-2016



Gardening in Pittsford, Vermont in January



January 7, 2007

December 2006:

- Warmest on record



January 10, 2008

Warm Fall:

- Record Arctic sea-ice melt
- Snow cover in December,
ground unfrozen



January 2, 2012



March 11, 2012



October 2011– March 2012

- **Warmest 6 months on record**
- **My garden frozen only 67 days**

• **January 15, 2013**



February 5, 2016

(Digging in Feb. first time ever)

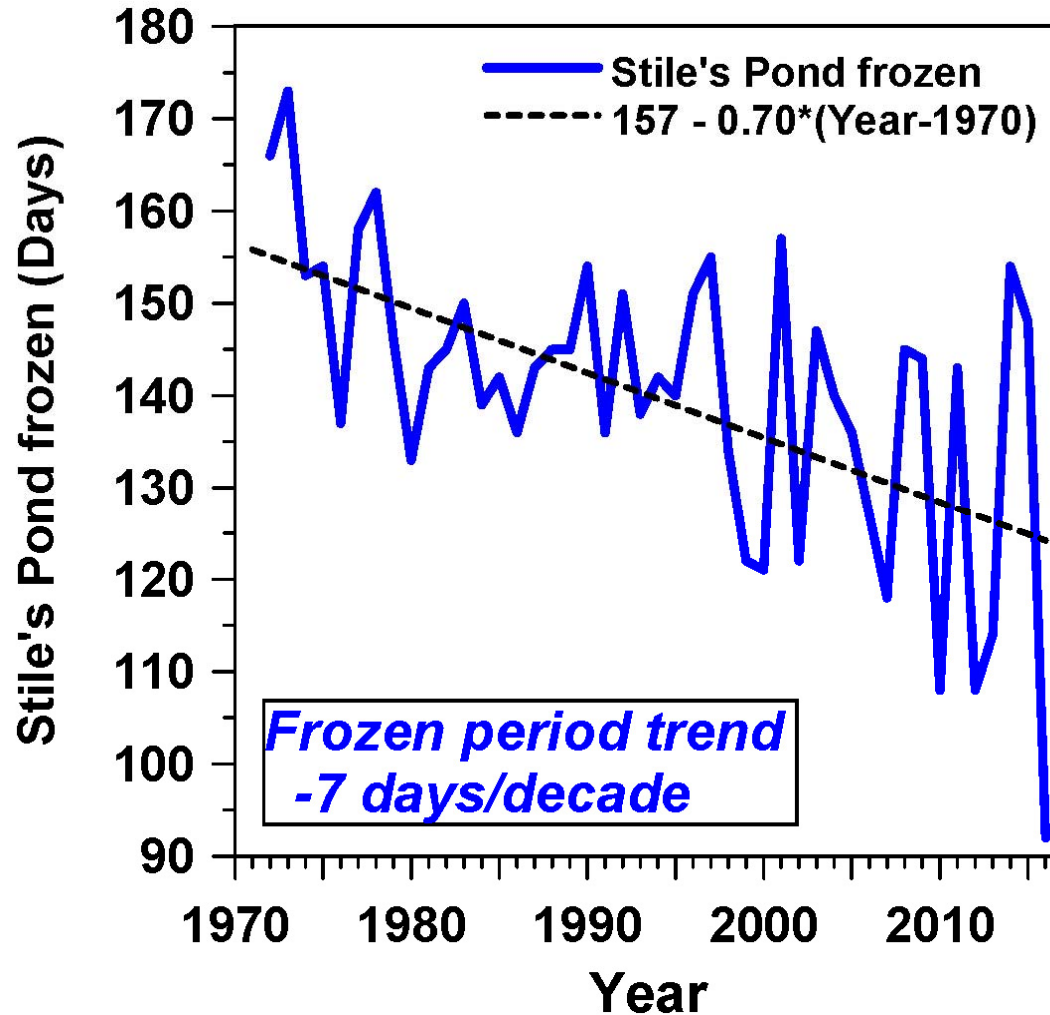


March 3, 2017



Vermont's Reference Lake

Frozen Period Shrinking: variability huge



Steve Maleski: "Eye on the Sky"

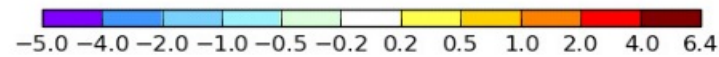
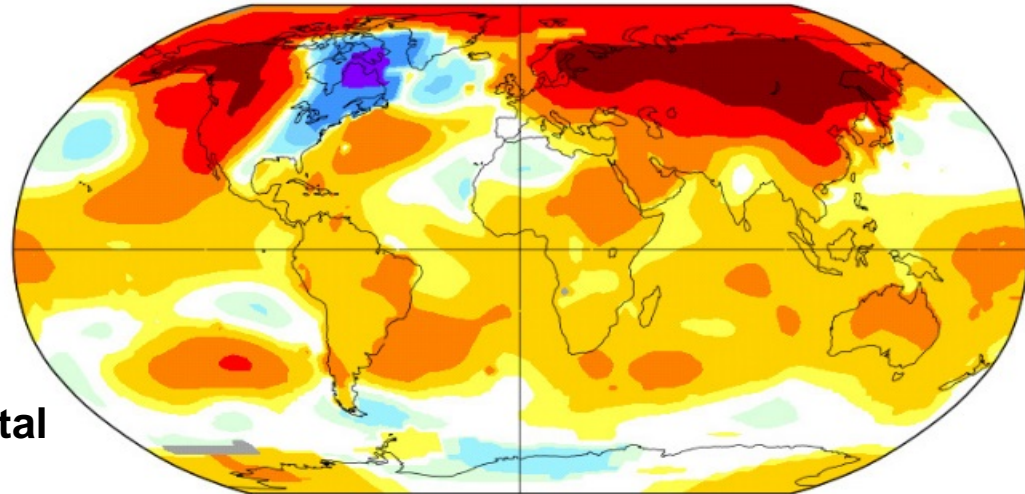
Jan-Feb-Mar 2015

Warm Atlantic, cold NE, strong coastal storms - Boston record snow

Jan-Mar 2015

L-OTI(°C) Anomaly vs 1951-1980

0.86



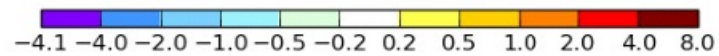
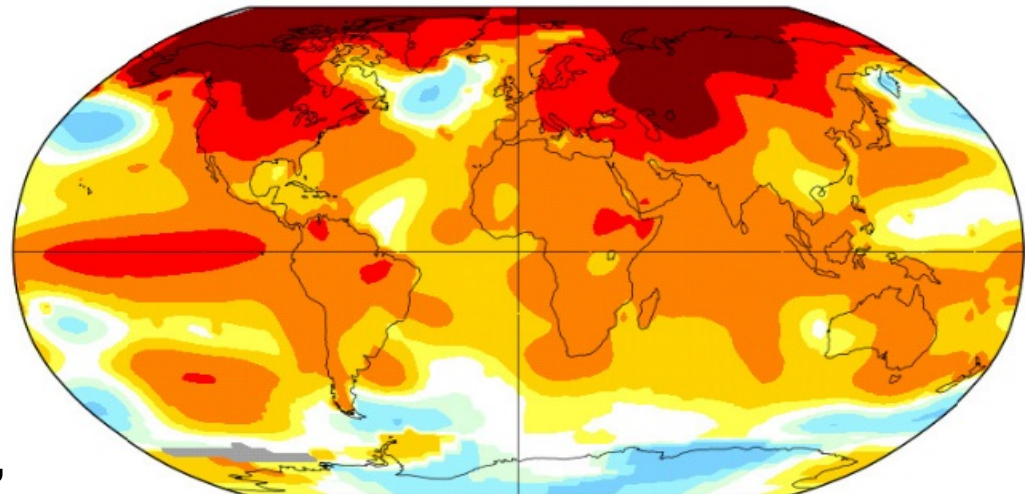
Jan-Feb-Mar 2016

Warm Atlantic, warm NE, little snow, warm Arctic

Jan-Mar 2016

L-OTI(°C) Anomaly vs 1951-1980

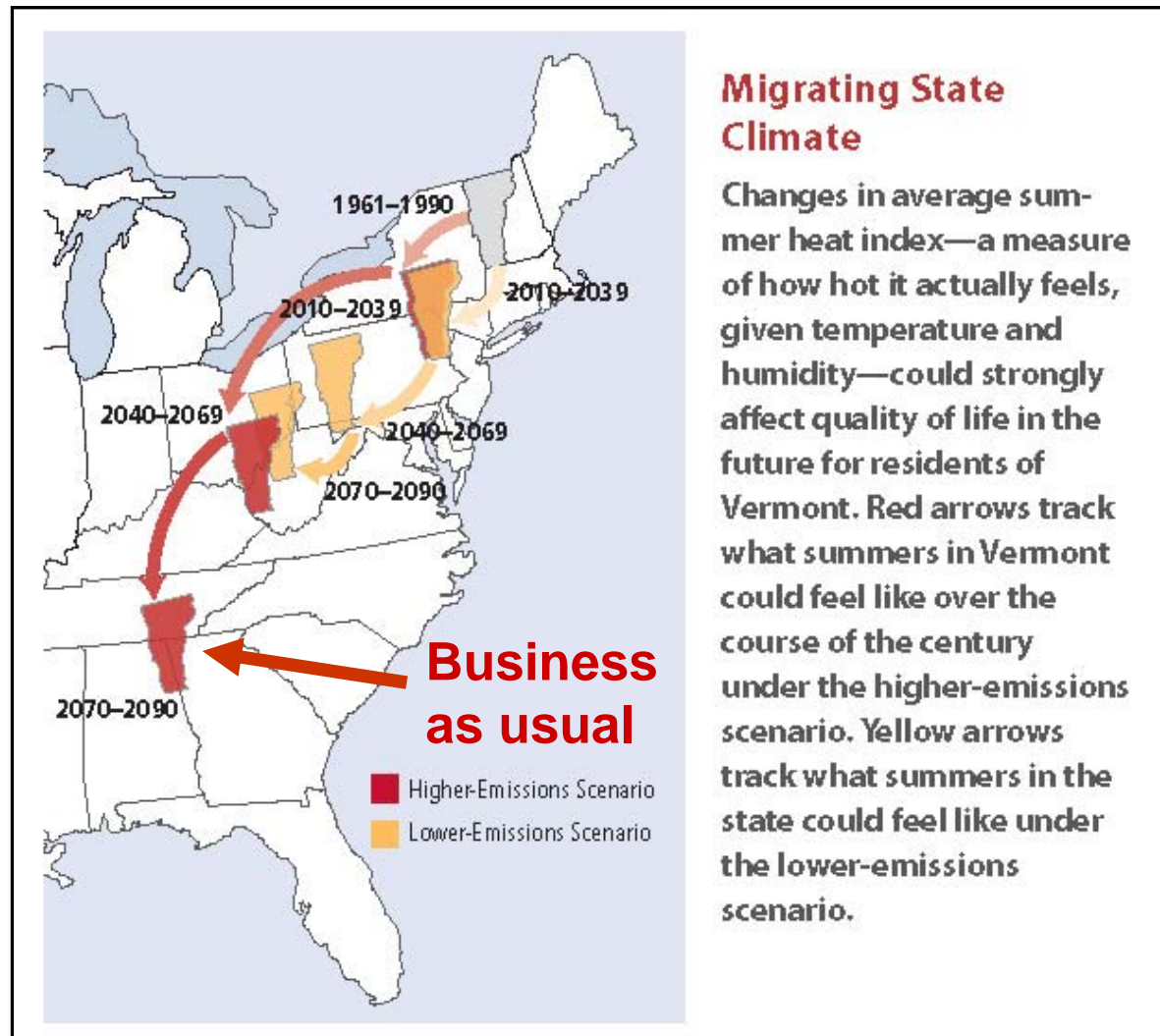
1.24



Vermont's Future with High and Low GHG Emissions

What
about VT
forests?

Sub-tropical
drought areas
moving into
southern US



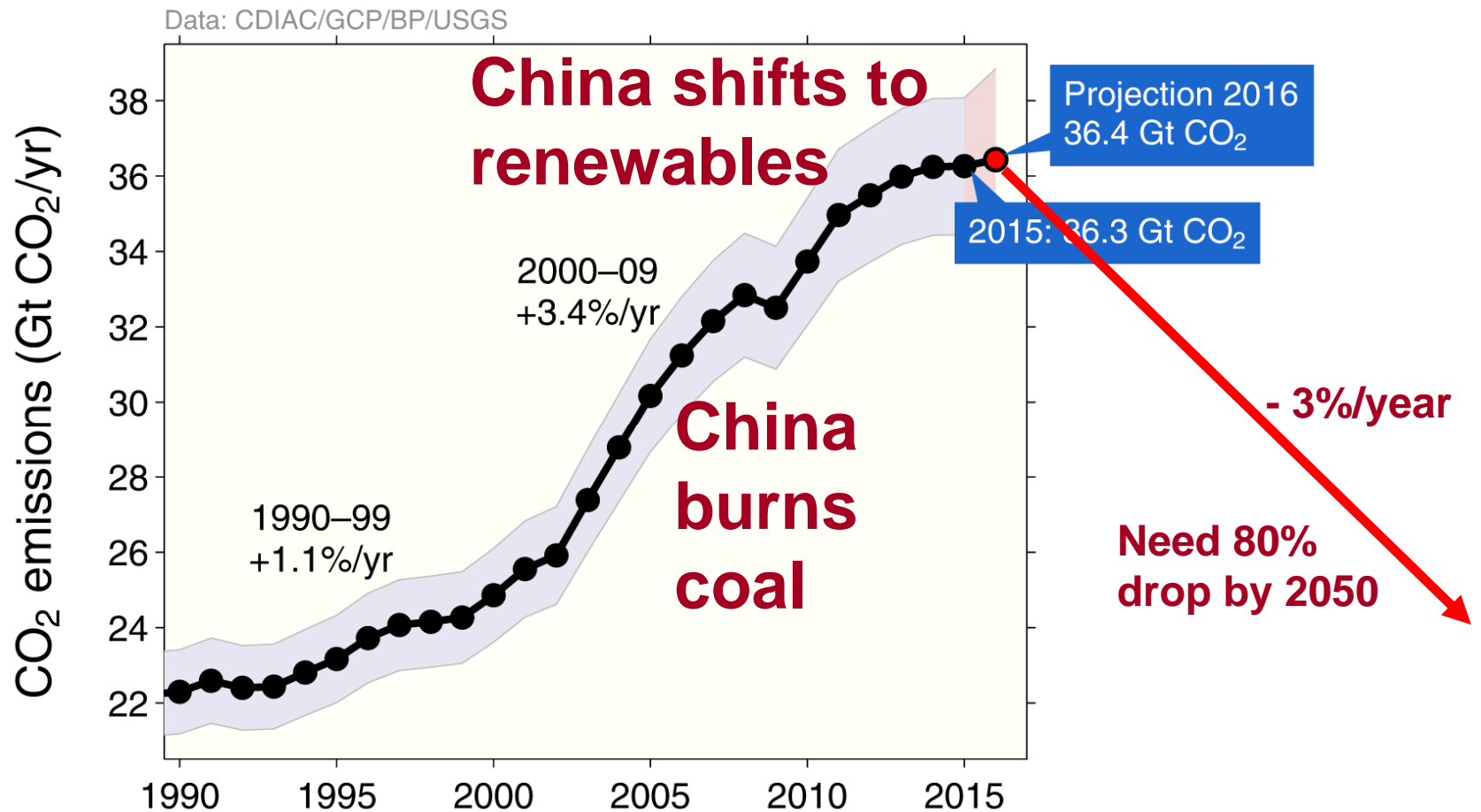
**NECIA,
2007**

Can We Stop “Dangerous Climate Change”?

(UNFCCC 1992)

- **Yes: Quickly stabilize atmospheric CO₂**
- **This means an 80% drop in CO₂ emissions!**
- **Technically possible but very difficult**
 - **Fossil fuels have driven our industrial growth and population growth for 200 years**
 - **“Lifestyle” has become dependent on fossil fuels**
 - **Powerful vested interests**

Growth of CO₂ Emissions Flat for 3 years



Efficiency Comes First

- **We need to double or triple our energy efficiency because...**
 - **We cannot replace current fossil fuel use with biofuels & renewable energy**
 - **Fossil fuel reserves are enough to push CO₂ to 1,000 ppm**
 - *Radically change climate/wipe out species*
 - *In time melt icecaps, raise sea-level 150ft*

System Guidelines

- **Reeducation of society and its 'systems'**
 - The transition we face is huge
 - What will raise awareness/change paradigm?
 - How can we better manage our relation to Earth?
- *Develop renewable energy*
 - *Maximize energy efficiency: housing, transport, power*
 - *Add and monitor renewable power*
- **Examine all waste-streams**
 - Aim to recycle/remanufacture everything
 - Fully cost all waste streams
- **Relocalize food system**
 - Compost all organic waste
- **Understand water and the landscape**
 - Limit phosphorus loads on streams/lakes
 - Growth of algae in lakes, big issue in VT (and elsewhere)
- **Reconnect with natural world**
 - Fundamental if we are to accept transition

Value of science

- **Great value of science is its honesty, integrity and its cooperative global vision**
 - It deals with the measurable world
 - It communicates openly
 - Priceless to a society lost in corruption & deceit
- **Greatest challenge is that humanity is embedded in a deeply interconnected living Earth's system**
 - That cannot be separated and objectified
 - In fact the separation of our social frames from the Earth's ecosystem is driving climate change

Vermont Newspaper Columns

2008-2017: 93 articles: “They blend science with a systems perspective, and encourage the reader to explore alternative and hopeful paths for themselves, their families and society”

(Rutland Herald and the Barre-Montpelier Times Argus)

(alanbetts.com/writings)

Today’s communities must understand the connections between energy use, climate and food to make the transition to an efficient, resilient and sustainable society.

Environmental journalism revisited (Betts and Gibson 2012)

Column Philosophy

- **These columns go through the seasons**
 - **dealing with weather, climate, climate change, energy and policy issues**
- **They blend science with a systems perspective**
 - **encouraging the reader to explore alternative and hopeful paths for themselves and society**
- **They are written so that a scientist will perceive them as accurate (even if simplified)**
 - **While the public can relate their tangible experience of weather and climate to the much less tangible issues of climate change, energy policy and strategies for living sustainably with the Earth system**

(alanbetts.com/writings)

Voice the Ethical issues

- **Do we just exploit the Earth's wealth**
 - For greater 'economic growth'
 - For a wealthy few
 - What will be left for our children?
 - What happens to the ecosystems we depend on?
- **Fundamental practical moral Issue**
 - Don't we need to co-operate with the Earth?
 - *Shift in understanding and mind-set needed*

As Climate Changes

Everything is interconnected

- *Accept our responsibility for the Earth's future*
- Human society & energy use; people's choices
- Precipitation, streams, forests; habitat and wildlife
- Look for the big picture and draw connections
- Talk to your neighbors and ask what you can do
- Stay connected to Vermont's natural environment
- *Insist on honesty (not "alternative facts" aka lies)*

Discussion

alanbetts.com

(articles and talks)

- *“Many things have to change course, but it is we human beings above all who need to change. We lack an awareness of our common origin, of our mutual belonging, and of a future to be shared with everyone.”*

Pope Francis, Encyclical 2015

Practical Local Solutions

- **Vermont is well on its way**
 - **Large solar development**
 - **Battery storage on its way**
 - **California installing 100MWh storage units**
 - **Energy efficiency for homes and businesses underway**
 - **Need net-zero building codes**
 - **Need transportation shift**

How do we plan/adapt?

- **Future needs creative approaches**
 - **Community support**
 - **People reconnected to landscape**
 - **Efficient transport: cooperative**
 - **Separate 'electric bike' roads**
- **We need to work with the Earth**
 - **Manage water on landscape**
 - **Manage forest diversity for a warmer climate**
 - **Manage diversified year-round agriculture**
 - **Manage energy crops and solar farms**

Social, moral, spiritual shift

- **The Future Is Not Our Past**
 - *an economic, technological and financial system driven by short-term profit*
- *Collectively, we create the future*
 - *plan for a transition to a sustainable society*
 - *Put community values and systems thinking above short-term profit*
- *What resources do we need*
 - *As community and as individuals?*

Community is Central

- You cannot deal with environmental issues alone
 - They were created by the community over time
 - You need a community to weigh the evidence, search for creative solutions, and tell the truth
 - For moral support: *to face resistance or opposition with fiery hope (not fear or despair)*
- *You need grounding*
 - *in yourself, as a group and with the Earth*

What is our role as Scientists?

- **Honesty, accuracy, clarity, and depth**
 - “**Bold humility**” *(Francis Moore Lappé)*
 - **Earth scientists should consciously accept responsibility for the Earth**
 - *As the political and economic system will not*
 - **Speak clearly to society: creative hope not despair**
 - **Search for language that sidesteps ideology**
 - *Realize that Earth system limits will need adaptive global governance*
 - *and a paradigm shift in science*

(alanbetts.com)