The NH Climate Action Plan: Opportunities to Preserve and Protect Water Quality and Watersheds

2009 New Hampshire
Joint Water and Watershed Conference
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NEW HAMPSHIRE DEPARTMENT OF Environmental Services

Overview

- Climate Change in the Northeast
- New Hampshire Greenhouse Gas Emissions
- Climate Change Policy Task Force Action Plan Recommendations
- Implementation
- Climate Action and Water Quality and Watershed Benefit

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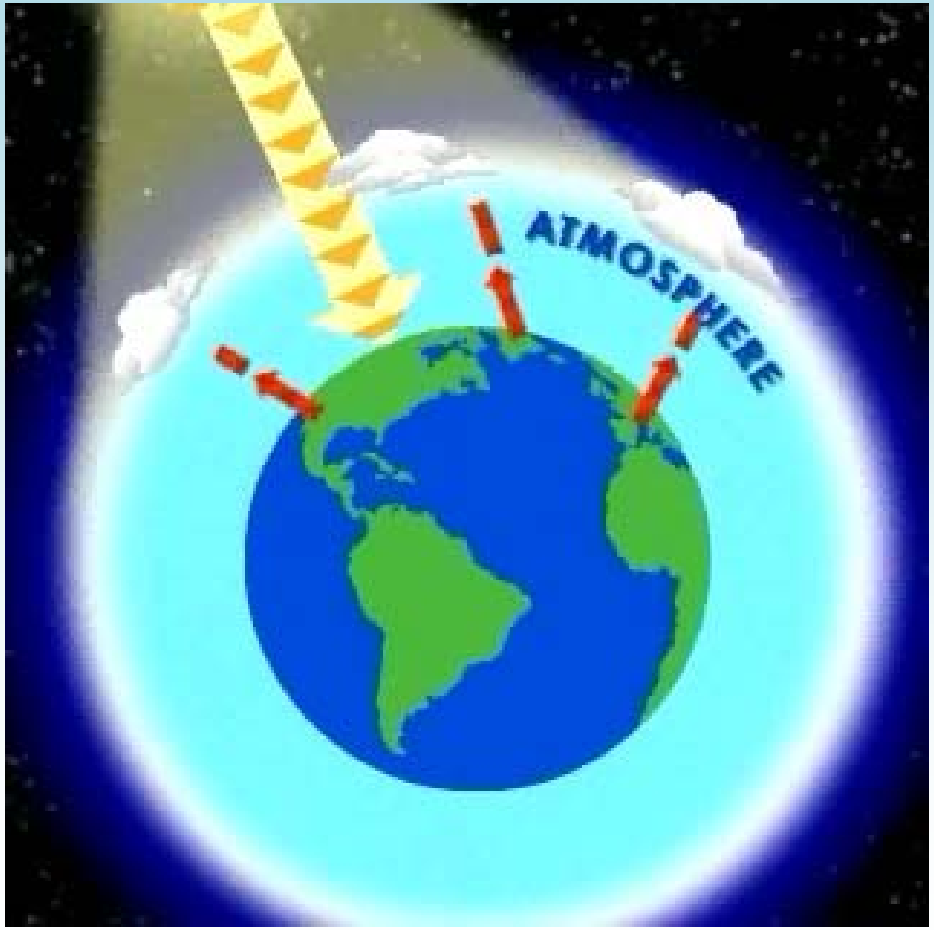
Our Planet Has a "CO_2-Blanket"



http://earth.rice.edu/mtpe/atmo/atmosphere/hot/anom_99/0Greenhouse_Effect.html

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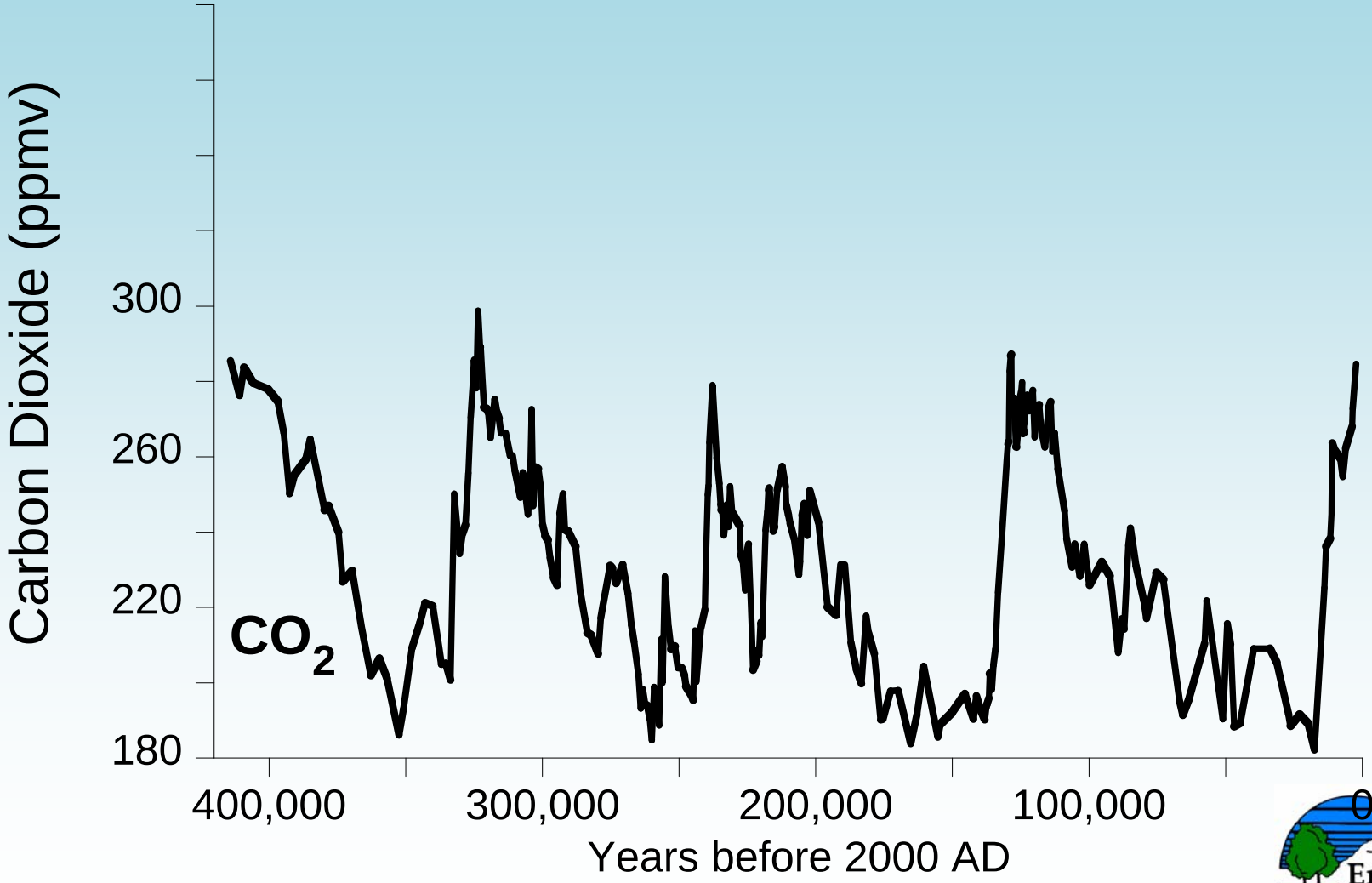
Atmospheric Carbon Dioxide Record



Petit et al., 1999

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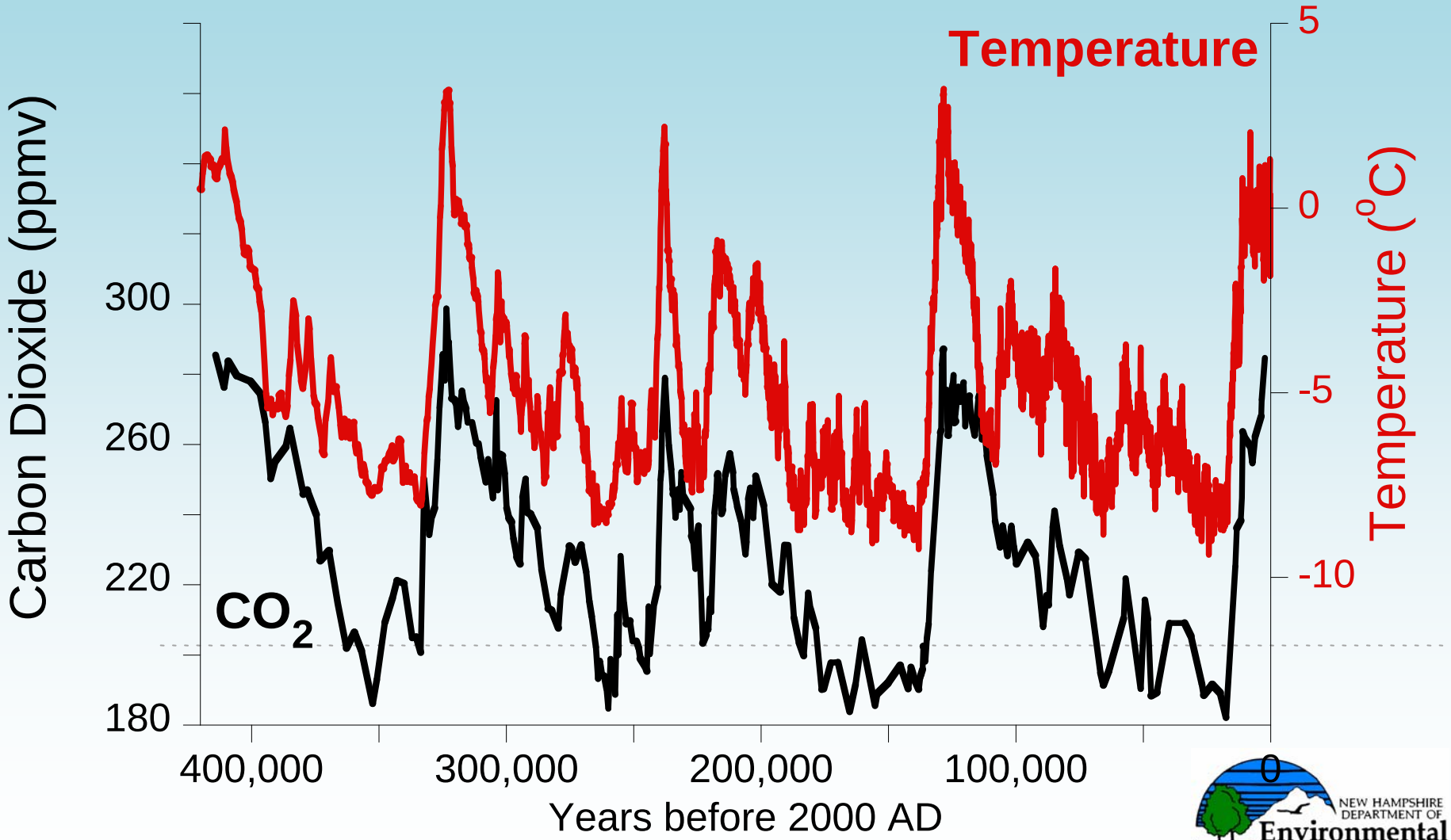
Atmospheric Carbon Dioxide & Temperature Record



Petit et al., 1999

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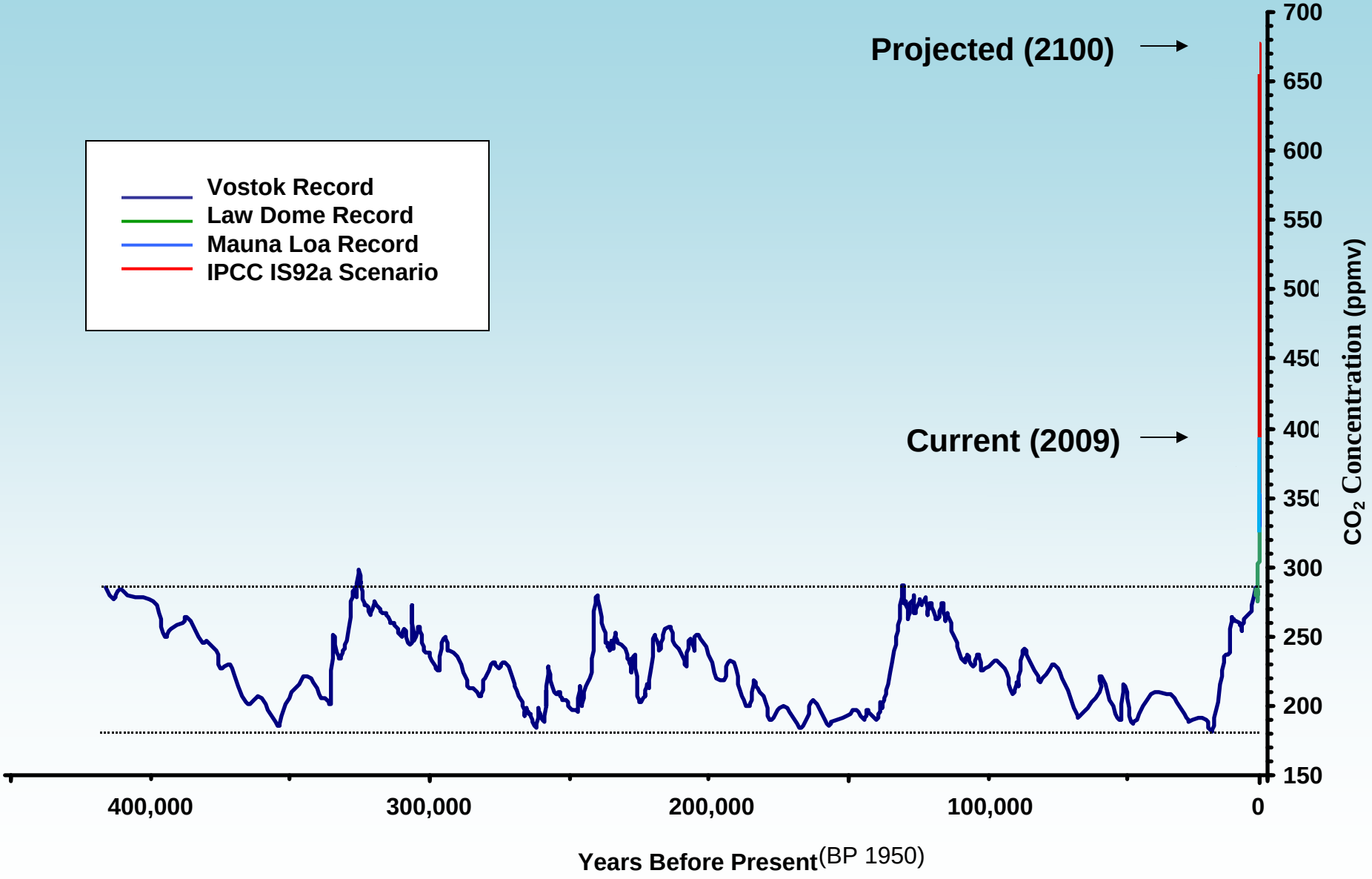
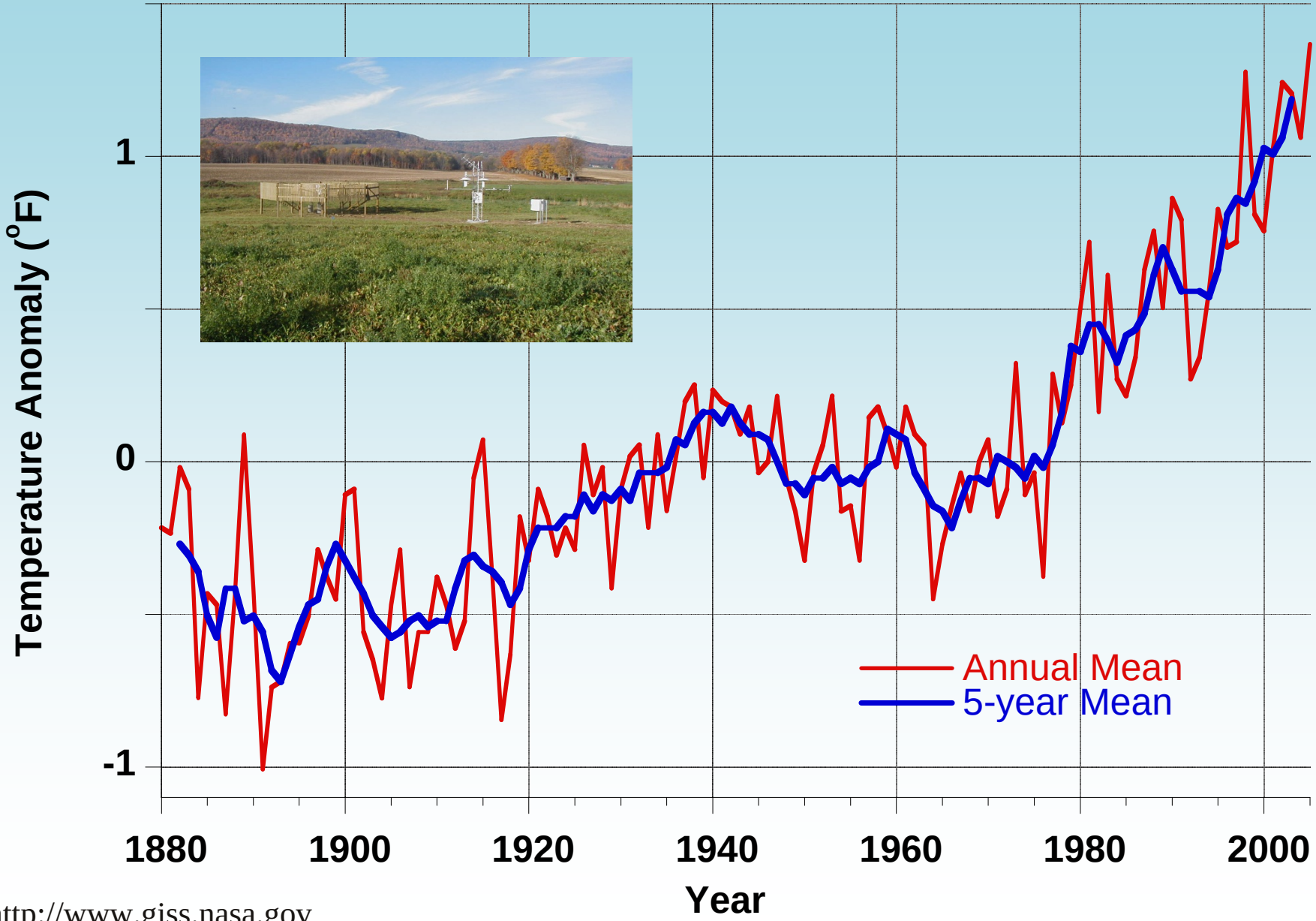
Historical and Future Carbon Dioxide Levels



Source: C. D. Keeling and T. P. Whorf; Etheridge *et.al.;* Barnola *et.al.;* (*PAGES* / IGBP); IPCC

Global Temperature 1880-2005



http://www.giss.nasa.gov

Indicators of Climate Change in the Northeast

- More precipitation
- More frequent extreme precipitation
- Winter warming
- Decreased snowfall
- Fewer days with snow on ground
- Lake ice out dates earlier
- Earlier spring runoff
- Extended growing season
- Sea-level rise

Hodgkins et al., 2002; 2003; Wolfe et al., 2005; Wake and Markham, 2005; Wake et al., 2006

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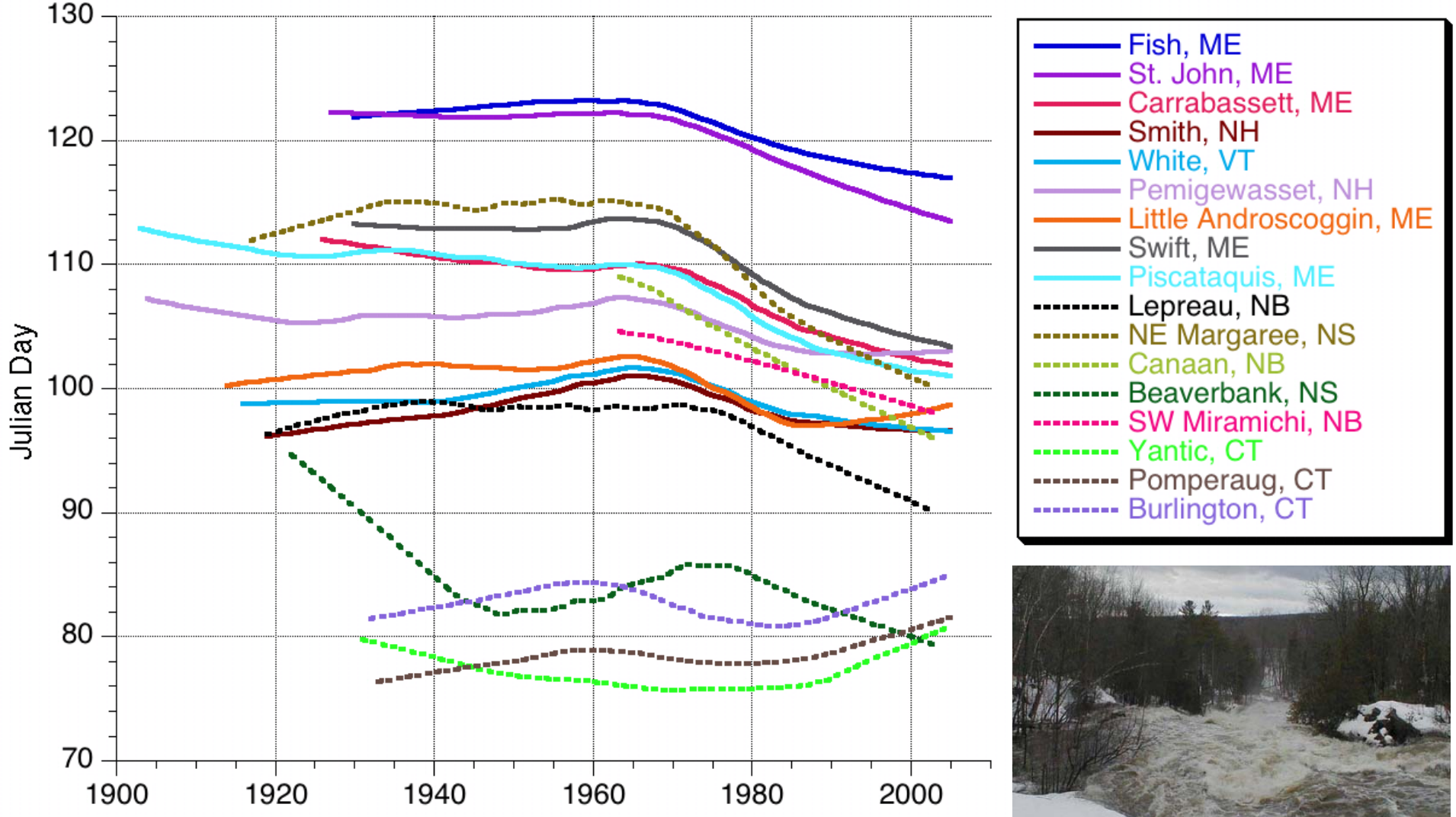
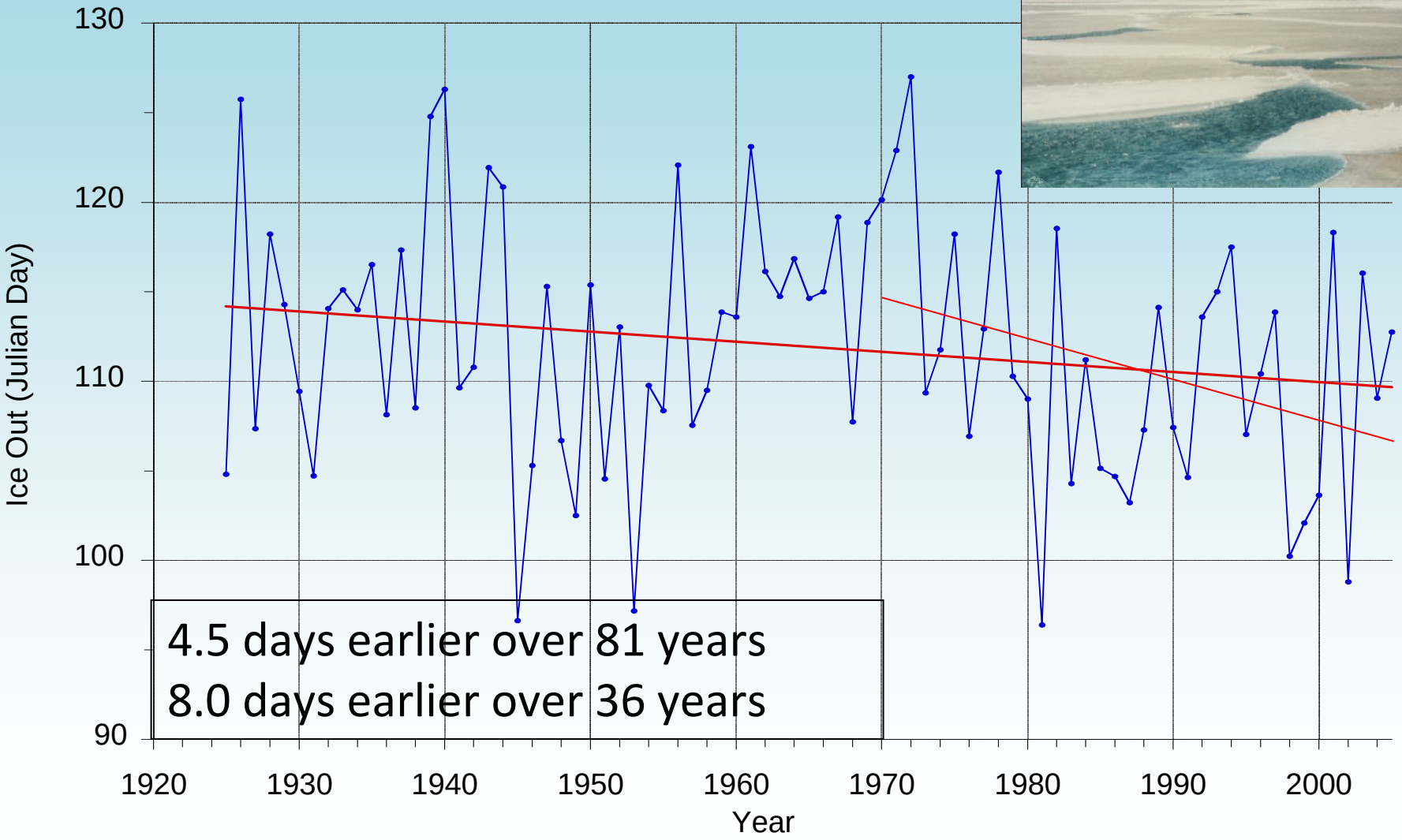
Winter/Spring (1 Jan - 31 May) Center-of-Volume Dates



All data from unregulated rivers; Hodgkins et al., 2003

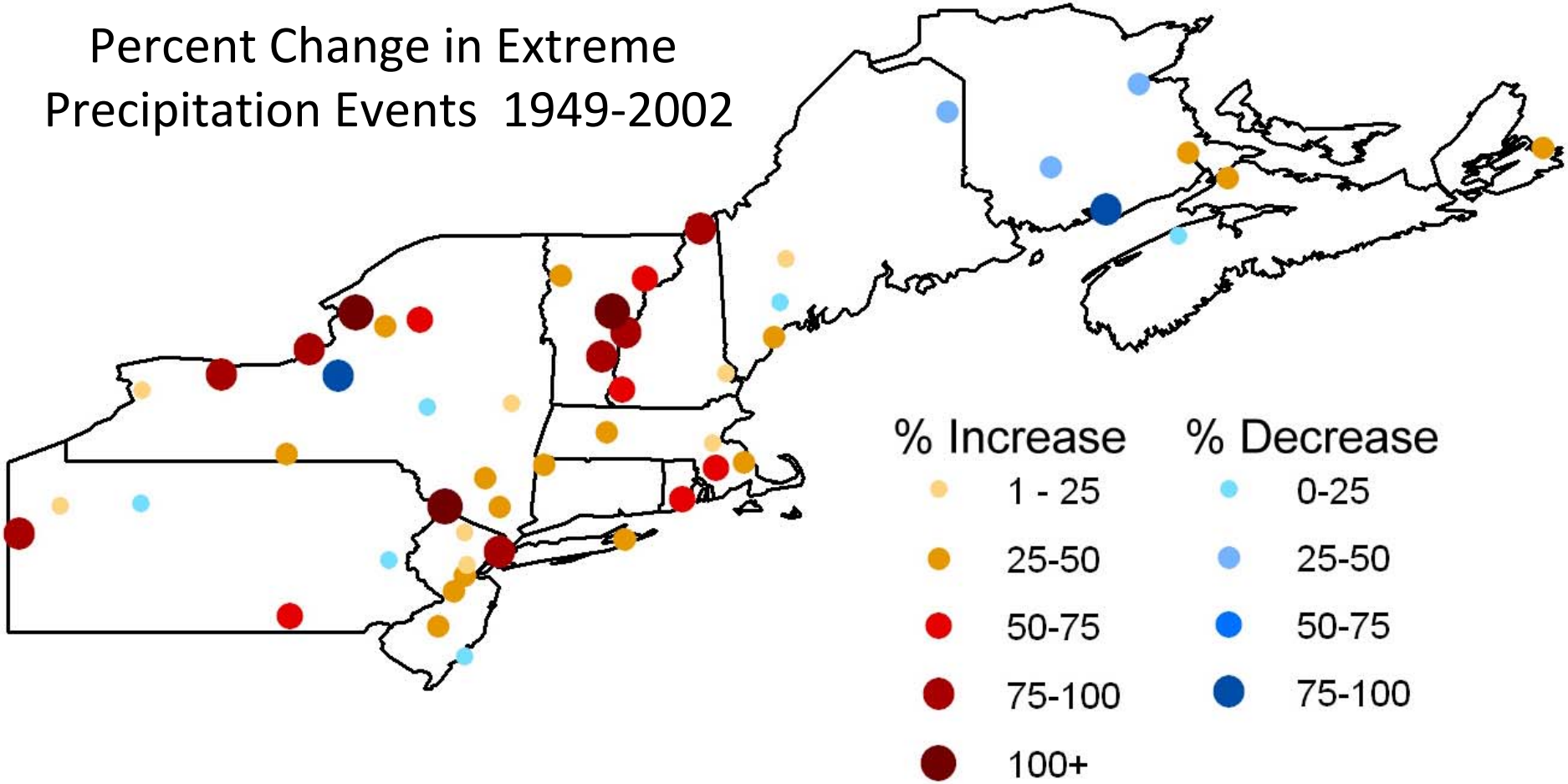
Average Ice Out Day Trend

1925-2005 (27 Lakes)



Ice Out data from Hodgkins et al., 2002 and at: http://me.water.usgs.gov/iceout.html

Spatial Variation of Extreme Precipitation Trends: 1970-2002



The extreme precipitation trend was calculated from a linear regression of number of events each year for each station.

Flooding in NH

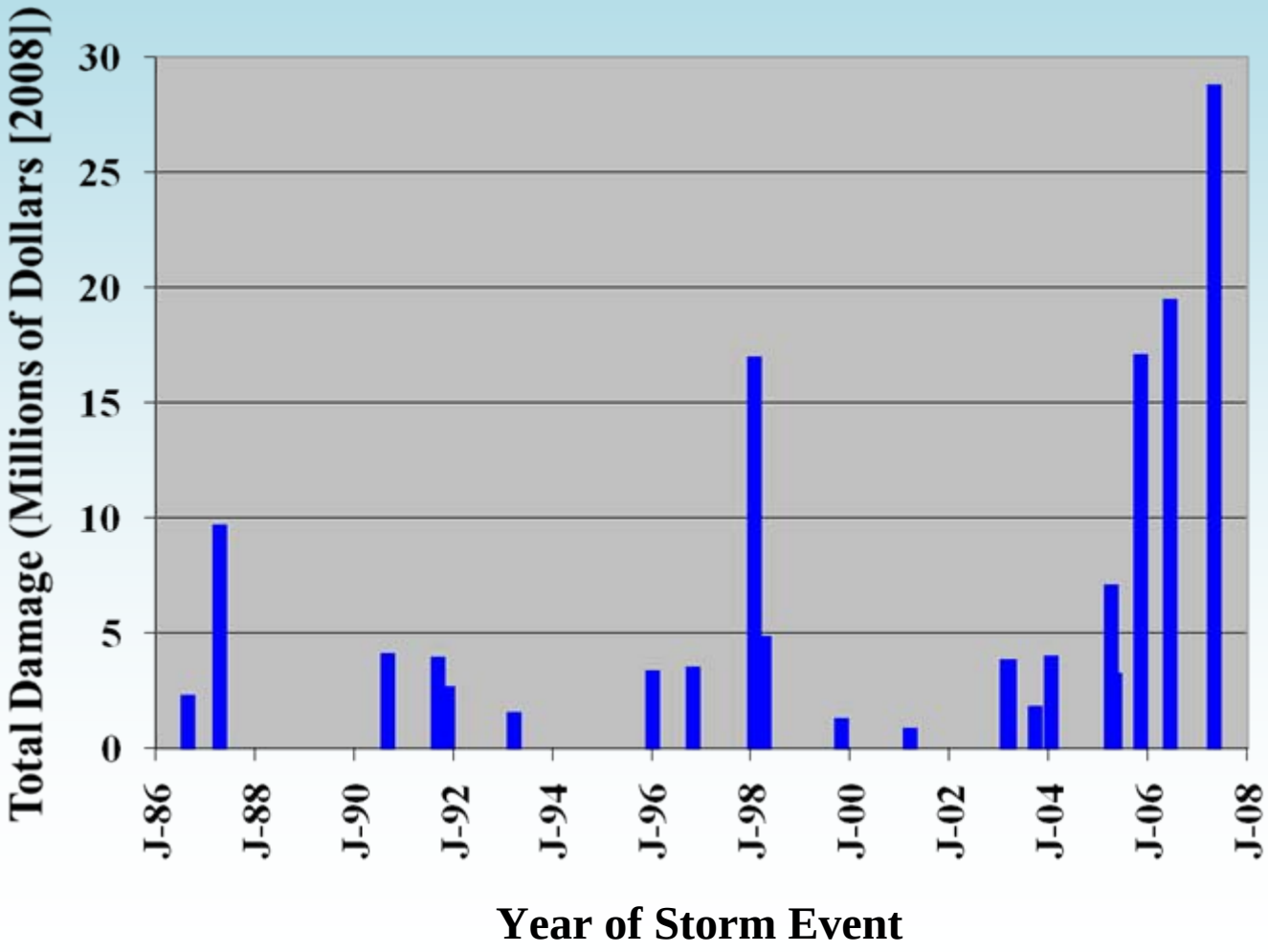
October 2005

May 2006

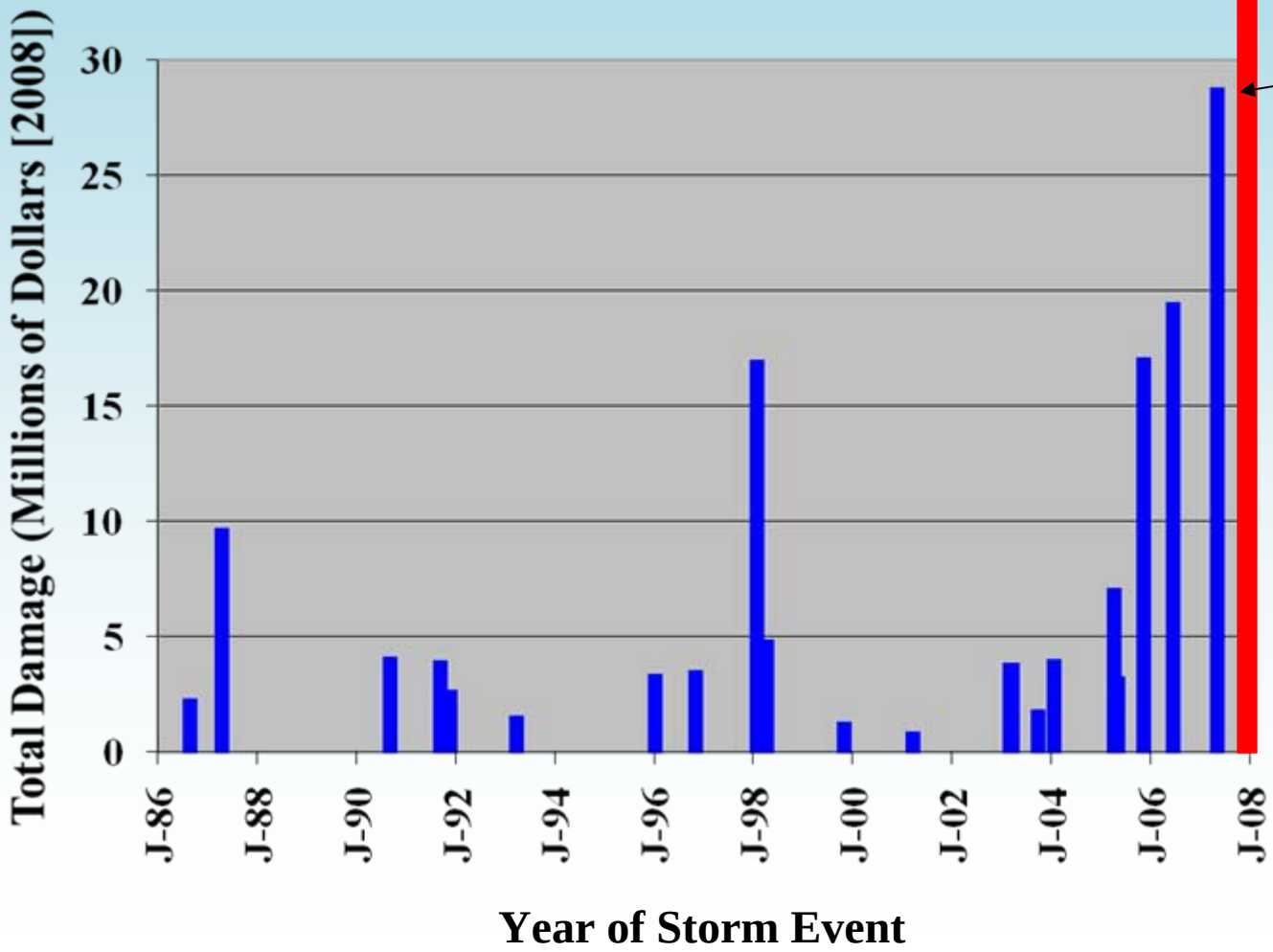
April 2007

September 2008

Presidentially Declared Storm-Related Disasters

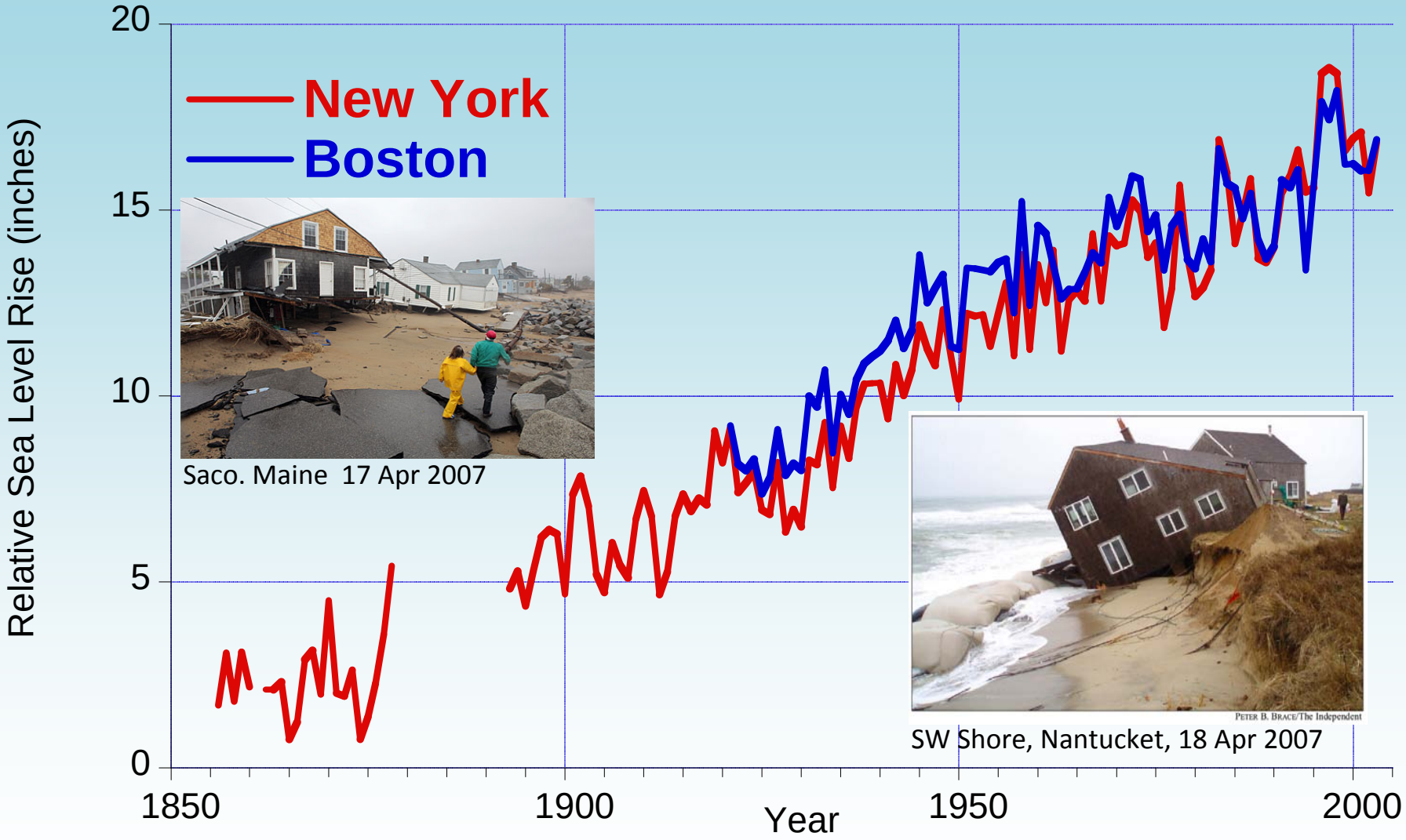


Presidentially Declared Storm-Related Disasters



ICE Storm
PSNH alone

Relative Sea Level Rise 1856 - 2005



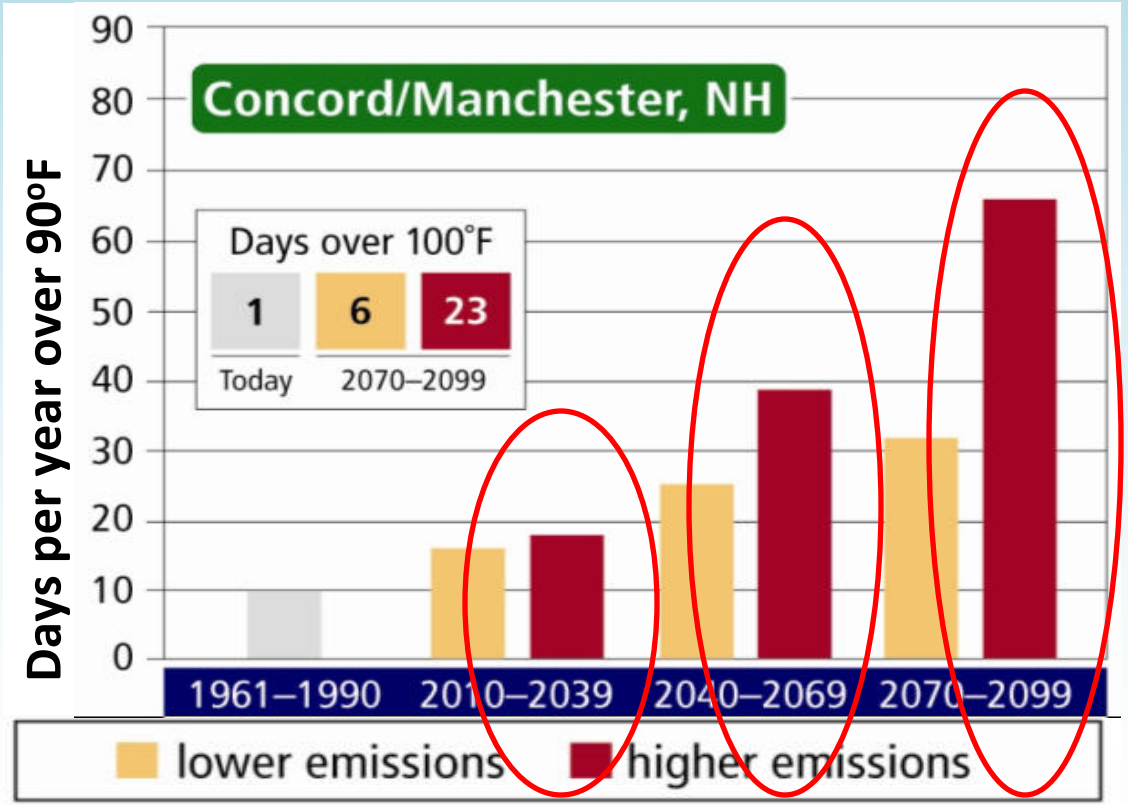
Data from Permanent Service for Mean Sea Level http://www.pol.ac.uk/psmsl/

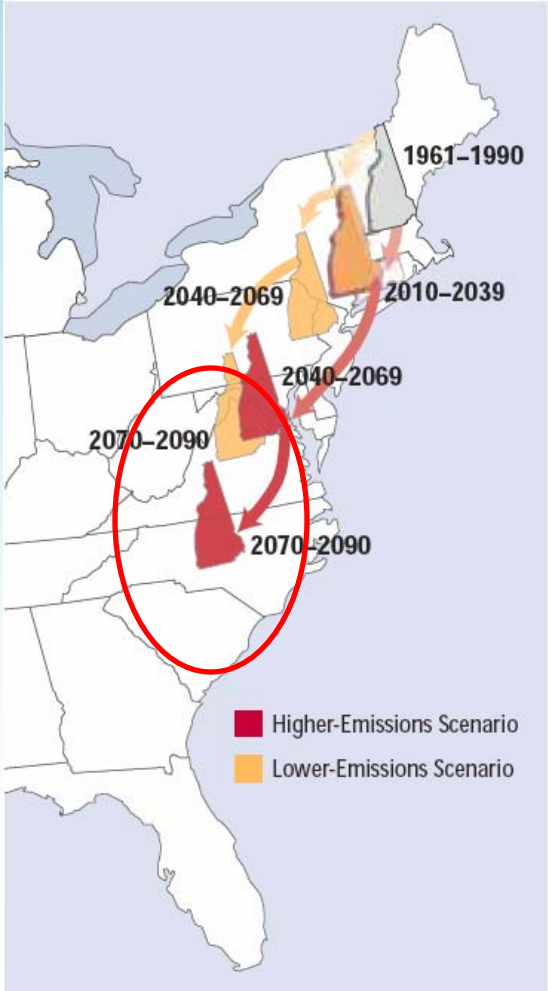
Difference Between
Cold, Snowy Winter and Warm, Slushy Winter

Winter Indicator	Difference in number	Difference in revenue	Percent Change
Alpine Skier Days	309,495	$11.5 million	14%
Nordic Skier Days	43,129	$0.7 million	30%
Snowmobile Licenses	10,892	$1.0 million	26%

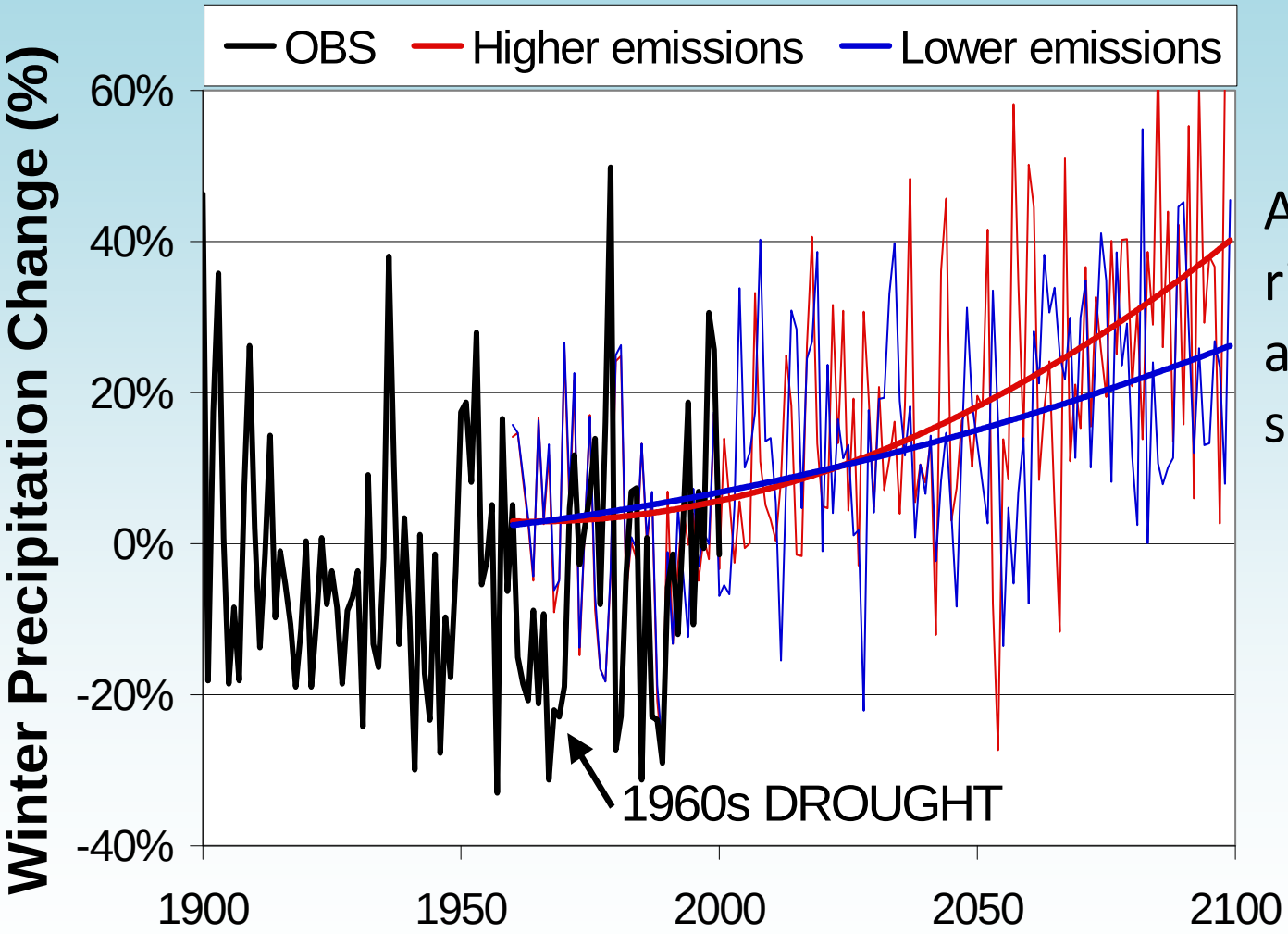
Data From: Winter Recreation and Climate Variability in New Hampshire: 1984 - 2006
Report available online at: http://www.carboncoalition.org/

Projections of Climate Change in New Hampshire





Increasing winter precipitation



As temperatures rise, more falling as rain, less as snow

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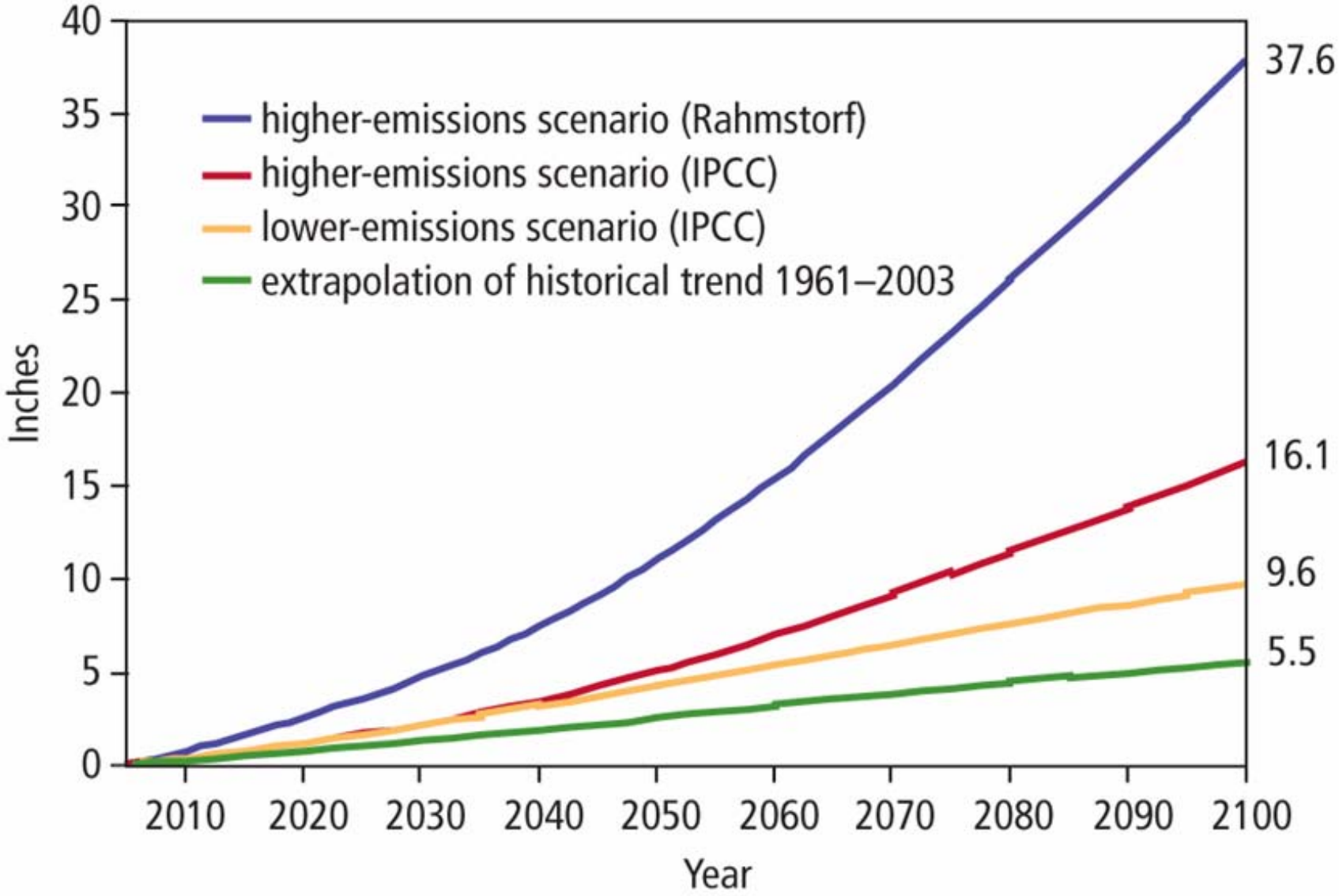
Extreme Precipitation Events Increase

- Heavy rainfall events are becoming more frequent across the Northeast
- Under both emissions scenarios
  - -rainfall is expected to become more intense
  - -periods of heavy rainfall are expected to become more frequent

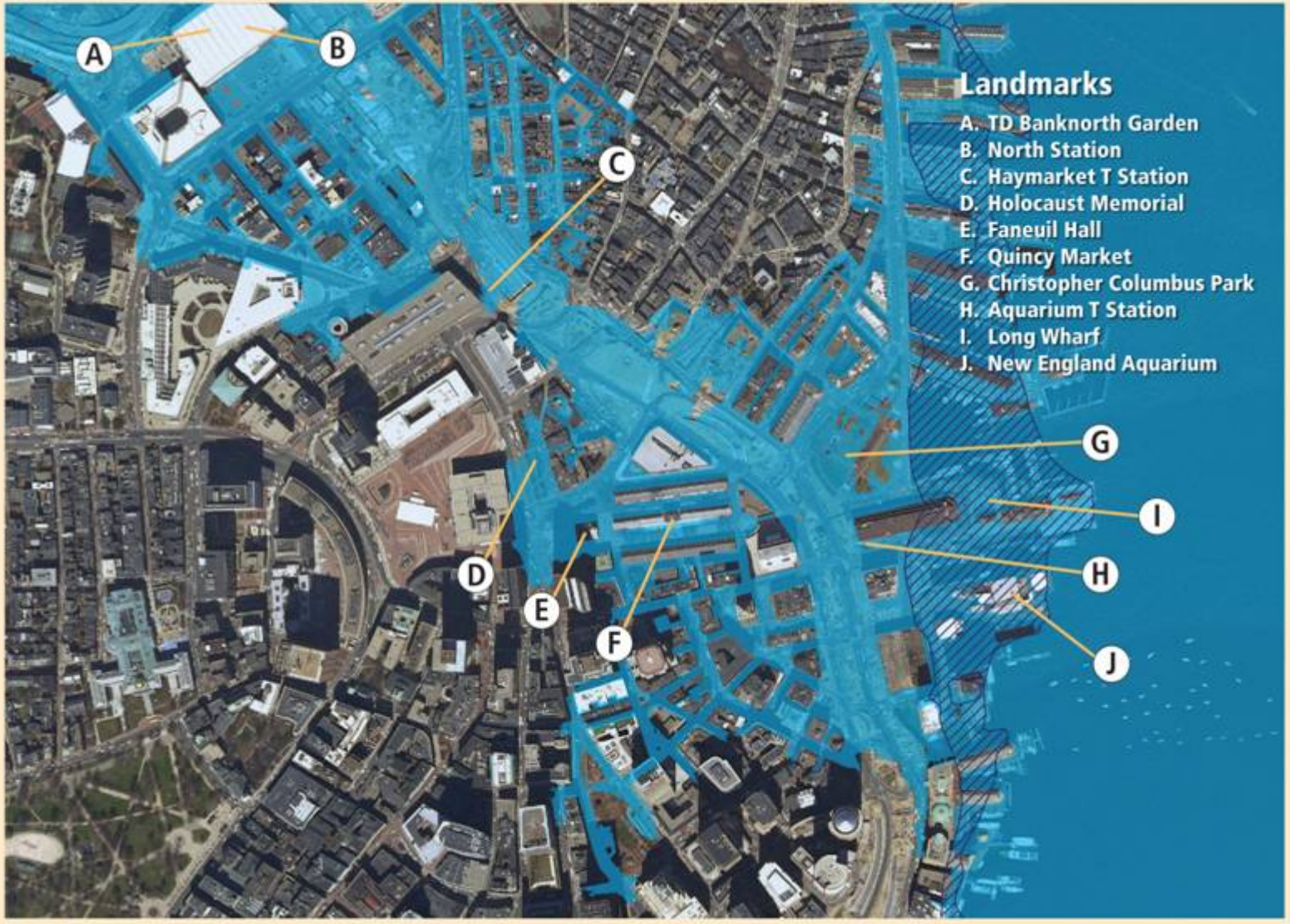
Bridge over Axe Handle Brook, Rochester, NH May 2006.

credit: Associated Press

Projected Rise in Global Sea Level

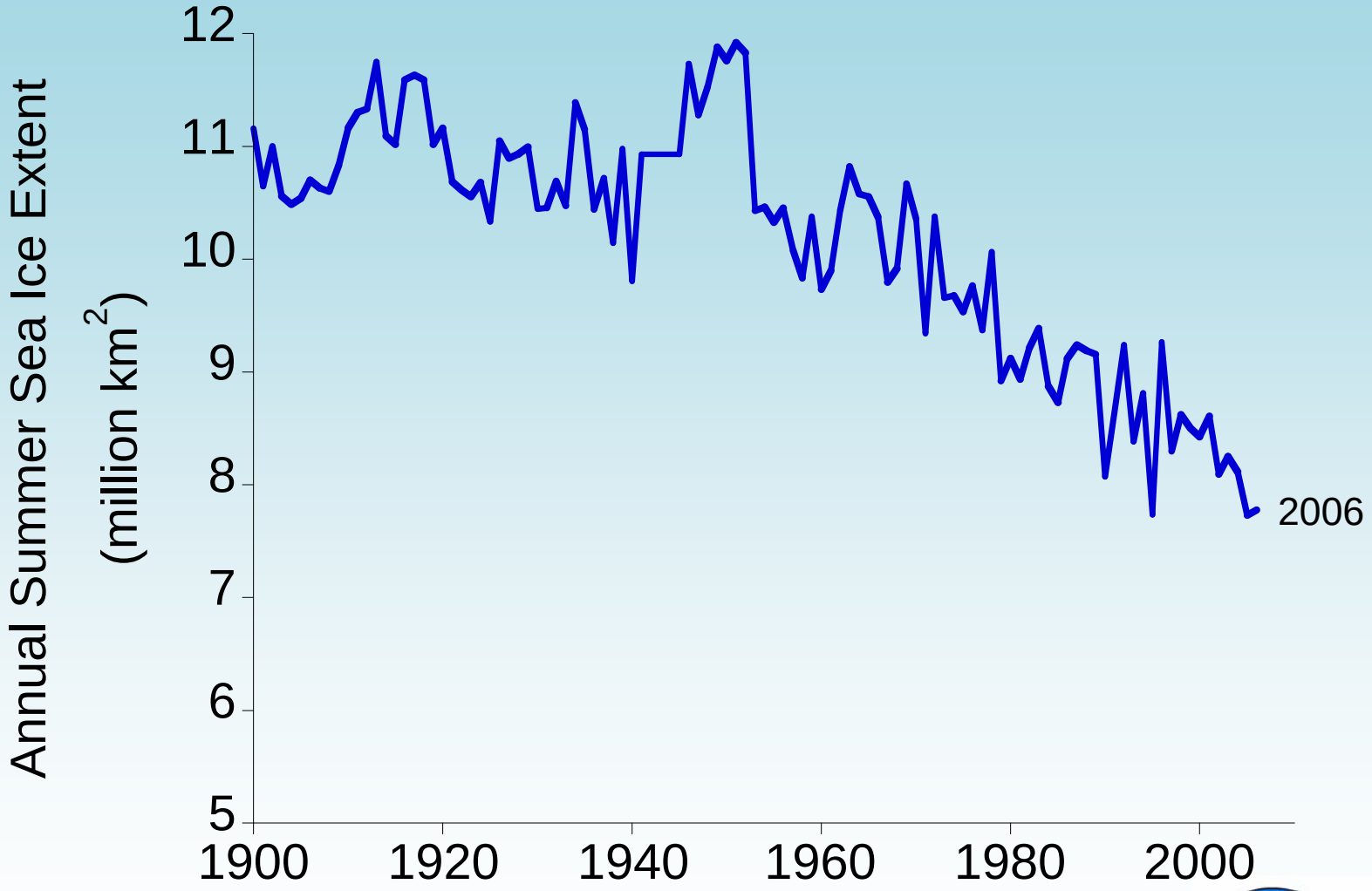


Boston: The Future 100-Year Flood under the Higher-Emissions Scenario



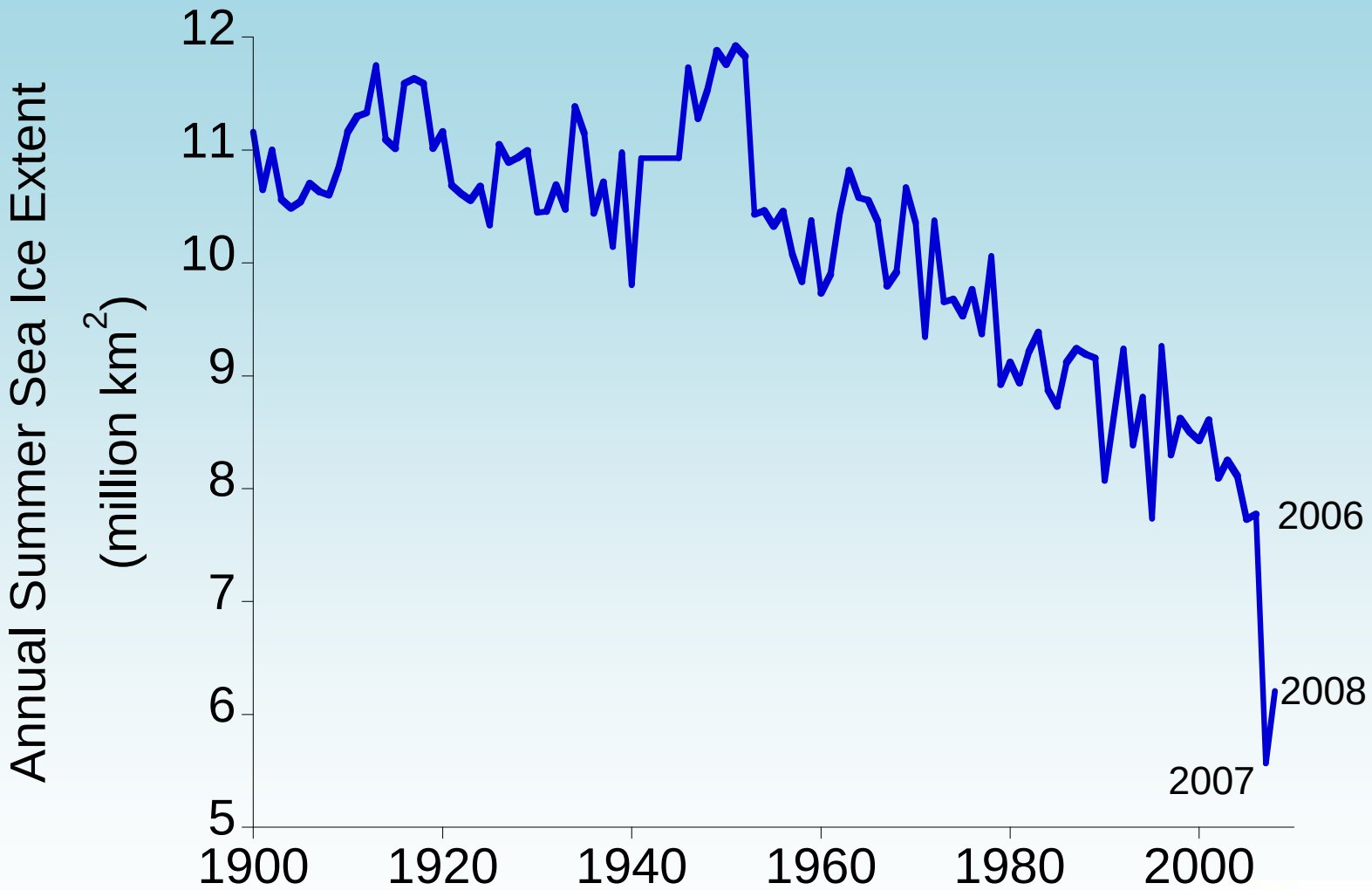
Current 100-year flood zone
Projected 100-year flooded area (higher-emissions scenario)

Summer (JJA) Arctic Sea Ice Extent



University of Illinois
The Cryosphere Today http://arctic.atmos.uiuc.edu/cryosphere/

Summer (JJA) Arctic Sea Ice Extent



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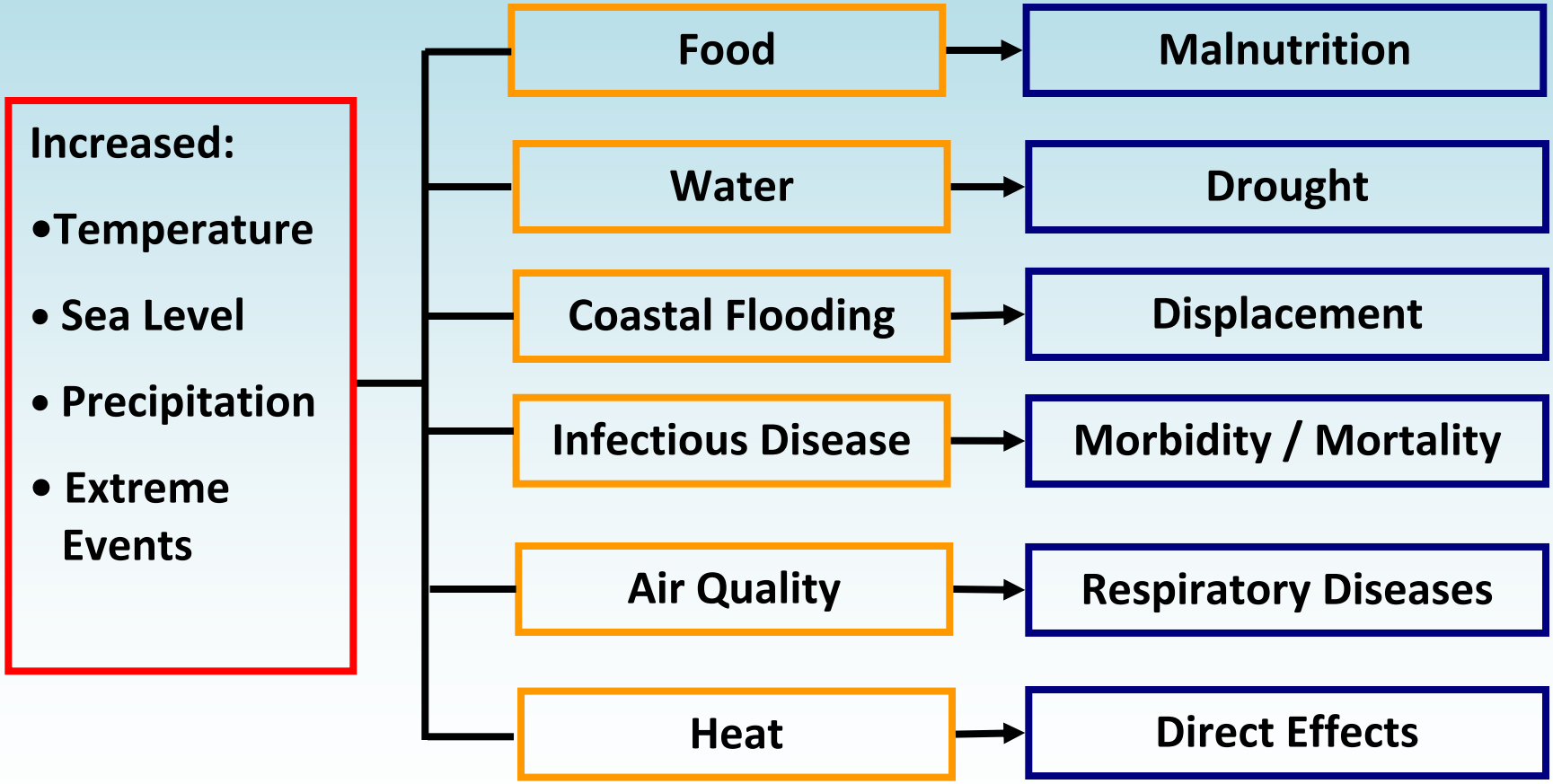
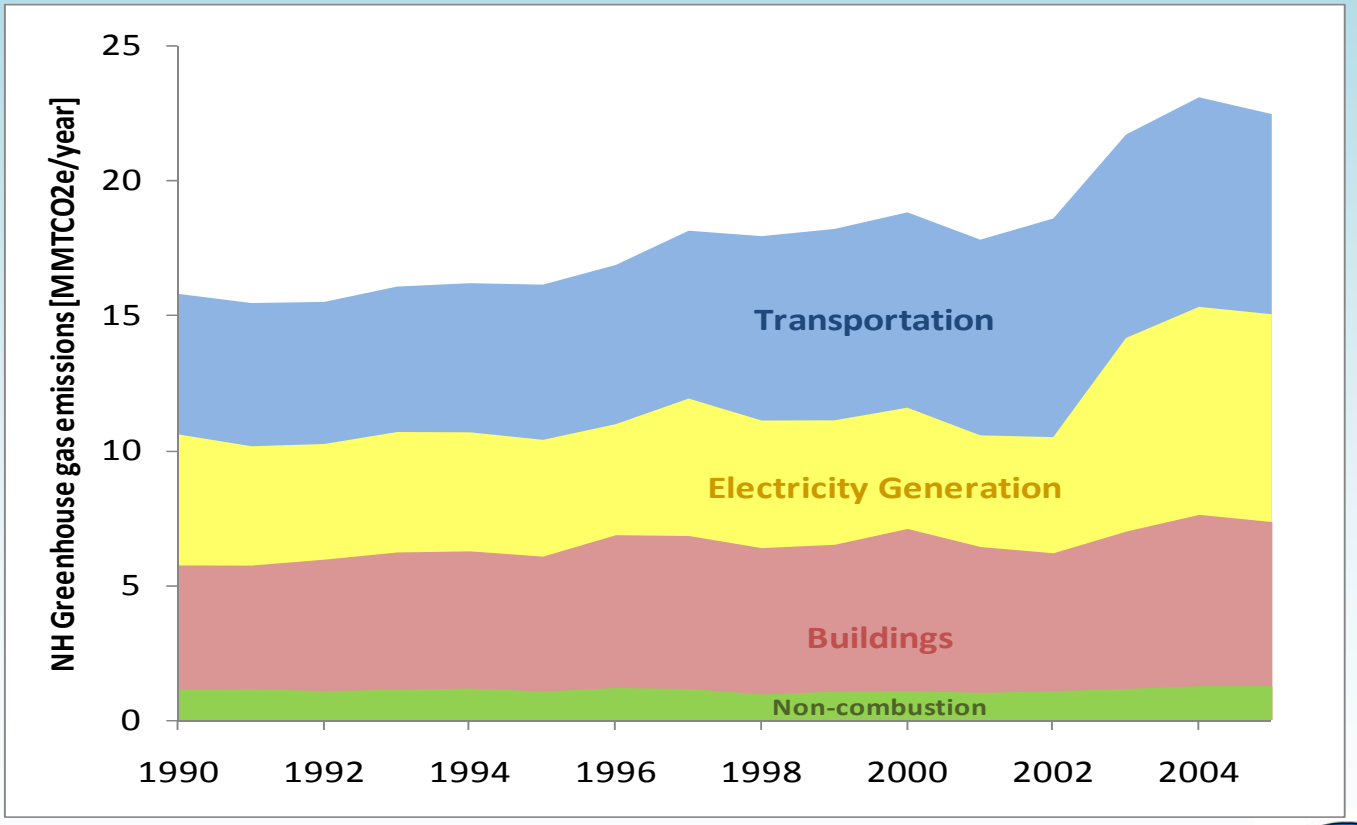
Potential Impacts of Climate Change on Human Health



NH's Greenhouse Gas Emissions Inventory



Historical data from EPA

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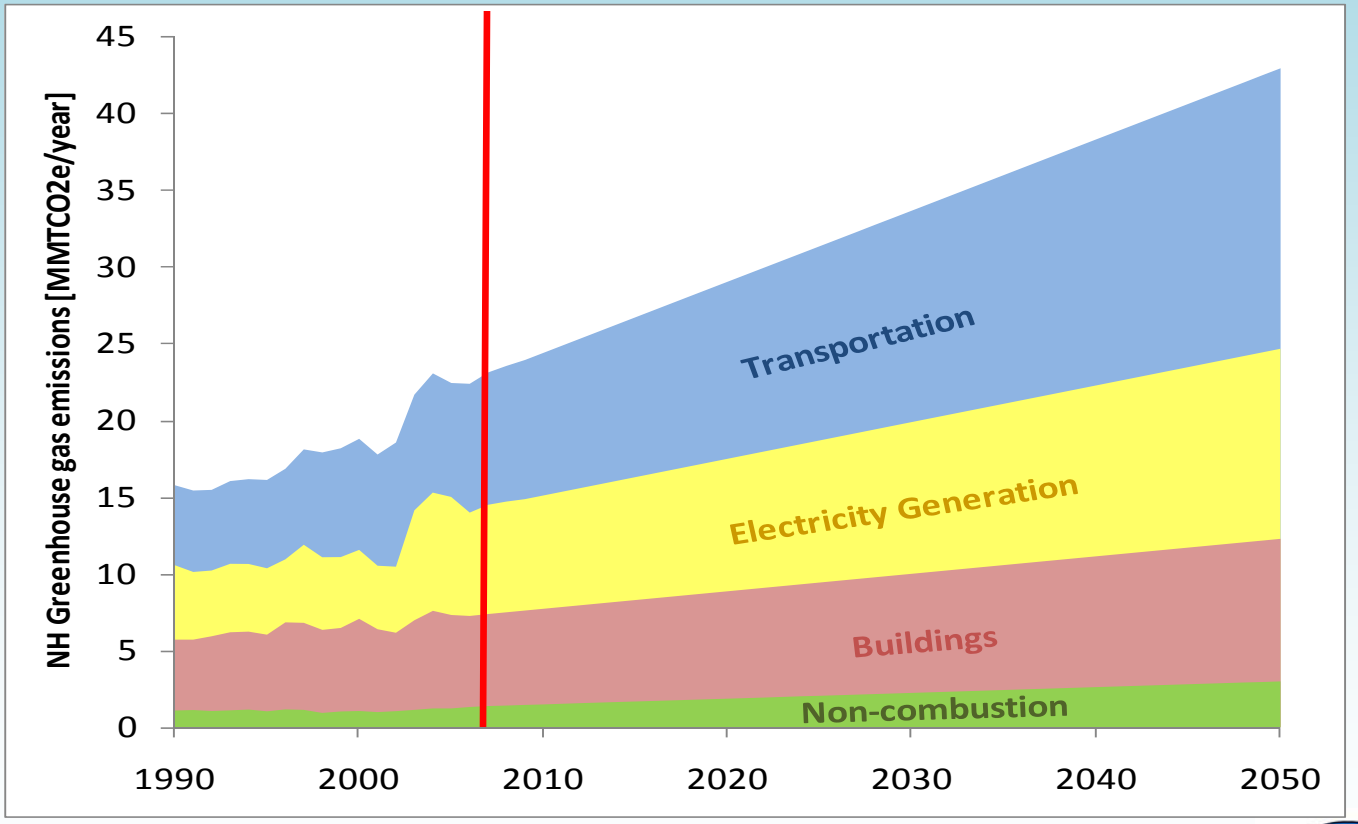
NH's Greenhouse Gas Emissions Projections



Historical data from EPA
Business as Usual (BAU) estimates from CSNE

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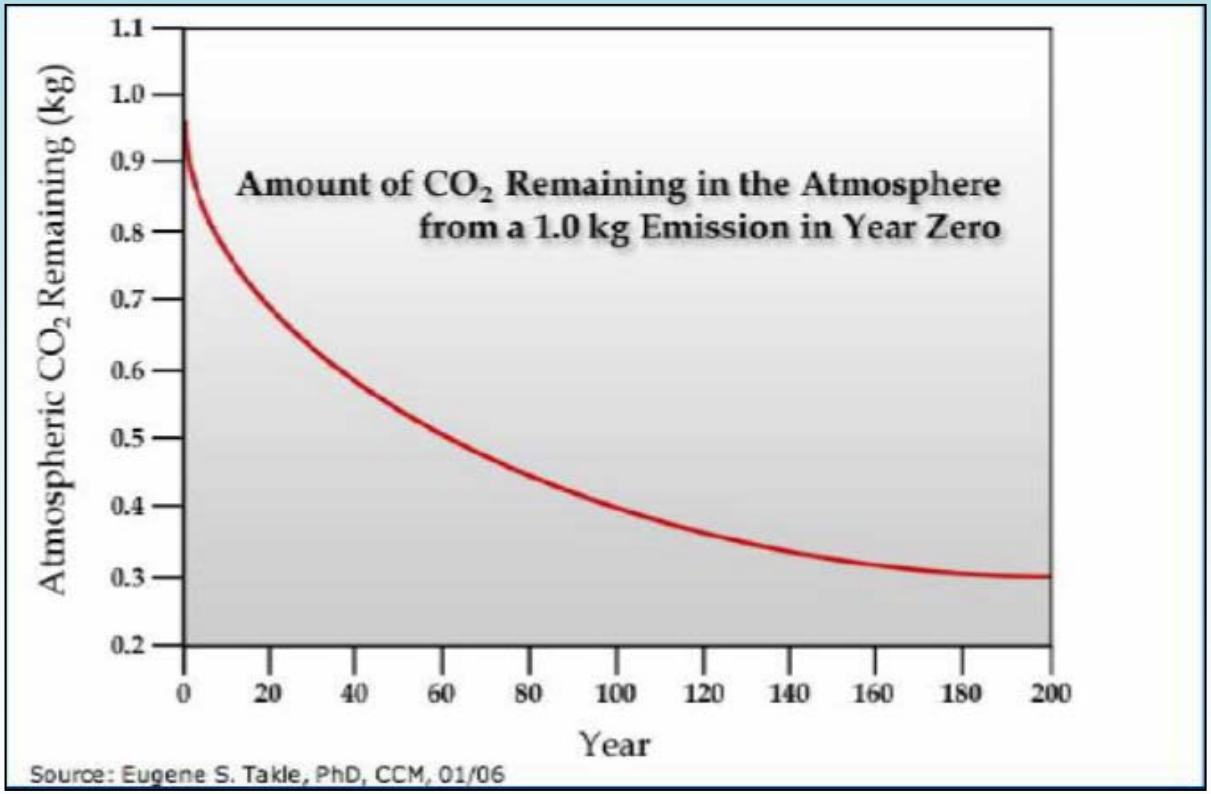
Delays in the Climate System



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Climate Change Policy Task Force

- Established through Executive Order 2007-3 December 6, 2007
  - Establish quantified greenhouse gas emission reduction goals
  - Recommend specific actions to achieve its greenhouse gas emission reduction goals

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Climate Change Policy Task Force

- Climate Change Policy Task Force
  - Twenty-nine (29) members
- Working Groups (6)
  - 125+ Participants
- Six (6) Official Public Listening Sessions
  - 15 Locations
  - 275 Participants
  - 100 Commenters
- 300 Pages of Public Comments
  - e.g., mail, email, phone calls

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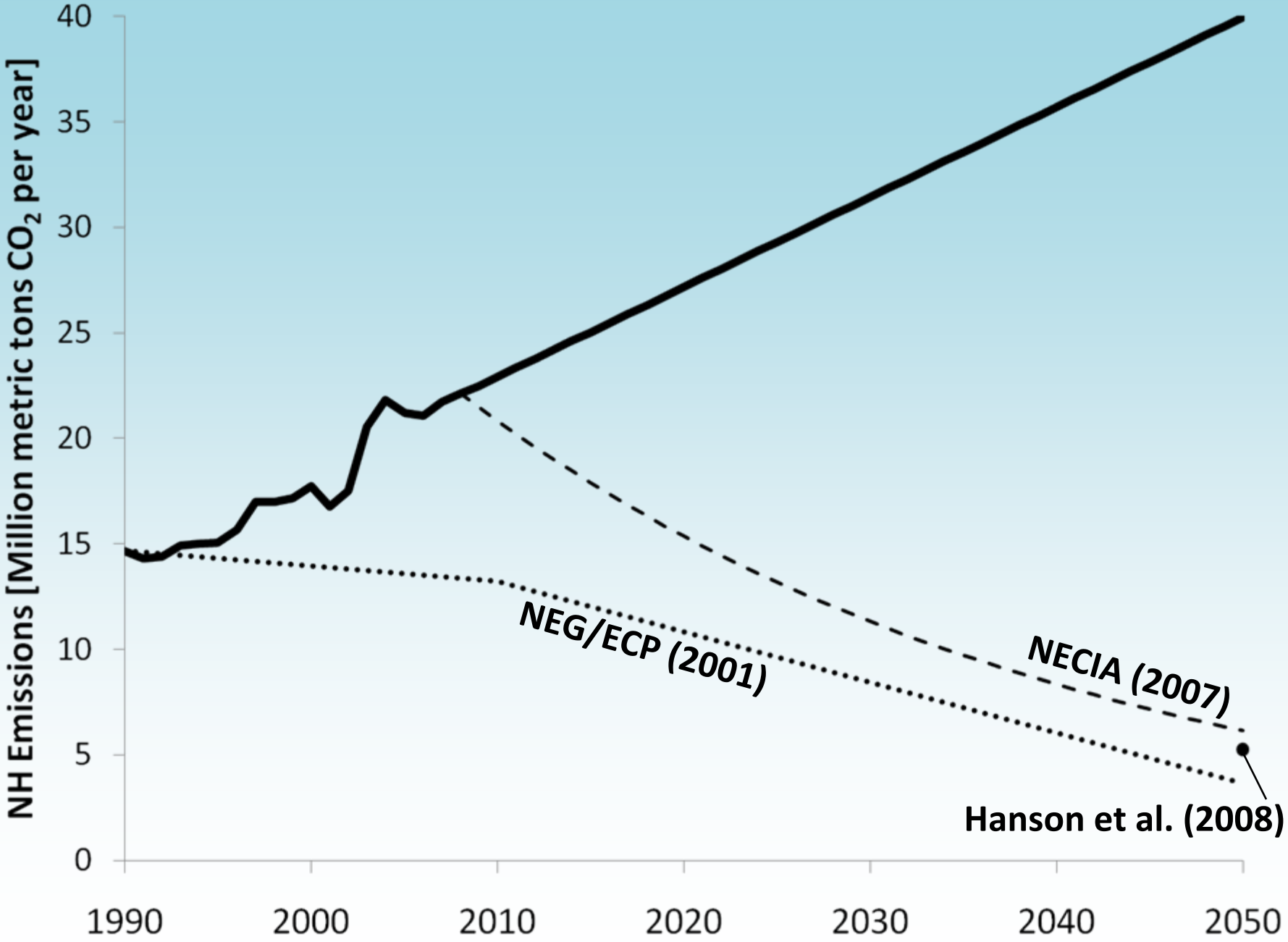
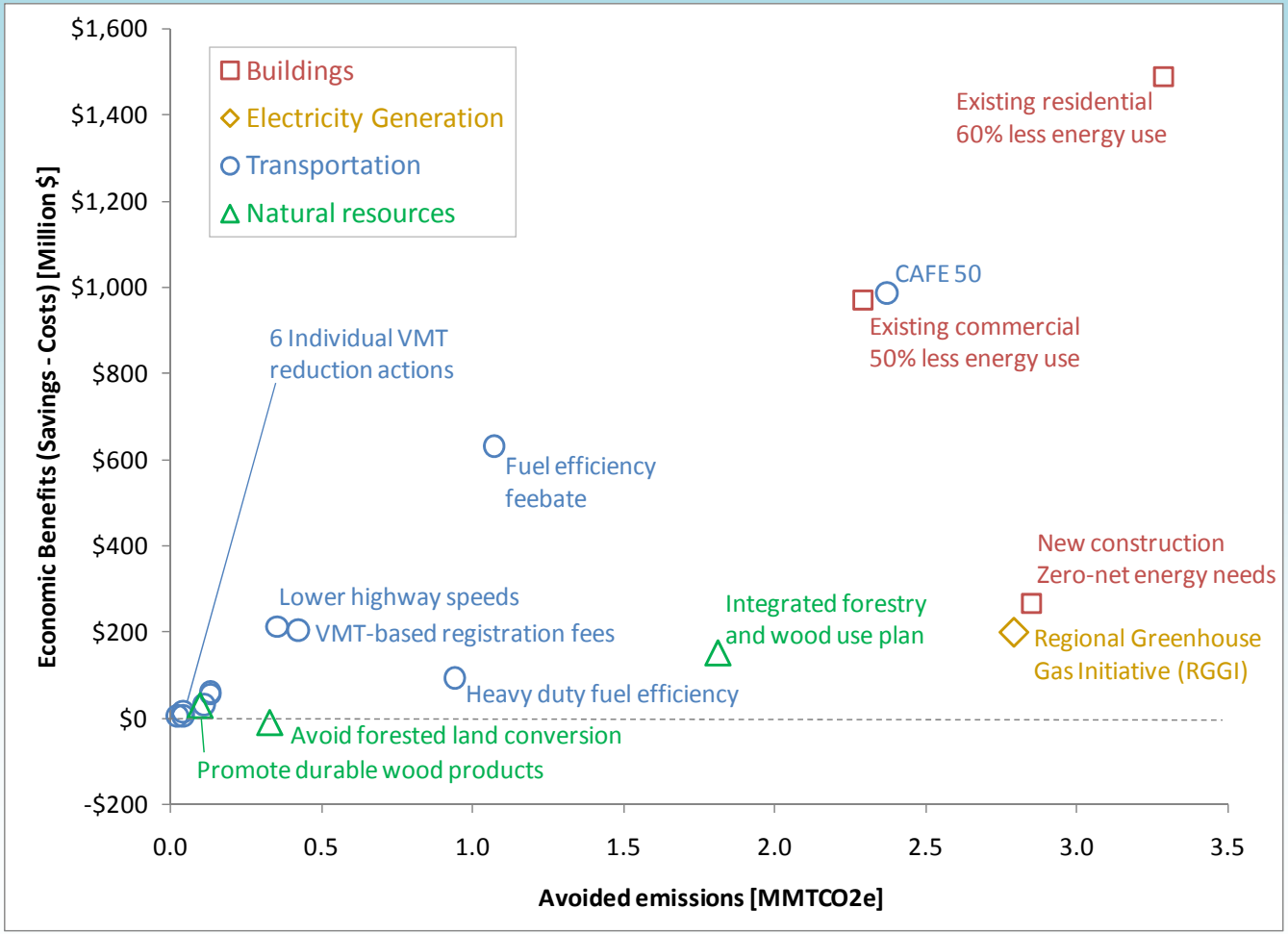

NH Emissions [Million metric tons CO_2 per year]
40
35
30
25
20
15
10
5
0
1990
2000
2010
2020
2030
2040
2050
NEG/ECP (2001)
NECIA (2007)
Hanson et al. (2008)

Economic Benefits and Avoided Emission Reductions



Analysis conducted by CSNE

Solutions = Opportunity

- Spur economic growth through re-investment of avoided energy costs
- Create jobs and economic growth through development of in-state energy sources
- Avoid the significant costs of responding to a changing climate

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Climate Change Policy Task Force Recommended Goals

- Reduce greenhouse gas emissions 20% below 1990 levels by 2025

- Reduce greenhouse gas emissions 80% below 1990 levels by 2050

<u>STATE ACTION COMPLEMENTS GLOBAL EFFORTS</u>

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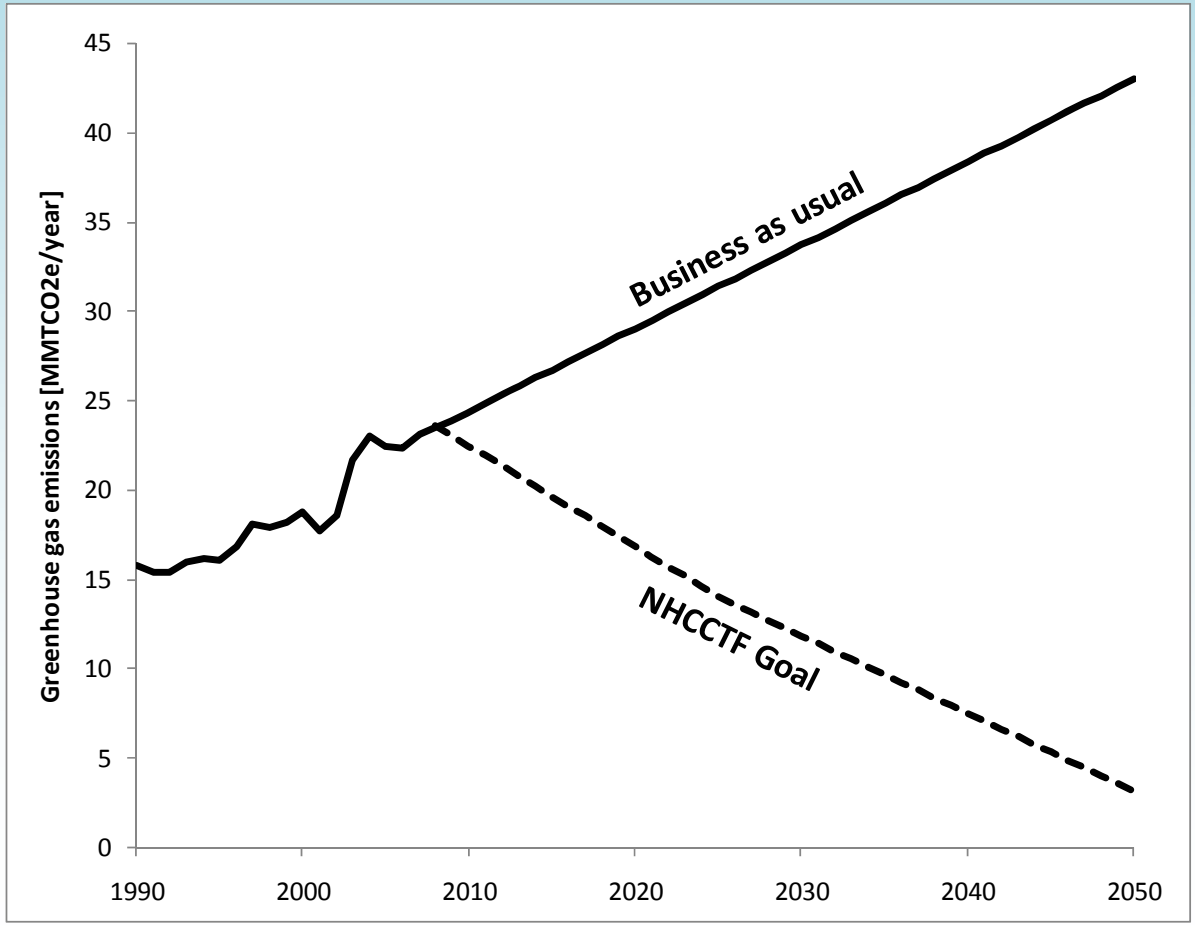
Climate Action Plan
Emission Reduction Potential



Overarching Strategies to Achieve Goals

1. Maximize energy efficiency in buildings and transportation;
2. Increase renewable and low-emitting heat and electric power sources;
3. Protect our natural resources to maintain the amount of carbon sequestered;
4. Develop an integrated education, outreach and workforce training program; and
5. Adapt to existing and potential climate change impacts.

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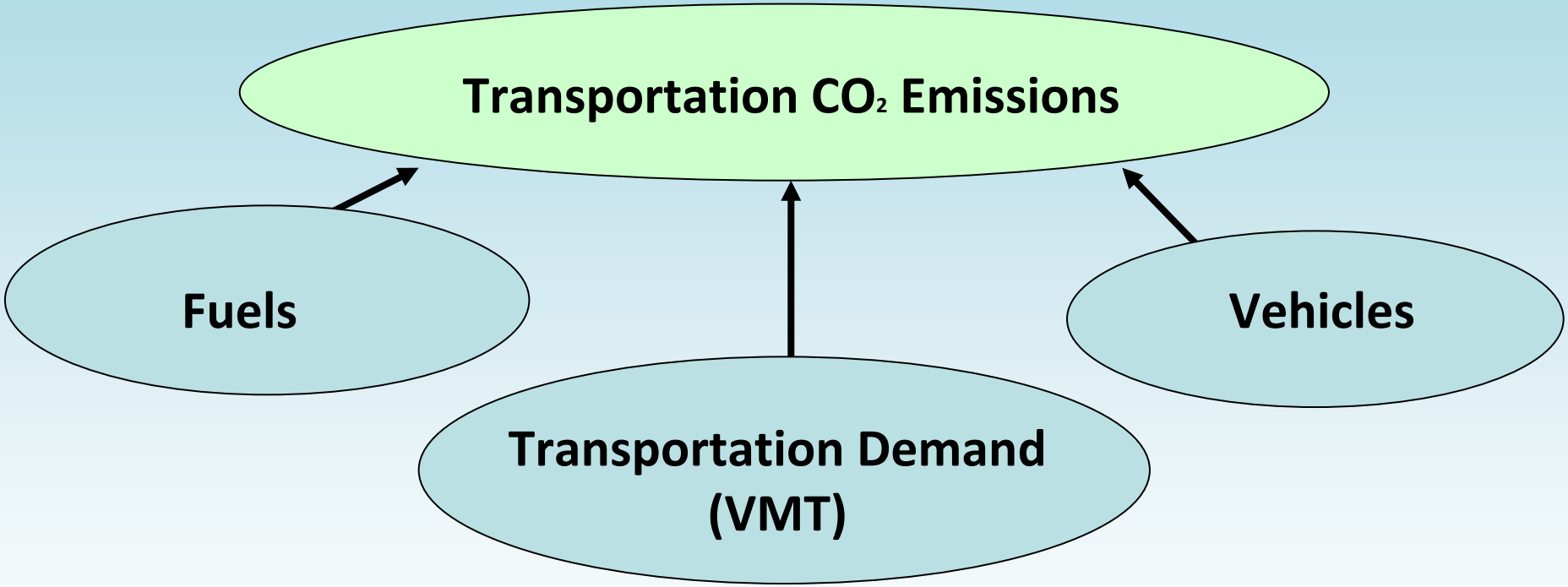
Greenhouse Gas Emissions Transportation Sector



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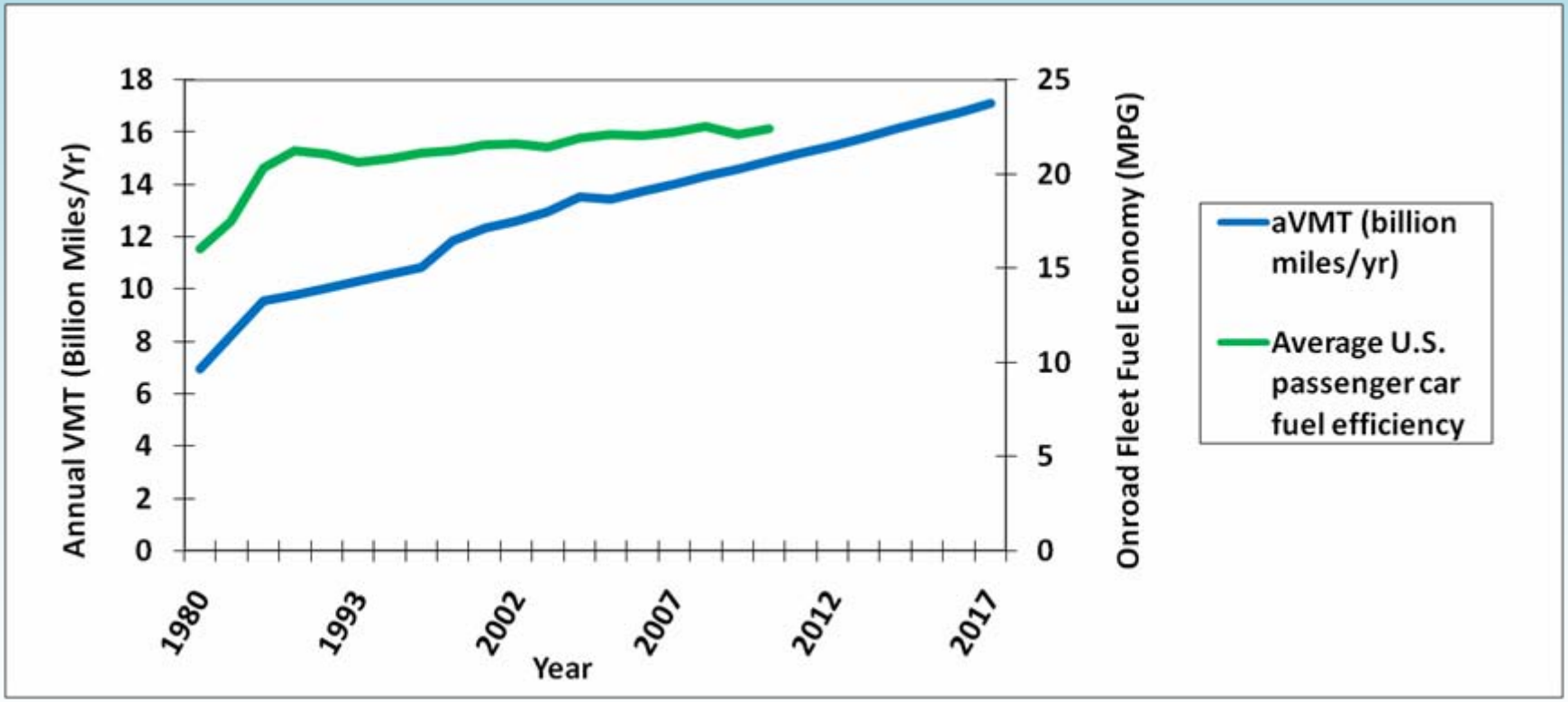
Greenhouse Gas Emissions Transportation Sector



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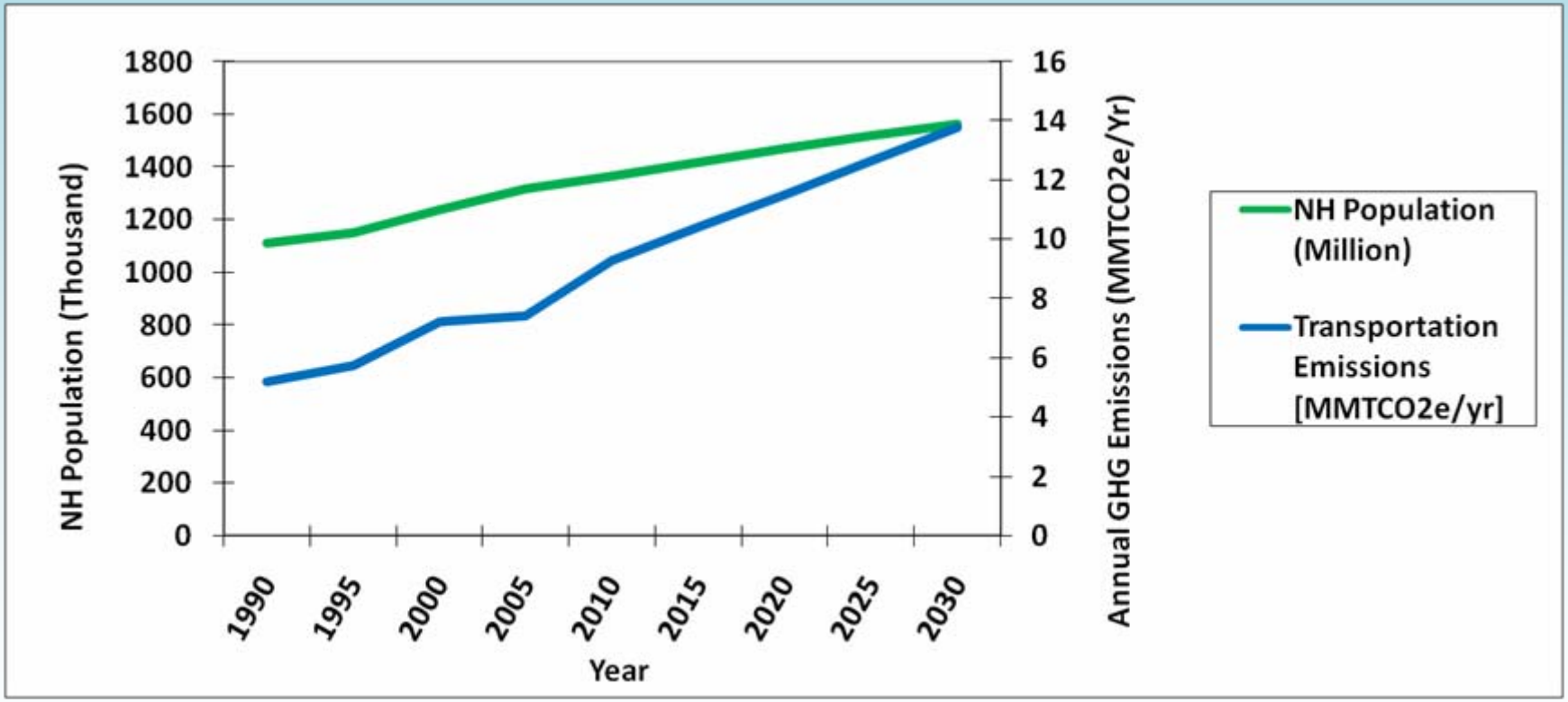
Greenhouse Gas Emissions Transportation Sector



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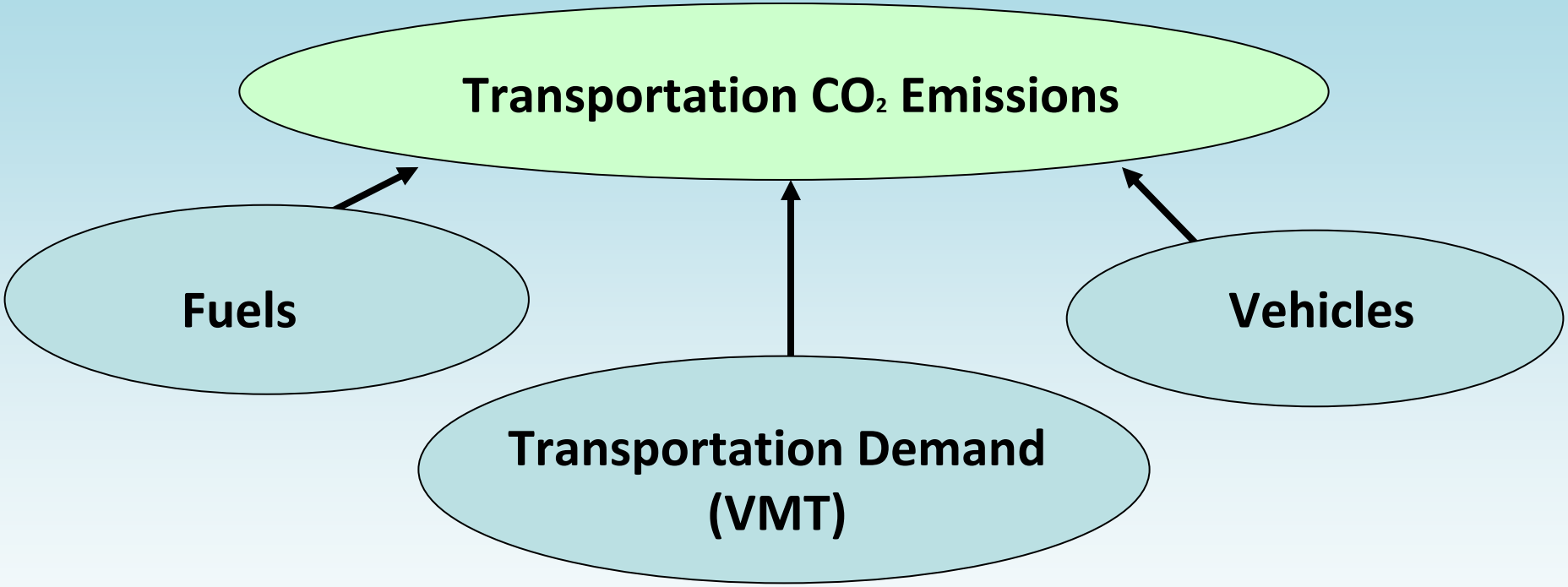
Greenhouse Gas Emission REDUCTIONS
Transportation Sector



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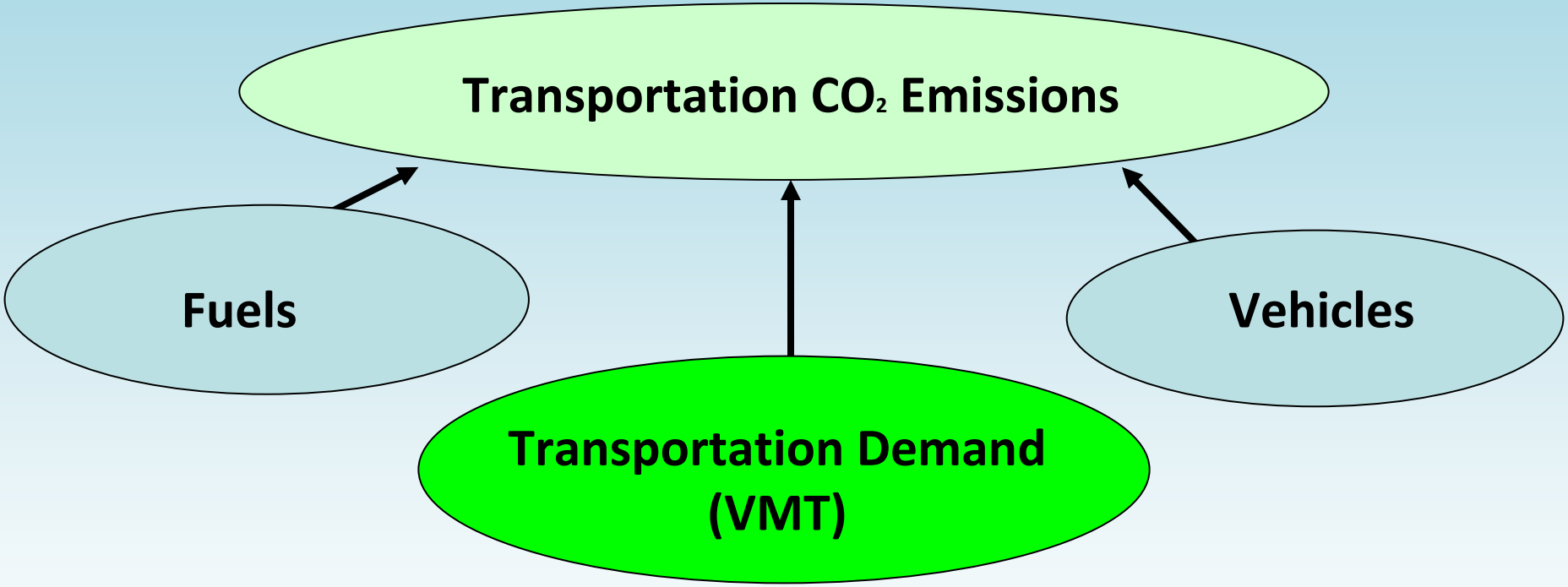

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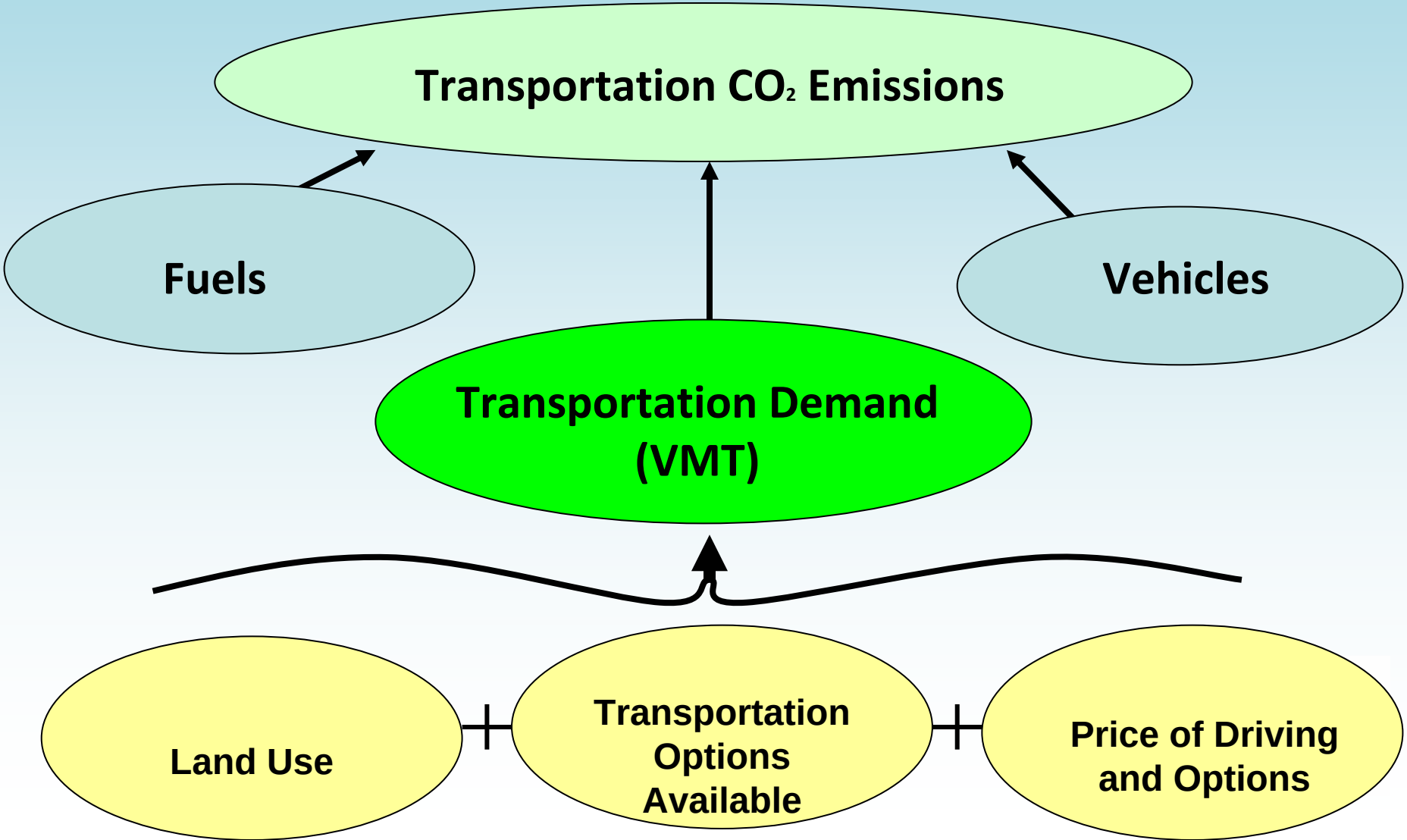
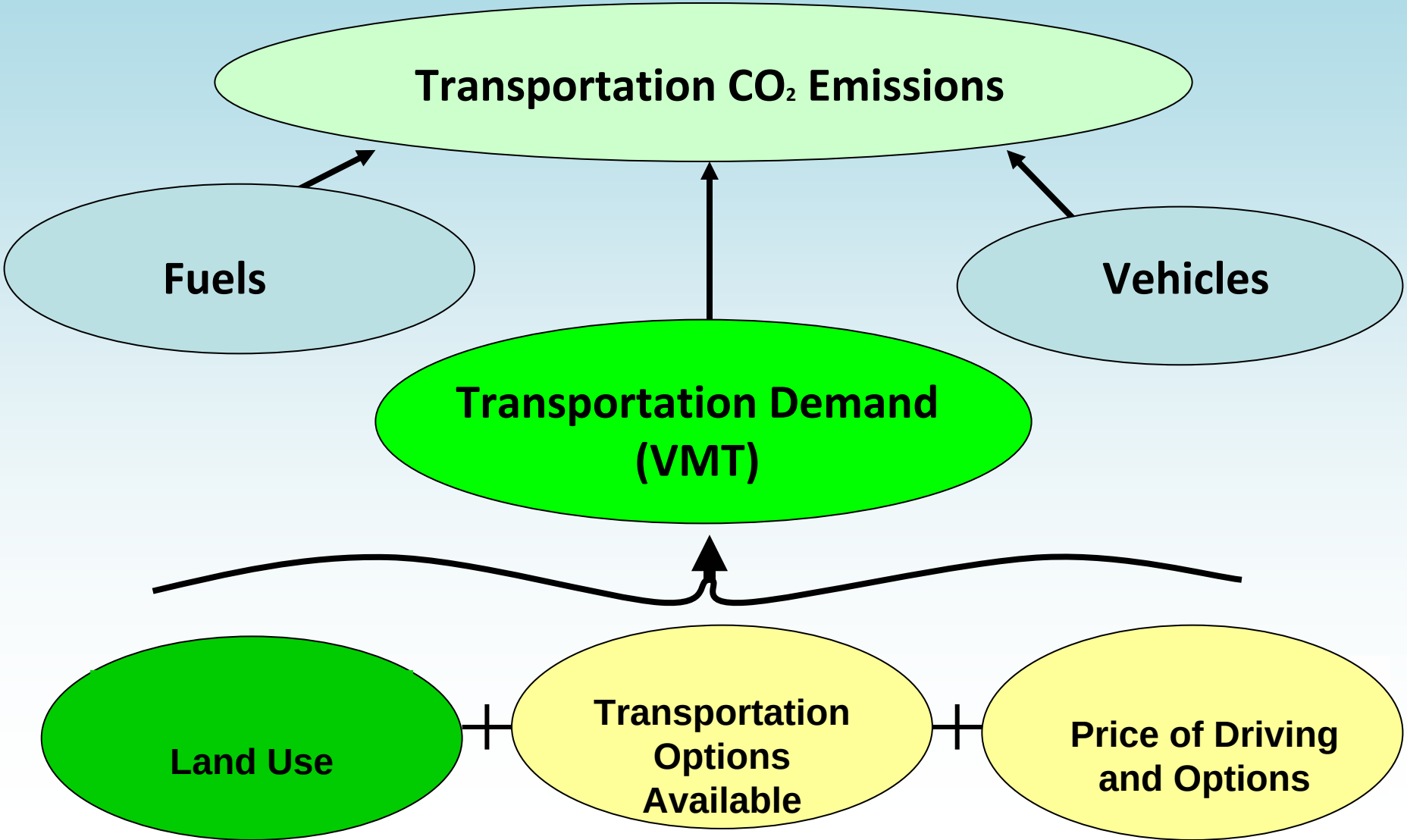


Greenhouse Gas Emission REDUCTIONS
Transportation Sector



Current New Hampshire Land Use Patterns

- Rapidly growing small towns
- Scattered development
- Dispersing population
- Increasing rate of land consumption
- Segregated land uses
- Lack of activity centers
- Poor accessibility

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Desired Land Use Conditions

- Open space preservation
- Higher density development
- Concentrated activity centers
- Mixed use development
- Pedestrian oriented design
- Increased density near transit

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Recommended Land Use Actions

- Assess Greenhouse Gas Development Impact Fees
- Streamline Approvals for Low- Greenhouse Gas Development Projects

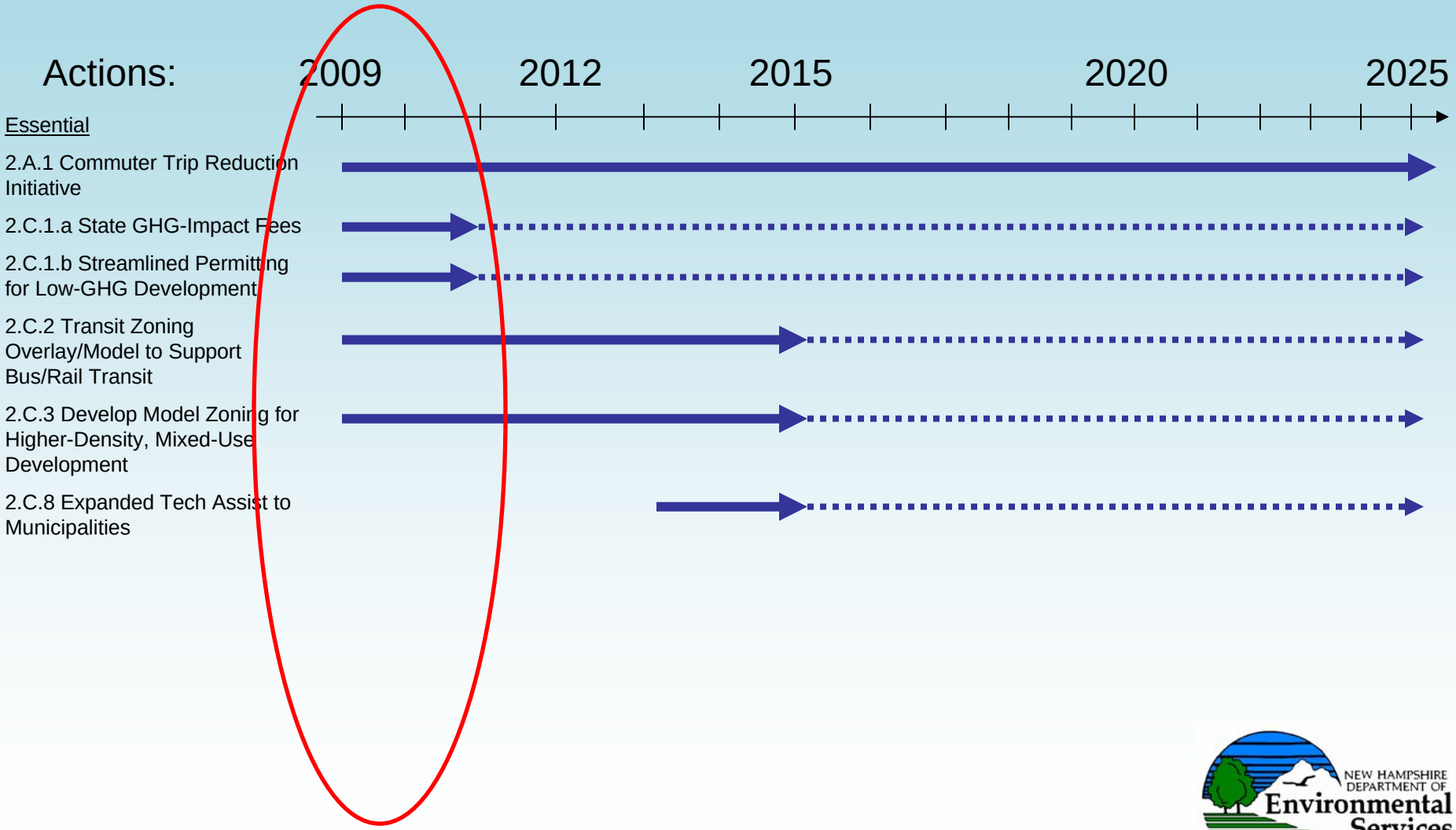
- Develop Model Zoning to Support Bus/Rail Transit
- Develop Model Zoning for Higher-Density, Mixed-Use Development

- Continue/Expand Funding, Education, and Technical Assistance to Municipalities

Encourage Appropriate Land-Use Patterns that Reduce VMTs

Key:

- Begin Work on Action
- Active Implementation
- Action Continues



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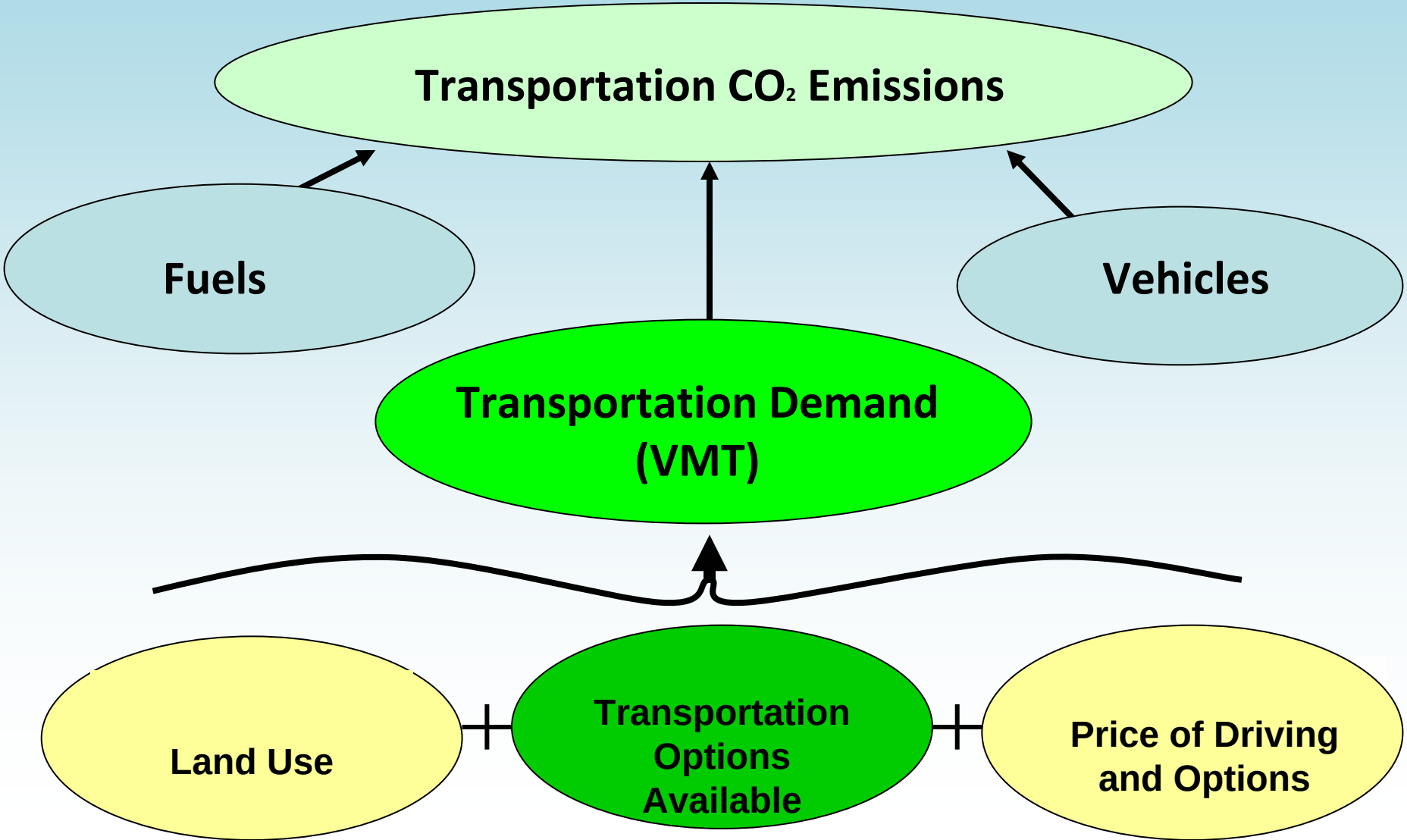
Greenhouse Gas Emission REDUCTIONS
Transportation Sector



Desired Transit Outcomes

- Expand existing transit availability
- Increase transit options
- Increase connectivity and accessibility of transportation system

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Desired Transit Outcomes

Recommended Transit Actions

- Implement a Stable Funding Stream to Support Public Transportation

- Improve Existing Local/Intra-Regional Transit (Bus) Service
- Expand Local/Intra-Regional Transit (Bus) Service
- Improve Existing Inter-City Bus Service

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Recommended Transit Actions

- Maintain and Expand Freight Rail Service
- Maintain and Expand Passenger Rail Service

- Expand Park-and-Ride Infrastructure
- Expand and Improve Bicycle and Pedestrian Infrastructure

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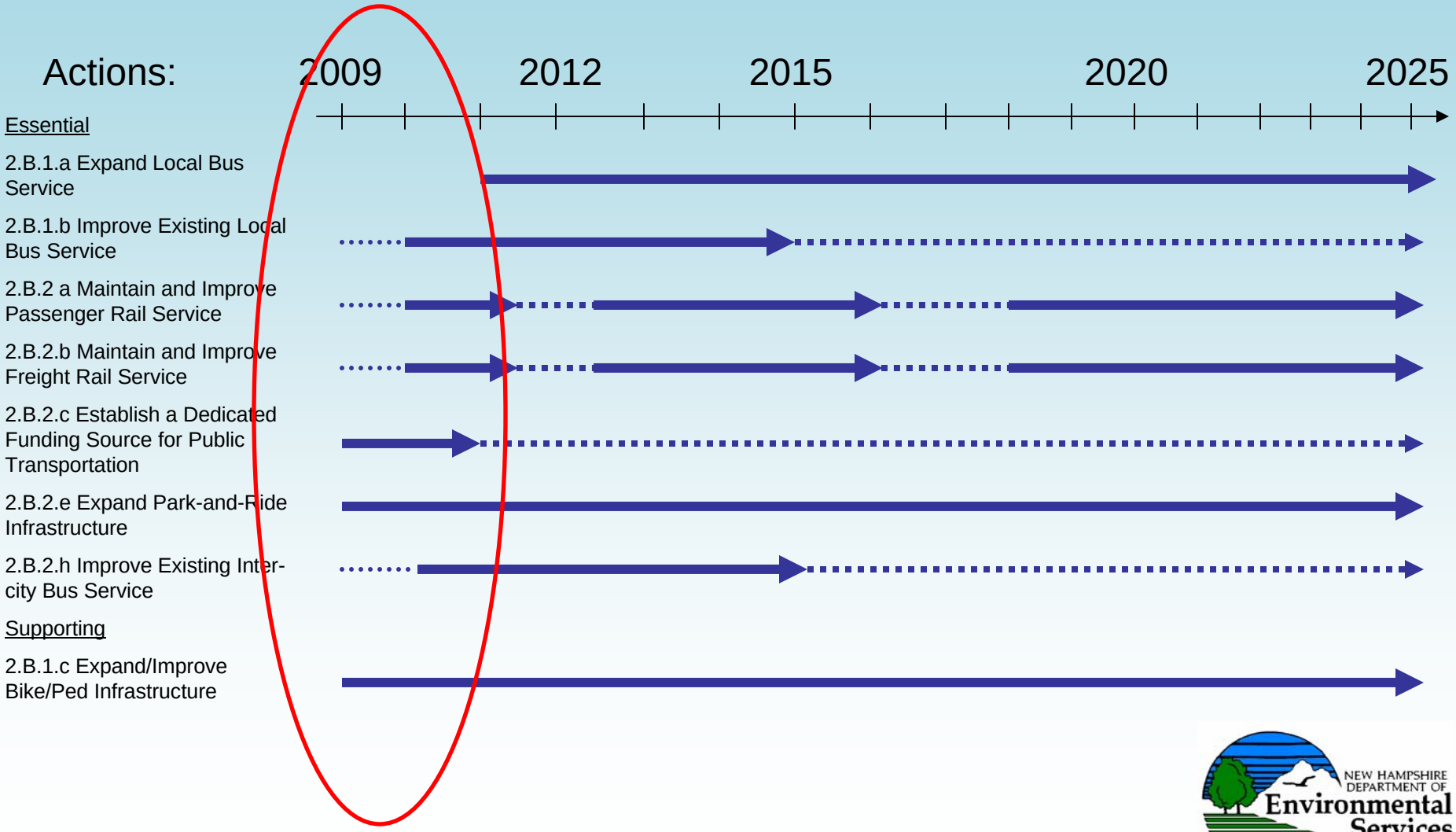
Reduce VMTs through an Integrated Multi-Modal Transportation System

Key:

- Begin Work on Action
- Active Implementation
- Action Continues



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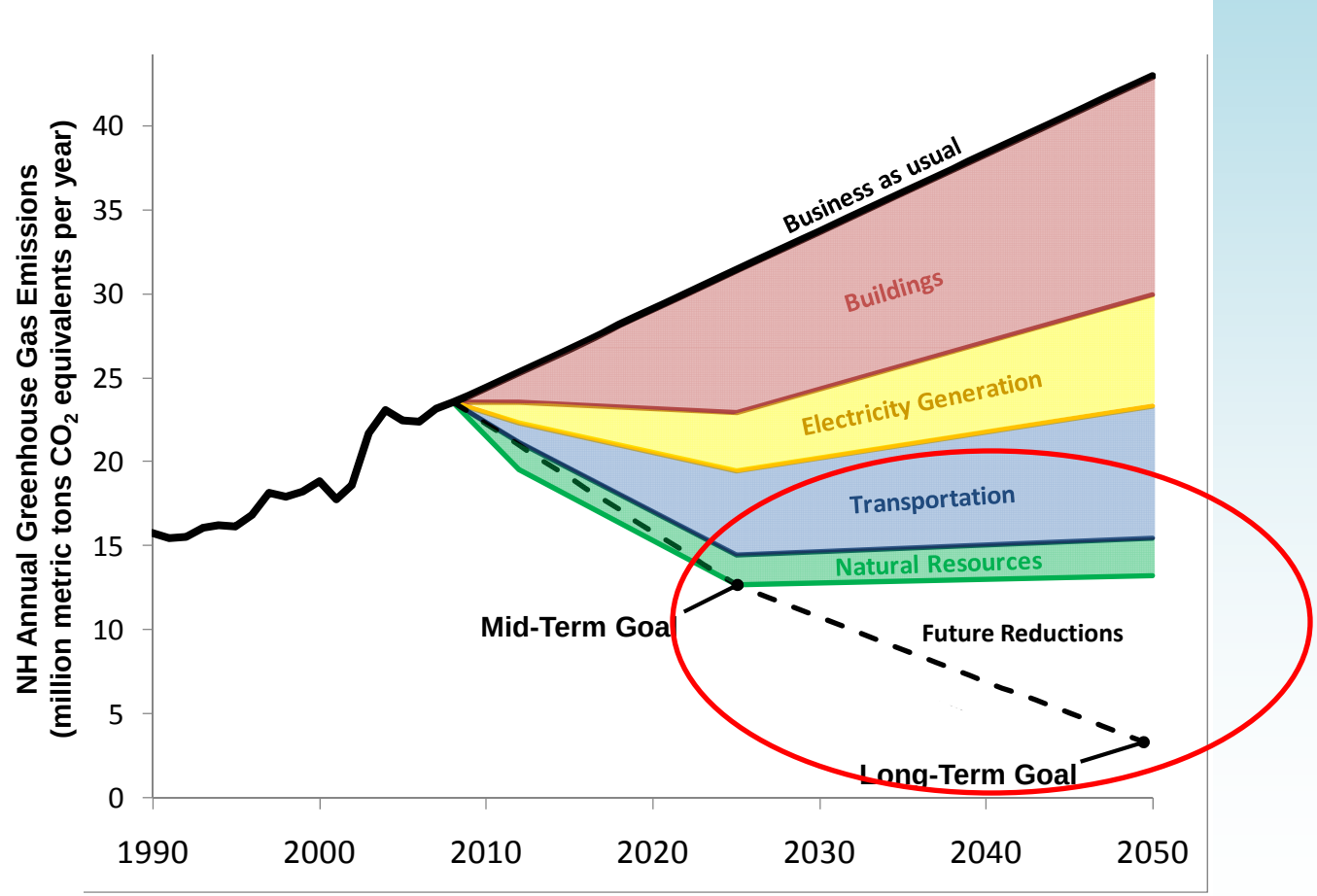
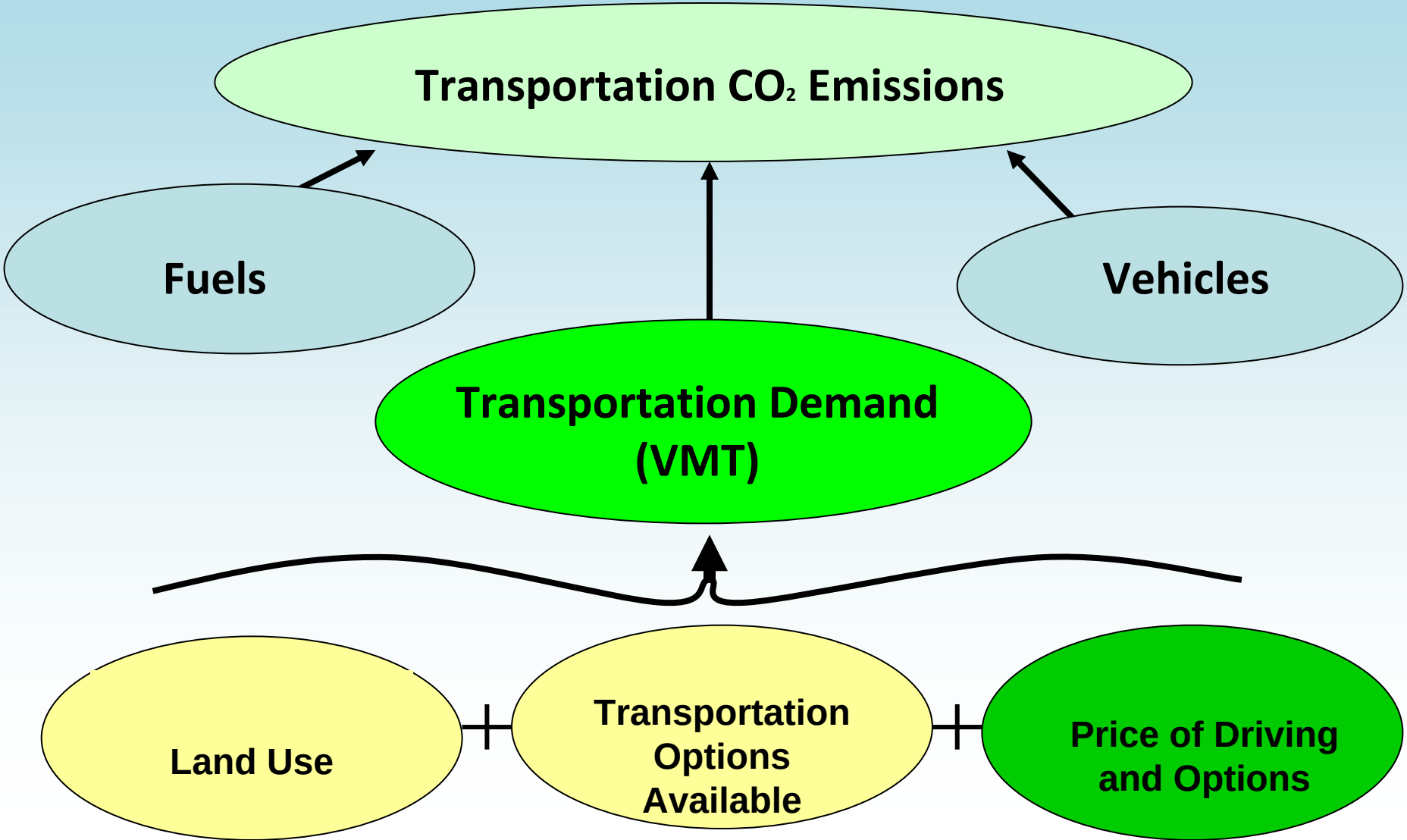
Climate Action Plan
Emission Reduction Potential



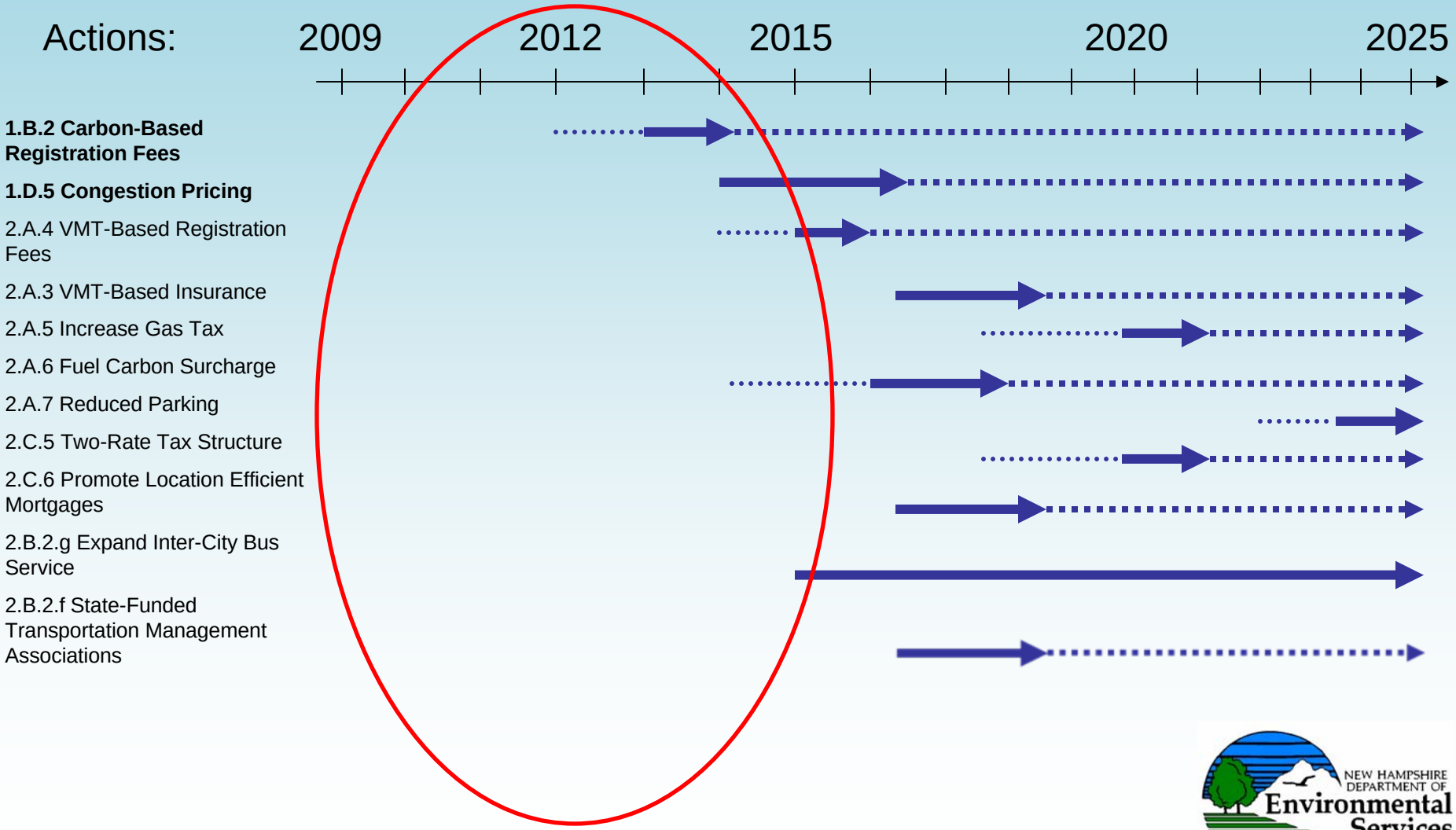
Greenhouse Gas Emission REDUCTIONS
Transportation Sector



Actions for Future Consideration

Key:

- Begin Work on Action
- Active Implementation
- Action Continues



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Protect Our Natural Resources to Maintain the Carbon Sequestered

- Maximize Availability of Biomass for Electricity and Heating within Sustainable Limits
- Invest in Forests to Maximize Carbon Storage and to Avoid Net Forest Land Conversion
- Promote Durable Wood Products
- Maximize Source Reduction and Recycling

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Addressing Climate Change Impacts

Newmarket, NH
May 2006

Fosters Daily Democrat photos

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Desired Adaptation Outcomes

- Facilitate early responses/avoided impacts
- Enhance communities' resistance to change
- Promote resilient communities

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Plan for Existing and Potential Climate Change Impacts

- Develop a Climate Change Adaptation Plan for the State of New Hampshire
- Develop and Distribute Critical Information
- Focus Policies and Actions to Most at Risk Populations
- Charge and Empower Public Health Officials
- Increase Resilience of Natural and Built Environments

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Moving Forward

- NH Climate and Energy Collaborative
  - Six members from the business community.
  - Six members from the public sector.
  - Six members from the education and nonprofit sectors.

  - Legislative liaison committee.

- Implementing Partners
  - "Boots of the Ground" : **The RPCs can play a leadership role in their regions and for the member communities.**

Implementation of the Climate Action Plan

- NH Climate and Energy Collaborative
  - Six members from the business community.
  - Six members from the public sector.
  - Six members from the education and nonprofit sectors.

- Implementing Partners
  - "Boots on the Ground" already implementing or developing programs key to success in New Hampshire.

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Areas of Climate Action Plan with Potential for Community Role

- Land Use
  - **Rearranging Density to Reduce VMT**
  - **Improving Transportation Options**
  - **Conserving Forests and Open Space**
- Adaptation
  - **Fluvial Erosion Hazard Planning**
  - **Emergency Preparedness**

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Download Action Plan

Visit **http://des.nh.gov/**

Search for “climate action plan”

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Contacts

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