Seven States' Climate Action Planning
October 2019

Introduction

This is one of several documents developed to help the Wisconsin Department of Natural Resources respond to executive orders 2019-38 and 2019-52. This document summarizes the climate work of seven states: California, Colorado, Connecticut, Illinois, Iowa, Michigan and Minnesota. California, Colorado and Connecticut are some of the leading states in addressing climate change. The remaining four states neighbor Wisconsin.

Thirty-four states have developed statewide climate mitigation and/or adaptation plans or recommendations.[1] These state plans identified the following similarities:[2]

- regulatory statutes and/or more extensive programmatic actions to mitigate greenhouse gas emissions;
- a long-term state emissions target of achieving emission levels that are 80-90% below 2005 levels by 2050;
- one or more less ambitious short-term emission targets to help the state take steps toward its more ambitious long-term target;
- relatively stringent monitoring and evaluation mechanisms;
- participation in multi-state climate initiatives;
- an implementation plan that clearly identifies responsible entities for implementation; and
- a fact-finding and consensus-building process involving many stakeholders.

State Summaries

The following information is adapted or replicated word for word from the sources indicated by the hyperlinks and footnotes. Quotation marks are excluded for ease of reading.

[1] Center for Climate and Energy Solutions: U.S. State Climate Action Plans.
[2] Alexander, Serena E., "From Planning to Action: An Evaluation of State Level Climate Action Plans," 2016, ETD Archive, 918.

California

- California has long been a national and international leader in environmental protection and addressing climate change
- According to its 2017 Climate Change Scoping Plan, California boasts the following achievements:
  - nearly 50% of the zero emission electric vehicles in the U.S. are in California
  - 40% of North American clean fuel investments are in California
  - 90% of total U.S. investment in clean transportation are in California
  - California has reduced air pollution, saved consumers money, reduced its energy consumption, and reduced greenhouse gas emissions, while maintaining an annual growth rate that is double the national average
- According to the Scoping Plan, some keys to the state's success include the following:
  - using open public participation processes to glean the best ideas from a variety of sources
  - engaging communities most disadvantaged by environmental and socioeconomic burdens
  - integrating effective regulation with investments — from the proceeds of its successful Cap and Trade Program — that provide broad market support for clean technologies
  - using those proceeds (so far half) to invest in "an environmental justice and equity movement" in partnership with and specifically benefiting disadvantaged communities
  - monitoring and reporting on efforts
  - making midcourse adjustments as necessary
  - collaborating closely with California-based military on developing technology, approaches, analyses, etc.[3]
  - enabling, supporting and to some degree mandating local, county and regional work on addressing climate change in communities
- See Georgetown's California overview and related plans and resources
- Latest state-led **adaptation** plan: Safeguarding California Plan: 2018 Update
  - the plan details the state's progress on adaptation plus a new actionable plan for the near future, including over 1,000 ongoing actions and next steps, organized by 76 policy recommendations across the following 11 policy sectors:
    - emergency management
    - energy
    - land use and community development
    - public health
    - transportation
    - agriculture
    - biodiversity
    - forests
    - oceans and coasts
    - water
    - parks, recreation and California culture
  - the plan is guided by seven principles to safeguard California from climate change:
    1. consider climate change in all functions of government

[3] Climate Adaptation Policy at the State and Local Level. Webinar on April 16, 2018. Security and Sustainability Forum. https://vimeo.com/265047198

2. partner with California's most vulnerable populations to increase equity and resilience through investments, planning, research and education
3. support continued climate research and data tools
4. identify significant and sustainable funding sources to reduce climate risks, harm to people, and disaster spending
5. prioritize natural infrastructure solutions that build climate preparedness, reduce greenhouse gas emissions, and produce other multiple benefits
6. promote collaborative adaptation processes with federal, local and regional government partners
7. increase investment in climate change vulnerability assessments of critical built infrastructure systems

- the plan increases the state's adaptation focus on equity and environmental justice, and incorporates equity considerations into strategies by including the following cross-sector strategy for ensuring climate justice (i.e., ensuring people and communities least culpable in causing climate change, and most vulnerable to its impacts, do not suffer disproportionately because of historical injustice and disinvestment)
  - actively engage, educate and partner with communities to enable early, continuous and meaningful participation in adaptation initiatives
  - identify the most vulnerable communities to climate change to prioritize initiatives and build grassroots capacity
  - support and coordinate adaptation efforts across jurisdictions and policy areas to maximize community resilience
  - promote holistic approaches to climate adaptation that maximize co-benefits and economic development
  - make equity an integral consideration for climate research

- Latest state-led **mitigation** plan: California's 2017 Climate Change Scoping Plan
  - the plan provides a strategy for achieving the state's 2030 greenhouse gas emissions target: 40% reduction from 1990 emission levels by 2030
  - the plan's primary recommendations:
    - increase the Renewables Portfolio Standard to 50% of retail sales by 2030
    - ensure grid reliability
    - double energy efficiency of electricity and natural gas by 2030
    - In 2015 California created a comprehensive "Mobile Source Strategy to achieve federal air quality standards, reduce GHG emissions, decrease air toxics and reduce transportation petroleum use. Reduction targets were set for smog (80%), GHG (45%), petroleum (50%) and diesel particulate matter (45%) including:
      - put at least 1.5 million zero emission and plug-in hybrid light-duty electric vehicles on the road by 2025 and at least 4.2 million by 2030
      - transition to innovative clean transit options:
        - zero emission bus technology for up to 100% of new bus sales by 2030
        - natural gas and clean diesel buses to meet new low nitrogen oxide standard by 2020
      - provide regulation requiring low nitrogen oxide or cleaner engines in delivery trucks, and increased numbers of zero emission trucks
      - further reduce vehicle miles traveled through implementation of new laws and regional Sustainable Communities Strategies
    - promote more high density, transit-oriented housing
    - promote more walkable and bikeable communities

- increase stringency of the Sustainable Community Strategy for 2035 targets
- adjust performance measures for selecting and designing transportation facilities
- develop pricing policies that support low greenhouse gas transportation, such as low emission vehicle zones for heavy-duty, parking pricing, transit discounts, etc.
- implement the California Sustainable Freight Action Plan:
  - by 2030, deploy over 100,000 zero-emissions freight vehicles
  - maximize zero and near-zero emissions freight vehicles powered by renewable energy
  - improve freight system efficiency
- adopt a Low Carbon Fuel Standard: setting a reduction goal in carbon intensity by 18%
- implement a Short-Lived Climate Pollutant Strategy (super pollutants) by 2030:
  - 40% reduction in methane and hydrofluorocarbons emissions below 2013 levels
  - 50% reduction in black carbon emissions below 2013 levels
- develop regulations and programs for organic waste landfill reduction
- implement post-2020 Cap and Trade Program with declining annual caps
- develop and implement the Integrated Natural and Working Lands Implementation Plan:
  - ensure these lands become a net-carbon sink
  - avoid at least 15-20 metric tons of greenhouse gas emissions by 2030
  - prevent land conversion by using incentives such as conservation easements
  - increase resilience of carbon storage in land base and enhance sequestration capacity
  - increase carbon stored in natural and built environments by further leveraging wood and agricultural products
  - create scenario projections
  - help the agriculture sector improve manure management, boost soil health, generate renewable power, use waste biomass, electrify operations, and increase efficiency in energy, water and fertilizer to reduce super pollutants
- create a Carbon Accounting Framework for natural and working lands
- implement the Forest Carbon Plan
- identify and expand funding and financing to support greenhouse gas reductions across all sectors

Colorado

- Colorado has been very active in climate-related planning and reporting over the years
- See Georgetown's Colorado overview and related plans and resources
- The state's 2018-updated Climate Action Plan builds on previous versions by incorporating additional commitments to adaptation and mitigation, stemming from Governor Hickenlooper's 2017 executive order
- The Climate Action Plan's goals and state commitments — primarily **mitigation** focused — include the following:
  - reduce emissions by more than 26% from 2005 levels by 2025
  - attain electricity savings of 2% of total electricity sales per year by 2020
  - reduce carbon dioxide emissions from the electricity sector by 25% by 2025 and 35% by 2030 from 2012 levels
  - collaborate with interested utilities or electric cooperatives on a voluntary basis to maximize use of renewable energy without increasing costs to taxpayers
  - create the Electric Vehicle Plan
  - develop a greenhouse gas emissions tracking rule
  - partner with local governments on locally led climate goals and resilience actions
  - institutionalize the state's greening government initiative
  - formalize and expand cross-agency actions providing economic development strategies and supportive services to communities impacted by the changing energy landscape
- The climate action plan includes numerous **adaptation** goals as well, such as the following:
  - agriculture:
    - promote and research efficient irrigation systems, soil health and land management practices to adapt to changes and decrease production losses due to lack of water
    - partner with research institutions and federal agencies to support producers' efforts to adapt to climate change
  - forestry:
    - provide homeowners in wildfire risk areas funding and technical support to reduce risks
    - encourage safer and more efficient forest management practices
  - infrastructure:
    - improve roadways and adapt airport infrastructure to be more resilient to climate
    - improve the state's water infrastructure, such as increasing reservoir size
  - public health and emergency preparedness:
    - educate the public about potential health hazards
    - continue to assess the relationship between climate change and illnesses and diseases, such as vector-borne diseases, heat-related illnesses and algal blooms
  - water:
    - promote water efficiency and conservation
    - support water-sharing agreements
    - work with regulators, utilities and federal agencies to incorporate climate change impacts into regulations
    - strengthen water resilience in local communities
- The plan covers progress that has been made at the state and local level
- The plan also highlights policies and programs in which the state can strategically address health equity and environmental justice

Connecticut

- Connecticut has employed a variety of executive orders, statutes, initiatives, partnerships, programs, plans and reports to forward its climate work (see Connecticut's climate action timeline)
- See Georgetown's Connecticut overview and related plans and resources
- **Mitigation**
  - the state has been a leader in fighting climate change since 2001, when it signed onto the first international climate initiative aimed at collectively reducing greenhouse gas emissions
  - Connecticut is one of nine Northeastern and Mid-Atlantic states participating in the Regional Greenhouse Gas Initiative, the first mandatory market-based program in the U.S. to reduce greenhouse gas emission
  - in 2019, the state joined nine states and D.C. to design a regional approach to capping greenhouse gas pollution from the transportation sector specifically
  - in 2017, Connecticut towns launched Sustainable CT to help municipalities accelerate, support and recognize sustainability actions, sparking action at the local level with statewide impacts.
  - by statute, the state's primary mitigation goals include:
    - doubling its Renewable Portfolio Standard from 20% by 2020 to 40% by 2030
    - mandatory emissions reduction targets of 10% below 1990 levels by 2020, 45% below 2001 levels by 2030, and 80% below 2001 levels by 2050
  - most recent mitigation-related plans:
    - 2018 Comprehensive Energy Strategy: addresses some of the sectors included in the document below
    - Building a Low-Carbon Future for Connecticut: Achieving a 45% Greenhouse Gas Reduction by 2030: Recommendations from the Governor's Council on Climate Change (December 2018)
      - the report's three fundamental objectives:
        - zero-carbon electricity generation
        - clean transportation
        - clean, efficient and resilient buildings
      - the following are the report's strategies and recommendations to achieve those objectives:
        - cross sector:
          - put a price on carbon:
            - implement an economy-wide carbon fee that assesses the carbon content of fossil fuels and set the price per ton of carbon emitted
            - implement an economy-wide Cap and Invest Program that sets a limit on carbon emissions and allows the market to determine a carbon price based on least cost reduction measures
          - expand consumer education and awareness efforts to increase the uptake of zero- and low-carbon technology and resiliency measures:
            - increase visibility of EnergizeCT resources
            - enhance outreach efforts by using social media campaigns, webinars, case studies, testimonials and the utilities' customer-engagement platforms
            - increase training of real-estate industry professionals on integrating U.S. DOE home energy scores and information on energy

efficiency, renewables, and resiliency into real-estate transaction processes
        - pursue an integrated approach to greenhouse gas mitigation, adaptation and resiliency:
            - prioritize opportunities for achieving synergies among actions that cut carbon pollution and prepare for the impacts of climate change
            - ensure that state building codes and performance standards are coordinated to incorporate the Insurance Institute for Business and Home Safety best practices for resiliency
    - zero-carbon electricity generation:
        - commit at least 50 MW of demand reduction per year to the ISO New England Forward Capacity Market:
            - reduce electricity consumption by 1-2 million MWh by replacing existing inefficient electric-resistance space- and water-heating equipment with high-efficiency renewable thermal technology
            - invest in efficient electric measures that reduce peak demand, such as more efficient exterior lighting, retail lighting, lighting in state buildings, and refrigeration
        - achieve at least 66% zero-carbon energy generation by 2030:
            - meet the Renewable Portfolio Standard target of 40% by 2030, with an aim to reduce the carbon intensity of the standard
            - ensure a transparent and predictable compensation framework to maintain at least the historical average deployment of 40-90 MW of additional residential behind-the-meter renewable energy resources per year
            - deploy at least 50 MW per year commercial distributed solar and 10 MW per year of fuel cells
            - implement a shared clean energy program deploying at least 25 MW per year, with a focus on low- and moderate-income customers
            - maintain in-state zero-carbon nuclear generation and develop a long-term zero-carbon replacement strategy equivalent to 2100 MW
            - exercise procurement authority for zero-carbon energy through competitive bidding processes that drive down prices
        - optimize grid-management strategies to reduce carbon emissions:
            - increase adoption of smart-management technologies to optimize flexibility of distributed energy resources
            - over the next 2-5 years, research and identify opportunities to integrate battery storage and distributed renewable energy technologies to displace carbon emissions
        - maintain increasing fuel economy and low- and zero-emissions standards:
            - maintain adherence to corporate average fuel economy and greenhouse gas emission standards mid-term review 2016 final determination
            - maintain adherence to California law- and zero-emission vehicle requirements

        - increase light-duty zero-emission vehicle penetration rate to at least 20% by 2030:
            - implement price signals to incentivize electric vehicle adoption and reduce electric system impacts
            - expand electric vehicle charging network to ensure consumer confidence, reduce range anxiety, and ensure equitable access
            - develop a state fleet transportation Lead by Example program that sets annual emission reduction targets and enables increasing adoption of zero-emission vehicles
        - advance initiatives that eliminate the rate of annual vehicle miles traveled growth by 2030:
            - implement transit-oriented development projects and adopt state policies and local zoning regulations that support walkable, mixed-use and sustainable urban and suburban development in areas served by transit
            - encourage, incentivize and support alternative modes and active transportation that reduce single occupant vehicle driving
        - develop sustainable funding for transportation electrification and transportation infrastructure:
            - implement a multistate Cap and Invest Program that sets a limit on transportation sector emissions and reinvests program proceeds in measures that drive down emissions, provide benefits to citizens, protect existing transportation funding, generate sufficient additional funding to support transportation infrastructure and operation, and mitigate costs to consumers
            - implement user-based direct transportation fees — market mechanisms to reduce traffic congestion and improve efficiency of travel for all drivers
    - clean, efficient and resilient buildings:
        - accelerate adoption of building thermal energy conservation improvements, such as weatherization, insulation, efficient windows, and efficient HVAC:
            - prioritize building envelope improvements and expand access to thermal energy-efficiency measures through innovative financing options for all income levels
            - ensure building codes are continuously aligned with the most recent Internal Energy Conservation Code standards
            - track and reduce energy consumption and associated greenhouse gas emissions in state and municipal buildings, including setting Lead by Example targets for 2030
            - review consistency of energy-efficiency cost-effectiveness testing with public policy goals
        - transition building fossil fuel thermal loads to efficient renewable thermal technologies:
            - develop sustainable funding mechanisms to incentivize replacement of fossil fuel space and water heating with efficient renewable thermal technologies
            - incentivize installation of renewable thermal technologies in new construction

        - improve training and technical capacity of workforce:
            - expand training programs to include renewable thermal technology installations and standards
    - the report also mentions the state's non-energy sector greenhouse gas commitments, such as the following:
        - implement the short-lived climate pollutants reduction strategies from the U.S. Climate Alliance (methane, hydrofluorocarbons and black carbon)
        - set achievable timelines for phasing out hydrofluorocarbons and transitioning toward climate-friendly, hydrofluorocarbons-free technologies and hydrofluorocarbons substitutes in refrigerators as well as building and vehicle air conditioning
            - closely examine California's adopted regulations on these substances and work with Maryland and New York as they develop regulations to phase out these substances
        - work with other New England states to measure and account for changes in land-use practices to inform smart growth and to protect valuable core forest land and prime farmland
        - follow through with the state's commitment to related U.S. Climate Alliance goals on: improving inventories of land-based carbon flux, increasing resilient carbon sequestration, maintaining natural and working lands as a net carbon sink, protecting and increasing those lands' carbon storage capacity, among others
        - work with land trusts, forest owners and working lands managers to adopt carbon accounting methods that further support sustainable land-use practices
- **Adaptation**
    - the state launched the Connecticut Institute for Resilience and Climate Adaptation in 2014
    - most recent adaptation plan: Connecticut Climate Change Preparedness Plan: Adaptation Strategies for Agriculture, Infrastructure, Natural Resources and Public Health Climate Change Vulnerabilities (2013)
        - some of the plan's major goals address the following topics:
            - agriculture:
                - protect critical soil landscapes
                - minimize water use
                - support local agriculture markets
                - provide technical assistance and education to the agriculture community to enhance their adaptive capacity
            - biodiversity:
                - collaborate across agencies and with neighboring states to protect habitats
                - enhance regulation of invasive species
                - assess climate risks to key habitats
                - acquire land and conservation easements to protect critical habitats
            - coasts and oceans:
                - developing sea-level rise projections
                - preserve ecosystem services
                - model in-land migration of tidal marshes
            - forestry:
                - increase active management of upland forests

    - protect habitats by expanding forest block
    - protect and establish urban forests
- infrastructure:
    - protect critical buildings such as health facilities, schools and historic structures
    - educate private landowners to protect assets
    - reduce repetitive flood losses
    - identify risks to transportation routes
- public health and emergency preparedness:
    - improve climate change health education
    - ensure adaptation planning considers the needs of vulnerable populations
    - monitor health issues related to air quality
    - develop legislation to allow regulatory agencies to respond to extreme heat in occupational settings and schools
- water:
    - incorporate climate change projections into water planning
    - enhance water conservation and reuse
    - assess climate change impacts to wastewater treatment facilities

Illinois

- See Georgetown's Illinois overview and related plans and resources
- **Mitigation**
  - a 2006 executive order created the Illinois Climate Change Advisory Group
  - the 2007 Illinois Climate Change Advisory Group report recommended the following:
    - transportation
      - implement smart growth initiatives and expansion of mass transit
      - greenhouse gas emissions standards for automobiles
      - incentives for fuel-efficient vehicles
      - low-carbon fuels standard
      - fuel-efficiency and/or low-carbon fuel requirements for all government vehicles
      - passenger and freight rail upgrades
    - power/energy
      - CO2 emissions performance standards for electricity generation or purchases of electricity (new generation only)
      - carbon capture and storage portfolio standard of 5%
      - small renewable distributed generation: rules, legislation and incentives
      - energy efficiency standards for appliances and equipment
      - establish residential and commercial energy efficiency construction codes beyond international standards, including for government buildings
      - phase-in energy efficiency standards for light bulbs
      - energy conservation and efficiency programs for existing state facilities
      - enhanced Renewable Portfolio Standard of 25% by 2025
      - enhanced energy efficiency: 2% demand reduction by 2015, with no revenue cap
    - commercial, industrial and agriculture
      - programs to encourage forest management, reforestation and tree- and grass-planting
      - energy efficiency incentives, assistance and standards for commercial/industrial generators and boilers
      - expand use of no-till farming
      - encourage methane capture from coal mines, landfills, livestock farms and wastewater treatment plants
      - increase traditional recycling diversion rate with municipal goals and by stimulating demand for recycled materials
      - land-use development offset requirement
      - encourage or require reductions in emissions of N2O, HFCs, PFCs and SF6
    - cap and trade
      - 20% carbon offset requirements for new fossil fuel power plants
      - Cap and Trade Program for power generators in relatively large industrial sources, with a preference to link with other states' programs
  - according to the 2007 Illinois Climate Change Advisory Group Report, the 2007 Illinois Power Agency Act required the following, among other things:
    - the Renewable Portfolio Standard, requiring electric utilities to supply renewable energy for 2% of electricity in 2008, increasing to 25% by 2025
      - applicable only to electricity supplied to residential and small commercial customers

        - the requirement is scaled-back if electricity rates increase more than 0.5% per year or 2% total
    - the Energy Efficiency Portfolio Standard, requiring electric utilities to achieve a 0.2% energy use reduction in 2008, increasing to 2.0% by 2015
        - these goals are scaled-back if electricity rates increase more than 0.5% per year or 2% total
  - the 2016 Future Energy Jobs Act focused on the following:
    - expanding renewables
        - increased funding for renewables to grow enough solar and wind energy to power 1,000,000 homes and create new clean jobs
        - established the Illinois Solar for All Program to fund low-income community solar and solar-related job training
    - energy efficiency
        - increased energy efficiency funding from $250 million to roughly $400 million per year by 2030
        - grew energy efficiency programs with at least $25 million per year dedicated to low-income energy efficiency programs through 2030
    - job training
        - provided $30 million total for the following job-training programs: solar training pipeline, craft apprenticeship program, and multicultural jobs program
        - directed funding for training toward diverse communities and those who struggle most to find employment, including ex-offenders and former foster children
    - zero-carbon energy
        - created and Zero Emission Standard to recognize all forms of zero-carbon energy and to ensure clean air
        - called for continuous operation of Illinois' at-risk of nuclear plants
- **Adaptation**
  - Illinois does not have a comprehensive state-led, state-wide adaptation plan, but it does have the following sector-specific plans:
    - State of Illinois Drought Preparedness and Response Plan (2011)
    - Adapting Conservation to a Changing Climate: An Update to the Illinois Wildlife Action Plan (2011)
    - Illinois SB 1489: Green Infrastructure for Clean Water Act (2009)

Iowa

- See Georgetown's Iowa overview and related plans and resources
- **Mitigation**
  - a 2006 executive order and legislation in 2007 and 2008 led to the creation of the Illinois Climate Change Advisory Council, which developed a mitigation-focused report in 2008
  - policy recommendations of the Iowa Climate Change Advisory Council Final Report (2008):
    - energy efficiency and conservation
      - use the council's broad climate change and greenhouse gas emissions reduction education program with a goal of achieving a 5% reduction in residential energy consumption by 2020
      - increase the efficiency of natural gas use through a goal of deploying new energy efficiency and demand-side management natural gas measures equal to 1.5% of retail sales by 2015 and 2% by 2017
      - modernize the financial mechanisms that could increase energy efficiency, including using incentives, with the overall goal of reducing consumption of electricity, natural gas and heating fuels by 2% of retail sales annually
      - improve building codes for energy efficiency, primarily for new and substantially renovated commercial and residential buildings
        - the goal is to reduce energy consumption per square foot of floor space by 15% by 2012 and 50% by 2025
      - change the incentive structures to deploy energy efficiency, with the goal of reducing consumption by 15% of retail sales by 2020
        - provides many types and options of incentives to investor-owned utilities, utility customers and other stakeholders
      - promote and incentivize improved design and construction to improve buildings' efficiency for using energy and other resources
        - the goal is to reduce energy consumption by 10% of retail electric sales and natural gas in residential and commercial buildings beginning 2010
      - implement an education and outreach policy for building professionals and code enforcement officials to encourage incorporation of energy efficiency and emissions reduction measures into construction
      - incorporate energy efficiency programs, funds or goals focusing on rental properties and low-income residential units
        - approaches could include:
          - expand weatherization assistance program
          - develop minimum efficiency goals for rental properties, such as the use of compact fluorescent light bulbs and energy-efficient appliances
          - provide financial mechanisms to help with retrofitting rental properties with energy-efficient appliances, insulation and high-efficiency furnaces
          - establish a shared savings or zero-interest loan program to make energy-efficient appliances affordable
          - allow paying for energy-efficient appliances over time on residential utility bills
      - participate in the Midwestern Governors Association energy security and climate stewardship platform, designed to help meet at least 2% of the

region's annual retail sales of natural gas and electricity through energy efficiency programs by 2015 and annually thereafter
- train building energy managers and operators in government to utilize methods for minimizing unnecessary energy waste
  - use certification for energy managers and facility operators in all sectors
- implement rate structures and technologies to promote reductions in energy use, such as seasonal rates, time of day rates, critical peak pricing and real-time pricing of electricity
- state, municipal and county governments and school districts should adopt policies that improve the energy efficiency of new and renovated public buildings, and the equipment and appliances they use
  - some of the goals include:
    - require new construction and major renovations of government-owned buildings to meet sustainable design standards
    - design these buildings to meet a fossil fuel, greenhouse gas emitting, energy consumption performance standard of 50% of the regional average for that type of building
    - governments will be required to procure energy-efficient equipment
    - fossil fuel reduction standard for all new buildings will increase to 60% in 2010, 70% in 2015, 80% in 2020, 90% in 2025, and carbon neutral in 2030
- increase appliance efficiency standards to achieve 5% reduction in energy consumption from residential, commercial and industrial consumers

- clean and renewable energy
  - use education and outreach to nurture public consciousness about climate change issues, and to provide technical skills training for jobs that directly support emission reduction
  - develop, promote and/or implement technologies that show promise for reducing greenhouse gas emissions, with the following goals for annual increases of renewable electric production:
    - landfill gas-to-energy projects: 9,000 MWh
    - municipal waste: 65,500 MWh
    - wind energy: 2.6 million MWh
    - biomass cofiring of agricultural residues: 3,600 MWh
    - biomass from energy crops: 760,000 MWh
    - repowering hydropower facilities: 112,000 MWh
  - participate in the Midwest Governors Cap and Trade Program if a federal program is not established soon
  - institute a decarbonization fund/fee
  - institute a Generation Performance Standard, targeting either a 50% or 90% reduction goal in CO2 intensity per megawatt hour from 2005 levels by 2050
  - adopt standards to recognize voluntary greenhouse gas reductions, including an incentive for companies voluntarily addressing climate change
  - seek voluntary commitments from investor-owned utilities to reduce emissions by at least 6% below 2005 levels by 2010, and commitments from 25% of greenhouse gas emitting private businesses
  - if deemed necessary, build a new 1,200 MW nuclear power plant by 2020 if it is economically feasible in a carbon-constrained environment

- provide financial incentives to encourage investment in grid-based renewable energy resources by businesses and individuals who sell power commercially
- support research and development of emerging technologies to develop demonstration projects and commercialization of reasonable cost generation technologies with low or zero emissions
- encourage investment in small-scale distributed generation via incentives or subsidies, with the goal of deploying 7,500 MWh per year of new distributed renewable generation by 2010
  - this should include establishing uniform requirements for emissions, land-use and building codes based on the technology of electricity generation
- promote combined heat and power technology via incentives for development of infrastructure
- create pricing and metering strategies to encourage consumers to implement combined heat and power, renewable energy and overall reductions in emissions, with the goal of achieving a 10% shift to renewables through 2019

▪ transportation and land-use
- establish incentives and programs to encourage smart growth such as downtown revitalization, transit-oriented development, and enhancing pedestrian and bicycle infrastructure
- expand and improve transit infrastructure to achieve an annual ridership increase of 100% by 2020
- provide additional funding for the above efforts, increasing state financing to at least 25% for transit systems that show increasing ridership or the ability to document vehicle miles traveled reduction strategies
- enable new transportation related fees from users to be allocated directly to regional transit authorities for vehicle miles traveled reduction services
- ensure state and local capital funding for developing, siting and expanding state facilities and funding used for community development is utilized to promote policies and facilities that support emission reductions
- establish and promote statewide passenger rail service
- reduce vehicle miles traveled due to commuting by making commuting more efficient or eliminating the need for commuting
- promote the Distributed Workplace Model for knowledge-based workers, providing community-based multi-location work centers rather than working from home and remotely supporting employees
- provide light-duty vehicle fuel efficiency incentives
- promote fuel-efficient operations, maintenance and add-on devices for light-duty vehicles
- develop new vehicle standards for increased fuel economy and reduced emissions with the goal to improve fuel economy by 20% by 2012, 100% by 2020, and 250% or more by 2050
- support efficient freight movement by removing bottlenecks, encouraging railroad capital investment, and providing incentives for trucking companies to invest in hybrid technology
- set a Low Carbon Fuel Standard for a 20% reduction in emissions

▪ agriculture, forest and waste management
- promote improved manure management practices, including:
  - incorporating manure into soil instead of surface spraying or spreading
  - manure composting

        - moving manure from nutrient rich to nutrient deficient areas
        - improved methods for application to fields so that farmers achieve reduced N2O emissions
    - promote redesigning drainage infrastructure over the next 50 years
    - expand use of agriculture and forestry biomass feedstocks for electricity, heat or steam production
    - encourage large-scale manure and methane management capture, including installing large-scale anaerobic digester systems and using methane captured from these systems to create heat or power
    - use a range of land management practices to promote carbon sequestration
    - promote sustainable in-state production of cellulosic biofuels from agriculture, forestry and municipal solid waste feedstocks to replace conventional petroleum-based fuels
    - promote improved on-farm energy use and efficiency
    - encourage the use of energy recovery technologies, particularly capturing and using methane at landfills via anaerobic digesters
  - cross-cutting issues not yet listed
    - develop and use greenhouse gas emission inventories, forecasts, reporting and a registry
    - the state and local governments should find energy efficiencies and emission reductions in procurements for buildings, vehicle fleets and office equipment
    - embark on a comprehensive, objective and authoritative climate change education campaign for the public to improve knowledge and motivate action to reduce emissions
    - seek funding and financing for implementation of this report's recommendations
    - develop a climate change adaptation plan
    - participate in regional and multi-state greenhouse gas reduction efforts
    - encourage the creation of a business-oriented organization to facilitate investment in climate-related business opportunities, share information and strategies, recognize successes, and support aggressive greenhouse gas reduction goals
    - promote buying locally-produced foods, goods and products
- **Adaptation**
  - in 2009, the legislature requested more information on the ramifications of climate change, leading to the development of the Iowa Climate Change Impacts Committee, which issued a 2010 report focused on impacts with some adaptation recommendations
  - Climate Change Impacts on Iowa 2010 describes consequences for agriculture, flora and fauna, public health, economy, infrastructure and emergency services, and provides the following policy recommendations for adaptation:
    - in policy and appropriations decisions, consider the increasing financial and human impacts of climate trends in Iowa
    - protect soil, water quality and long-term agricultural productivity
    - increase investments in state programs that enhance wildlife habitat and management, and that restore public and private lands
    - require the Iowa Department of Public Health to report annually on the consequences of climate change on public health

        - advocate for federal highway construction standards that address effects of climate change
        - encourage Iowa's Department of Transportation to explore using interim designs that account for climate trends
        - authorize the Iowa Insurance Division to periodically report findings and policy recommendations on the risks and anticipated costs of property insurance related to climate-related claims and payouts
        - fund ongoing research that delineates changes in climate and their effects on the state and its residents
    - Summarized in EPA's 2011 Iowa Climate Change Adaptation and Resilience report, EPA conducted a pilot project looking into regional effects of climate change in hazard mitigation planning and other community planning processes in Iowa

Michigan

- A 2007 executive order sparked the development of the Michigan Climate Action Plan, finalized in 2009, focusing primarily on mitigation
- The plan also recommended developing a state-wide climate adaptation plan, but the state has not yet adopted one
- The state has also published, among others:
  - Michigan Climate and Health Adaptation Program Strategic Plan Update for 2016 – 2021
  - Michigan State Wildlife Action Plan (2015)
- See Georgetown's Michigan overview and related plans and resources
- In 2019, Governor Whitmer announced several executive orders refocusing the state on protecting the Great Lakes, cleaning up drinking water, and addressing climate change
  - this included creating an Office of Climate and Energy and other offices
- **Mitigation**
  - Michigan Climate Action Plan 2009
    - greenhouse gas reduction goals:
      - 20% reduction below 2005 levels by 2020
      - 80% reduction below 2005 levels by 2050
      - develop a tracking system to measure progress over time in achieving these reductions
    - other policy recommendations:
      - estimated to generate a net cumulative savings of about $10 billion between 2009 and 2025 if implemented
      - energy supply:
        - extend and expand the Clean Renewable and Energy Efficiency Act
        - promote the development and use of advanced fossil fuel technologies
        - expand use of nuclear power
        - promote integrated resource planning and combined heat and power generation
        - convert to a smart grid
        - advance the use of emerging technologies
        - promote improved efficiency or replacement of older generating units
        - promote the expanded use of small-scale distributed generation, including renewable energy payments
        - improve transmission and distribution system efficiency and access
      - market-based policy:
        - continue participation in and encourage the development of the Midwestern Greenhouse Gas Reduction Accord program (discontinued)
        - join the Chicago Climate Exchange (discontinued), inventorying and quantifying all greenhouse gas emissions from sources that are under control of state government
        - create a formal Market Advisory Group
      - residential, commercial and industrial sectors:
        - provide utility operated incentives for energy efficiency
        - reduce overall, statewide energy use in buildings
        - set regulatory policies to remove disincentives and encourage energy efficiency investments by investor-owned utilities
        - make building energy codes more stringent

    - provide energy efficiency consumer education such as the Michigan Climate Challenge and related consumer education programs
    - provide training and education for building design, construction and operation
    - create incentives to promote renewable energy systems implementation
    - encourage net metering for distributed generation
    - reduce energy use among water utilities
- transportation and land use:
    - promote low-carbon fuel use in transportation
    - provide public education toward more efficient driving practices (Eco-Driver Program)
    - reduce truck idling
    - provide incentives for public fleet owners to purchase advanced technology vehicles to achieve per vehicle emission benefits
    - expand the use of intelligent transportation systems to improve traffic flow and travel time
    - through land-use planning and incentives, promote and expand regional growth management for more compact, mixed-use, transit-oriented, walkable developments
    - pursue transportation system management and pricing that allows for greater investment in alternatives to single occupancy vehicles
    - increase public transit capacity and make other improvements to meet goals for increasing participation in public transit, carpools and vanpools
    - encourage more energy-efficient freight movement by increasing rail capacity and addressing rail freight system bottlenecks
    - improve marine infrastructure to increase use of Great Lakes shipping
- agriculture, forestry and waste management:
    - expand use of biomass feedstocks for electricity, heat or steam production, producing 10% of total in-state electric generation from sustainable biomass feedstocks by 2025
    - produce more liquid biofuels in-state
    - reduce greenhouse gas emissions from handling, treatment and storage of livestock manure and organic waste by 50% by 2015 and 25% by 2025, through improved manure management practices and methane utilization
    - expand use of bio-based materials, such as wood, fiber, wheat board, agricultural byproducts, biodegradable plastics, and green chemistry applications
        - use 100,000 tons of bio-based products annually by 2025, and reclaim 150,000 tons of solid wood residues from manufacturing processes, deconstruction sites and urban/suburban trees annually by 2025
    - increase the acreage of lands with permanent vegetative cover by 10% by 2025
    - retain 90% of lands coming out of the federal Conservation Reserve Program by 2025 in some type of permanent vegetative cover
    - reduce rates of carbon loss by restoring or enhancing the maximum feasible percentage of wetlands by 2025
    - reduce the rate of conversion from agriculture to development use by 50% by 2025

    - maintain or increase forest land acreage by 2025 without converting agricultural land to forest unless it has higher carbon sequestration potential
    - protect and restore northern peatlands and other wetlands
    - increase conservation tillage farming to 4 million acres by 2025
    - adopt soil management and nutrient management practices on 5 million acres by 2025
    - reduce the net on-farm fossil fuel energy consumption by 50% by 2025
    - increase the local/regional purchasing of locally grown agricultural produce and products by 50% by 2025
    - enhance forest land management, including improved stocking of under stocked stands, on 1 million acres through afforestation and reforestation by 2025
    - achieve 40% canopy cover in urban communities by 2025
    - implement wildfire reduction community-wide protection plans for 10-12 at-risk communities by 2025
    - achieve a 75% municipal solid waste recycling and enhanced organics management rate by 2025
    - achieve a 50% recycling rate for industrial, commercial and new construction waste by 2025
    - implement methane controls or waste management options at municipal solid waste landfills to capture 50% of methane emissions by 2025 under business-as-usual conditions
- crosscutting issues:
    - institute formal greenhouse gas inventory, forecast and facility-level reporting functions
    - encourage other governmental entities and academic institutions to establish greenhouse gas reduction goals for their jurisdictions and to develop plans, programs and other initiatives to achieve these goals
    - the state should compile, track and share its Lead by Example initiatives, which are finding additional energy efficiencies and emissions reductions in state procurements for buildings, vehicle fleets and office equipment
    - build on existing public education and outreach to create awareness of climate change issues and share justification for policies to reduce emissions
    - seek funding and financing for implementation of this report's policy recommendations
    - pursue adaptation and vulnerability funding, research, planning and implementation concerning communities, natural resources, wildlife, fisheries, related industries, etc.
    - participate in regional, multi-state and national greenhouse gas reduction efforts
    - enhance and encourage economic growth and job creation opportunities through climate change mitigation, providing additional incentives and supportive government policies to maximize investment
    - address environmental justice and enhance and encourage community development through climate change mitigation

Minnesota

- Minnesota has pursued comprehensive efforts on climate change
- See Georgetown's Minnesota overview and related plans and resources
- The state's **adaptation** work focuses on the following:
  - agency planning, including
    - a statewide climate change risk assessment
    - a data dashboard of trends and actions
    - fact sheets, such as:
      - guidance on best practices for stormwater
      - alerts to communities on air quality/wildfire smoke
      - how to minimize pollution and health risks for businesses, homes and families due to floods
  - leading the Inter-Agency Climate Adaptation Team
  - assisting communities, including
    - identifying climate-vulnerable populations and strategizing to reduce their risks
    - providing resilience information for communities
    - surveying for government progress on adaptation and resilience planning
    - community-based projects, toolkits and other resources
    - participating with local, regional and national organizations, such as:
      - working with Georgetown Climate Center to explore what state agencies and the legislature can do to enable more resiliency at the local level
- Key statewide adaptation-related plans and reports include, among others:
  - Adapting to Climate Change in Minnesota: 2017 Report of the Interagency Climate Adaptation Team (see the summary here)
    - identifies statewide indicators to track climate impacts and progress in adaptation:
      - adaptation planning among state agencies, tribes and local units
      - power grid disruptions
      - heat-related health impacts
      - damages from extreme weather
      - urban and community forest canopy cover
    - recommends further action on these primary areas:
      - resilience to extreme precipitation
      - health of vulnerable populations
      - conservation of terrestrial and aquatic habitat
      - management of agricultural water practices
      - reduction of impacts in cities, towns and other population centers
      - development of data, information and communications
      - acceleration of including climate adaptation into all aspects of state agency operations
      - in collaboration with public and private partners, development of a multi-stakeholder statewide climate adaptation plan by 2020
  - Minnesota State Hazard Mitigation Plan 2019, including recommended actions for climate change adaptation
    - provides assessments of hazard risk, reviews current state and local hazard mitigation and climate adaptation capacity and programs, and includes climate adaptation strategies for Minnesota's state agencies and programs

- **Mitigation**
  - Minnesota's 2007 Next Generation Energy Act helped rank the state only behind California at the time for passing aggressive reductions in greenhouse gas emissions
    - Minnesota's law requires the state to:
      - reduce greenhouse gas emissions by 80% between 2005 and 2050, reaching a 15% reduction by 2015 and a 30% reduction by 2025
      - support clean energy, energy efficiency, community-based energy development, energy savings to bolster in-state conservation programs, and supplementing other renewable energy standards in the state
  - the state's 2016 Climate Solutions and Economic Opportunities Report recommends innovative pilot projects and the following actions to better meet the state's emission reduction and other climate goals:
    - immediate actions to take for immediate reduction of emissions:
      - increase the Renewable Electricity Standard to 40% or 50%
      - retire and repower coal plants
      - increase energy efficiency requirements for the electric sector by 2% or 2.5%
      - encourage an increase in the use of combined heat and power (CHP) systems:
        - expand electricity and natural gas utility conservation improvement program goals to promote CHP systems
        - encourage electric or natural gas utility owned CHP
        - incentivize implementation of non-utility owned CHP
      - zero energy building codes for new and renovated buildings and homes, emphasizing energy efficiency and producing their own renewable energy
      - increasing wastewater facility energy efficiency, such as by replacing old, inefficient aeration equipment
    - long-term strategies to start now:
      - increase investment in transit and multimodal travel
      - pursue compact development in urban areas
      - increase the number of electric vehicles that use 100% renewable energy:
        - create more utility programs that incentivize off-peak charging or that create a market value for vehicle-to-grid services
        - join the existing Zero-emission Vehicle Standard, requiring auto manufacturers to ensure 10% of total light- and medium-duty vehicle sales in the state are electric vehicles by 2030
        - expand the availability of charging options
        - incentivize the adoption of electric vehicles
        - research, test and deploy electric buses on regular route services
        - research and monitor new technologies that could expand electric vehicle use, like dynamic wireless power transfer and self-driving vehicles
      - protect, maintain and expand community and urban forests, prioritizing areas with vulnerable populations
      - provide dedicated funding to ensure timely restoration of forests after large disturbances
      - restore and protect prairies, wetlands, forests, hay fields and pastures to increase carbon sequestration (perennials sequester more carbon then row crops)
      - consider ways that conservation actions can achieve and be tracked for greenhouse gas emissions reductions

- make land conservation programs more effective at protecting and increasing carbon storage by:
    - ensuring guarantees that the land will be set aside for a long enough period for carbon to collect
    - ensuring funding to continue and expand these programs
- encourage landowners to use a suite of agricultural soil development practices to increase carbon storage, such as:
    - diversifying production systems with perennials
    - minimizing tillage
    - using manure as a soil amendment
    - incorporating cover crops
- support re-use, composting and recycling
- support reduction of emission sources

- recommended pilot projects:
    - incentivize the development of advanced biofuels (other than ethanol) and related technology
    - transportation pricing: Pay As You Drive car insurance, which incentivizes drivers' reduction in vehicle miles traveled
        - address privacy concerns about monitoring drivers' mileage to speed up adoption
    - transportation pricing: carbon tax and/or fuel tax
        - use proceeds to provide rebates to low-income households to address equity issues, and/or to fund other climate work
    - set a statewide renewable thermal energy goal and establish a related incentive fund to help with installation costs
        - pay for the fund by imposing a fee on natural gas, fuel oil and propane sold in the state
    - reduce fertilizer use through efficiency improvements:
        - nitrogen fertilizer best management practices
        - improve nitrogen fertilizer products and techniques such as the 4Rs
        - encourage precision agriculture materials and methodologies
    - market development for cover and perennial crops

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