2018 Pennsylvania Climate Action Plan

Climate Action Plan Review and Energy Assessment Updates

Prepared for the Climate Change Advisory Committee Meeting
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Harry Vidas (ICF)

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Agenda

- Introductions

- Reminder of Overall Project Approach
  (Cory Jemison)

- Review of Climate Action Plans
  (Cory Jemison)

- Energy Assessment Update
  (Harry Vidas)
ICF Introductions
ICF Technical Leads

Cory Jemison—GHG Accounting and Mitigation Specialist
- 10+ years of experience in the energy/carbon accounting
- Philadelphia EMP, Kleinman Center, and MWCOG technical specialist
- Works with numerous states, cities, EPA State and Local branch (including State Inventory Tool)

Harry Vidas—Energy Specialist
- Over 35 years of experience in analyzing and forecasting energy supply, demand and prices
- Specialized expertise in natural gas & oil resource assessment; upstream economic analysis; and the forecasting of drilling and production activity and related demands for E&P services, equipment and materials
- Participated in several studies related to upstream oil & gas environmental impacts and the economics of alternative environmental mitigation methods
Reminder of Overall Project Approach
ICF’s Integrated Project Approach

**Project Task Flow**

- **Task 1: Comprehensive Energy Assessment**
  Review Energy and Emissions Data, Develop Energy Projections

- **Task 2: Energy Resource Assessment**
  Assess Sector-level and Statewide Resource Potential and Opportunities

- **Task 3: Energy Assessment Report**
  Combine and Summarize Findings from Tasks 1 and 2

- **Task 4: Energy and Climate Goal Assessment & Recommendations**
  Define Goals and Assess Policy Options

- **Task 5: GHG Emission Reduction Strategies**
  Identify and Quantify Strategies, and Develop Implementation Steps

- **Task 6: Economic Analysis**
  Develop Sector-level and Statewide Micro and Macroeconomic Impacts From Strategy Analysis

- **Task 7: Adaptation Strategies**
  Develop Workable and Effective Adaptation Strategies

- **Task 8: Final Report**
  Develop Climate Change Action Plan Update

**Key Benefits of ICF’s Approach**

**Summary:** ICF’s leading state and national energy analysis and GHG planning expertise will make DEP’s SEP reporting and Climate Change Action Plan more robust.

- **Tasks 1 and 2:** ICF’s deep expertise in fossil energy, power sector, and energy efficiency will give DEP enhanced baseline and resource assessment data.

- **Tasks 4 and 5:** ICF’s extensive energy sector and state-level GHG planning expertise will help DEP make policy decisions from a range of actionable GHG goals and reduction strategies.

- **Task 6:** ICF’s broad experience in economic modeling of state energy and GHG scenarios will help DEP understand and evaluate the costs and benefits of the Plan.

- **Task 7:** ICF’s leading climate adaption expertise will help DEP develop workable and effective adaptation strategies.

- **Tasks 3 and 8:** ICF’s integrated in-house team of technical communications experts will give DEP impactful reports.
Review of Climate and Energy Plan Goals
Review of Climate and Energy Plan Goals - Agenda

- Purpose
- Approach
- Findings
- Key Decisions
Purpose
Purpose

- Inform selection of goals for Pennsylvania’s 2018 updated Climate Action Plan

- Provide an understanding of the goals being set across the country, including the motivation and approach for setting them
Approach
Approach

Step 1
Identify Plans to Review

Step 2
Identify Information to Collect

Step 3
Review Plans
- **By Jurisdiction**: 22 State, 2 Regional, and 5 Local
- **By Type of Plan**: 14 Climate Action Plans, 12 Energy Plans, and 3 Other (e.g., climate reports, general regional planning documents)
- **By Publication Year**: 19 published 2015 or later, 6 published 2010 – 2014, and 3 published before 2010
- **Other**: IPCC, President Obama’s 2016 Climate Action Plan, Under 2 MOU, The GHG Protocol Mitigation Goal Standard
- Global Protocol for Community-Scale GHG Inventories (GPC)

Step 4
Review Other Resources
Findings
### Overview of Key Findings

#### Plan Findings

<table>
<thead>
<tr>
<th>Name of Plan</th>
<th>Publication Year</th>
<th>Type of Plan</th>
<th>State/Region</th>
<th>Includes Adaptation</th>
<th>Notes on Adaptation/Resilience</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008 Texas State Energy Plan</td>
<td>2009</td>
<td>Energy</td>
<td>Texas</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>2015 Climate Change Action Plan Update</td>
<td>2015</td>
<td>CAP</td>
<td>Pennsylvania</td>
<td>Yes</td>
<td>There is discussion in the climate change impacts section on the impact of extreme weather events.</td>
</tr>
<tr>
<td>Alaska Regional Energy Plans</td>
<td>Various</td>
<td>Energy</td>
<td>Alaska</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

#### Goal Findings

#### Findings from Other Resources

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*Climate Action Plan Review and Energy Assessment Updates*
Plan Findings

- Just under half include sector-specific goals
- Roughly 2/3 included a discussion of adaptation and resilience
- States and municipalities designate sectors differently
Goal Findings: Approach

- Plans have two key attributes when discussing goals:
  - Focused on one main goal (typically emission-focused)
  - Wide range of goals related to mitigating or adapting to climate change impacts
Goal Findings: Goal Types

- **Most common goal type: Base year emissions goal**
  - Most commonly used target years: 2020 (5), 2025 (2), 2030 (6), 2050 (9)
  - Most commonly used base years: 1990 (6), 2005 (5)
  - Seven plans included 80 x 50 goals
Goal Findings: Goal Development

- Goal Development Methods
  - Top-Down: Nearly all plans reviewed (as interpreted)
  - Bottom-Up: Seemingly none of plans reviewed (hard to tell)
  - Science-Based: Only two of plans reviewed (explicitly) + Under2 Coalition Guiding Principle
Goal Findings: Goal Development

Top-down goals
(including science-based)

Nearly all plans reviewed
(as interpreted)

Seemingly none of plans
reviewed (hard to tell)

Bottom-up goals
Goal Findings: Goal Characterization

- **Attainability**
  - > 75% of GHG reduction goals with target years of 2030 or earlier → considered **attainable**
  - 90% of goals with target years of 2040 or later → considered **aspirational**

- **Other Observations**
  - Only one plan included gas-specific targets
  - Sector-specific targets for GHG reductions are uncommon (sector-specific activity targets more common)
Goal Findings: Other Goals

- **Sector-Specific Goals: Relatively Common**
  - Transportation (most common sector) – includes goals related to transit, alternative fuels, zero emission vehicles
  - Waste (a few) – includes goals related to diversion, reuse
  - Land Use (DC) – includes goals related to tree canopy, open space

- **Adaptation/Resilience Goals: Not Common**
  - DC included one
  - Adaptation/resilience strategies were common; quantitative goals were not
Findings from Other Resources

**Intergovernmental Panel on Climate Change (IPCC)**

- Scenarios keeping atmospheric concentrations at or below 450 ppm CO$_2$eq. by 2100 (2 degrees)
  - Require global GHG emission reductions of 40-70% relative to 2010 by 2050.
  - Delaying beyond 2030 is too late.

**Under 2 MOU**

- Guiding principle: limit global temperature change to less than 2 degrees Celsius.
  - Pursue long term targets of 80 to 95% below 1990 by 2050, or per capita emissions of less than 2 metric tons.
Key Decisions
Questions on Key Decisions

- What goal timeframes are most appropriate?
- Start from a bottom-up or top-down perspective?
- Set broad and/or sector-specific goals?
- What goal motivation is most appropriate?
DEP Initial Thoughts on Goals

- Long-term aspirational goal: 80 by 50 (80% reduction in GHGs by 2050)
- Short-term goal: Reduction 28% below 2005 levels by 2025
  - Consistent with U.S. Paris Accord commitments
- U.S. commitments are well documented and based on scientific evidence and expert agreement
Progress Update on Energy Assessment
Agenda

- Update on Comprehensive Energy Analysis
- Questions and Input
- Next Steps
Comprehensive Energy Analysis
Objectives

- Summarize and present state-wide historical and projected (2000 through 2050) BAU energy production and consumption data by sector and fuel type.

- Reflect existing policies and identify key trends and patterns in state energy production and consumption, including assessing Pennsylvania’s gap between production and consumption.
Approach

Steps

1. Review existing energy production and consumption data

2. Develop updated historical and projected production and consumption baseline estimates

3. Produce task summary and spreadsheets

Key Components

- Use existing state and federal data sources (State Inventory Tool, EIA, USDA, BLM, NREL, etc.)
- Covers energy production and consumption, including transportation
Relationship with CAP and PA Inventory

- Energy Assessment provides the foundation for the energy portion of the CAP inventory and projections
- Alignment with EPA State Inventory Tool estimates
- Allows for tracking progress towards CAP
Energy Assessment Data Elements: Consumption

Historical and Future Energy Consumption/Expenditures (2000 through 2050)

- Energy/Electricity Consumption
- Energy Prices (by fuel type)
- Energy Expenditures
- GHG/Criteria Air Pollutants
- Sector break down for each fuel type
  - Residential/Commercial/Industrial/Transportation
- Pennsylvania GSP and Energy Consumption (Btu/$ GSP)
Energy Assessment Fuel Types: Consumption

- Fossil Fuels
  - Electricity (Mix of Fuels)
  - Natural Gas
  - Coal
  - Motor Gasoline
  - LPG
  - Distillate Fuel Oil
  - Residual Fuel Oil
  - Jet Fuel
  - Kerosene
  - Other Fuels

- Non-Fossil Fuels
  - Biodiesel
  - Ethanol (Corn)
  - Ethanol (Cellulosic)
  - Wood and Waste
  - Biogas
Consumption: General Approach

Historical

- State Energy Data System (SEDS) provides annual consumption data for PA from 1960-2015. Annual pricing and expenditure data also available for PA from 1970-2015.
- Consumption of fuel for electricity generation by fuel type *not* provided by SEDS
- EIA provides this data from 1990 to 2015, which is used in addition to the SEDS data

Projections

- Regional AEO data was used to forecasted historical data from SEDs. Consumption was forecasted using the Middle Atlantic Census Region
- ICF took the regional growth rates for a particular energy resource from the AEO from 2015, and applied this growth rate to the historical state data from SEDS to project Pennsylvania energy resource data.
Consumption: Data Sources for Historical Energy Consumption/ Expenditures

Key data sources

- Energy Consumption: SEDS, EIA
- Prices: SEDS
- Expenditures: SEDS

Additional data sources

- Energy Consumption: LMOP, CMOP, PA Biodiesel Standard, ARIPPA
Consumption: Data Sources for Future Energy Consumption/ Expenditures

Key data sources
- Energy Consumption: SEDS, AEO
- Prices: AEO
- Expenditures: AEO

Additional data sources
Energy Assessment Data Elements: Electricity Generation

Historical and Future (through 2050) Electricity Generation

- Fossil Fuels: Coal, Natural Gas, Oil, Petroleum Coke
- Renewable Electricity
  - Solar
  - Hydro
  - Wind
  - Biomass Solids
  - Biogas
- Pumped Storage
- Nuclear
- CHP

Includes GHG / criteria air pollutant emissions and economic characteristics
Electricity Generation: General Approach

Historical
- Net generation of electricity by fuel type is provided by SEDS but only for certain renewable fuel types.
- EIA provides net electricity generation or capacity of fossil fuel generators from 1990 to 2015, which will be used in addition to the SEDS data.

Projections
- Regional AEO data was used to forecast historical data from EIA and other sources. Electricity generation was forecasted using the Reliability First Corporation East and West Regions.
- ICF took the regional growth rates for a particular energy resource from the AEO from 2015, and applied this growth rate to the historical state data from EIA to project Pennsylvania energy resource data.
Electricity Generation: Historical Electricity Generation

Key data sources
- Electricity Generation: SEDS, AEO
- Prices: SEDS
- Expenditures: SEDS

Additional data sources
- Energy Generation: EIA Electric Power Monthly (Solar Breakout)
Electricity Generation: Projected Electricity Generation

Key data sources

- Electricity Generation: SEDS, AEO
- Prices: AEO
- Expenditures: AEO

Additional data sources

Energy Assessment Data Elements: Production

Historical and Future Production Energy Projections (through 2050)

- Fossil Fuels: Bituminous & Anthracite Coal, Natural Gas, Crude Oil
- Renewable and Alternative Fuels
  - Biogas, Methane: Landfill Gas, Coal Mine, Digesters (wastewater & agricultural waste)
  - Biomass solids (wood waste)
  - Biodiesel
  - Ethanol (corn)
  - Waste coal production
- Includes estimates of GHG and criteria air pollutant emissions
Energy Assessment Data Elements: Energy Imports and Exports

- Electricity
- Comparison of Fossil Fuel Consumption and Production
  - Natural gas
  - Coal
  - Crude Oil
- Comparison of Electricity Consumption and Production
- Comparison of Renewable Fuels Consumption and Production
  - Landfill Gas Methane
  - Coal Mine Methane
  - Biodiesel
  - Ethanol
Policies Considered

- Consolidated Appropriations Act of 2016 (H.R. 2029)
- Clean Air Act Amendments of 1990 (CAAA1990) and Cross State Air Pollution Rule (CSAPR)
- Maximum Achievable Control Technology for Industrial Boilers (Boiler MACT)
- Light-Duty Vehicle Combined Corporate Average Fuel Economy (CAFE) Standards
- Heavy-Duty Vehicle Combined Corporate Average Fuel Economy Standards
- Emission Control Areas in North America and U.S. Caribbean Sea waters under the International Convention for the Prevention of Pollution from Ships (MARPOL)
- Low-Emission Vehicle Program (LEVP)
- FERC Orders 888 and 88
Questions and Input from the CCAC on the Energy Assessment
Energy Assessment Next Steps
Thank You

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