

# State Government Climate Change Activities in Pennsylvania

## ***Climate Change 360***

February 3, 2009

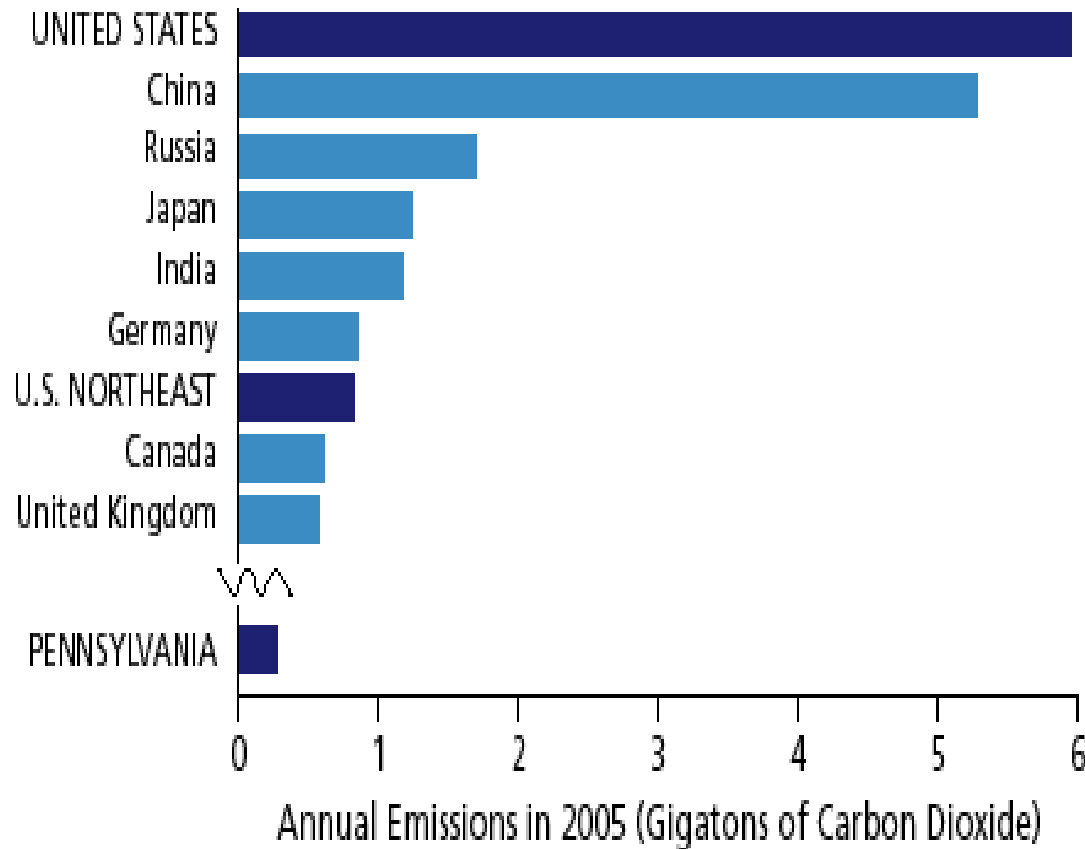
Dan Griffiths  
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Pennsylvania emits approximately 1%  
of the world's Greenhouse Gases.

6 Major GHG's:

- Carbon Dioxide,
- Methane,
- Nitrous Oxide,
- Sulfur Hexafluoride,
- Hydrofluorocarbons,
- Perfluorocarbons

## FIGURE 5: 2005 Pennsylvania Emissions: Significant on a Global Scale



When compared with entire nations, Pennsylvania's emissions are so high that this single state ranks as the world's twenty-second largest emitter of CO<sub>2</sub>. Pennsylvania's total emissions are higher than those of New York State and Wyoming combined, while its per capita emissions are more than double those of New York State.

Note: U.S. emissions include those from the nine Northeast states, and Northeast emissions include those from Pennsylvania.

Source: Energy Information Administration. 2005. *International energy annual 2005*.

Source of Graphic: Union of Concerned Scientists, "Climate Change in Pennsylvania: Impacts and Solutions for the Keystone State", Executive Summary, Page 10.

# Global CO2 Emissions

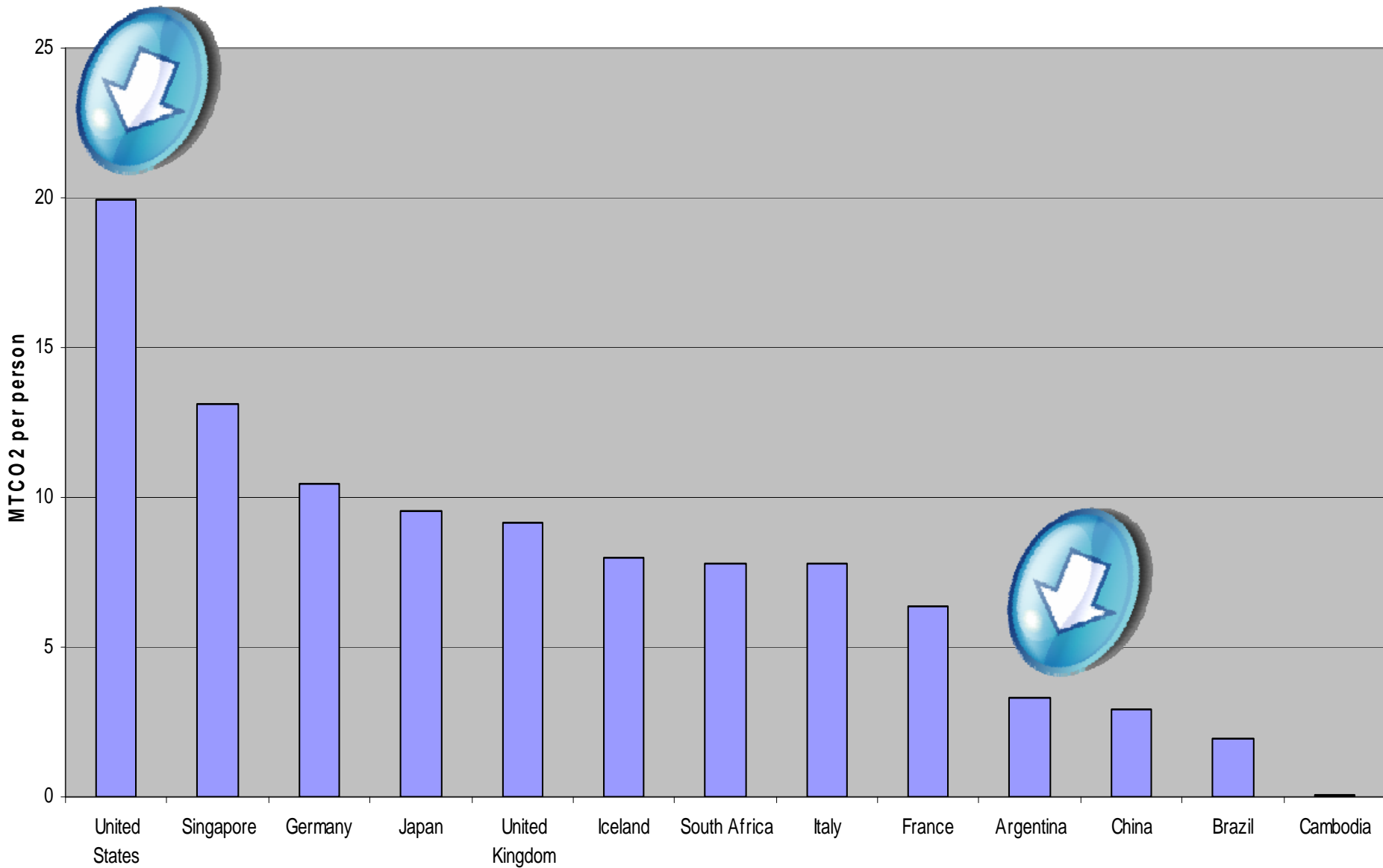
- United States and China are the world's largest emitters of CO2. They release a similar amount of CO2 per year.
- China has a population of about 1.3 billion
- U.S. has a population of 300 million
- Surprise! Per capita emissions in the U.S. are four times China's!



# Per Capita Emissions (2003)

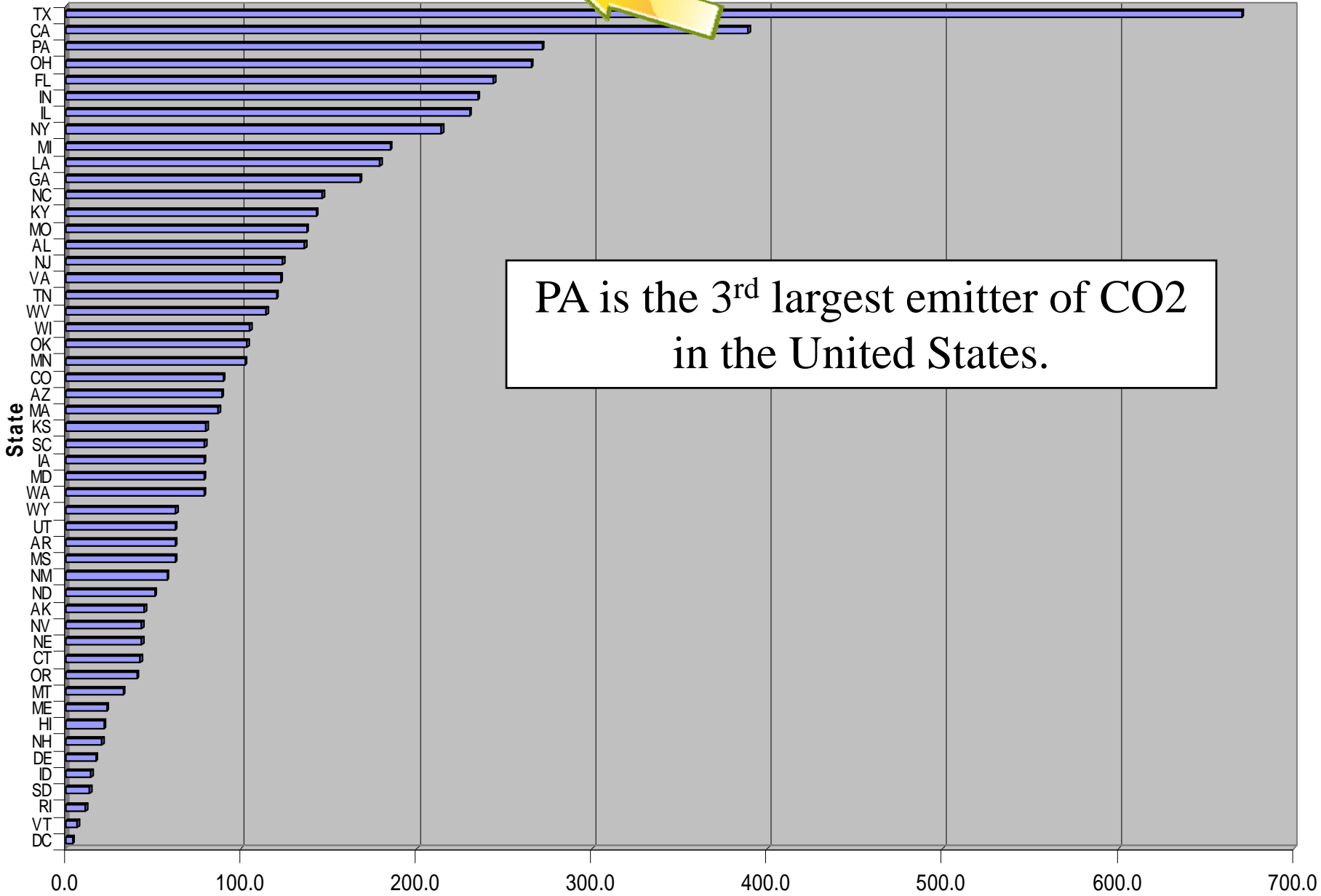
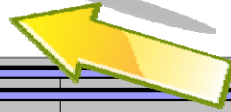
- Average U.S. Per Capita CO<sub>2</sub> Emissions
  - 20 MTCO<sub>2</sub>e
- PA Per Capita CO<sub>2</sub> Emissions
  - 22 MTCO<sub>2</sub>e

# International Per Capita Emissions (Selected Countries)



Data Source: World Resources Institute - Earthtrends (2002)

# U.S. State Emissions (MMTCO2)



PA is the 3<sup>rd</sup> largest emitter of CO2  
in the United States.

Million Metric Tons of CO2 (2003 EIA Data)



# Largest Source of PA Emissions

1. Electricity Production (37%)
2. Industrial (25%)
3. Transportation (23%)
4. Residential (8%)
5. Commercial (4%)
6. Agriculture (2%)
7. Waste (1%)

# Pennsylvania's Actions on Climate Change.

# PA Climate Change Act of 2008 (Act 70)

Effective on July 9<sup>th</sup>, 2008, Act 70 requires DEP to:

1. Annually compile an **inventory** of greenhouse gas (GHG) emissions in PA.
  - First report due July 9, 2011
2. Create a Voluntary **GHG Registry** (offsets and emissions)
  - Emissions - The Climate Registry
  - Offsets - Climate Action Reserve, Voluntary Carbon Standard, The Gold Standard

# PA Climate Change Act of 2008

## 3. Establish a permanent **Climate Change Advisory Committee** (CCAC) to the DEP

- The CCAC has been meeting monthly since September 2008.
- The subcommittee process is currently underway:  
[Electricity GTD](#), [Industry & Waste](#), [Residential & Commercial](#), [Land Use & Transportation](#), and [Agriculture & Forestry](#)
- Contracts for technical assessment for the final report as well as economic impacts will be let

<http://www.depweb.state.pa.us/energy/cwp/view.asp?a=1532&q=539829>

## 4. **Climate Change Action Plan**

- Due October 9<sup>th</sup>, 2009
- CCAC to provide recommendations to DEP
- DEP has proposed 50 individual action plans for CCAC consideration.
- Report to be submitted to the Governor and Legislature
- Implementation not required

# PA Climate Change Act of 2008

## **5. Monitor the Effect of Federal Law**

- EPA proposed rule for CO<sub>2</sub> Underground Injection
- EPA's Advanced Notice of Proposed Rulemaking to regulate GHG's under the Clean Air Act

To support these efforts, DEP is putting together a permanent climate team that will provide the professional staffing for much of the climate-related work inside state government.

# Some General GHG Reduction Opportunities

- Energy Conservation and Efficiency
- Renewable and Alternative Energy
- Green Building Practices
- Biofuels and Vehicle Efficiency
- Carbon Offsets
- Terrestrial Sequestration (ex. planting trees)
- Geologic Sequestration



# PA Initiatives (Renewable Energy)

- **Alternative Energy Investment Act**
  - Provides \$650 million in funding and Tax Credits for Alternative Energy and Conservation
  - Some grant programs, such as the small business energy efficiency program, have already begun!
  - Over 15 MMTCO<sub>2</sub>e reduction in 2025
- **Alternative Energy Portfolio Standards**
  - Tier I @ 8% (such as wind, solar, low-impact hydro, etc)
  - Tier II @ 10% (such as waste coal, municipal solid waste, demand-side management, etc)
  - Over 9.6 MMTCO<sub>2</sub>e reduction in 2025
  - New initiatives before the legislature in weeks.

# More PA Initiatives (Vehicle Efficiency & Biofuels)

- PA Clean Vehicles
  - President Obama recently directed EPA to reconsider the decision not to allow California, Pennsylvania and 12 other states to implement this low emissions vehicle program.
  - If PA is allowed to implement this program, over 6.3 MMTCO<sub>2</sub>e reduction in 2025
- Biofuels Development and In-State Production Act
  - Requires mandates a % of biofuel (ethanol or biodiesel) be added to every gallons of gasoline or diesel once biofuel production in PA exceeds certain triggers.
  - By January 2010, every gallon of diesel will contain 2% biodiesel.
  - Over 1MMTCO<sub>2</sub>e reduction in 2025

# More PA Initiatives (Conservation)

- **Act 129 (Electricity Conservation Act)**
  - Requires reductions in electricity consumption load and peak demand load.
  - Requires smart meter installation to all customers within 15 years.
  - Provides 3 flexible electricity pricing schedules to consumers
  - Provides for a study of the development of a Carbon Sequestration Network in PA
  - 4.2 MMTCO<sub>2</sub>e reduction in 2025

# The CCS Option

- Carbon Capture and Sequestration (CCS) or Geologic Sequestration
- Four Phases of Geologic Sequestration or CCS:
  1. **Capture** CO<sub>2</sub> emissions at a source facility (coal fired power plant, etc) and compress the gas.
  2. **Transport** the liquid to a geologic storage site.
  3. **Inject** the liquid underground as a supercritical liquid for permanent storage.
  4. **Monitor** the injected CO<sub>2</sub>.

# Why CCS is Necessary.

- 50% of U.S. electricity is generated from coal combustion, more in PA.
  - Coal will continue to be used to generate electricity because it is not possible to quickly shift to other technologies.
  - Coal will continue to be used as an energy source, as it is relatively cheap and abundant.
  - CCS will allow the U.S. to continue to use coal as an energy source, while reducing GHG emissions.

# Is CCS a Feasible Technology?

- CCS projects are currently operational.
  - Sleipner CO<sub>2</sub> Project (North Sea, Norway)
  - In Salah (Algeria, Africa)
  - EOR: Dakota Gasification Plant (North Dakota, U.S./Saskatchewan, CA) and West Texas
- New projects are in the development stages.
  - Midwest Carbon Sequestration Partnership and other regional efforts
  - Victoria, Australia
  - Rotterdam, Netherlands

# Why are Some Environmentalist Supporting CCS?

- Organizations such as the IPCC, Union of Concerned Scientists, National Resources Defense Council, Environmental Defense, etc, support CCS.
- The IPCC scientists believe that US GHG emissions need to be cut by 60%-80% by 2050 to prevent the most severe impacts from climate change and that CCS is one path to that goal.

# Barriers to CCS

- The fundamental barrier to widespread deployment of CCS technology is economics.
  - Underground storage of CO<sub>2</sub> is technically very similar to transmission and storage of natural gas but without the benefit of a market value for the gas.
  - CO<sub>2</sub> capture technology exists, but is very expensive.
  - CO<sub>2</sub> capture imposes a parasitic load on electric generation. The result is less electricity for load and at a higher price.
- The technology and its uses are unfamiliar to lenders so financing costs are higher.

# PA's Study of a Carbon Sequestration Network (CSN)

- Under Act 129, the PA Department of Conservation and Natural Resources, among other things, is directed to:
  - Study suitability of PA's geologic formations for CCS.
  - Hire consultants to assess risk, provide cost estimates, and perform engineering studies regarding the development of a CSN in PA.
  - Authorizes a pilot project to determine CSN feasibility.