Pennsylvania's Hydrogen Ecosystem

Commonwealth of Pennsylvania
Office of the Governor, Critical Investments

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- Pursue new investments across the Commonwealth in critical areas like transportation, infrastructure, job-creation, and energy.
- Leverage opportunities within the IIJA and IRA.
- Strategically link diverse community stakeholders, local governments, state agencies, and federal partners.
- Hydrogen is a key pursuit because it checks all the boxes.

Hydrogen's Role in the Commonwealth

- Hydrogen to play a key role in Pennsylvania's energy strategy.
- Strategic consideration to our position as a national energy leader.
- Stimulate modern energy infrastructure investments, deploy new technologies, create good paying union jobs and manufacturing opportunities, and promote an equitable and inclusive clean energy future.
- Opportunity to diversify our energy mix, driving reliability and resiliency.
- Direct electrification is in principle the most cost-effective and optimal use of renewable energy.

Hydrogen Applications in the Commonwealth

- Transportation
  - Sustainable Aviation Fuel
  - Medium and Heavy-Duty Vehicles
  - Maritime/Port Applications
- Power generation
- Hard to decarbonize industries
  - Steel
  - Refining
  - Industrial Heat
  - Chemical Industry
- Renewable optimization and storage

Pennsylvania's Hydrogen Hubs

- Only state to secure two regional clean hydrogen hub projects.
  - Mid Atlantic Clean Hydrogen Hub (MACH2)
  - Appalachian Regional Clean Hydrogen Hub (ARCH2)
- Goal is to create regional networks of hydrogen production, connective infrastructure, and off-take.
- Key to achieving large-scale:
  - Demonstrate low-carbon intensity
  - Economic viability of hydrogen-based energy ecosystems

H2 Beyond the Hubs

- Existing hydrogen use in the Commonwealth.
  - Permitting, standards, and codes already in effect.
  - Lean upon industry knowledge.
- Notable development outside of the hubs:
  - Large scale power generation
  - Hydrogen microgrids
  - Sustainable Aviation Fuel

Fostering the PA Hydrogen Ecosystem

- Government support
  - Financial incentives
  - Policy levers
  - Engagement with policy makers and technology suppliers
- Industry buy-in and collaboration
- Community/stakeholder engagement

Foundational Issues

- The role and involvement of government.
- Sufficient power at a sufficient price to produce hydrogen?
- Adequate demand/offtake?
- Blue hydrogen vs. natural gas with CCS.

Business Model Challenges

- Financial viability?
- Difficult to be price competitive with traditional fuels.
- Hesitancy to contract.
- First-mover disadvantages.
- Can they convince their customers/investors/board?

Technical Difficulties

- Carbon capture and sequestration issues:
  - Where is it going?
  - Do we have proper geology/geologic capacity?
  - Transportation method and volume?
- Pipelines: utilization of new H2 pipelines vs. existing oil/gas pipelines.
- Turbine technology constraints.
- Amount of land use needed for renewables.

A Case Study: Denmark

- Denmark is a glimpse into the energy future.
- Denmark has surplus renewable energy. It therefore needs hydrogen and its derivatives (Power-to-X) to achieve its environmental and energy goals.
- Applications include: shipping, aviation, medium-heavy duty vehicles, green chemicals, and green plastics.
- Danish government is already supporting research, development, innovation, major demonstration and scaling projects, and creation of regulations.

The Hydrogen Challenge is an Opportunity

Since its founding, Pennsylvania has been an energy leader and innovator. Each energy transition has presented its own challenges, and each has been met by Pennsylvanian ingenuity and resolve. A robust hydrogen ecosystem provides the Commonwealth an opportunity to maintain its leadership while fostering a cleaner, more sustainable, and more equitable future.

Thank You

Max Schultz
Director of Energy Infrastructure Solutions
Office of the Governor, Critical Investments
maxschultz@pa.gov
www.pa.gov/en/critical-investments