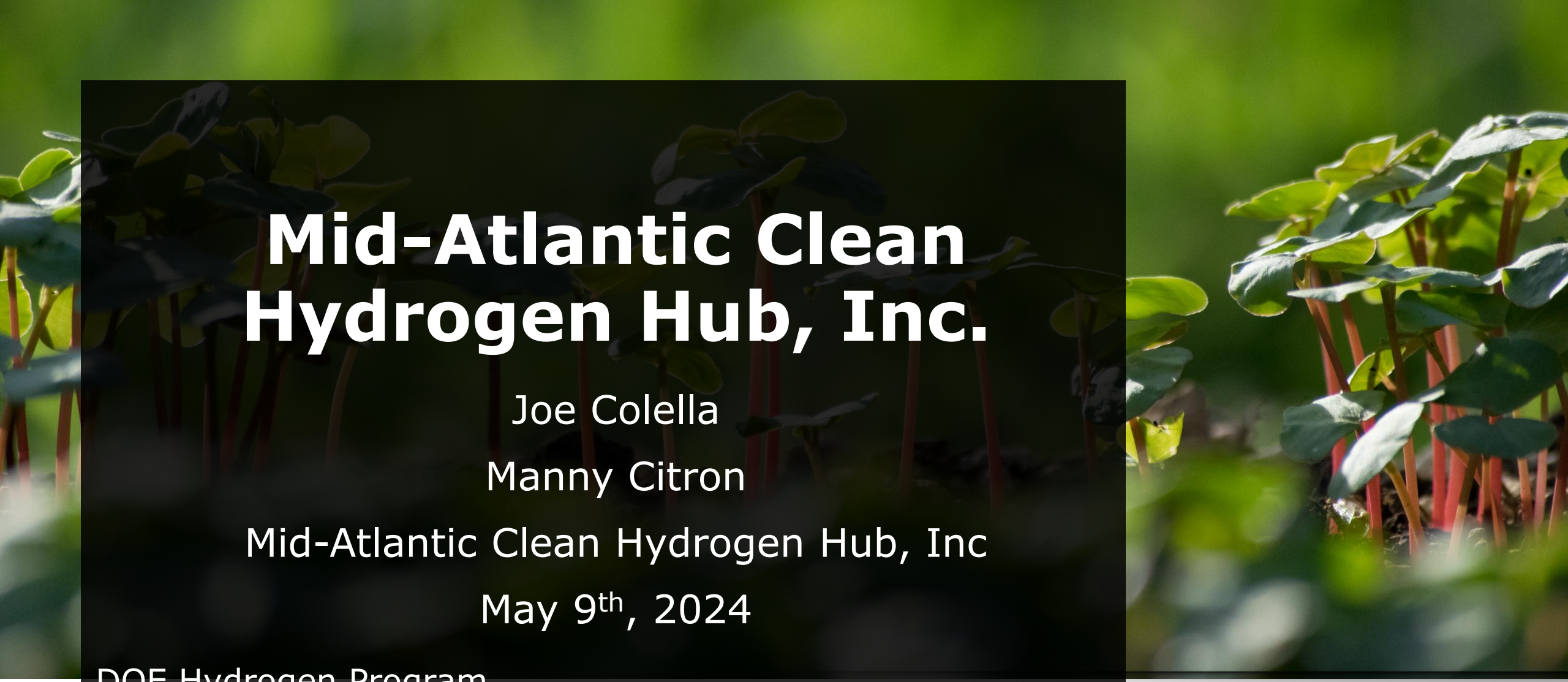


Mid-Atlantic Clean Hydrogen Hub, Inc.

Joe Colella

Manny Citron

Mid-Atlantic Clean Hydrogen Hub, Inc

May 9th, 2024

DOE Hydrogen Program

2024 Annual Merit Review and Peer Evaluation Meeting

AMR Project ID #: OCED006

MACH2

Agenda

1. Introductions
2. MACH2 Vision, Impact & competitive advantages
3. MACH2 infrastructure & partners
4. MACH2 by the numbers: H_2 production & demand, CapEx & DOE funding request
5. Community benefits plan & Justice40 benefits

MACH2 | Introductions

Who we are

501 (c)(3) incorporated in DE

12+ project partners executing
20+ projects across production, transportation & offtake of H2 in the Southeast PA, DE, and South NJ areas

www.mach-2.com

Your presenters today

Joseph Colella
Chief Operating Officer

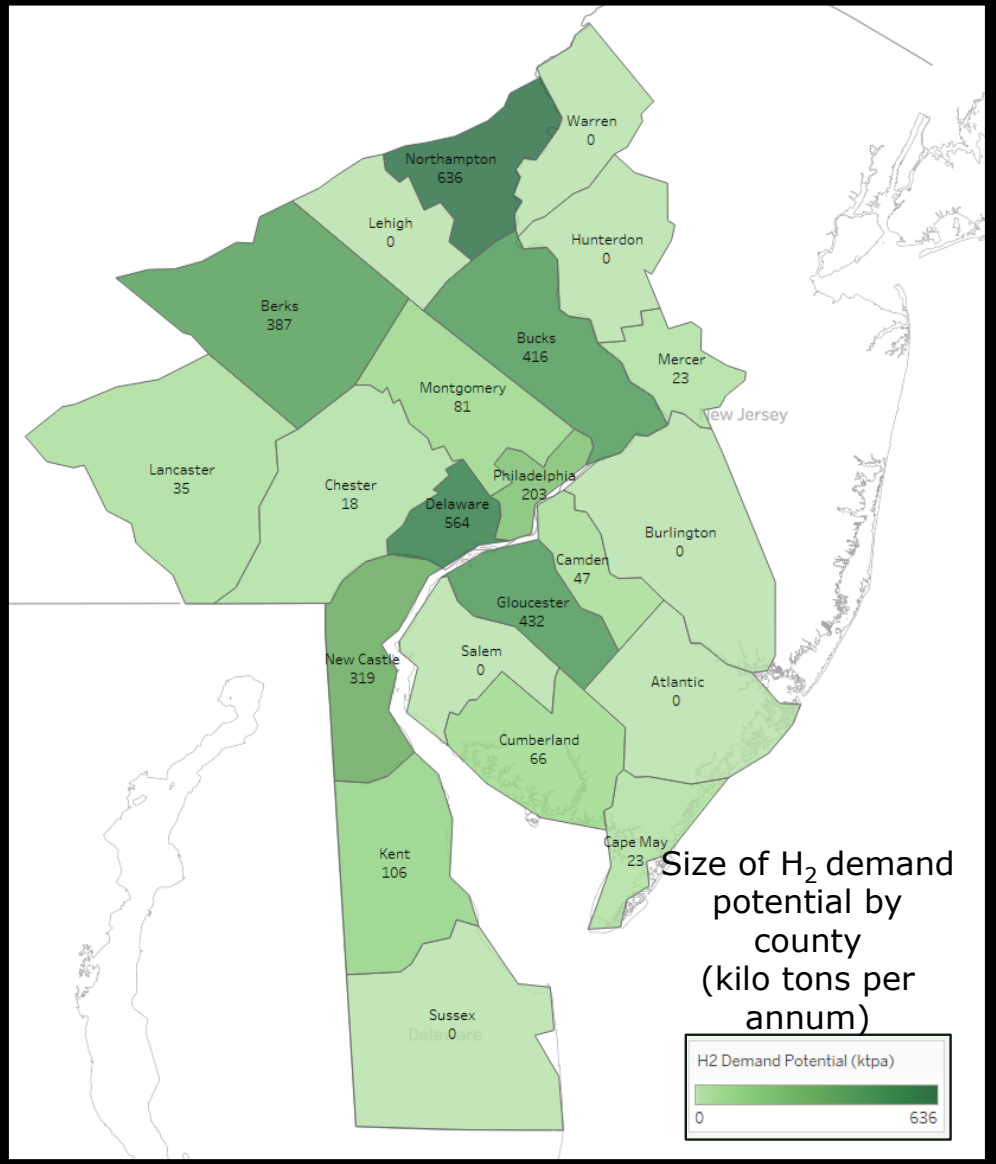
Manny Citron
VP of Partnerships & Community Engagement

MACH2 | Why Green / Pink Hydrogen for Mid-Atlantic?

- Only use energy solutions that reduce both GHG & criteria pollutants
- Seize opportunities to create good, union jobs in clean energy economy
- Reduce emissions in sectors that have high levels of pollution and are difficult to decarbonize/electrify:
  - Industrial facilities (23% of GHG): chemical manufacturing, steel, cement, logistics facilities
  - Transportation (28% of GHG) : Heavy-duty trucking, transit buses, ports, marine vessels, aviation
- Focus renewable energy electrification in sectors that make most sense: residential, light-duty vehicles, commercial buildings, etc.

MACH2
Mid Atlantic Clean Hydrogen Hub

MACH2 Potential Demand l Large emitters in hub area are large sources of captive demand in the future



Source: EIA AEO, EPA 2019 Emission Inventory, DOE AFDC

MACH2 | Our Vision & impact across Southeast PA, DE & Southern NJ

~20K

Well-paying jobs in low carbon economy across Southeast PA, DE, and Southern NJ

12+

Partners committed to decarbonization & clean H2 across production, transportation and demand of clean H2

$3B+

Investment[1] to advance clean H2 economy across the region, with significant benefits flowing to DACs - preponderance in region

High community impact

$20M+ Direct commitment to CBP[2] on WDBs, HBCUs, higher ed & training to support Justice40 goals

Our vision

- **Leader in production of clean green & pink H2** to drive decarbonization efforts & related health benefits in the Mid-Atlantic
- **Engine for growth & economic development** with lasting impact on the industrial economies, H2 innovation ecosystem and communities across Southeast PA, DE, and South NJ post award period

1. $750M DOE funding, ~$2.5B MACH2 partners' cost share 2. Community Benefits Program

Competitive advantages detail I MACH2 region presents significant competitive advantages to differentiate our Hub

Vast existing infrastructure

Broad network of existing, underutilized pipelines that will serve as backbone and for **further expansion to producers, offtakers, neighboring hubs**

Labor involvement in shaping Hub

Embedded in an industrial area, with access not only to existing pipelines, but also to **highly trained unionized workforce, involved in shaping the Hub since early on**

Partners with broad expertise

Multitude of large established players with years of experience in large capital project development, cutting edge technology expertise[3]

Clean Green & Pink Hydrogen

~97% production from Green and pink H2, resulting in **average emissions of no more than 0 kg CO_{2e}/kg H_2**

Competitive production costs

Initial analysis shows resulting LCOH of $4-5/kg[1] allowing the Hub to set the stage for rapid development of H2 market – subject to 45V

Strong Comm. benefits program

Developed **partnerships with HBCUs & ed. institutions** to develop community outreach & safety training

*MACH2 is uniquely positioned to **contribute to a national hydrogen development** through **dense & underutilized infrastructure,** geographically **concentrated offtake partners**, abundance of feedstock, and strategic proximity to important innovation centers*

1. Projections after Award Phase 4, assumes capture of full 45V Production Tax Credit and accounts for federal funding allocated to projects

MACH2 I Multitude of partners with wide regional reach & variety of expertise

Labor, Workforce & Community Outreach

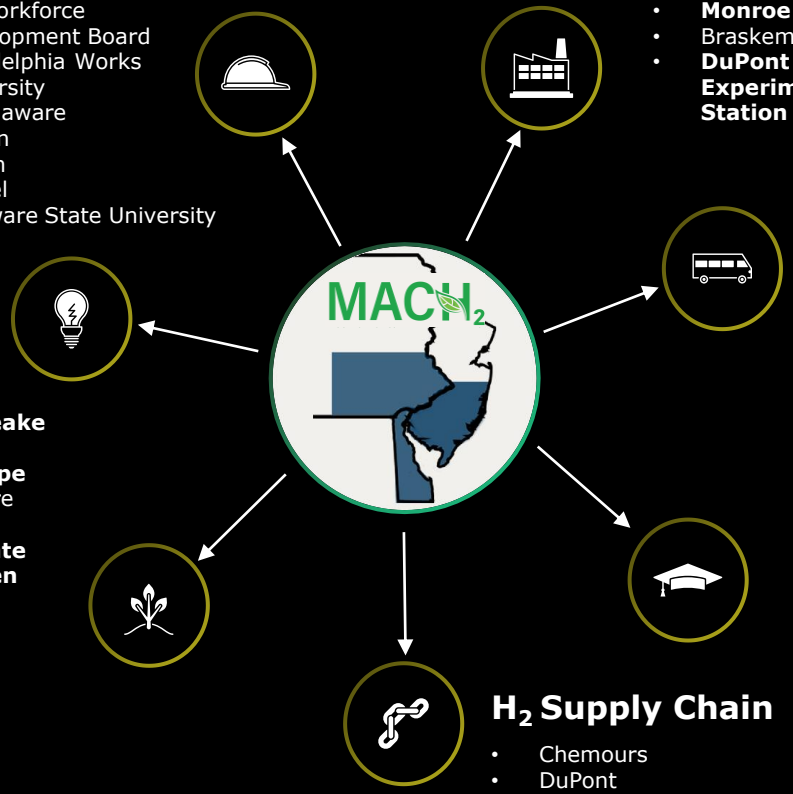
- PA AFL-CIO
- DE AFL-CIO
- Building Construction Trades
- Pipefitters & Steamfitters
- Delaware Prosperity Partnership
- DESCA
- DE Workforce Development Board
- Philadelphia Works
- University of Delaware
- Rowan
- UPenn
- Drexel
- Delaware State University

H_2 Producers & Innovators

- Air Liquide
- Bloom Energy
- **PBF Energy**
- **PGW**
- **Monroe Energy**
- **Enbridge**
- **Versogen**
- **Holtec**
- **PSEG**
- **Chesapeake Utilities**
- **SmartPipe**
- Hydropore
- sHYp
- **First State Hydrogen**

Feedstock Diversity & Infrastructure

- PECO
- **PSEG**
- **Enbridge**
- US Wind
- Buckeye
- IRPL
- Orsted



Industrial & Commercial Applications

- **Monroe Energy**
- Braskem
- **DuPont Experimental Station**
- **PSEG**
- **Enbridge**
- **Hilco**
- Vicinity Steam
- Amazon
- Ameresco

Transportation Applications

- **SEPTA**
- DART
- NJ Transit
- **Philadelphia Municipal Fleets**

Education, Research & Development

- University of Delaware
- Cheyney
- UPenn
- Rowan
- Lincoln
- Drexel
- Delaware State University
- DESCA

H_2 Supply Chain

- Chemours
- DuPont
- WL Gore
- Compact Membrane Systems

Variety of clean H2 producers & tech OEMs:

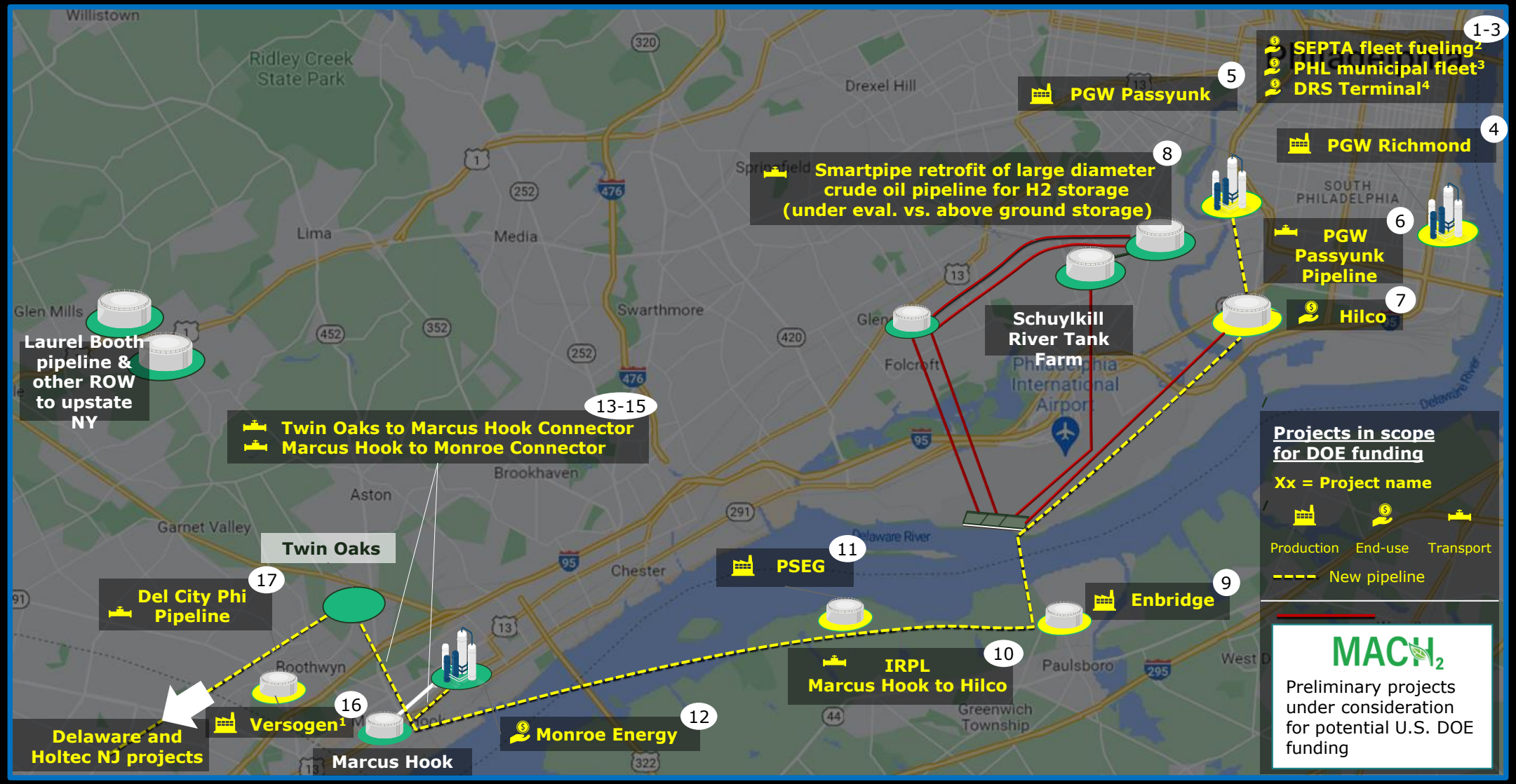
- **Established utilities and gas & liquid fuel players**
- **Startups & innovators**
- **Power generation OEMs**
- **…**

Variety of clean H2 end-uses:

- **Transportation fuel**
- **Refining & other Industrial processes**

Partners bring complementary skillsets and expertise across the clean H2 value chain, fostering the long-term development of a supply-chain for technology & equipment needed for production, transportation & end uses of clean hydrogen

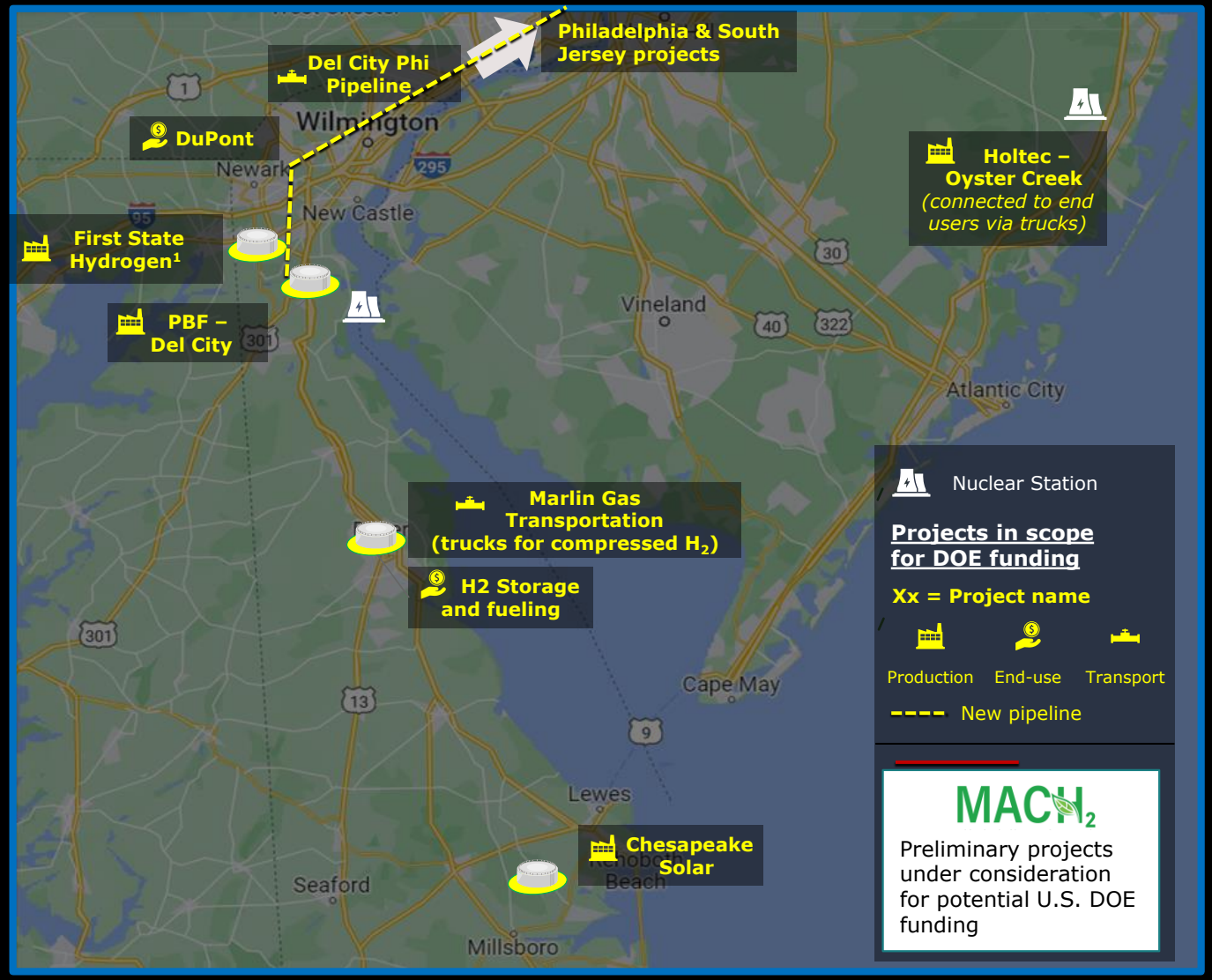
MACH2 Infrastructure | MACH2 map view – PA & NJ



1. Final location to be determined; most probable location shown; 2. 3 SEPTA fleet fueling projects; 3. 2 PHL municipal fleet projects; 4. 2 DRS terminal projects

MACH2 Mid Atlantic Clean Hydrogen Hub

MACH2 Infrastructure | MACH2 map view – DE



1. Final location to be determined; most probable location shown

MACH2 Production & Demand l Key datapoints

MACH2 is a fossil fuel-free Hub powered by renewable & nuclear energy with staggered ramp up of 20+ projects taking MACH2 into at least 250 tpd of production and demand by end of Award

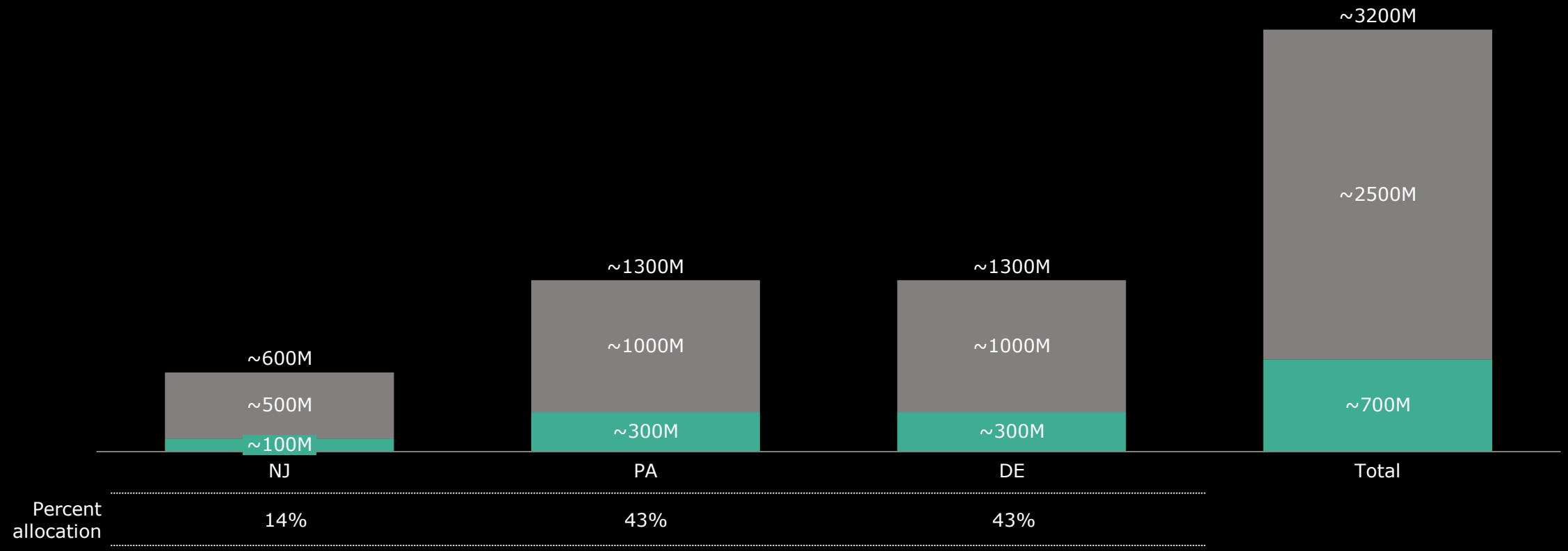
~97% of production generated using electrolysis powered by renewable energy or nuclear, resulting in average emissions for the overall hub close to 0 kg CO2e/kg H2

	Green	Pink	Orange
Definition:	Solar or Wind powered electrolyzer	Nuclear powered electrolyzer	Biogas or biomethane in SMR (e.g., RNG)
Carbon intensity:	0 kg CO_{2e}/kg H_2	0.2 kg CO_{2e}/kg H_2	-6.5 kg CO_{2e}/kg H_2
% of currently forecasted production	**88%**	**9%**	**3%**

Source: DOE Greet Model; IEA; Acar et al 2022; Yao et al 2017; Müller 2013; Kraussler 2013

MACH2 projected Capital Investments | Engine for growth across Southeast PA, DE & Southern NJ

Total **estimated project[1] capital spending & DOE funding allocation** broken out by state
(rounded to nearest hundreds of $M)



1. Only project partners represented, based on DOE funding of $750M for project partners (per proposal). Additional $89M in DOE funding for overall Hub ($89.09M) not represented

MACH2 Community benefits | Investing in America's workforce & engaging DACs & underrepresented groups

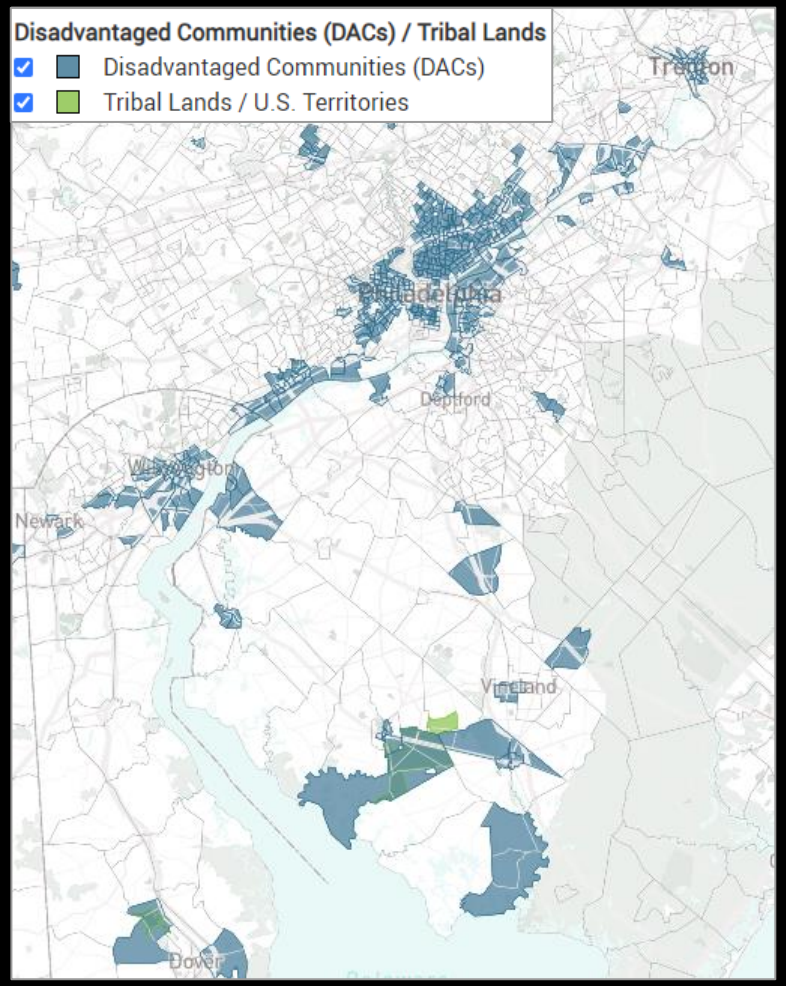
Select highlights include:

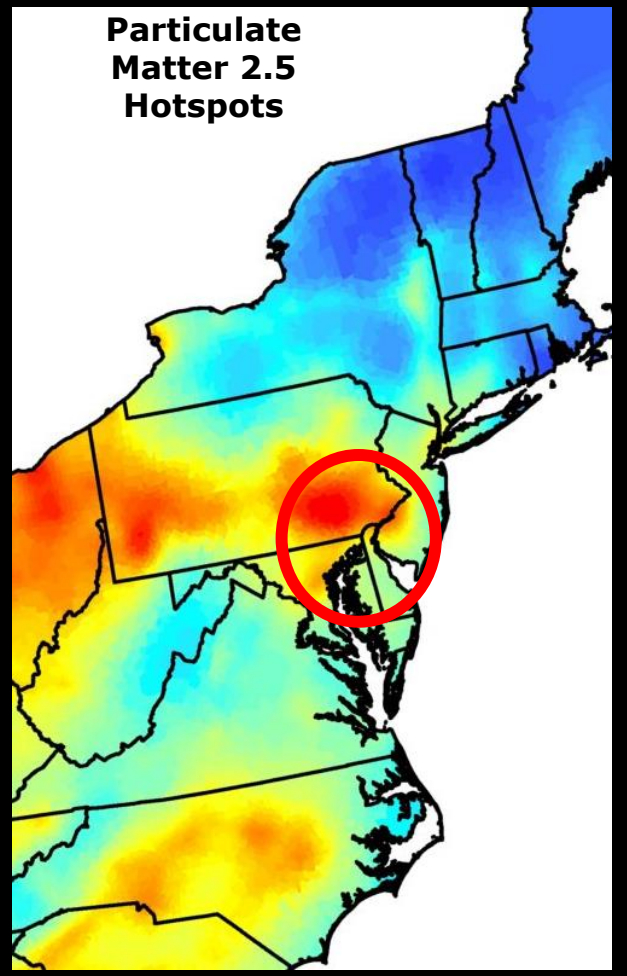
- **Investing in America's Workforce |** ~$14M committed to regional Workforce Development Boards to serve as MACH$_2$ anchor partners for community college training, pre-apprenticeships

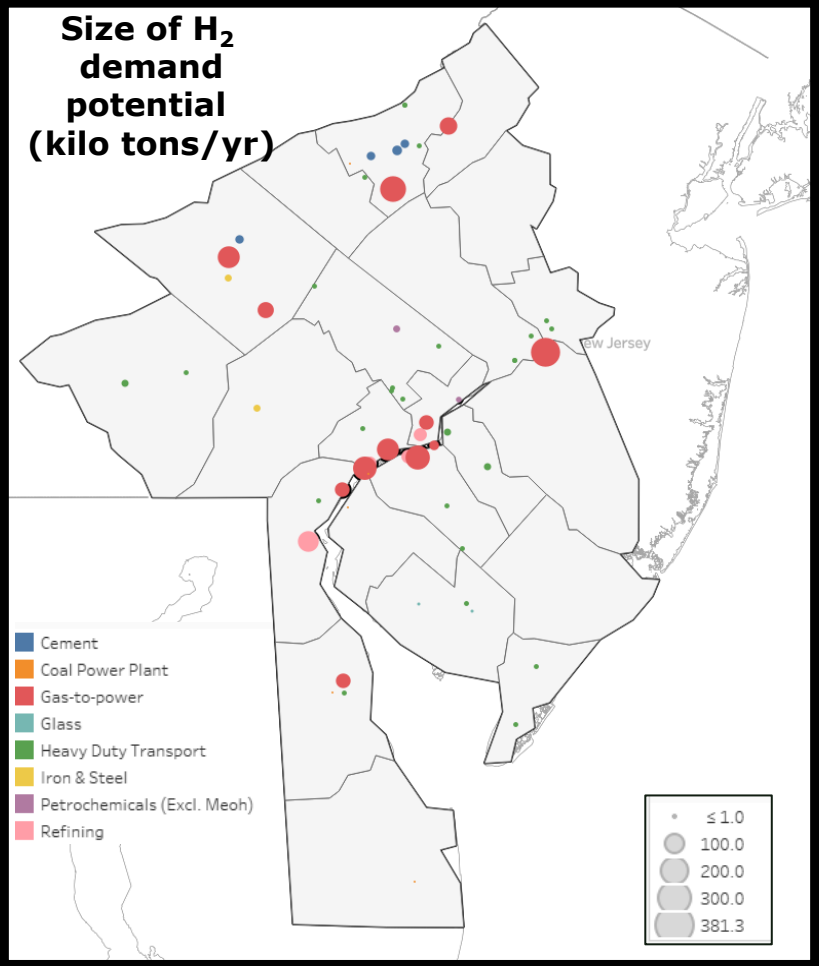
- **DEIA, EJ and J40 |** $10M commitment to technical and professional development initiatives for programs to overcome barriers in higher-ed to entry-level & professional careers for underrepresented groups – including Cheyney University, the country's first HBCU, U Penn and others[1]

1. Includes University of Delaware, Cheyney University, U Penn, Rowan University across higher-ed & technical training

MACH2 Justice40 | MACH2 will significantly reduce air pollution







Source: EIA AEO, EPA 2019 Emission Inventory, DOE AFDC

MACH2 | Workforce Development & Jobs

- MACH2 will create 20,000+ well-paying jobs in the clean energy economy, including 13,000+ union construction jobs
- The regional Building Trades and AFL-CIO helped lead MACH2 from the start. Every project will be constructed with project labor agreement
- MACH2 will coordinate equitable access to next-generation job training opportunities, especially historically underserved communities
- Key workforce partners: Labor, Cheyney University, Delaware Tech, the Collegiate Consortium, Philadelphia Works, DE Workforce Development Board, NJ State Employment and Training Comission, FAME Inc.. LEEP

Recap & Key Takeaways

MACH2 has est. production of at least 250 mtpd and demand of at least 250 mtpd by end of Award on a robust demand mix

MACH2 will produce clean green & pink H2 resulting in average emissions of close to 0 kg CO_{2e}/kg H_2

MACH2 is labor led. The Hub has had strong involvement from labor leaders and workforce development groups since early stages

MACH2 counts with extensive underutilized pipeline infrastructure. It serves as the backbone or hydrogen highway of the Hub, decreasing overall cost and providing opportunities for expansion

MACH2 partners proposed total CapEx of ~$3B with 75% non-federal cost share. Supported by $750M DOE Award

MACH2 has a strong CBP plan and will produce significant Justice40 benefits. Hub will have provide significant health and economic benefits for DACs that have among the highest levels of air pollution (PM 2.5, etc.) in U.S.


MACH2