

Scaling Hydrogen Supply for Transit

Presentation by
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Getting Started - Buses

- Do your homework
- Engage the experts
 - Fuel cell
 - Fuel cell electric bus
 - Hydrogen fuel
 - Non-profits
 - Funding agencies
- Make the decision
- Bus options: 1, 5, 10 or more buses

Getting Started – Hydrogen Supply

Temporary Fueling

- Days, weeks, or months
- Minimal site preparation
- Outdoor fueling
- Ideal for early days, start-up
 - ie. – one bus
 - AC Transit



Scaling Hydrogen Supply

- Various Options
 - Liquid hydrogen
 - Making hydrogen
 - Reforming – natural gas, biogas
 - Electrolyzer
 - Tri-generation
 - Pipeline hydrogen

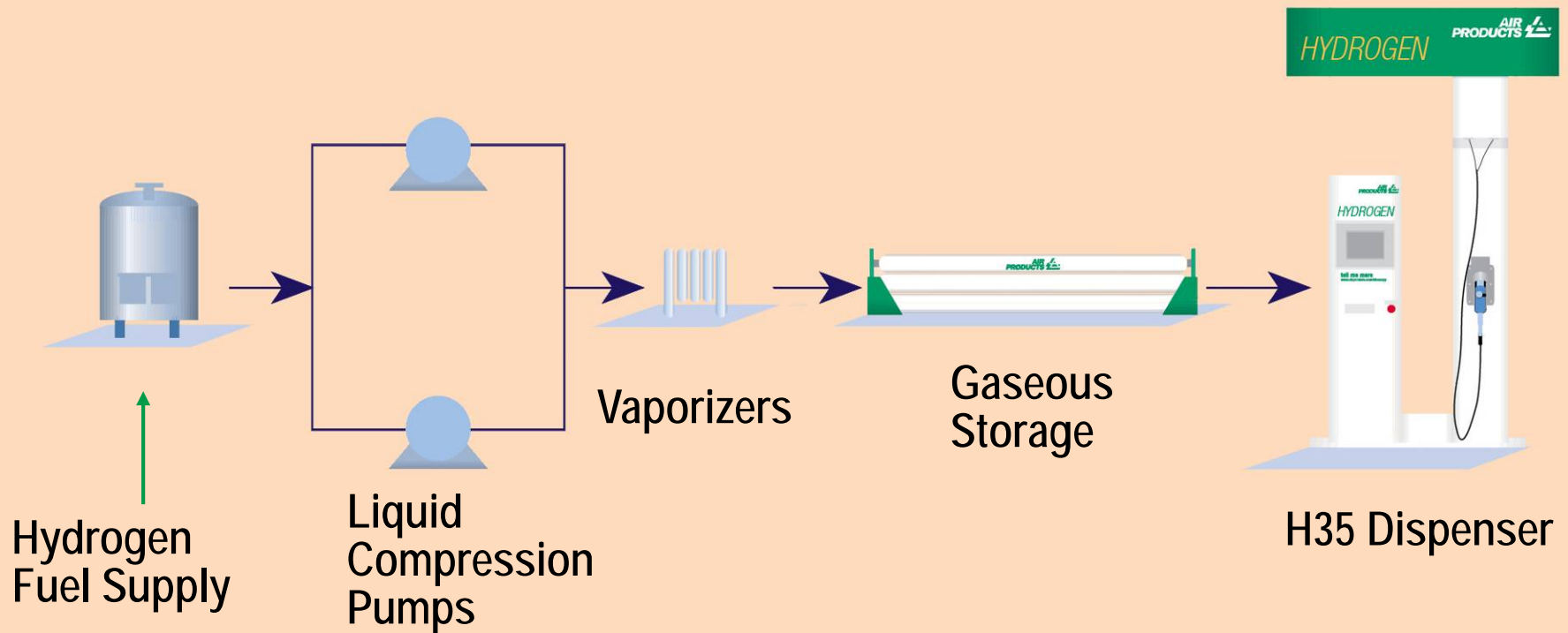


Orange County Transportation Authority Station (2019)

- Delivered liquid hydrogen (AP LHY)
- Air Products design & key equipment
 - AP dual-phase compressors
 - 6-10 min. fills
- 10 buses initially
 - Can scale to 30, 50, or more buses
- Two dispensers
- Planned on-stream Spring 2019

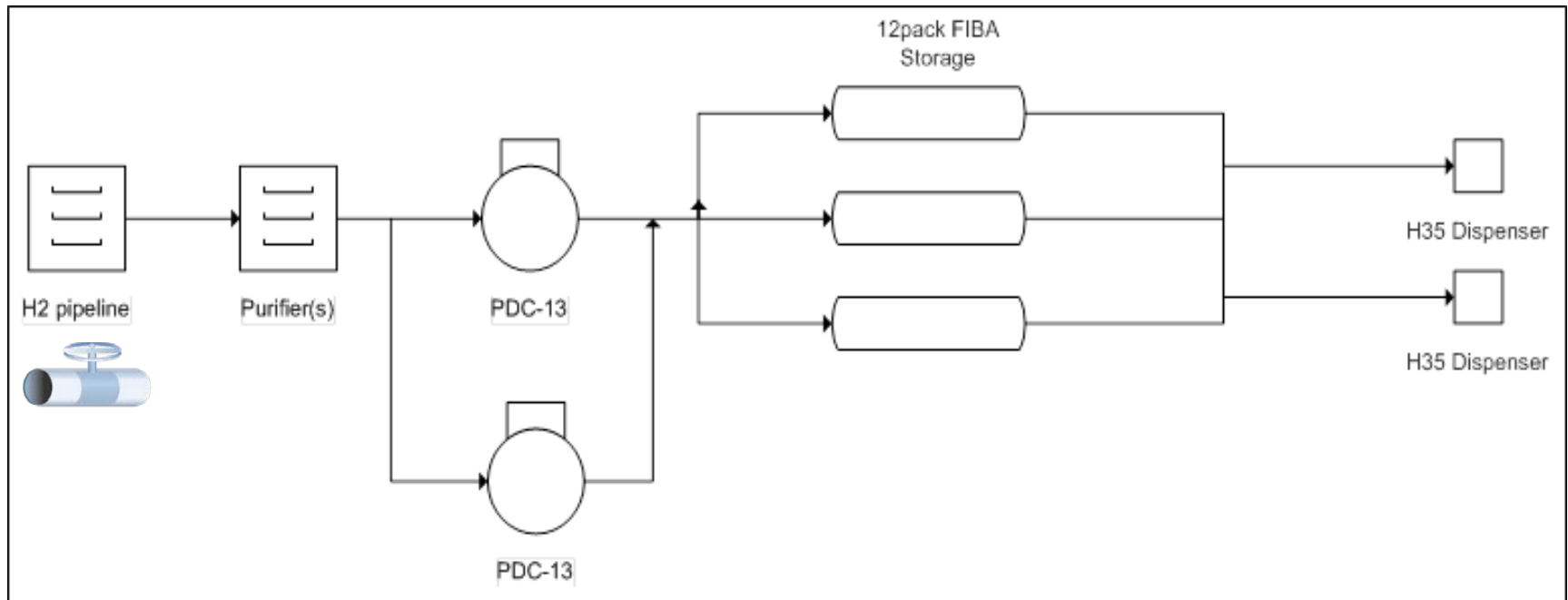


SmartFuel[®] Liquid Hydrogen Bus Fueling Infrastructure



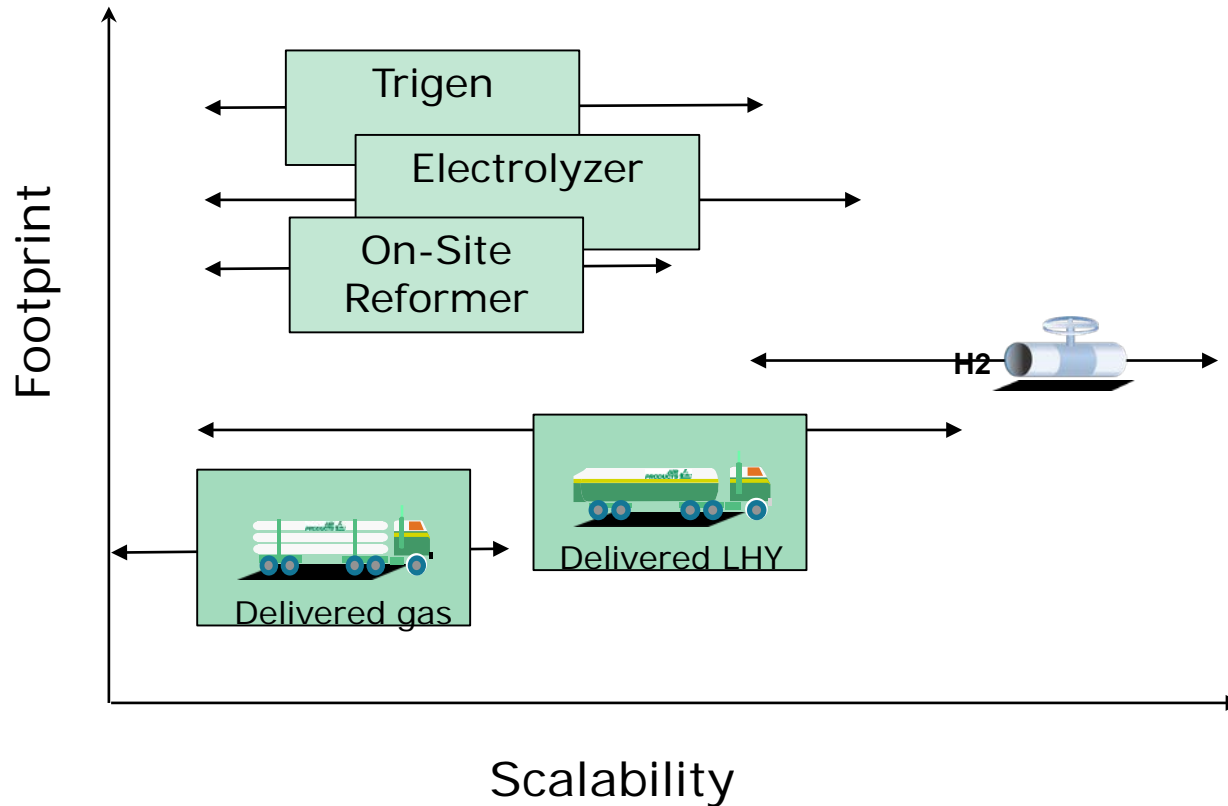
-Readily expandable to 30, 50 or more buses

Pipeline Hydrogen Station (25, 50, 100 Buses or more)



Same basic building blocks/pieces of equipment

Hydrogen Supply Options and Key Framing Conditions



Thank you
tell me more

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Full Scale Deployment Option 1- Liquid H2

- Liquid hydrogen delivery
- One or more H₂ dispensers
- Installation in as little as 6-8 weeks
- Good for 10-100 or more buses
- Can lease, buy or do a mixed lease/buy



Full Scale Deployment Option 2- On-Site Generation

- On-site H₂ generation
- One or more H₂ dispensers
- Installation in as little as 6-8 weeks
- More infrastructure & utilities needed
- Multiple sizes
 - 500kg/day (20 buses)
 - 1000kg/day (40 buses)
 - 1600kg/day (60 buses)

