Today's Transit for Tomorrow's World

Early Adoption
How to Minimize Detours in ZEB Deployments

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SunLine Facts

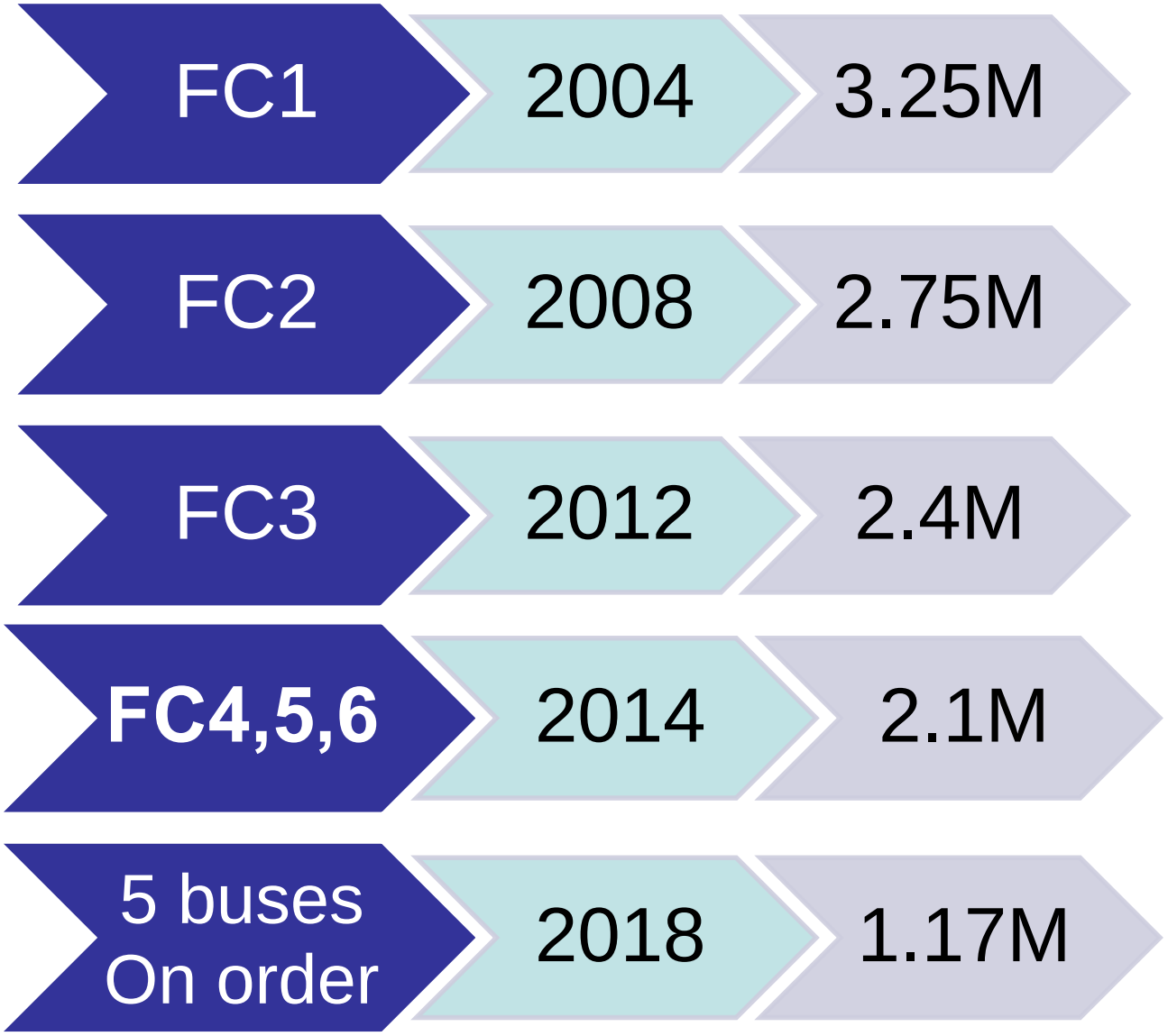
SunLine Operations

- Fourteen (14) local SunBus fixed routes, (1) express line, (1) Riverside Commuter Link, ADA Paratransit
- 68 CNG buses
- 10 Electric Hydrogen Fuel Cell buses (6 on the way)
- 3 All Electric Battery buses (4 on the way)
- 39 CNG Paratransit Vehicles
- 220 Kg Hyradix Reformer
- Usage 200 Kg per day
- Installing 900Kg per day Electrolyzer through a CARB funded project with NEL/Proton

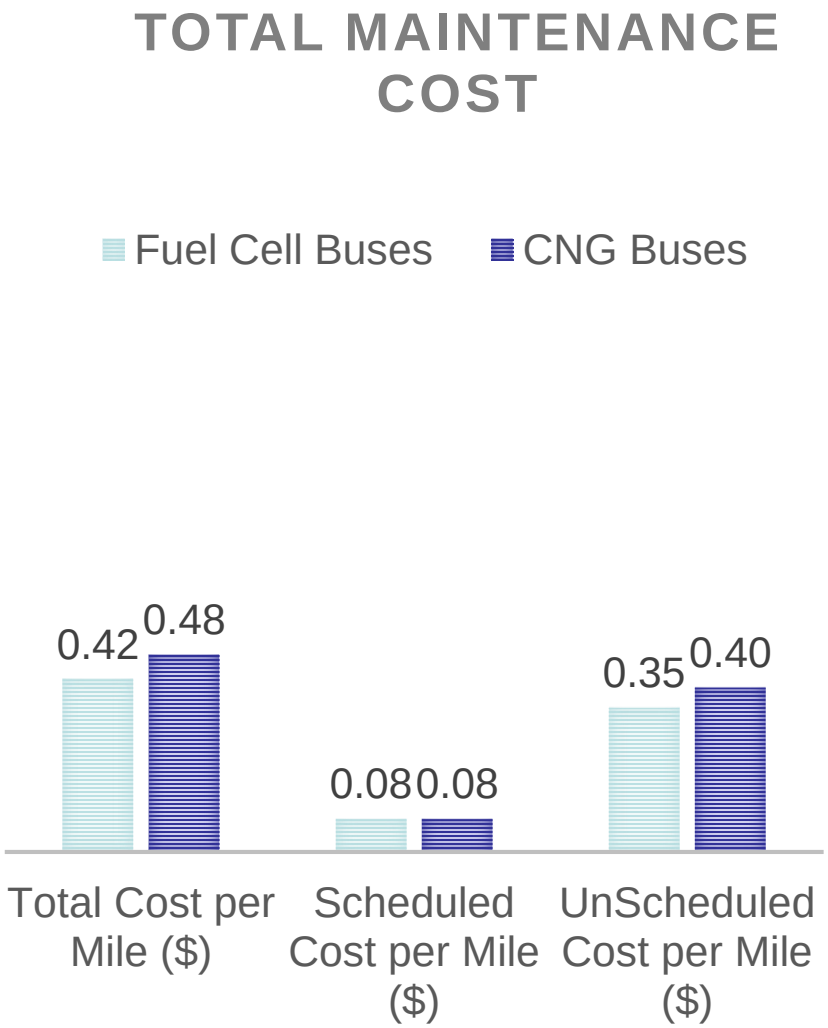
People Often Ask Us

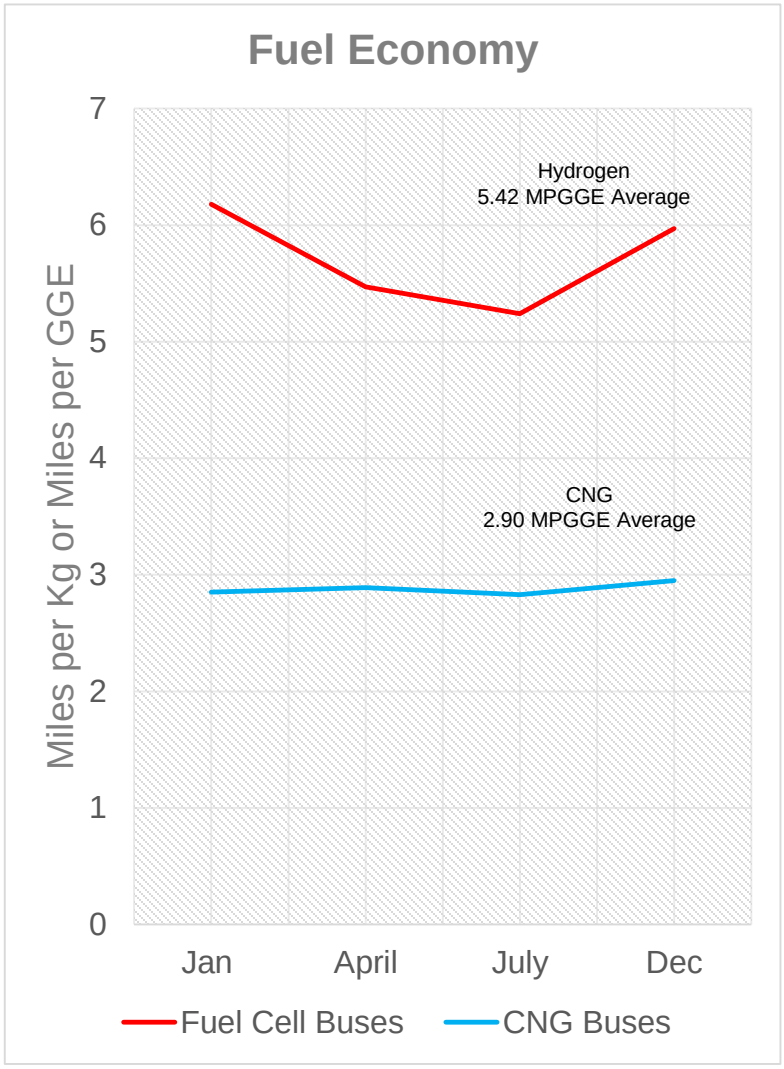
- **What has contributed to SunLine's ZEB success?**
  - Mission focus on alternative fuel use
  - Commitment by SunLine staff
  - Board Policy/support
  - Internal expertise and continual reinvestment
  - Solution based approaches with OEM's
  - Sustained efforts to pioneer the technologies that the industry is using today
  - Data collection and review of performance, costs and life cycle reliability
  - Strong communication to our internal team and external stakeholders

H2 Bus Affordability



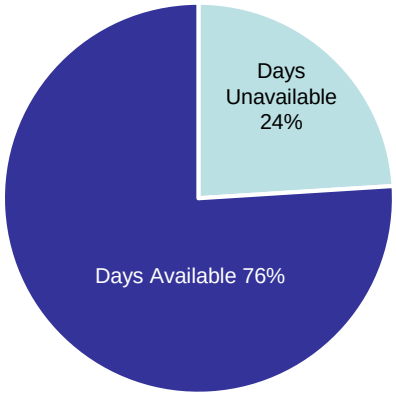
Maintenance Costs



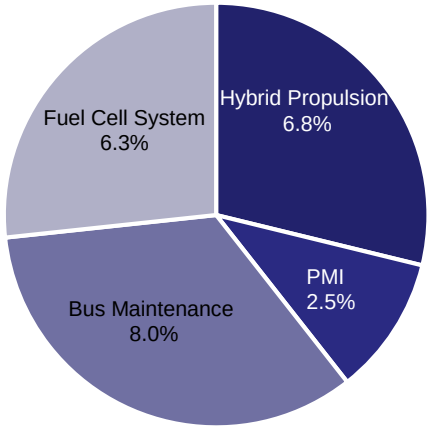


Availability

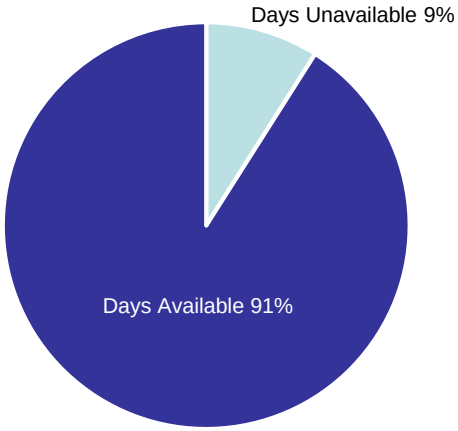
Fuel Cell Buses Availability



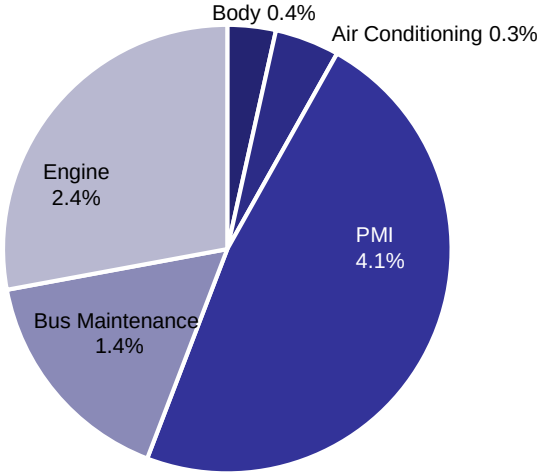
Fuel Cell Buses Reasons for Unavailability



CNG Buses Availability



CNG Buses Reasons for Unavailability



Success and Challenges

- **Successes**
  - Zero Emissions vehicles should be integrated into your pull-out and not segregated as a special fleet
  - Anticipate short term system issues by obtaining additional financial support coverage for vehicles in grant requests
  - SunLine has invested in Hydrogen infrastructure to manage operating costs and create fueling self-sufficient
  - Integrate Zero Emissions Technology into the Planning, Financial, and Programming strategies for the Agency
  - Develop internal champions of the technology inside and outside the agency

Success and Challenges

- **Challenges**
  - Choose technical and OEM partners carefully
    - Financial solvency and commitmment
    - Knowledge of US funding and procurement rules
    - Seek independent project and construction cost analysis experts to ensure project cost projections are real world
  - Ensure that all taxes, shipping, and internal staff time costs involved have been addressed
  - Consider the value of in-kind support when drafting a grant
  - There WILL be performance issues. Stay focused on ensuring they are not just “regular” bus issues versus new technology issues

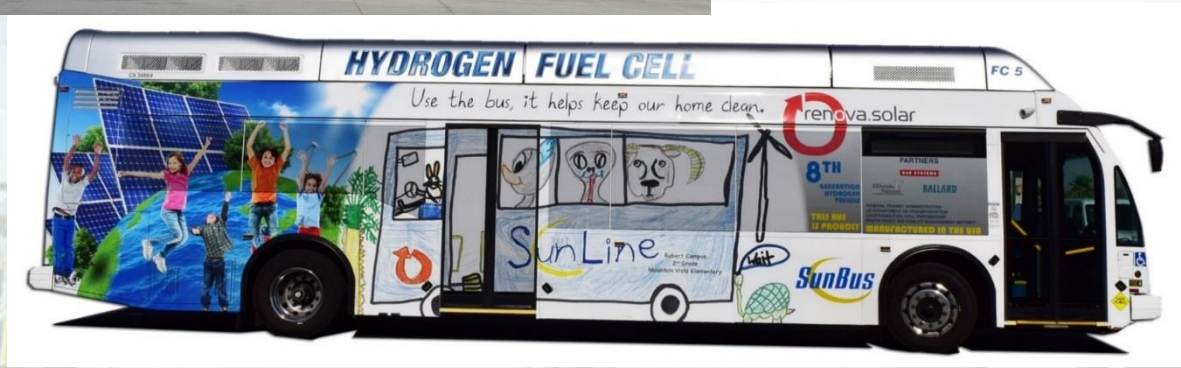
Reaching the Industry

- **How can we achieve SunLine's success at other transit properties?**
  - Enhance education efforts
    - Most Operators assume Hydrogen is too complicated for their team and their community
      - Operators using CNG are already well on the way to a potential Hydrogen program
  - Infrastructure
    - Hydrogen is not available in cost effective forms
      - Hydrogen producers do not currently see a viable market in the transportation sector
      - A "starter set" scalable solution to infrastructure just like BB chargers sold with H2 buses is needed
  - Manufacturer/Operator relationships
    - Ensuring all parties understand risk and work together to solve problems

Reaching the Industry

- **What should you do to start a ZEB program?**
  - Create a Board Policy
    - Most Operators assume Hydrogen is too complicated/expensive for their team and their community
  - Develop a mission or focus on ZEB technology
    - Ensure that the agency knows what and why leadership is directing change a in platform
    - Develop internal champions who are emerging leaders and believe in the benefits of piloting new technology
  - Redesign of your existing system
    - We have to “stop selling, what riders aren’t buying”
    - Plan your new network using ZEBs
      - Many agencies are looking at more frequent, reduced running times and more productive services
  - Manufacturer/Operator relationships
    - Ensuring all parties understand risk and work together to solve problems

Thank You



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