Hydrogen Fuel Project

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Washoe County, Nevada

Objectives

- Develop an integrated, geothermal energy powered fuel production and use cycle that has:
  - essentially zero criteria emissions
  - zero green house gas emissions
  - scalability
  - reliability comparable to today's mature fossil fuel technologies
- Foster public and regulatory agency acceptance of hydrogen fuel technology as a safe, effective and desirable path

This R&D effort should contribute significantly to the commercialization of hydrogen fuel technologies for mass transit applications

Budget

Year	RTC	DOE	Total
FY04	$800K	0	$800K
FY05	$455K	$1962K	$2417K
FY06	$936K	$3742K	$4678K

Technical Barriers and Targets

- status of fuel cell vehicles (cost, reliability)
  - target date for fuel cell bus acquisition: 2010
- fuel transport from production site to dispensing site
  - target is to achieve fuel costs comparable to diesel operation.
- water conditioning
  - target is effective, low-cost water conditioning for reliable electrolyzer operation
- integration and control
  - geothermal power to electrolysis

Approach

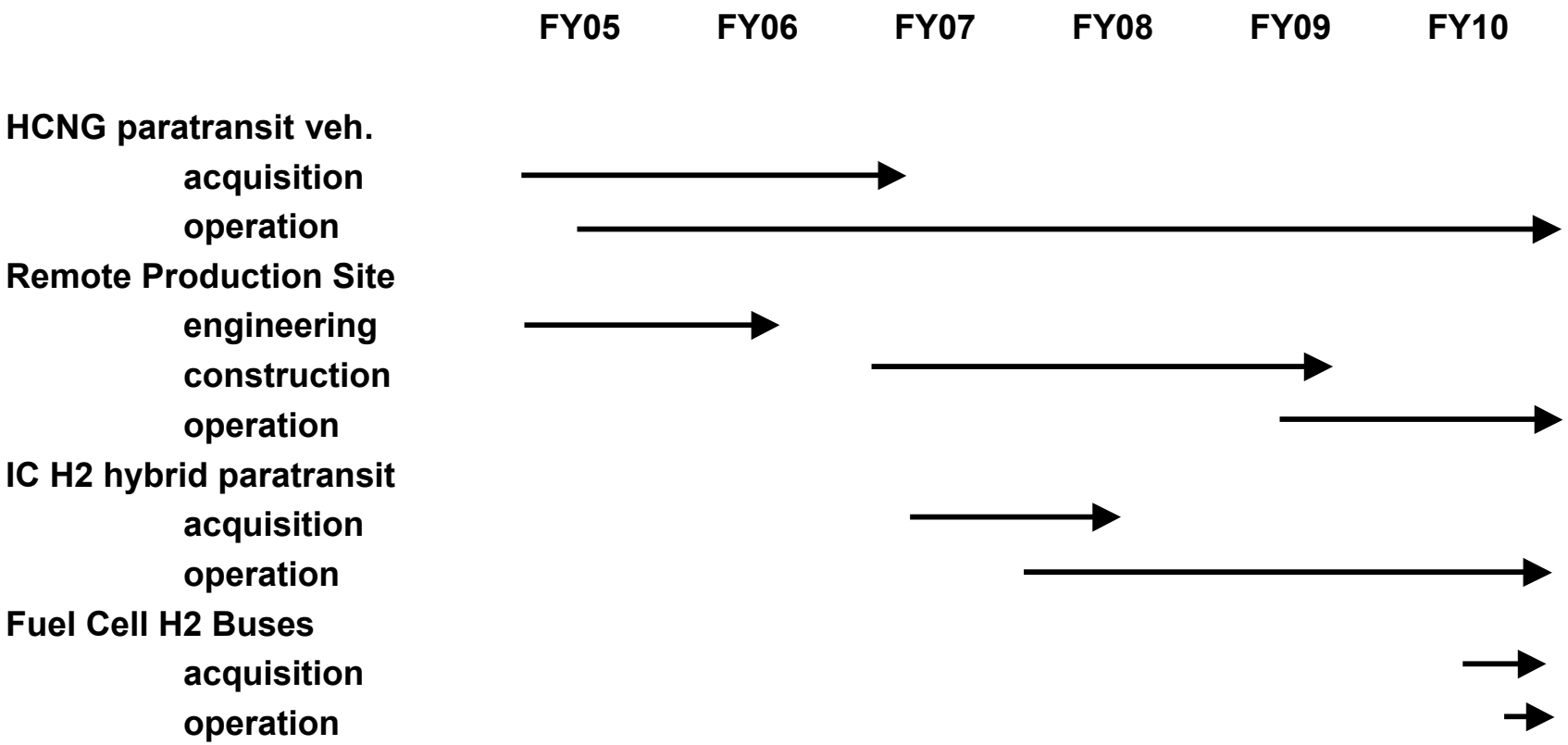
- staged approach which transitions from vehicles
  (1) using hydrogen/natural gas fuel mixtures (HCNG),
  (2) then to IC-powered hydrogen vehicles,
  (3) and ultimately to fuel cell hybrid vehicles.
- concurrent construction of fuel production facilities to meet vehicle needs:
  (1) dispensing facility with onsite fuel production and storage
  (2) scaling up of facility to meet increasing numbers of vehicles
  (3) remote site production facility utilizing geothermal energy integrated with electrolysis hydrogen production

Builds on RTC's CNG paratransit fleet and fueling facility

Project Safety

- Design and fabricate facilities and equipment to requirements of codes and standards being developed by SDO's (e.g., NFPA, ASME, ISO, . .)
- Satisfy the needs and requirements of local fire marshalls and local government agencies
- Use modeling, risk analyses if needed to mitigate failure probabilities and consequences of failures

Project Timeline



Accomplishments/Progress

- Technical and economic feasibility studies were completed (funded by RTC)
  - these studies form the basis for the approach taken in this project
  - analyses of renewable energy sources indicated that geothermal energy, a plentiful resource in the Reno/Tahoe area, would be the most cost effective and reliable option for electrolysis production of hydrogen
  - a fuel cell powered bus fleet sufficiently large to determine reliability, operating cost and maintenance data would be prohibitively expensive at current fuel cell prices.
  - combination of HCNG and HICE/electric hybrids are suitable for accomplishing most project objectives at significantly reduced costs
  - combination of HCNG and HICE/electric hybrids are suitable for accomplishing most project objectives at significantly reduced costs
  - hydrogen transport from a production site to a dispensing site can be a significant factor in fuel cost

Interactions and collaborations

Technical/Scientific
- -University of Nevada, Reno
- -Desert Research Institute

Mass transit contractors
- -First Transit
- -MV Transp.

Energy suppliers
- -Sierra Pacific Power
- -ORMAT (geothermal)

Gas suppliers
- -Air Products
- -BOC

Government agencies
- -Pyramid Lake
  Paiute Indian Tribe
- -Nevada State
  Energy Office

Equipment suppliers
- -Stuart
- -ISE

Future Work

- next year (FY05)
  - conversion of existing paratransit vehicles to hydrogen/natural gas operation
  - acquire and install interim fuel production, storage and dispensing facility
- following years
  - design, engineering and construction of remote power and hydrogen production facility (begin FY06)
  - desalinization studies (begin FY06)
  - HCNG paratransit vehicles (FY06-08)
  - acquire IC hydrogen/electric hybrid paratransit vehicles (FY08)
  - acquire IC hydrogen/electric hybrid fixed route buses (FY09)
  - acquire fuel cell hybrid fixed route buses (FY10)