# *Alaska Remote Area Program Overview*

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# *Summary of Approach and Rationale*

- **Meeting the Power Cost Equalization (PCE) challenge**
  - Conservation
    - Does not reduce the fixed costs of operating a utility
  - Look for other ways to meet energy needs of rural residents
    - UAF Energy Center is working on this issue
- **Criteria for new technologies**
  - Reduce total system cost of energy
    - High reliability
    - Lower capital costs
    - Lower fuel consumption
  - Must work in an arctic climate
- **PEM Fuel Cells for Rural Alaska Villages**
  - Distributed electrical generation
  - Heat recovery to increase efficiency
    - 80% fuel utilization possible
  - System reliability improved by multiple units networked together
  - Capital costs reduced due to lower excess capacity for outages

# *Past Results*

- **Not Applicable**
  - Program start date July 15, 1998

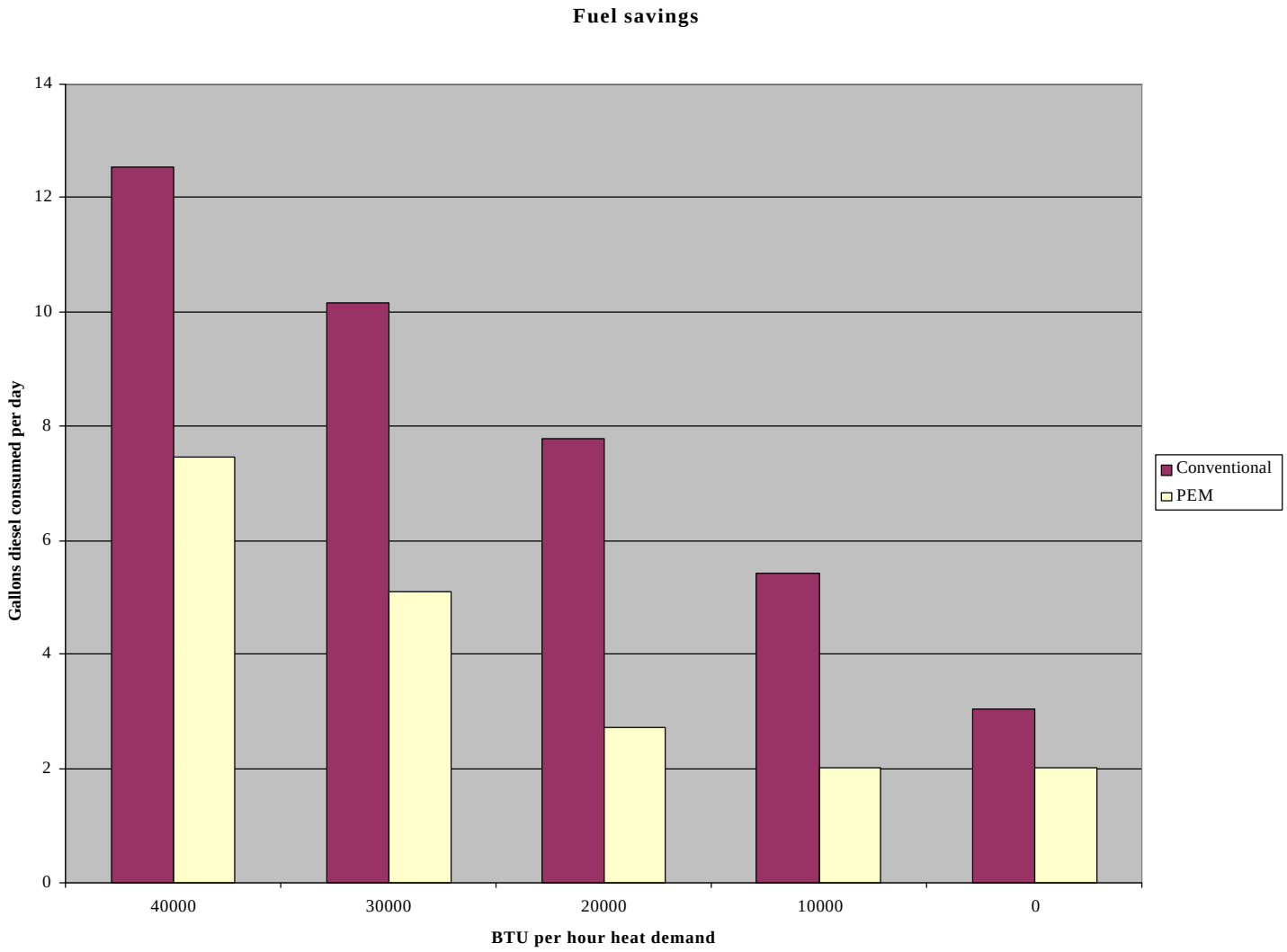
# *Current Year Results*

- **Surpassed Phase I goals by 21 orders of magnitude**
  - Three Hydrogen PEMFC's were delivered and made operational by 30 Sept. 1998.
    - The milestone was to deliver 2 electrons from a 3-5 kW hydrogen PEMFC by 30, Sept. 1998. The SERC system delivered a couple hundred coulombs (recall 1 Coulomb is $10^{19}$ electrons, hence we received approximately $10^{21}$ electrons)
  - Delivered by 30 Dec. 1998
    - Steam reformer operating on Kerosene
  - Delivered by 5 April 1999
    - POX reformer operating on Kerosene
  - Fuel Cell test benches were constructed and made operational 15 Feb. 1999
  - System efficiency data on all three PEMFC systems operating on hydrogen were measured, and paper prepared for the $10^{th}$ Annual NHA meeting April 4-9 1999
  - Steam reformer made operational
    - first order data obtained

# *Plans for Future Work*

- **Phase I completed**
- **Phase II under way**
  - Deliverables and milestones are:
    - Second generation PEMFC and reformation technologies are due from each of the industrial partners
    - Laboratory systems are to be fully integrated producing “grid” quality power in a fully automated manner by the end of CY 1999
- **Phase III**
  - Deliverables and milestones are:
    - Create third generation fully automated system suitable for a remote arctic validation site.
    - Demonstrate this system in a suitable remote arctic site

# Status of Economic Evaluation / Systems Analysis



# *Goals and Basis for Goals*

- **Goals**
  - Accelerate development of PEM fuel cells for distributed power applications
  - Significantly reduce consumption of fossil fuels
  - Start development of a power generation network based on hydrogen as an energy carrier
  - Work on carbonless infrastructure based on renewable energy
- **Basis for Goals**
  - Motherhood and apple pie

# *Major Barriers to Meeting Goals*

- **Developing a reliable diesel and/or kerosene reformer**
- **Operation in 220 K ( -60 F) weather**
- **Convincing the end consumer that this system will be better than that currently used.**
- **time**
- **money**