the Energy to Lead

Performance Evaluation of Delivered Hydrogen Fueling Stations

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Gas Technology Institute
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Project ID: TV025

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gti

Overview

Timeline

- Start: 03 / 2013
- End: 03 / 2017
- Progress: 15% Complete

Barriers

- Unforeseen Permitting Issues
- Construction Delays
- Efficient Integration of Data Collection Equipment

Budget

- Total Spent: $31,530*
- Total Project Value: $800,000
- Cost Share Percentage: 50%

* as of 3/31/2014

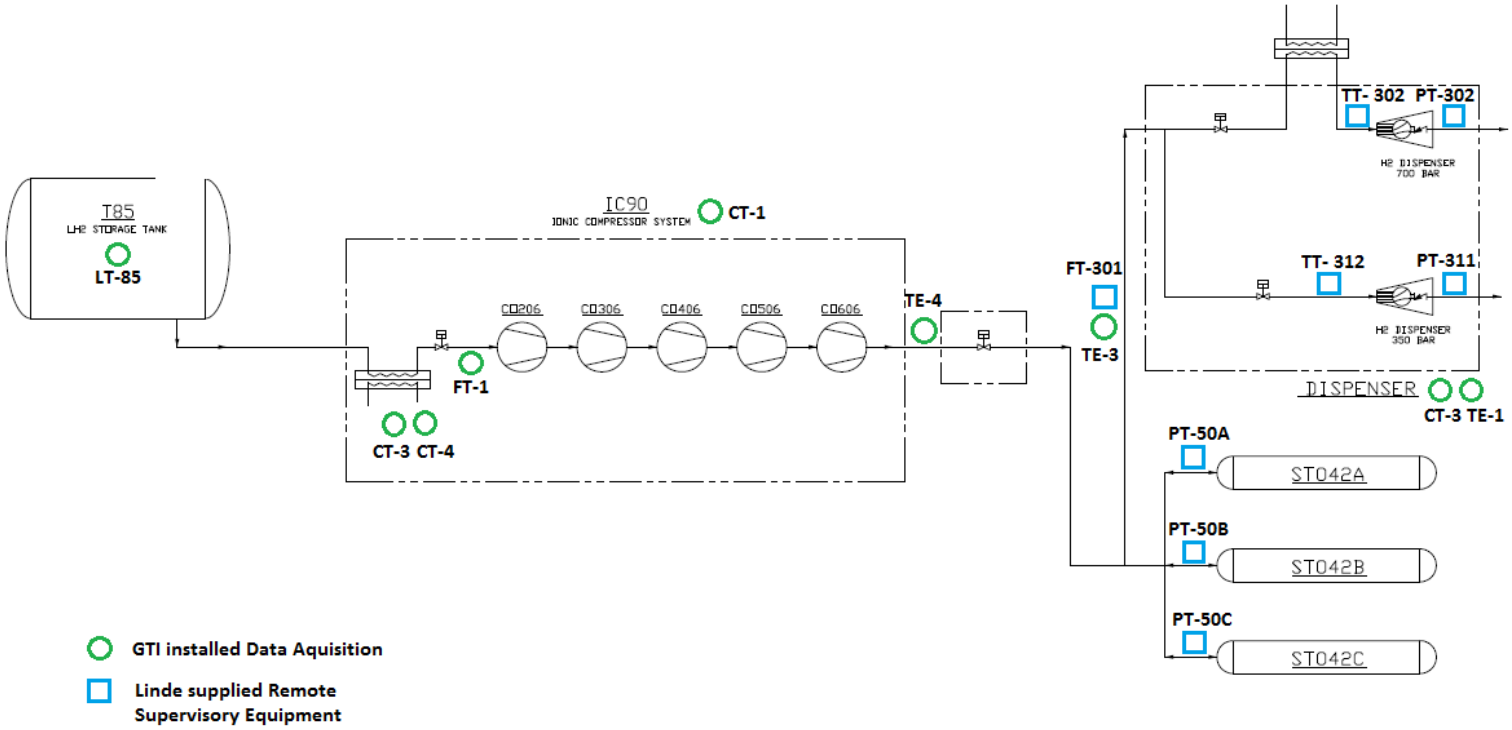
Partners

- Gas Technology Institute (GTI)
- Linde, LLC.

Relevance

DOE Technical Objectives	Project Team Goals
1. Confirm performance of systems in real world applications through data collection.	• Integrate largely non-intrusive data collection systems at (5) 100 kg/day delivered hydrogen fueling stations located in California for 24 month period.
2. Provide the public with aggregated data presented in composite data products, and secure confidential data in National Fuel Cell Technology Evaluation Center (NFCTEC).	• Submit station data specified in the NREL Hydrogen Station Data Templates.
3. Benchmark station capacity, utilization, maintenance, and safety.	• Provide useful data to accurately characterize stations' performance.

Approach: General



- A combination of the techniques and coordination between Linde's station controls and GTI's data acquisition system are required to meet project objectives.

Approach: Budget Period 1

Task 1

- Station Assessments- Evaluation of station adequacy to ensure deliverables are achievable. A data acquisition plan will be developed.

Task 2

- Engineering Design and Packaging – Station design package will be reviewed for data acquisition integration. The data collection system design will be finalized.

Task 3

- Data Acquisition Preparation (Initial 2 Sites) – Specification of project materials, execution of HAZOP, and fabrication and installation of equipment.

Go/ No Go Decision Point: A decision to move forward with full project scope will depend on project team's ability to secure funding for remaining three station sites and supply complete sets of data for BP 1.

Approach: Budget Period 2

Task 4

- Data Acquisition Preparation (Remaining 3 Sites) – Specification of project materials, participation of HAZOP, and fabrication and installation of equipment.

Task 5

- Data Collection– Performance period of two years for each station. Equipment and system integrity will be maintained through periodic inspections and maintenance.

Task 6

- Data Analysis and Reporting – Data from equipment and Linde operations will be compiled by GTI and submitted to the HSDC on a quarterly basis throughout the life of the project.

Accomplishments and Progress

Major Accomplishments :

- Permitting phase initiated for San Juan Capistrano and West Sacramento sites (2013).
- Construction bid phase initiated for West Sacramento (Q2-2014).
- Permit drawings submitted for San Capistrano location (Q1-2014).

Accomplishments and Progress

Major Accomplishments (Cont.):

- Data acquisition system design and drawings were completed (Q1-2014).

  - GTI System consist of (9) data collection points identified through station design review.

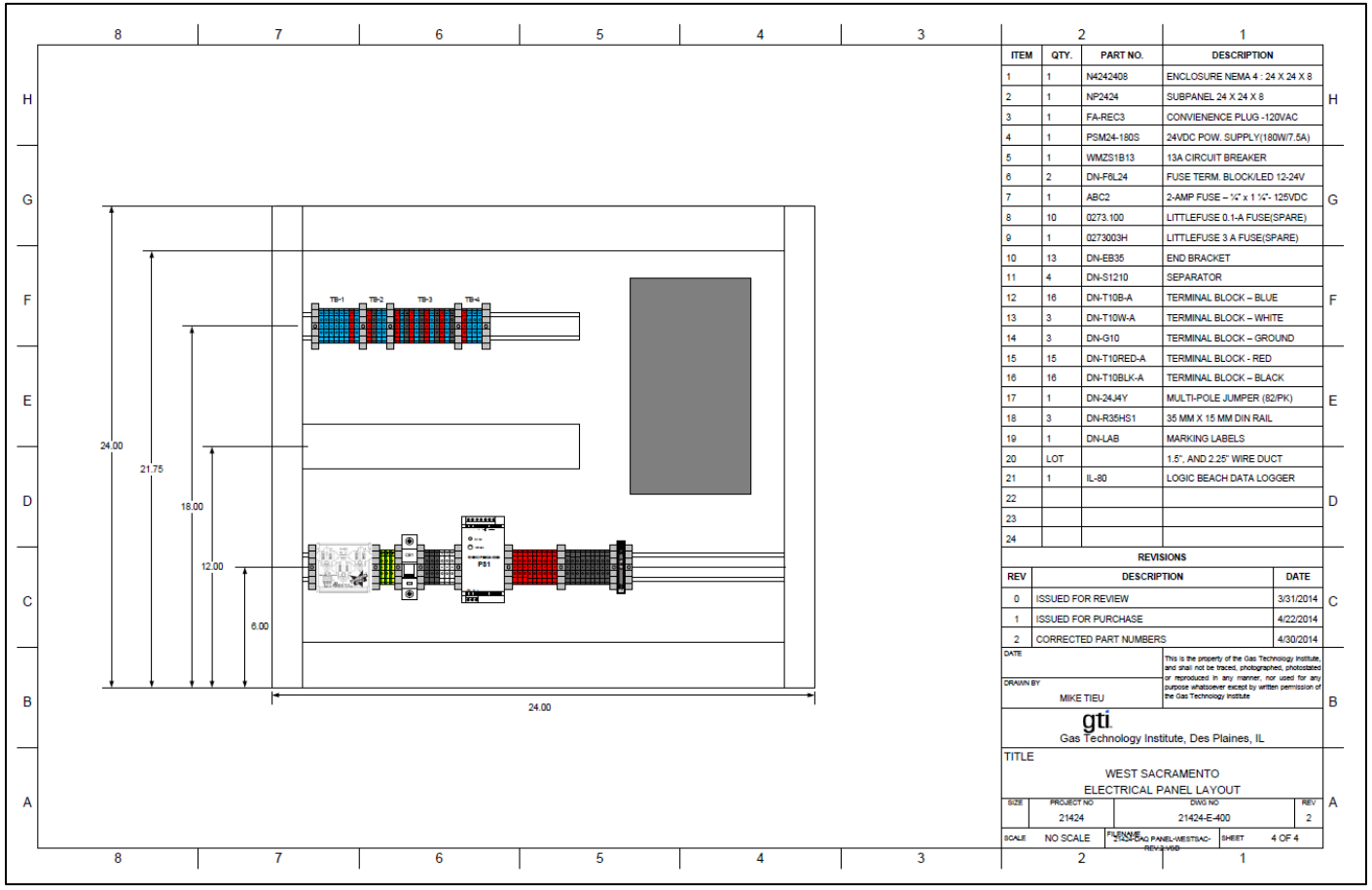
  - An additional (8) data points will be provided by the dispenser's web based supervisory system including final dispensing temperatures and pressures, storage pressure, and dispenser flow rates.

  - Data will be collected and stored at 1 Hz and stored for extraction via internet.

  - Data logger selected was Logic Beach IL-80 with analog, digital, and thermocouple input capabilities.

Accomplishments and Progress

Major Accomplishments (Cont.):



ITEM	QTY.	PART NO.	DESCRIPTION
1	1	N4242408	ENCLOSURE NEMA 4 : 24 X 24 X 8
2	1	NP2424	SUBPANEL 24 X 24 X 8
3	1	FA-REC3	CONVIENENCE PLUG -120VAC
4	1	PSM24-180S	24VDC POW. SUPPLY(180W/7.5A)
5	1	WMZS1B13	13A CIRCUIT BREAKER
6	2	DN-F6L24	FUSE TERM. BLOCK/LED 12-24V
7	1	ABC2	2-AMP FUSE – ¼" x 1 ¼"- 125VDC
8	10	0273.100	LITTLEFUSE 0.1-A FUSE(SPARE)
9	1	0273003H	LITTLEFUSE 3 A FUSE(SPARE)
10	13	DN-EB35	END BRACKET
11	4	DN-S1210	SEPARATOR
12	16	DN-T10B-A	TERMINAL BLOCK – BLUE
13	3	DN-T10W-A	TERMINAL BLOCK – WHITE
14	3	DN-G10	TERMINAL BLOCK – GROUND
15	15	DN-T10RED-A	TERMINAL BLOCK - RED
16	16	DN-T10BLK-A	TERMINAL BLOCK – BLACK
17	1	DN-24J4Y	MULTI-POLE JUMPER (82/PK)
18	3	DN-R35HS1	35 MM X 15 MM DIN RAIL
19	1	DN-LAB	MARKING LABELS
20	LOT		1.5", AND 2.25" WIRE DUCT
21	1	IL-80	LOGIC BEACH DATA LOGGER
22			
23			
24			

REVISIONS		
REV	DESCRIPTION	DATE
0	ISSUED FOR REVIEW	3/31/2014
1	ISSUED FOR PURCHASE	4/22/2014
2	CORRECTED PART NUMBERS	4/30/2014

DATE

DRAWN BY: MIKE TIEU

gti
Gas Technology Institute, Des Plaines, IL

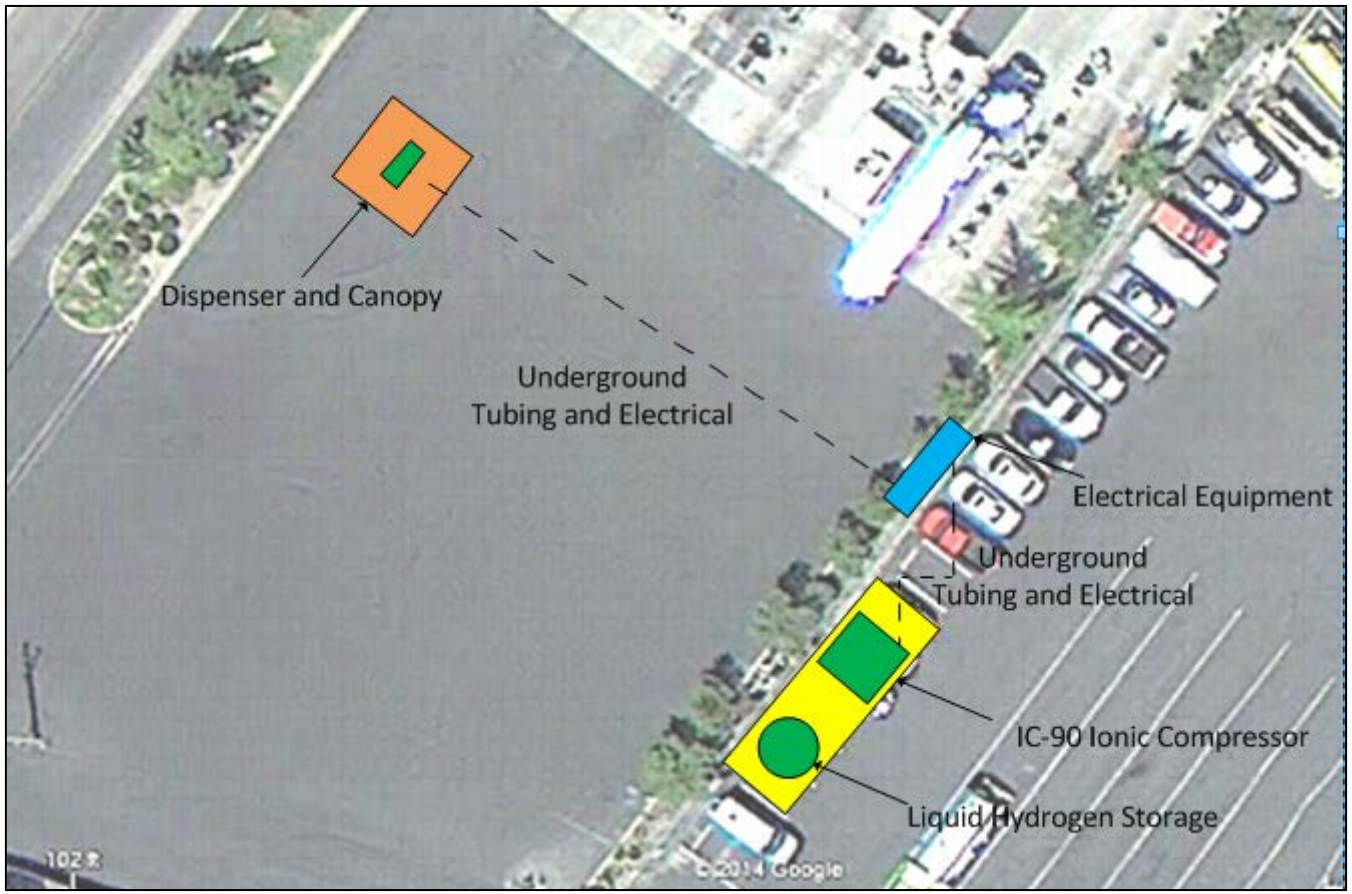
TITLE
WEST SACRAMENTO
ELECTRICAL PANEL LAYOUT

SIZE	PROJECT NO	DWG NO	REV
	21424	21424-E-400	2

SCALE	FILENAME	SHEET
NO SCALE	21424-DAD PANEL-WESTSAC-REV2.VSD	4 OF 4

Accomplishments and Progress

Major Accomplishments (Cont.):



Accomplishments and Progress

Major Accomplishments (Cont.):

- Instrumentation and data logger components have been ordered and received for BP1 scope (Q2-2014).

  Instrumentation and end devices include:

  - (1) Sierra Instruments Mass Flow Meter (0- 40 kg/hr)
  - (2)Honeywell Temperature Transmitters (Type T thermocouples)
  - (1) CR Magnetic Current Transducer (0-20 Amp)
  - (3) Powertek Current Transducers (0-200 Amp, 0 -50 Amp, & 0 -10 Amp)
  - (1) Smart Sensor, Type T Thermocouple
  - (1) Isolation Board used to duplicate tank level signal

Awardee

Project Team:
Gas Technology Institute (Prime) – Current projects:

- Design and build of a landfill gas to hydrogen reformation and refueling demonstration in South Carolina.
- Operations and maintains 50kg/day hydrogen generation, compression, and dispensing station at University of Texas-Austin.

Collaborations

Project Team (Continued):

Linde Hydrogen Fueling (Subcontractor) –

- Linde LLC. is a global supplier of industrial gases and is committed to developing fueling infrastructure in the U.S.
- In 2012, Linde designed, built, and currently operates Emeryville, CA Station for AC Transit.
- Working with Lawrence Livermore National Laboratory to demonstrate liquid hydrogen pumping technologies.

Collaborations

Team Member	Roles
GTI	Oversees and manages the project; designs, builds, and installs data collection system; post processes of data and reports to NREL; maintenance of data collection unit throughout performance period.
Linde	Technical advisor and Coordinator of site design information; coordination of site utilities, communications, and power for data collection effort, submitting transactional, utility, safety, and operations data to GTI, maintenance of the station throughout performance period.

Proposed Future Work

- Fabrication and testing of data acquisition hardware and software at GTI (Q3-2014).
- Installation of instrumentation and electrical panel at West Sacramento site (Q3-2014).
- Advance the readiness of remaining station sites.

Summary

Relevance: GTI aims to compile, analyze, and submit pertinent data to meet technology validation objectives and goals set forth by the Fuel Cell Technologies Program through its multi-year research, development, and demonstration plan.

Approach: Develop, integrate, and maintain non-intrusive data collection systems to produce meaningful observations and data collection for the NFCTEC.

Accomplishments: Technical reviews of initial sites were completed. Data collection equipment design was completed and hardware procured.

Summary

Collaborations: Project team and structure have been assembled. Key team members from both organizations have been identified and roles have been defined, and are working together well.

Future Work: Fabrication, testing, and installation of systems on initial site locations. First set of data produced for West Sacramento is expected by end of 2014.