



Technical Report
NREL/TP-5400-60797
November 2013

Next Generation Hydrogen Station Composite Data Products

Data through Quarter 2 of 2013

S. Sprik, J. Kurtz, C. Ainscough, M. Post, G. Saur, and M. Peters

This report is available at no cost from the National Renewable Energy Laboratory (NREL) at www.nrel.gov/publications.

**NREL is a national laboratory of the U.S. Department of Energy, Office of Energy
Efficiency & Renewable Energy, operated by the Alliance for Sustainable Energy, LLC.**

Contract No. DE-AC36-08GO28308

NOTICE

This report was prepared as an account of work sponsored by an agency of the United States government. Neither the United States government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States government or any agency thereof.

Available electronically at <http://www.osti.gov/bridge>
Available for a processing fee to U.S. Department of Energy
and its contractors, in paper, from:
U.S. Department of Energy
Office of Scientific and Technical Information
P.O. Box 62
Oak Ridge, TN 37831-0062
phone: 865.576.8401
fax: 865.576.5728
email: <mailto:reports@adonis.osti.gov>

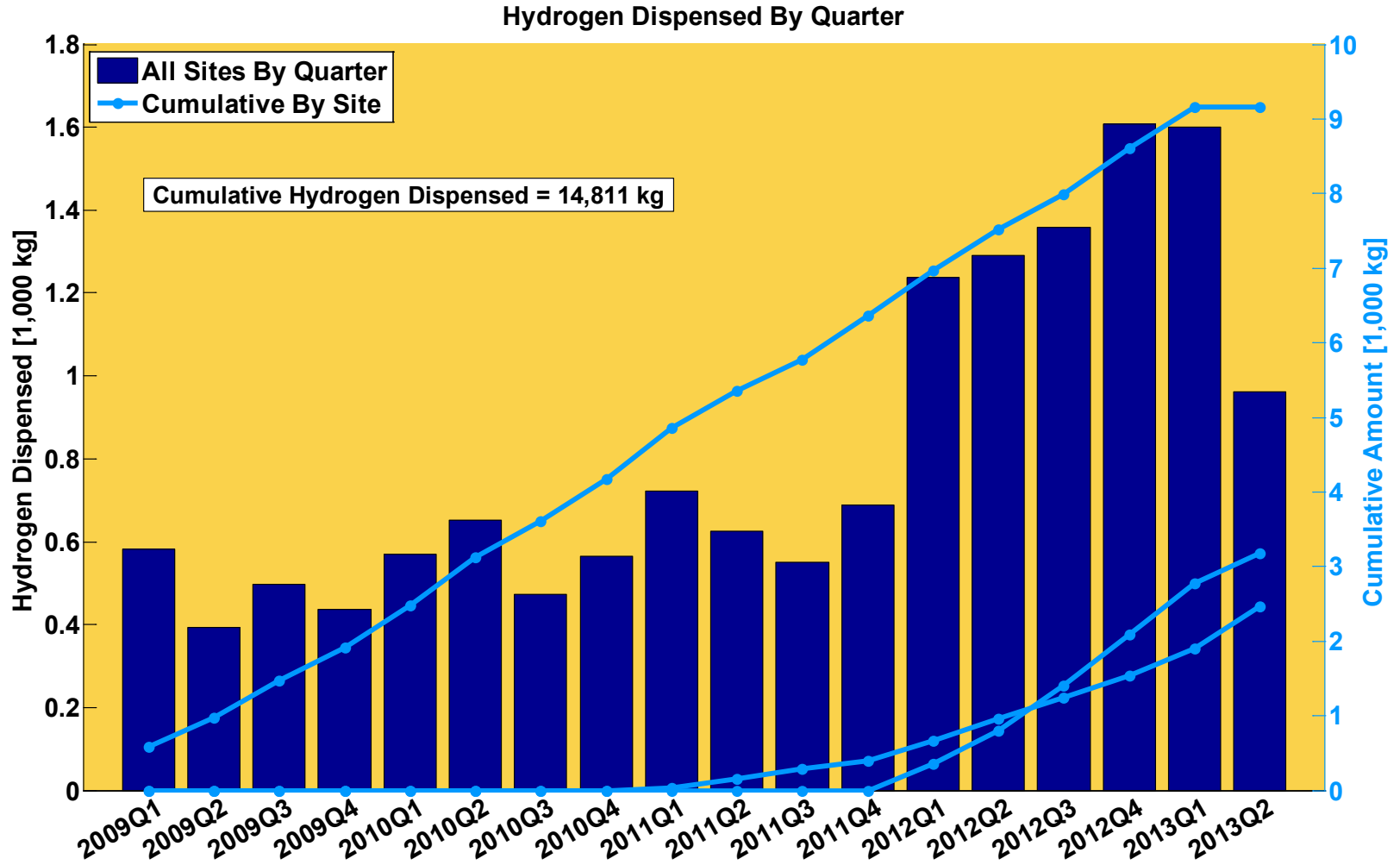
Available for sale to the public, in paper, from:
U.S. Department of Commerce
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
phone: 800.553.6847
fax: 703.605.6900
email: orders@ntis.fedworld.gov
online ordering: <http://www.ntis.gov/help/ordermethods.aspx>

Cover Photos: (left to right) PIX 16416, PIX 17423, PIX 16560, PIX 17613, PIX 17436, PIX 17721

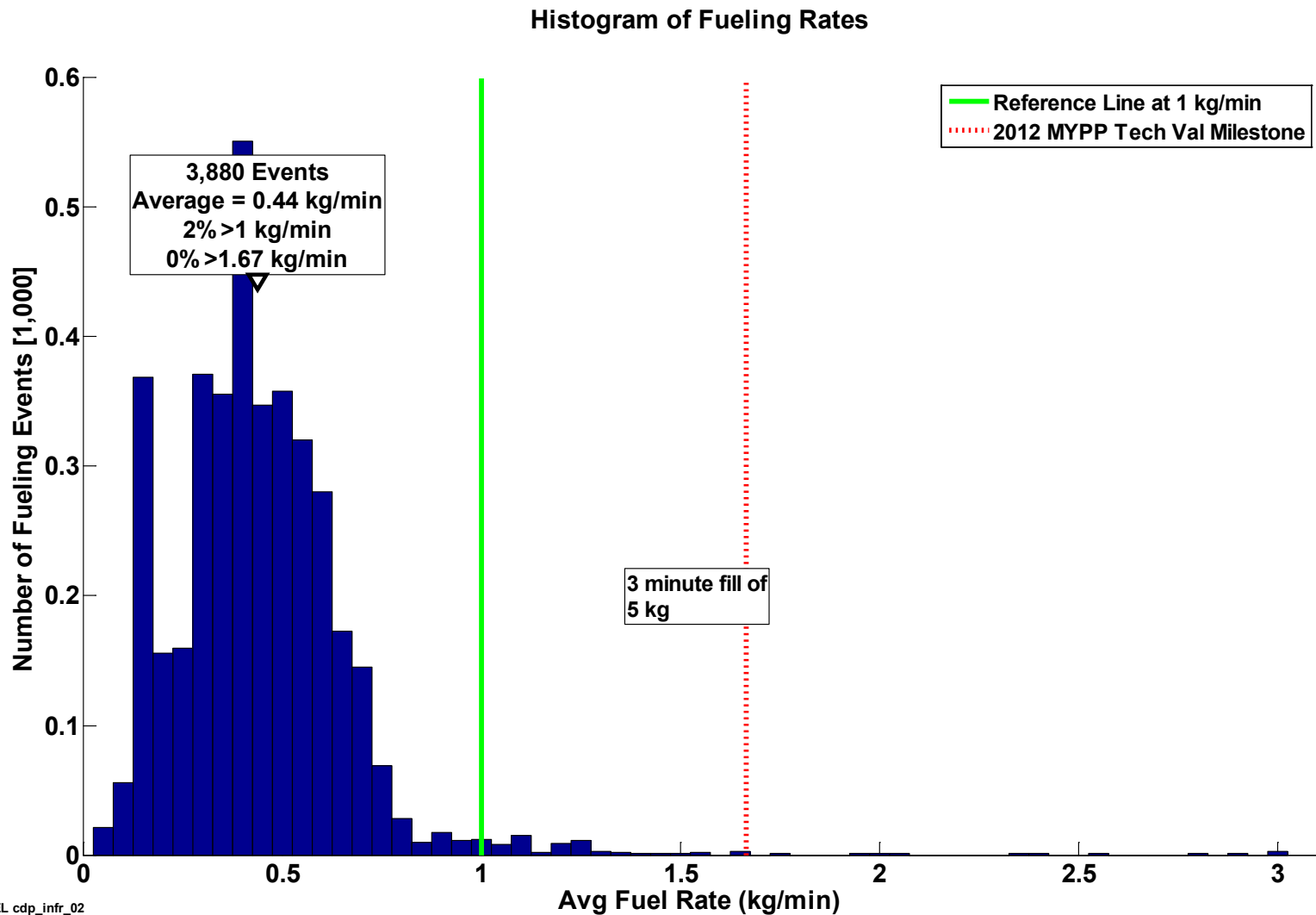


Printed on paper containing at least 50% wastepaper, including 10% post consumer waste.

Hydrogen Dispensed by Quarter

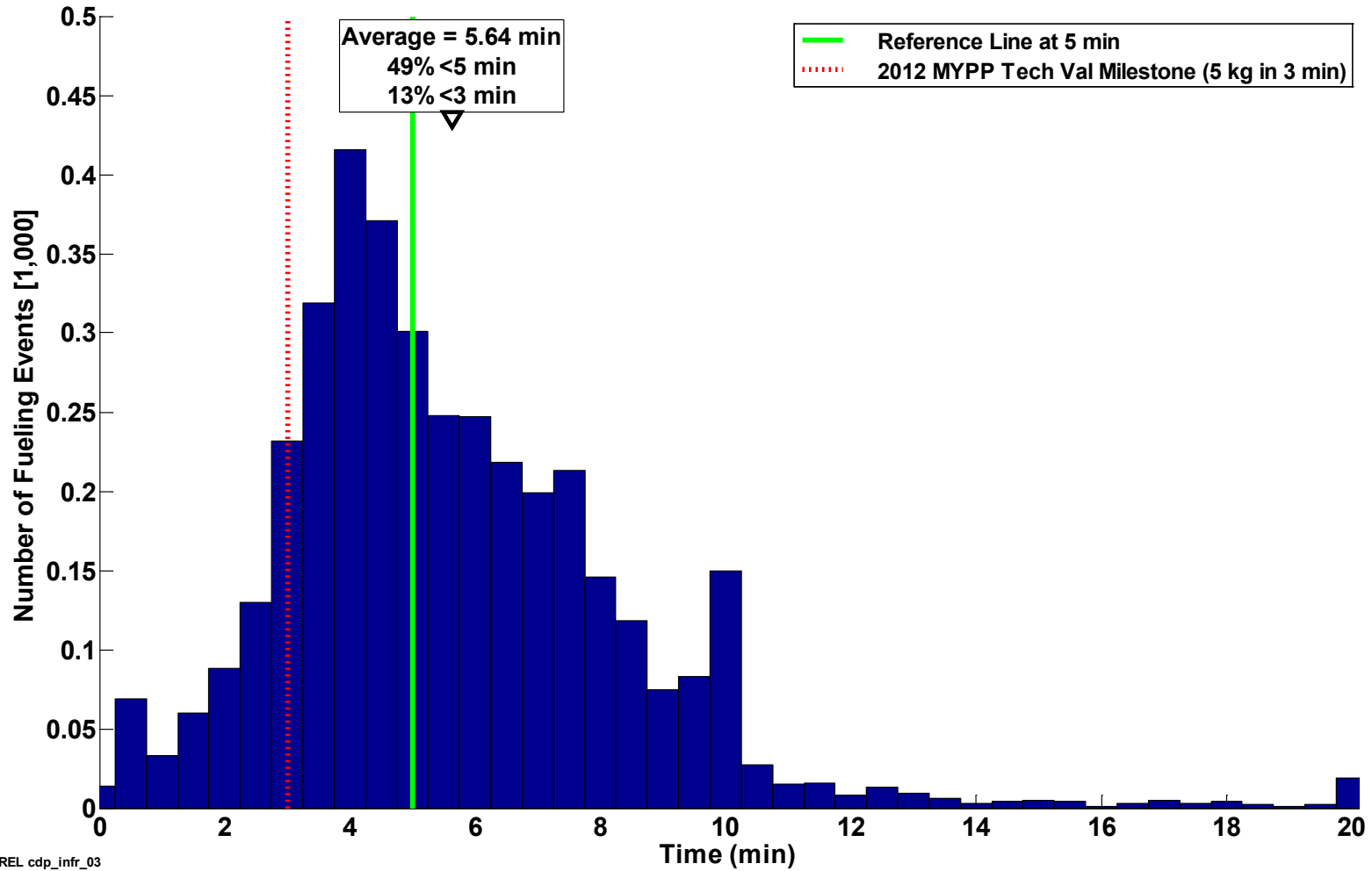


Histogram of Fueling Rates



Histogram of Fueling Times

Histogram of Fueling Times

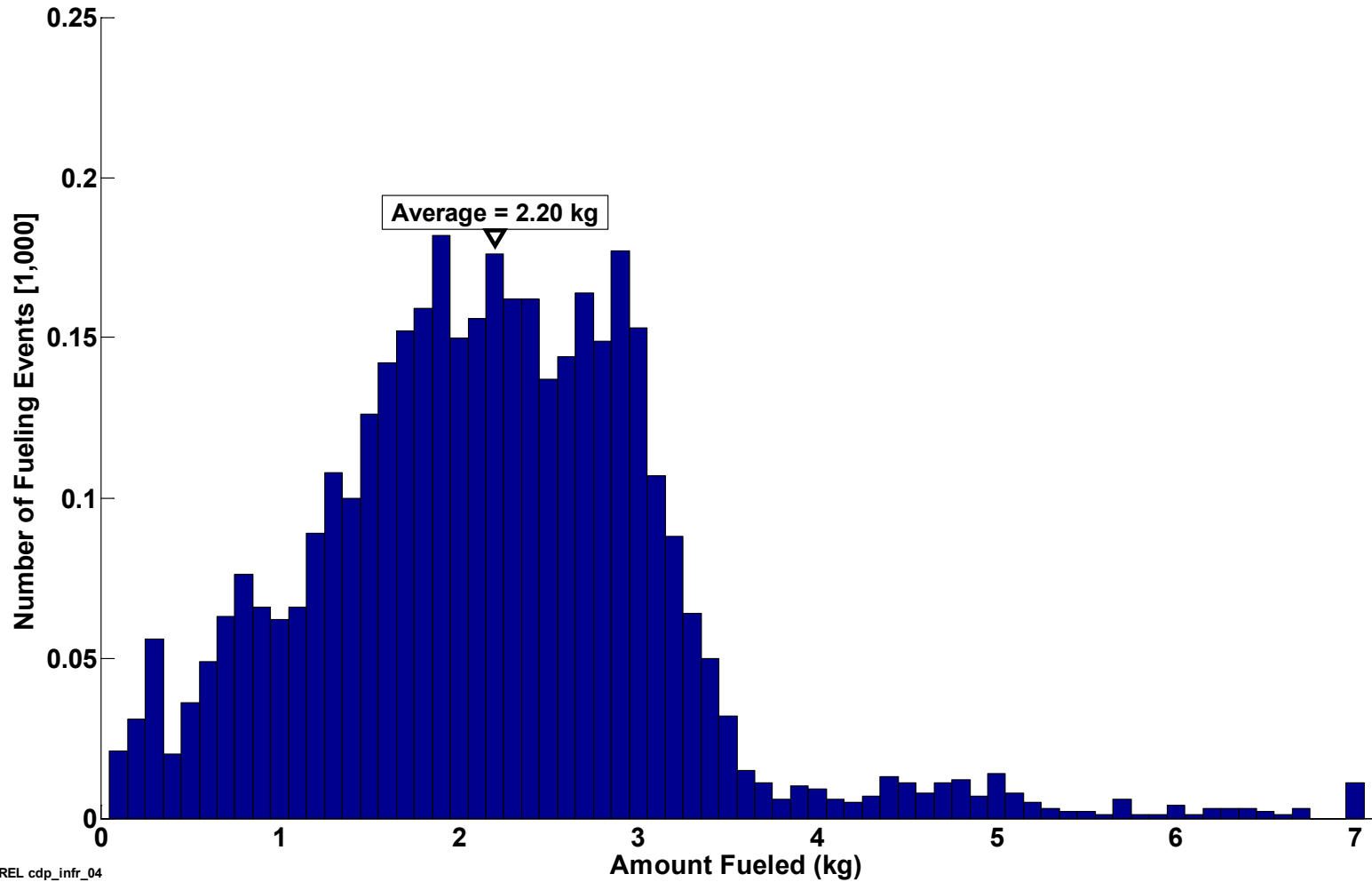


NREL cdp_infr_03

Created: Oct-14-13 4:28 PM | Data Through: 2013Q2

Histogram of Fueling Amounts

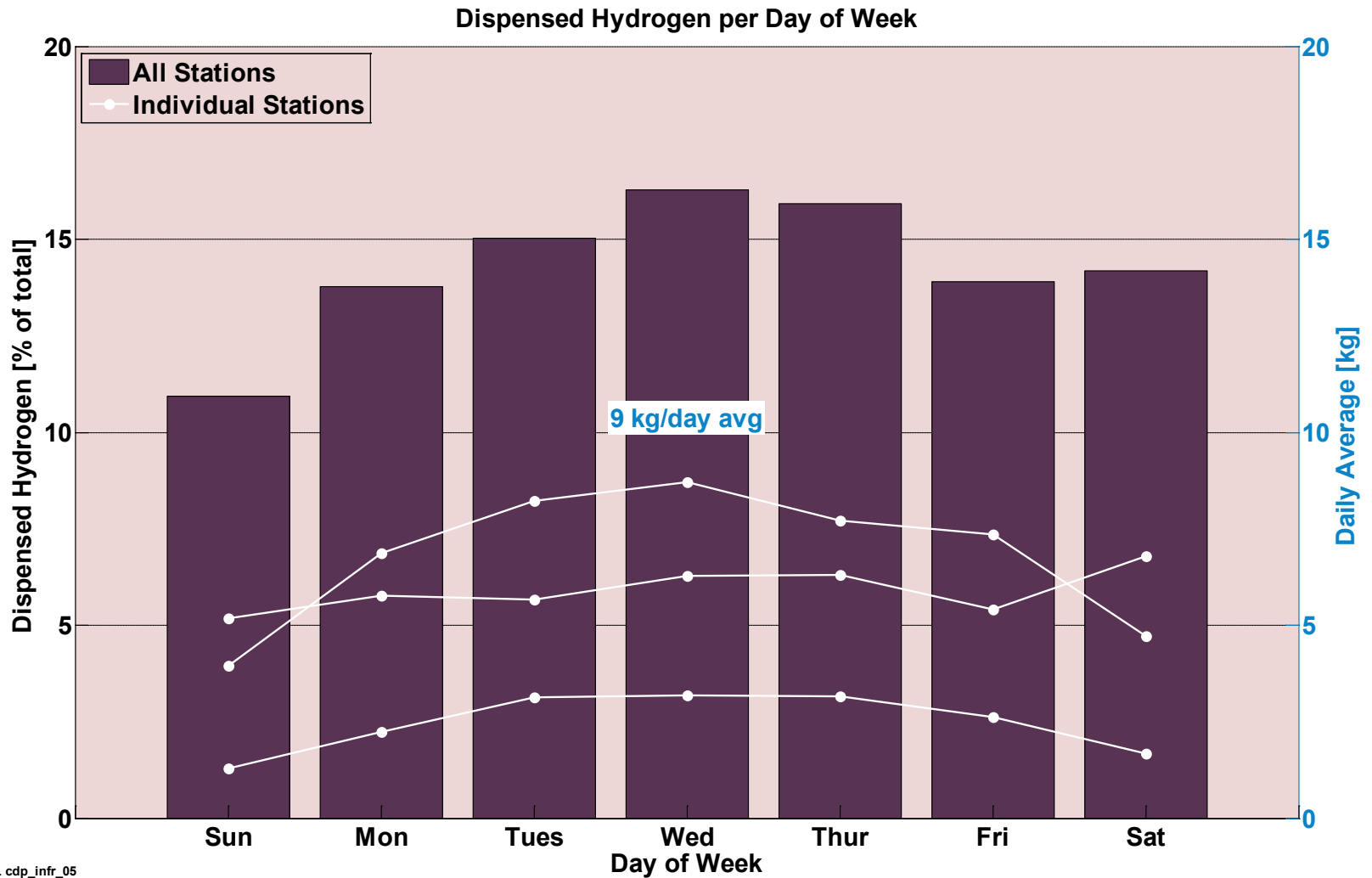
Histogram of Fueling Amounts



NREL cdp_infr_04

Created: Oct-14-13 4:28 PM | Data Through: 2013Q2

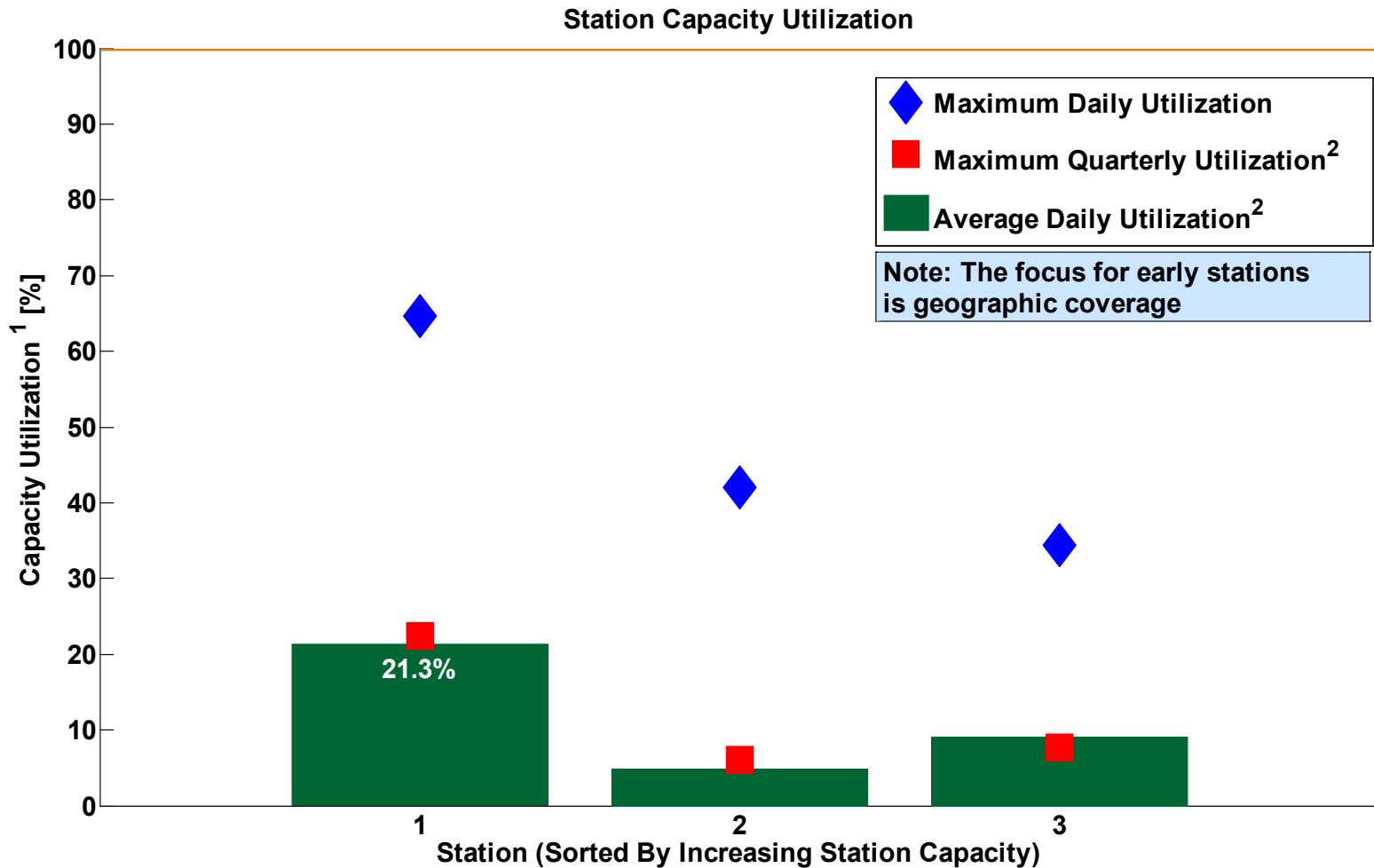
Dispensed Hydrogen per Day of Week



NREL cdp_infr_05

Created: Oct-14-13 4:29 PM | Data Through: 2013Q2

Station Capacity Utilization



NREL cdp_infr_06

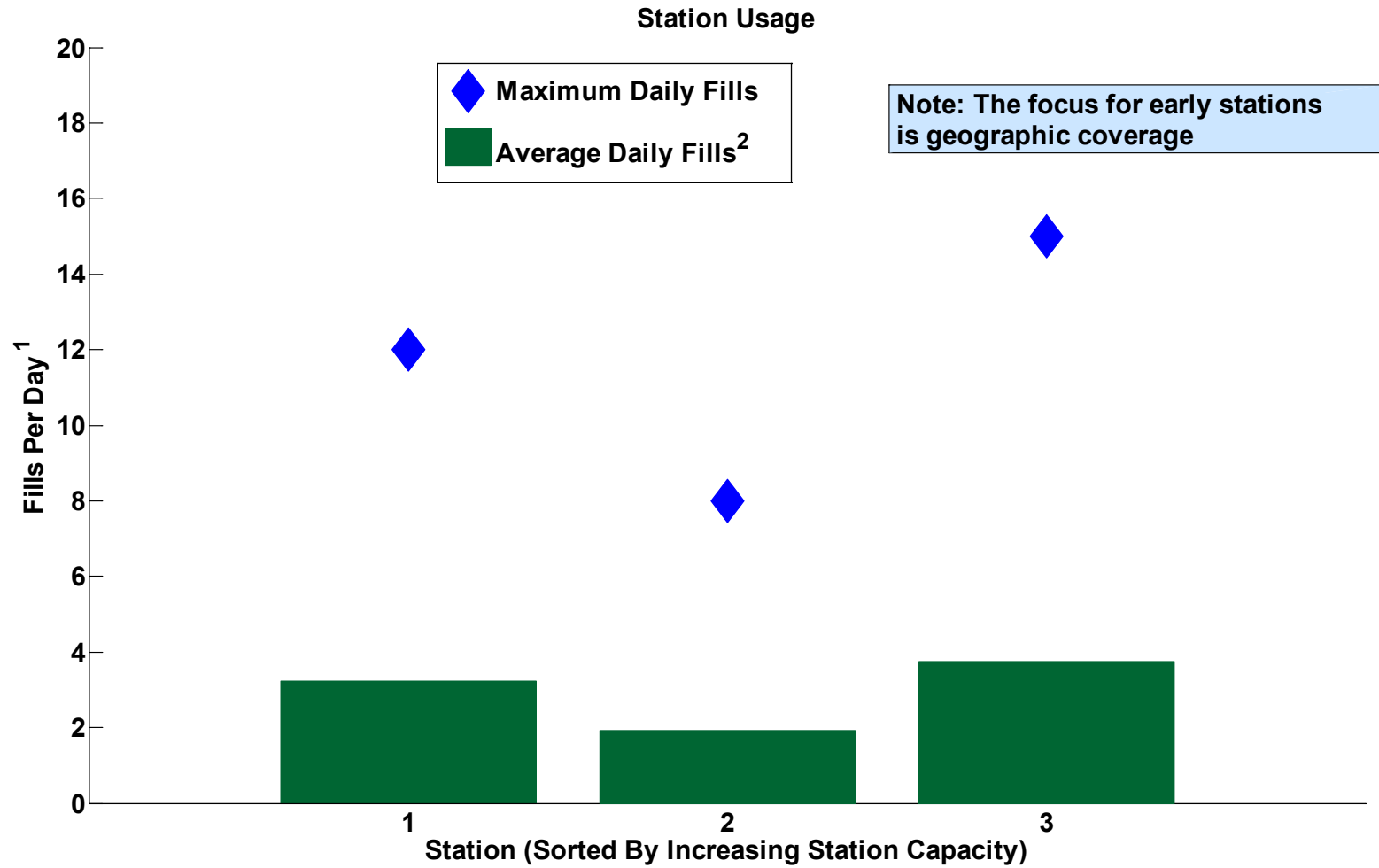
Created: Oct-14-13 4:29 PM | Data Through: 2013Q2

¹Station nameplate capacity reflects a variety of system design considerations including system capacity, throughput, system reliability and durability, and maintenance. Actual daily usage may exceed nameplate capacity.

²Maximum quarterly utilization considers all days; average daily utilization considers only days when at least one filling occurred

CDP-INFR-07

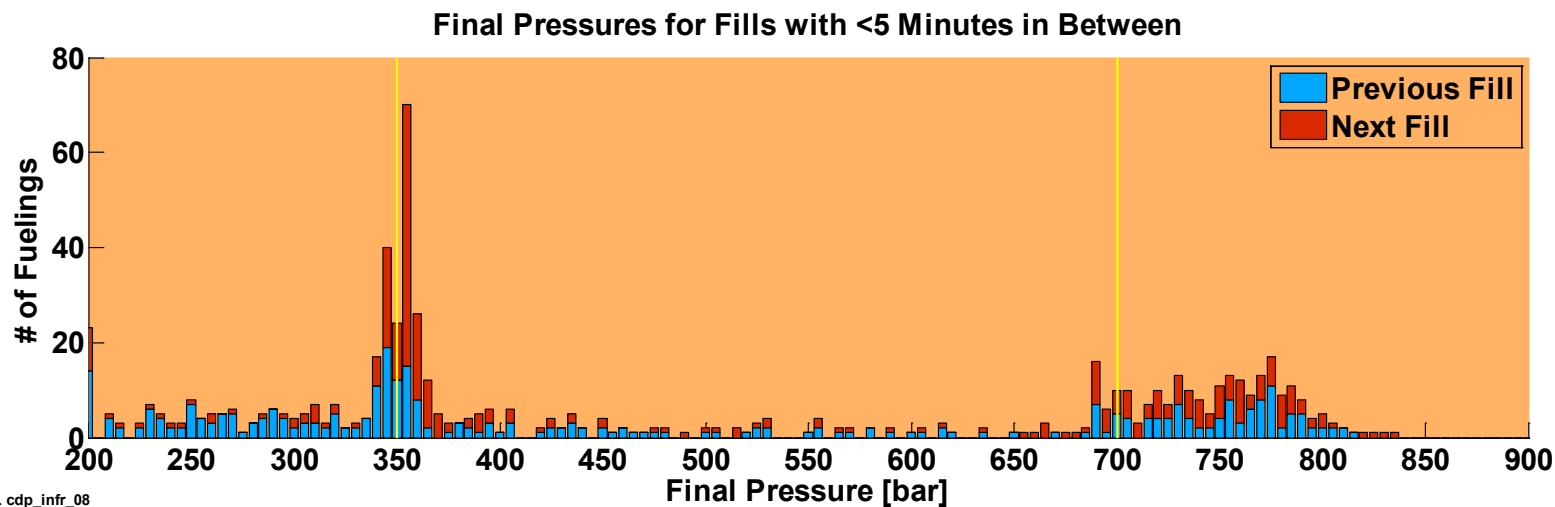
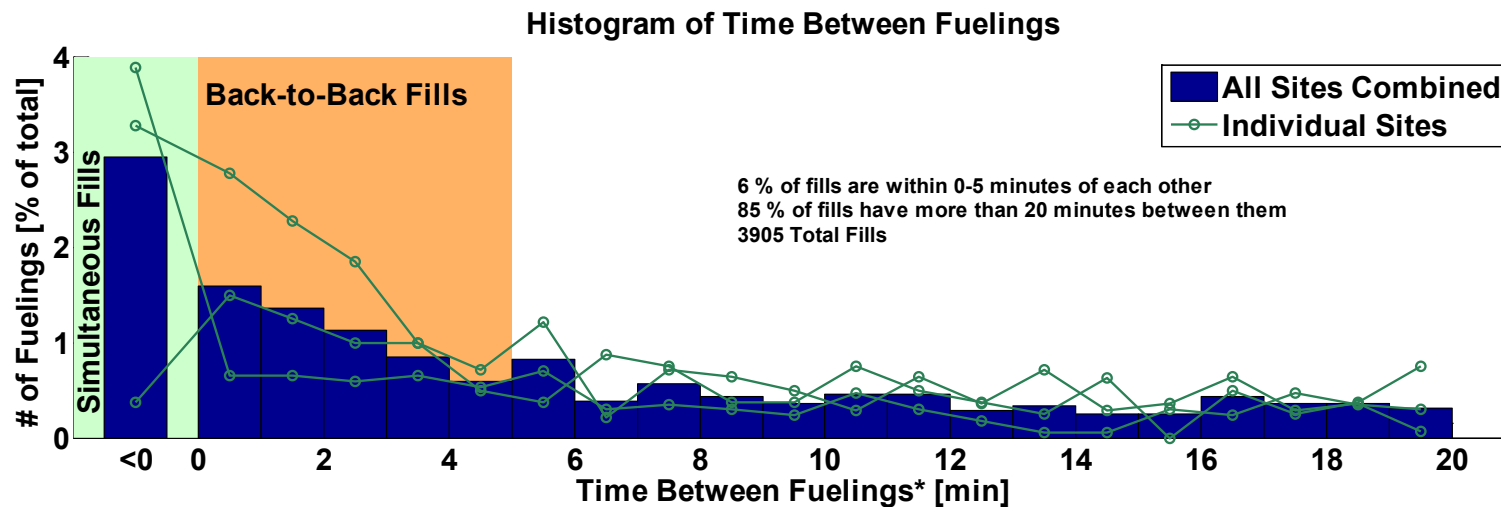
Station Usage



¹Excludes hydrogen fills of < 0.5 kg

²Average daily fills considers only days when at least one fill occurred

Time Between Fueling

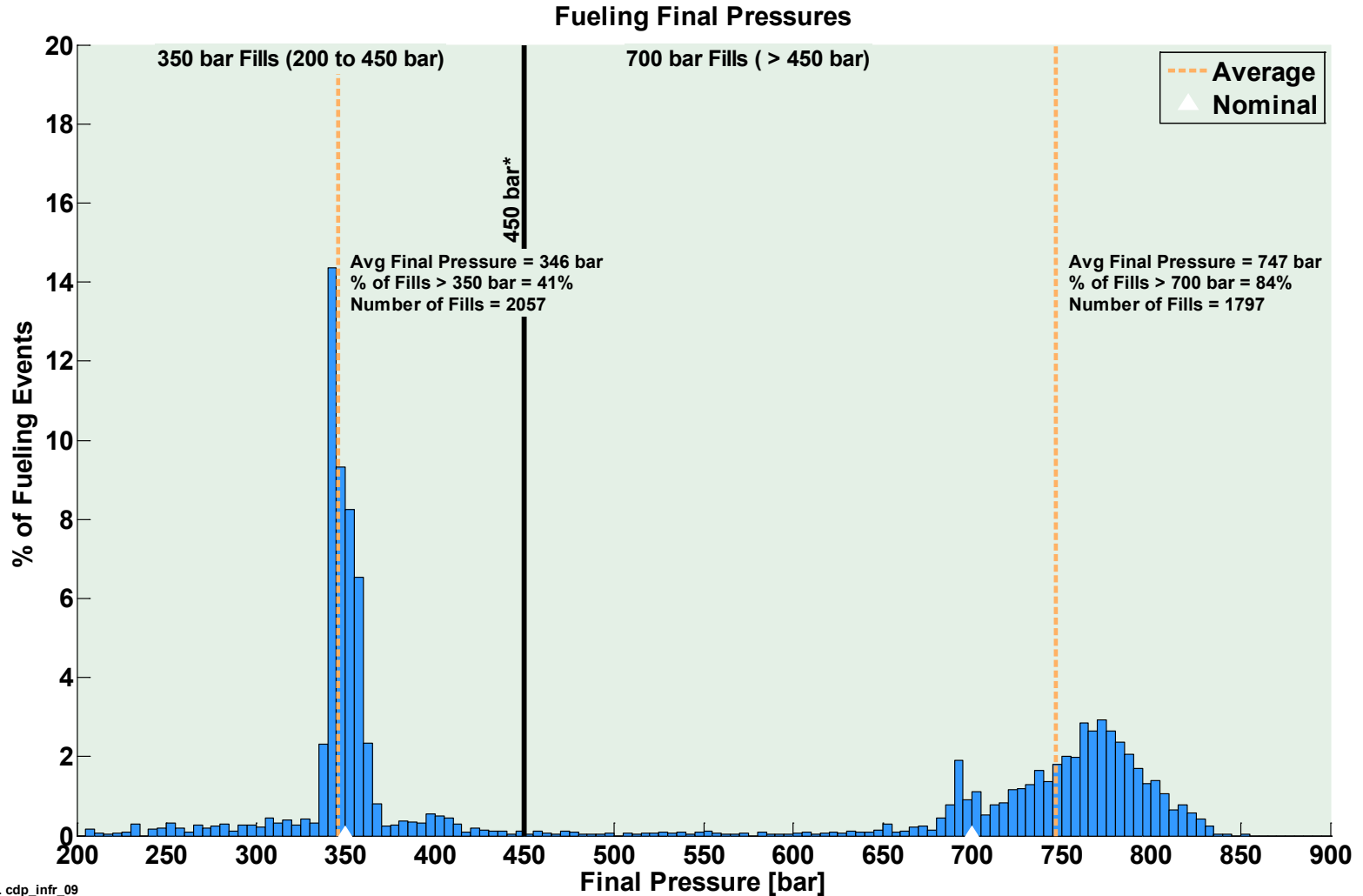


NREL cdp_infr_08

Created: Oct-14-13 4:30 PM | Data Through: 2013Q2

*Time is from end of fill to start of next fill.

Fueling Final Pressures

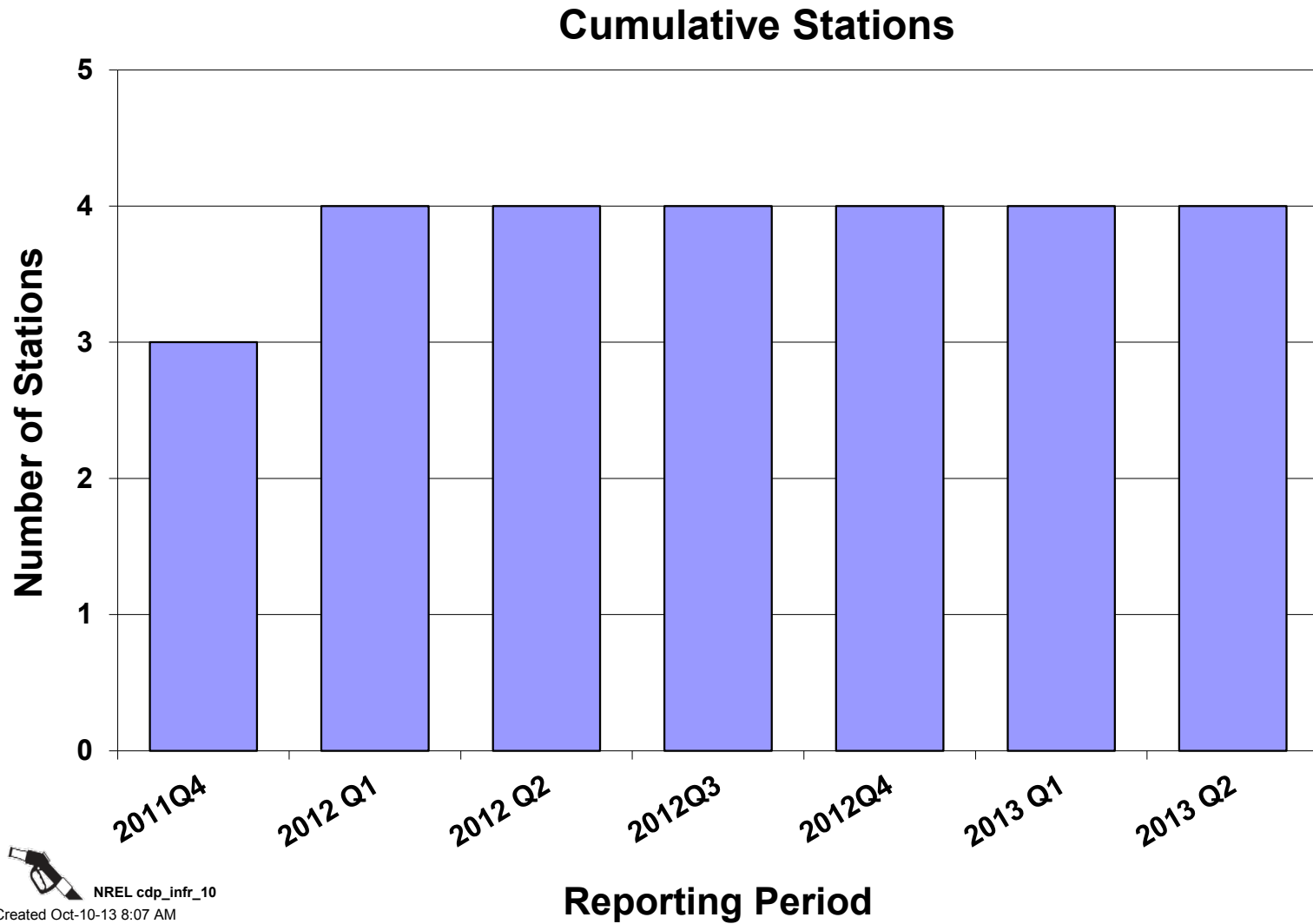


NREL cdp_infr_09

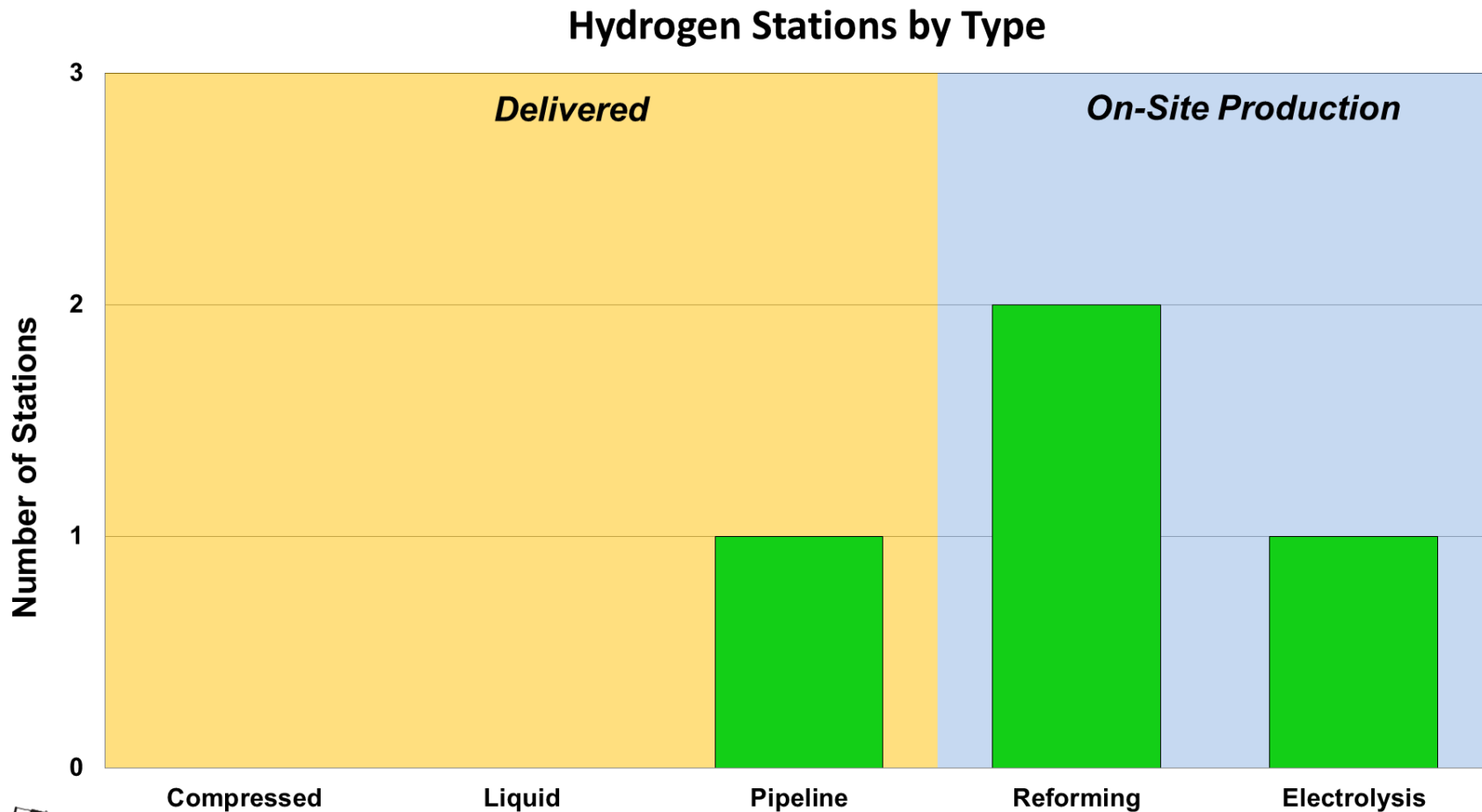
Created: Oct-14-13 4:30 PM | Data Through: 2013Q2

*The line at 450 bar separates 350 bar fills from 700 bar fills. It is slightly over the allowable 125% of nominal pressure (437.5 bar) from SAE J2601.

Cumulative Number of Stations

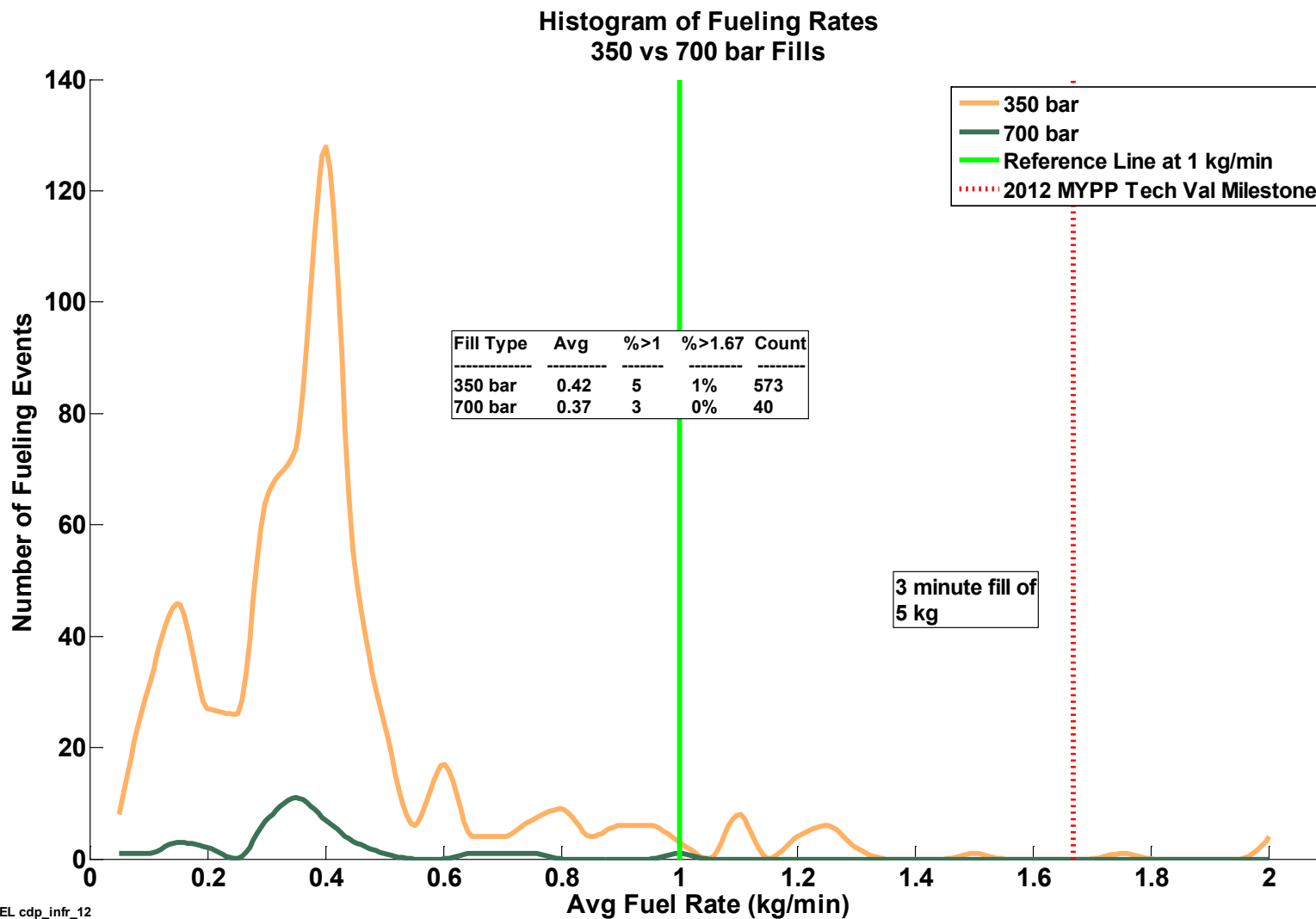


Hydrogen Stations by Type



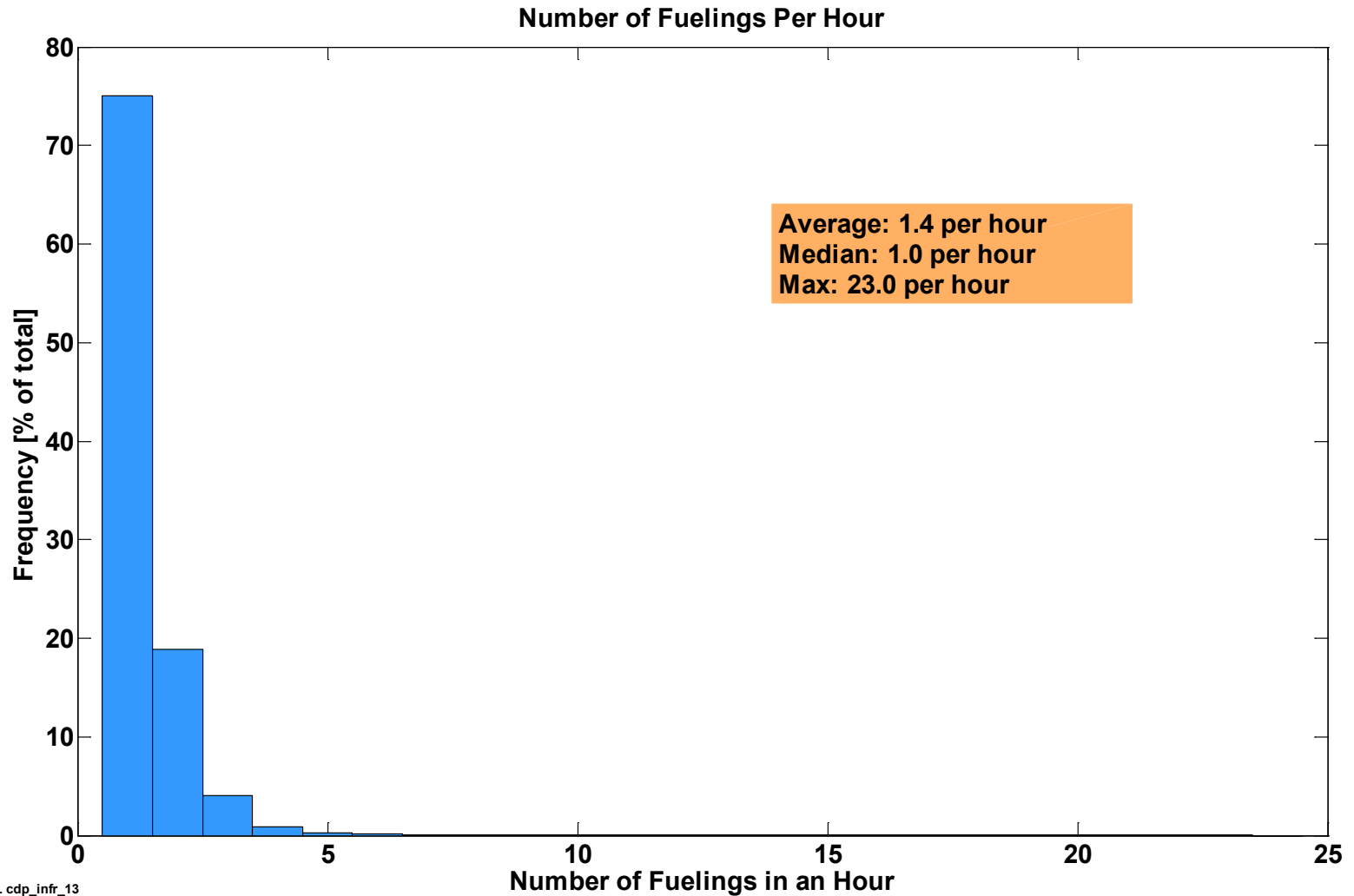
CDP-INFR-12

Fueling Rates 350 vs. 700 bar



CDP-INFR-13

Number of Fueling Events per Hour

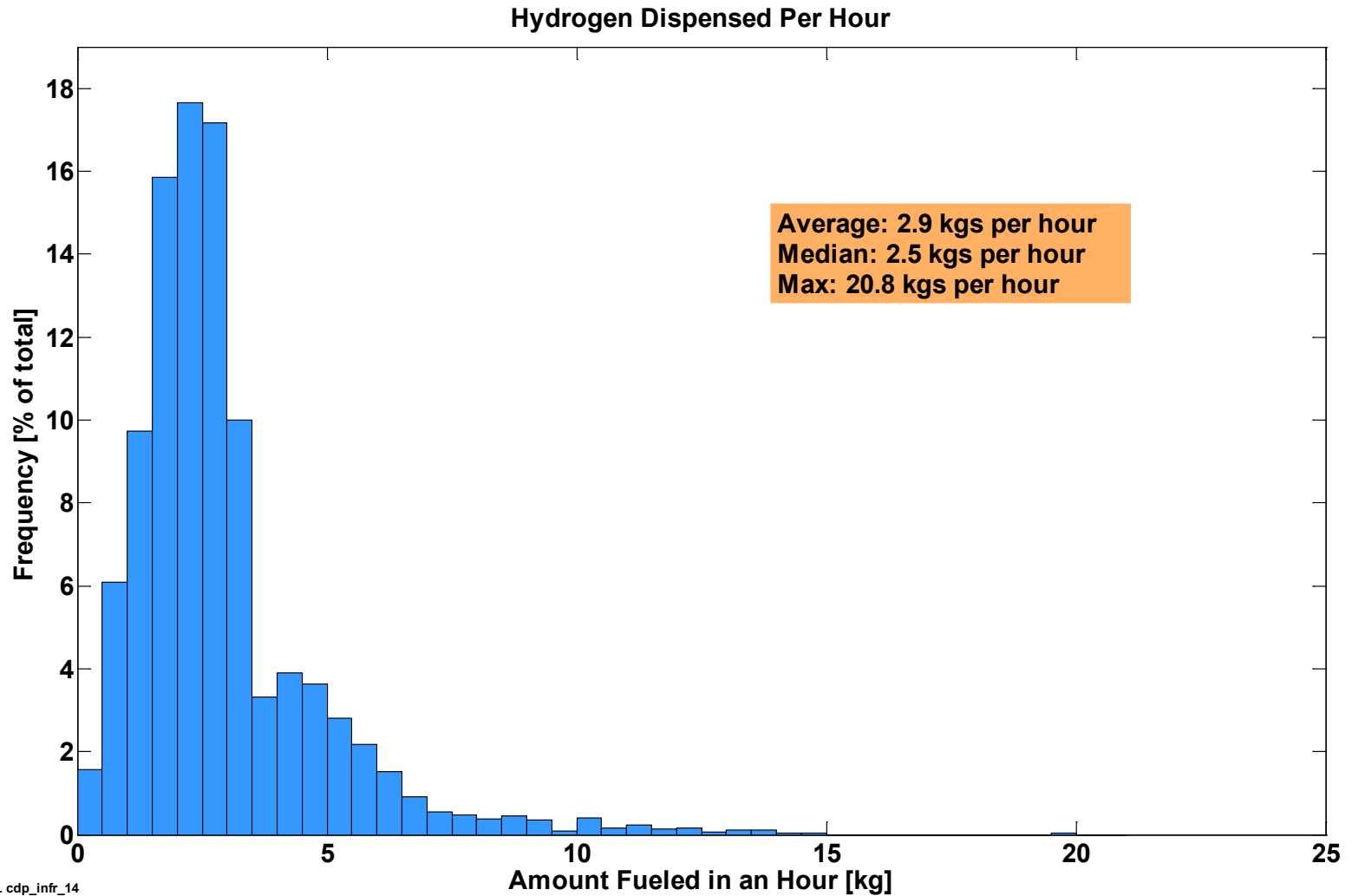


NREL cdp_infr_13

Created: Oct-14-13 4:31 PM | Data Through: 2013Q2

CDP-INFR-14

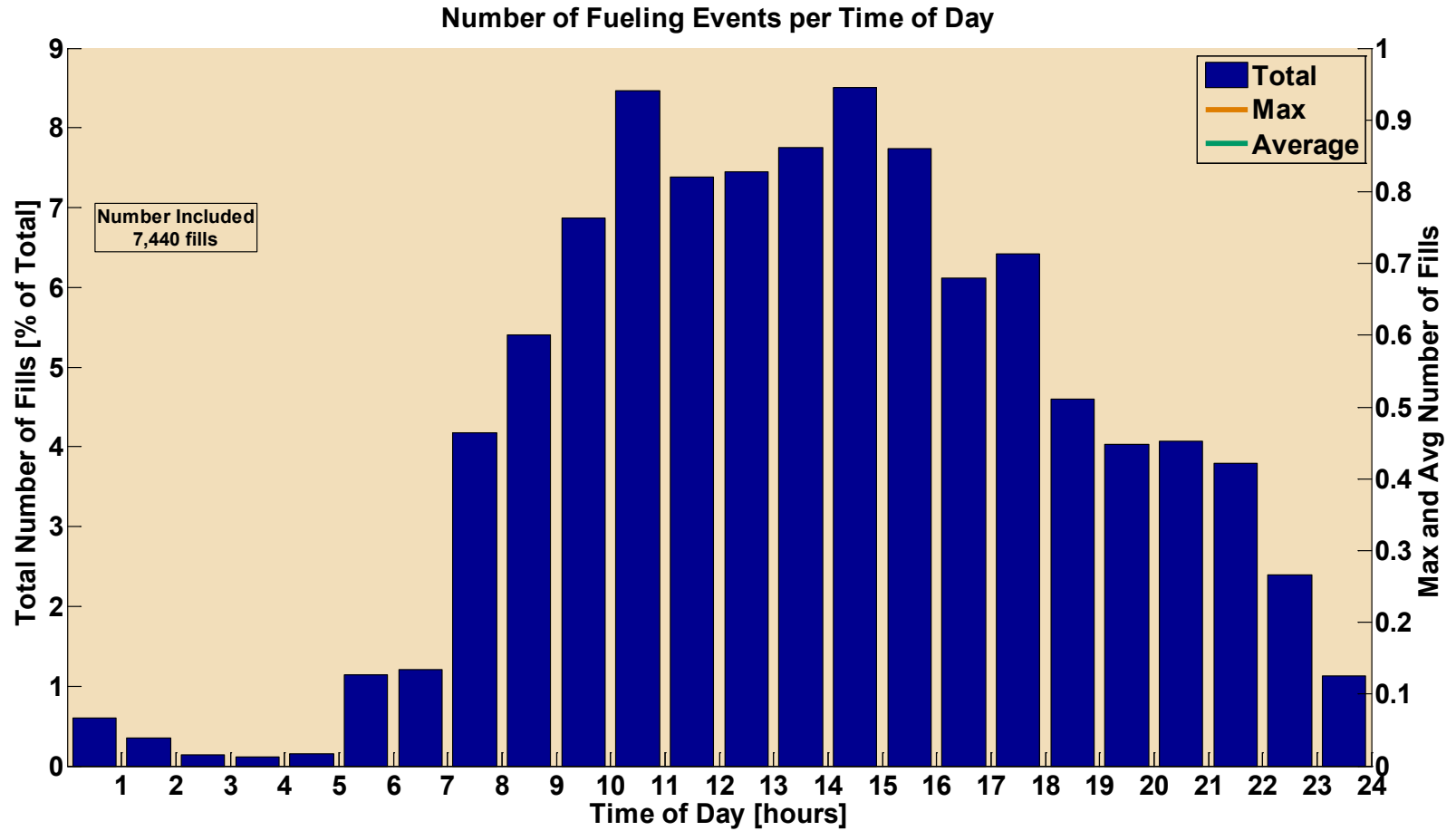
Hydrogen Dispensed per Hour



NREL cdp_infr_14

Created: Oct-14-13 4:31 PM | Data Through: 2013Q2

Number of Fills by Time of Day

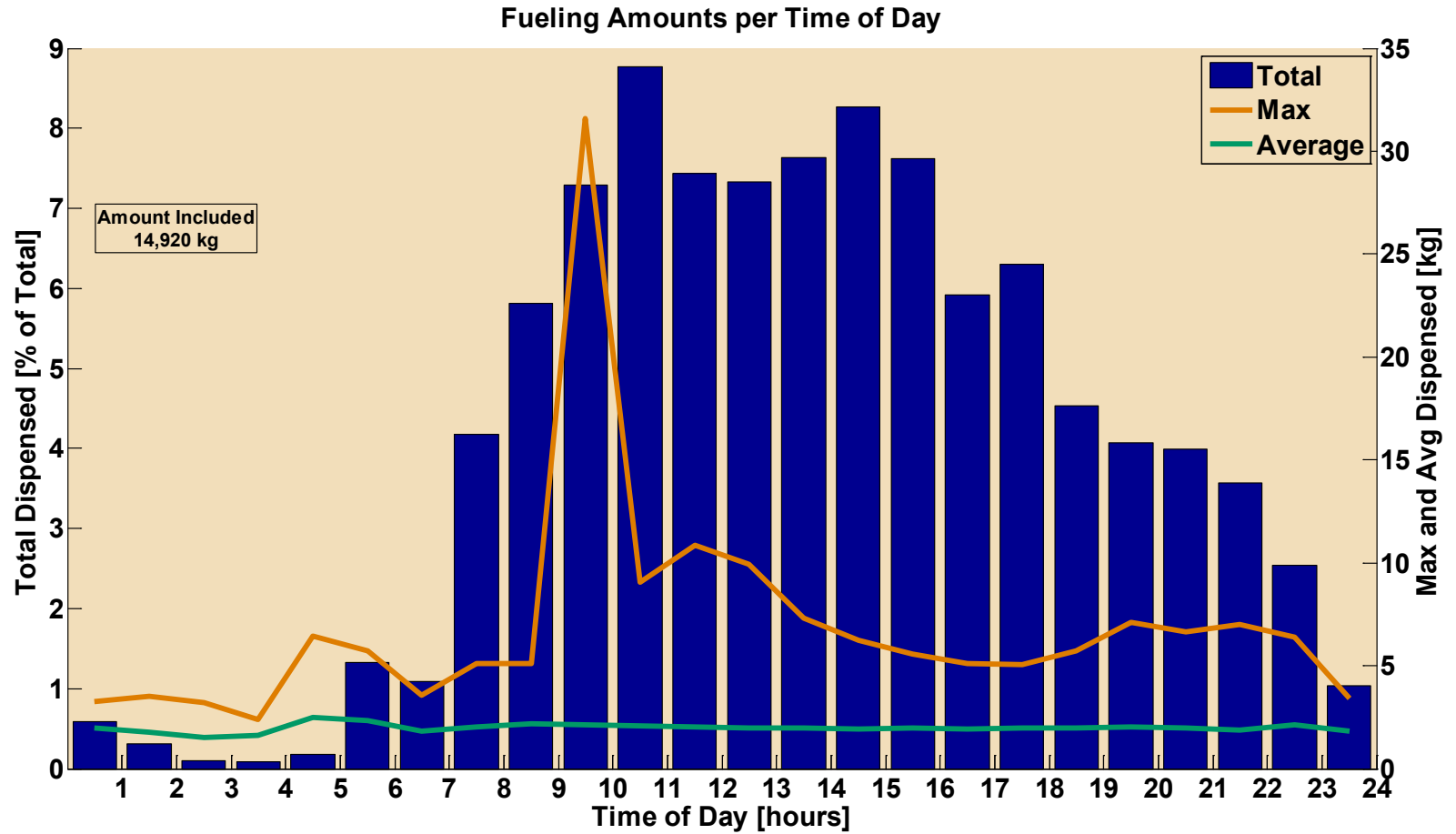


NREL cdp_infr_15

Created: Oct-14-13 4:32 PM | Data Through: 2013Q2

CDP-INFR-16

Fueling Amounts per Time of Day



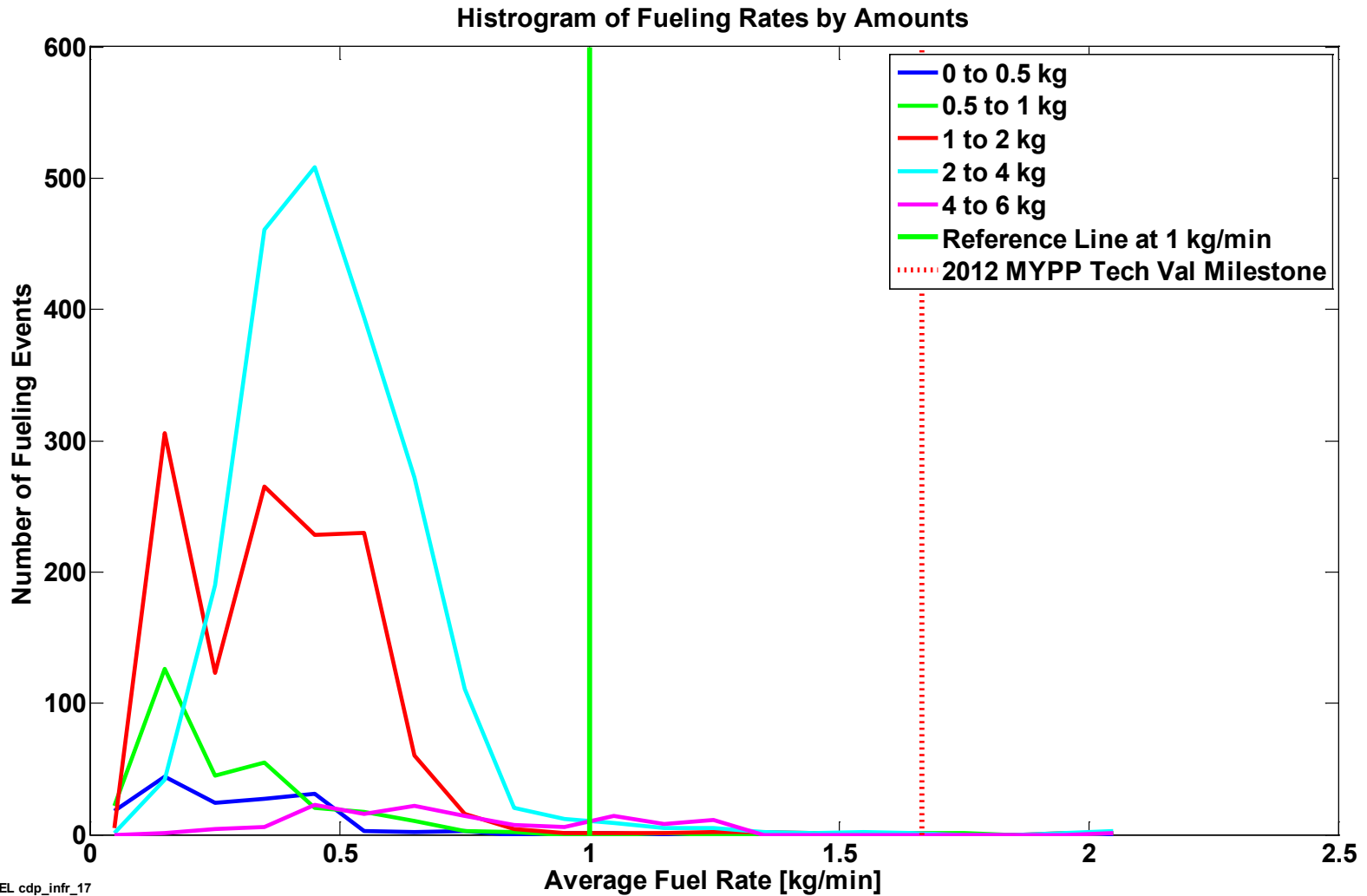
Amount Included
14,920 kg



NREL cdp_infr_16

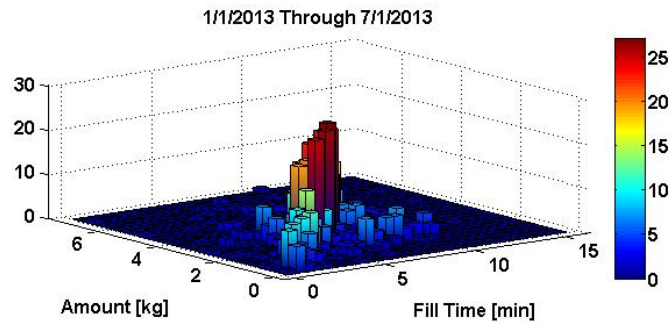
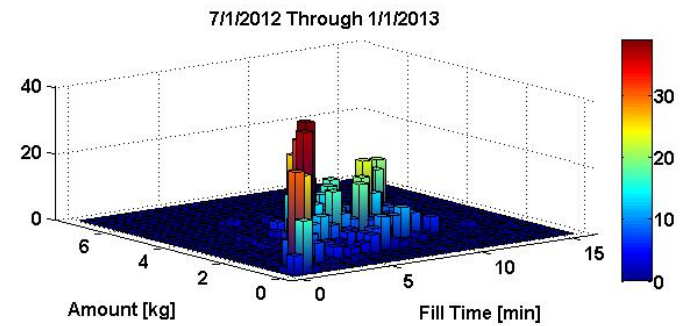
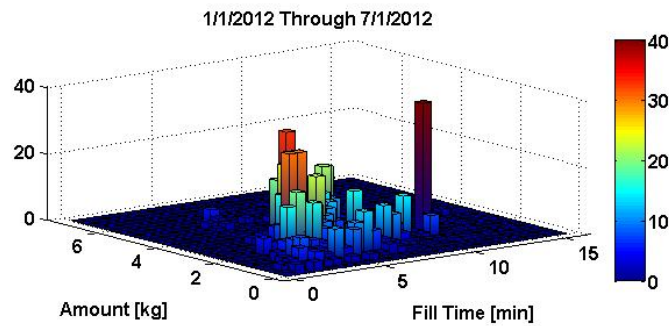
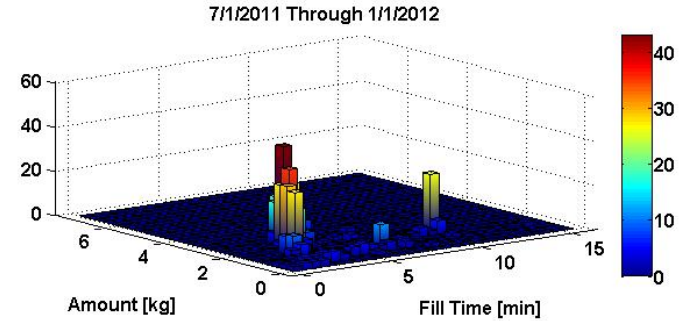
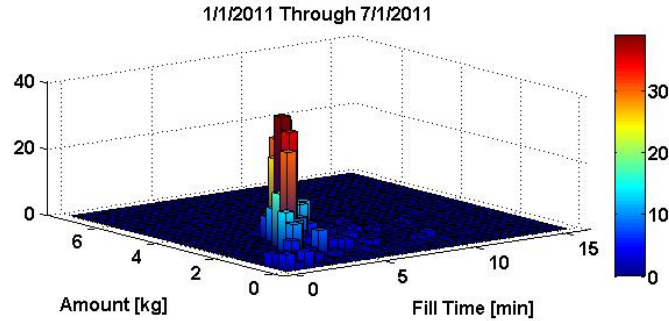
Created: Oct-14-13 4:32 PM | Data Through: 2013Q2

Fueling Rates by Amount Filled



Fueling Amount vs. Time to Fill

Histogram of Fueling Amount Vs Time



NREL cdp_infr_18

Created: Oct-14-13 4:33 PM | Data Through: 2013Q2