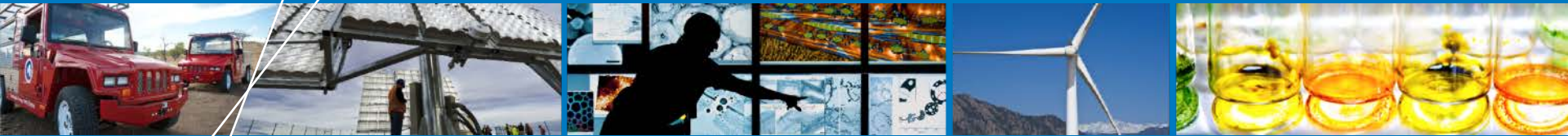


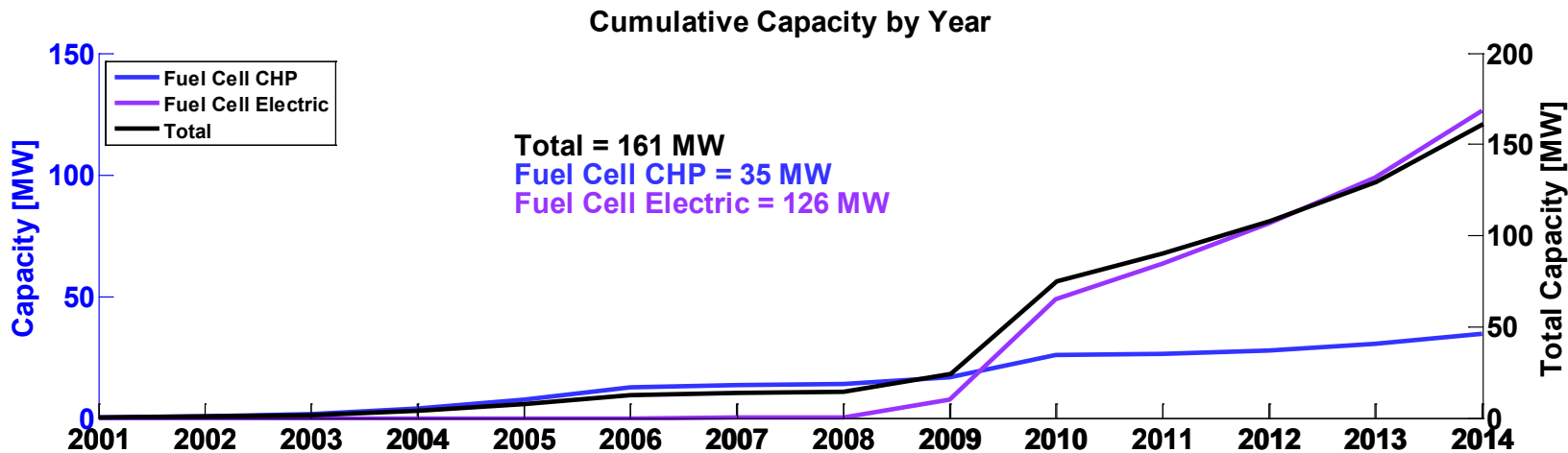
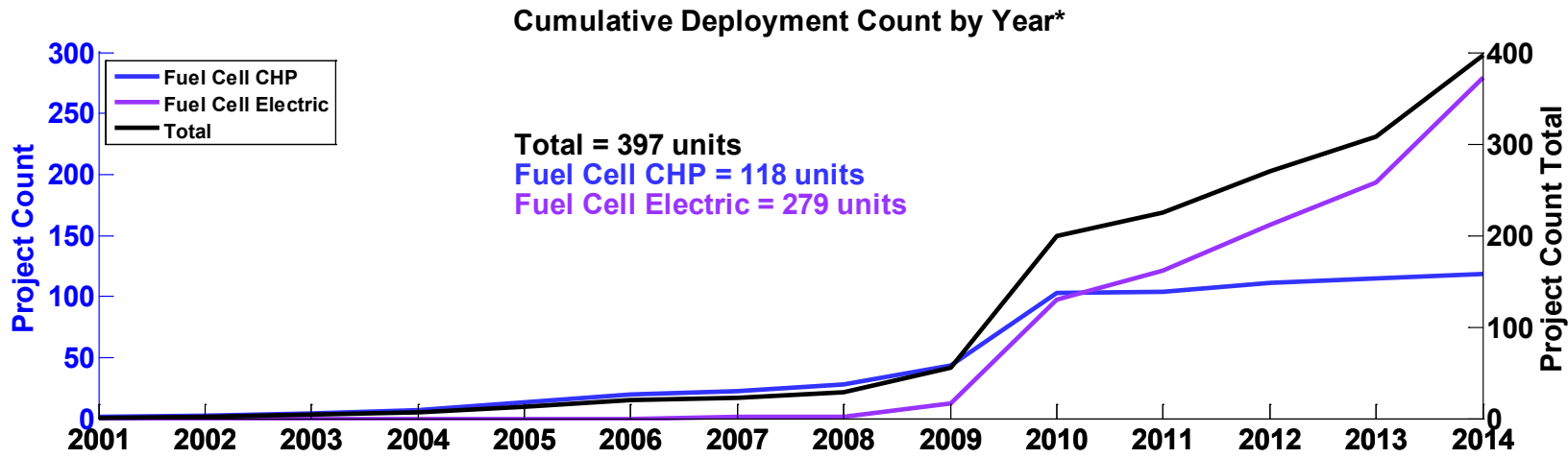
Stationary Fuel Cell System Composite Data Products Data through Quarter 4 of 2014



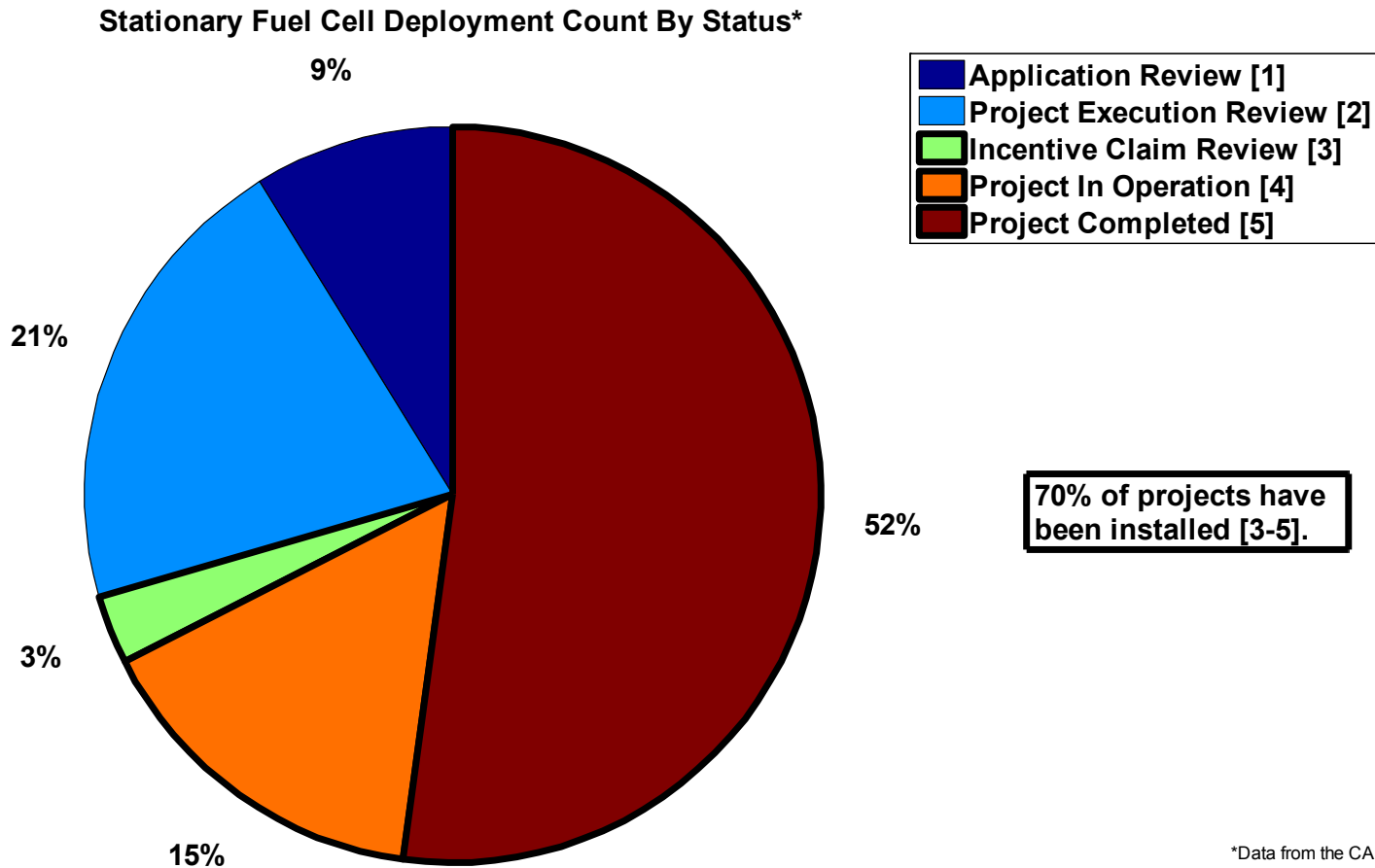
**Genevieve Saur, Jennifer Kurtz,
Chris Ainscough, Sam Sprik,
Matt Post**

April 2015

Fuel Cell Stationary Systems Deployed by Year



Stationary Fuel Cell System Count by Status



Order of Project Phases: [1] Includes CA SGIP projects in Reservation Request Form (RRF) phases.

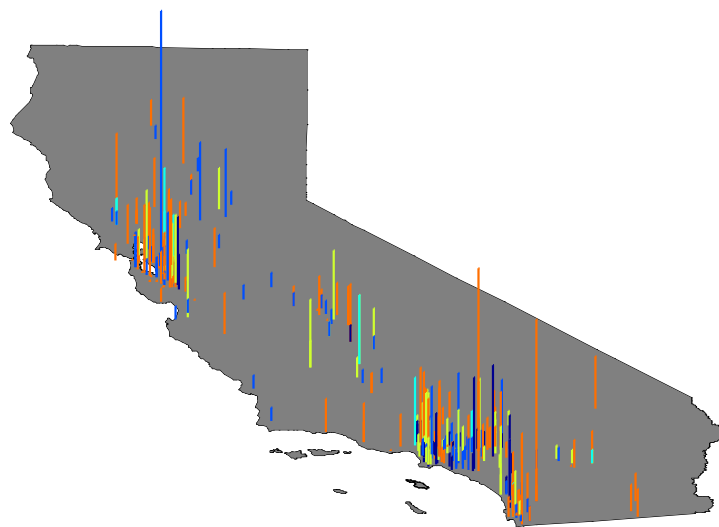
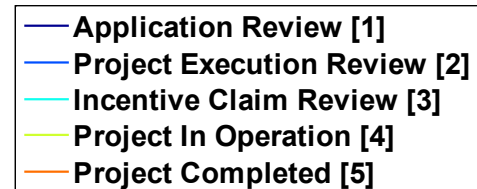
[2] Includes CA SGIP projects in Proof of Project Milestone (PPM) phases.

[3] Projects are in operation and pending confirmation of incentive claims, including CA SGIP Incentive Claim Form (ICF) phases.

[4] Includes projects that are receiving performance based incentives, includes CA SGIP Performance Based Incentives (PBI) In Progress.

[5] Includes installed projects with unknown operation status, includes CA SGIP Payment Completed and Payment Recalled status.

CA Stationary Fuel Cell Installations [1] (2001 - 2014)



Order of Project Phases: [1] Includes CA SGIP projects in Reservation Request Form (RRF) phases.

[2] Includes CA SGIP projects in Proof of Project Milestone (PPM) phases.

[3] Projects are in operation and pending confirmation of incentive claims, including CA SGIP Incentive Claim Form (ICF) phases.

[4] Includes projects that are receiving performance based incentives, includes CA SGIP Performance Based Incentives (PBI) In Progress.

[5] Includes installed projects with unknown operation status, includes CA SGIP Payment Completed and Payment Recalled status.

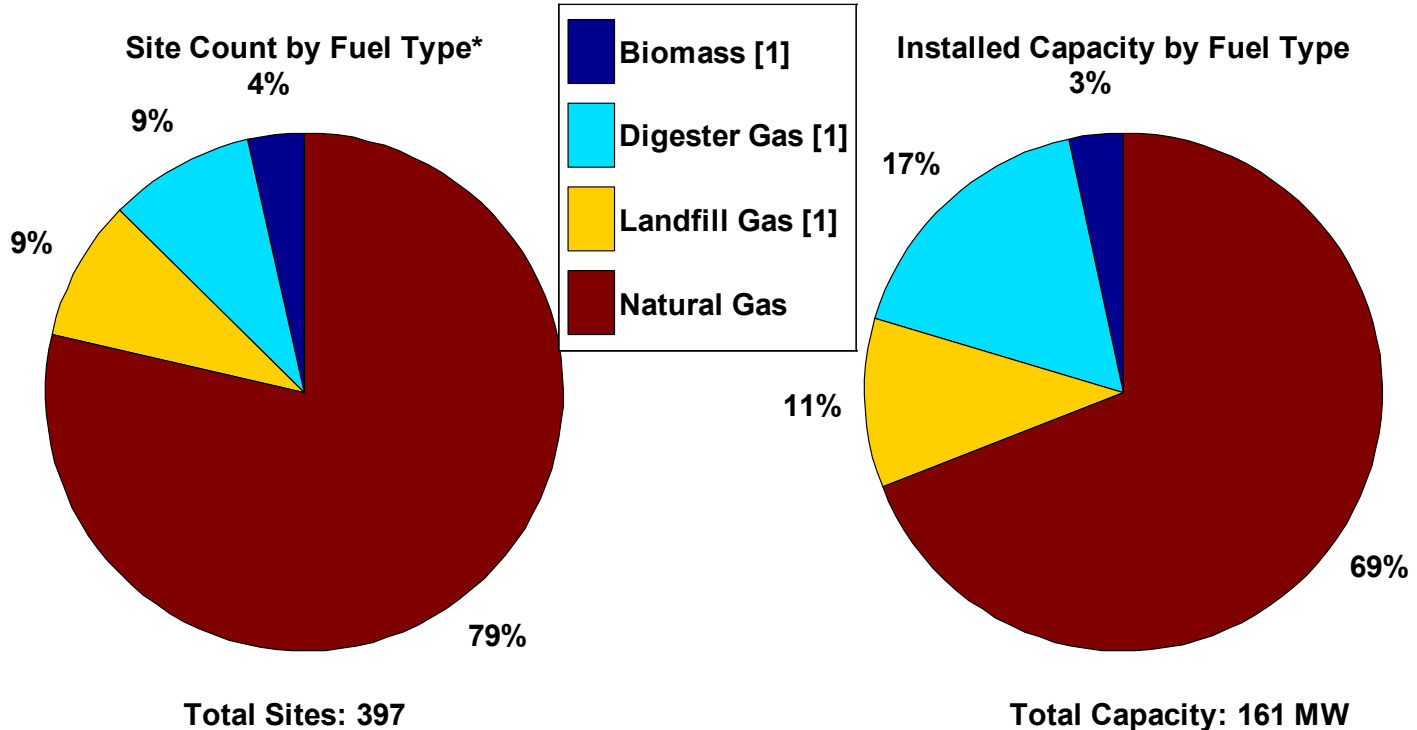
*Data from the CA SGIP.

NREL cdp_stat_03

Created: Apr-21-15 11:09 AM | Data Range: 2001Q2-2014Q4

Stationary Fuel Cell System Count and Capacity by Fuel Type

Installations by Fuel Type
(All Fuel Cell Systems)



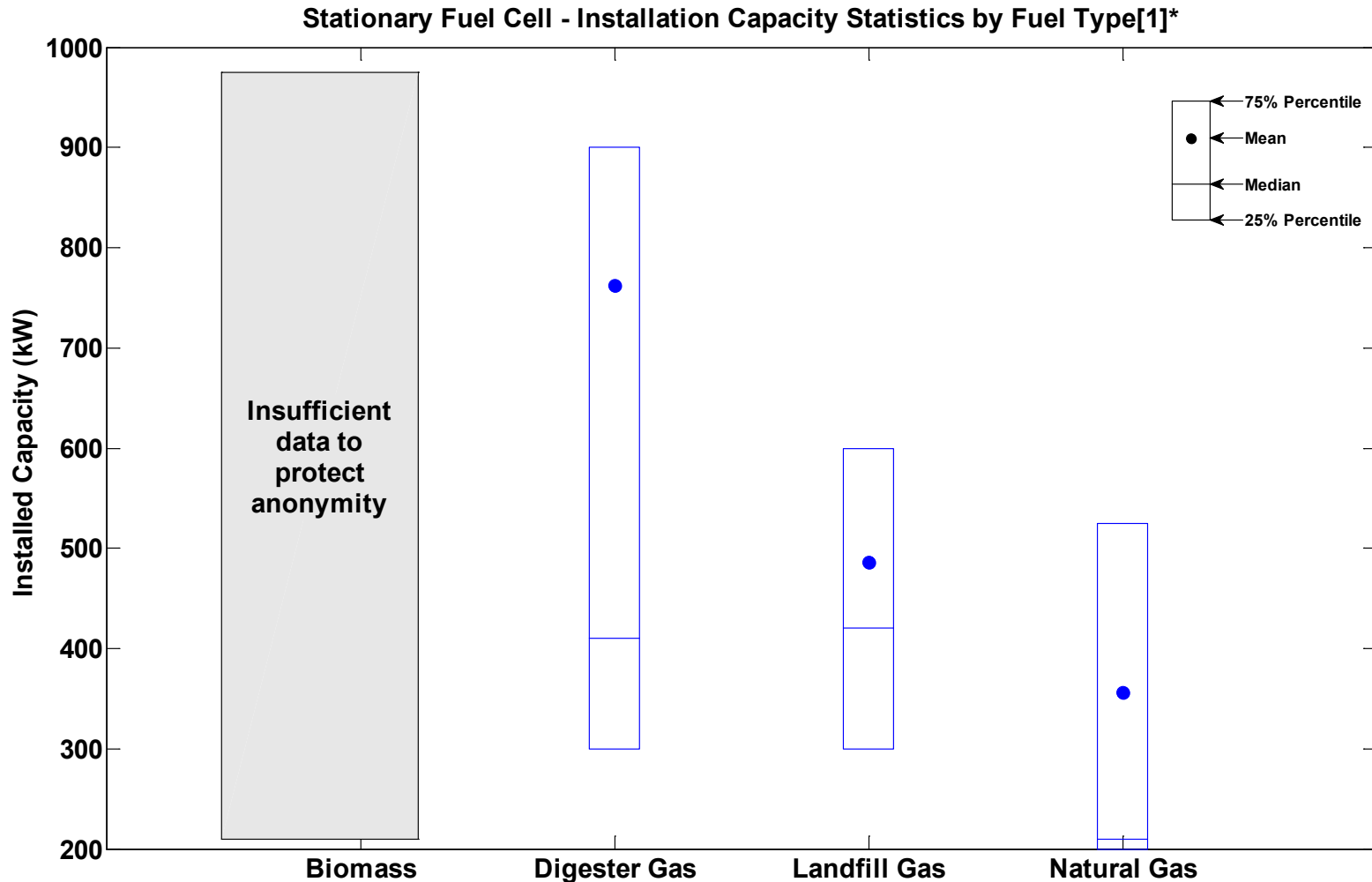
[1] The renewable fuels exclude those defined as conventional in Section 2805 of the California Public Utilities Code and are categorized here as gas derived from biomass, digester gas, or landfill gas.
 Definition of Included Status:
 [2] Includes CA SGIP projects in Reservation Request Form (RRF) phases.
 [3] Includes CA SGIP projects in Proof of Project Milestone (PPM) phases.
 [4] Projects are in operation and pending confirmation of incentive claims, including CA SGIP Incentive Claim Form (ICF) phases.
 [5] Includes projects that are receiving performance based incentives, includes CA SGIP Performance Based Incentives (PB) In Progress.
 [6] Includes installed projects with unknown operation status, includes CA SGIP Payment Completed and Payment Recalled status.

Includes Status Categories:
 Application Review [2]
 Project Execution Review [3]
 Incentive Claim Review [4]
 Project In Operation [5]
 Project Completed [6]

*Data from the CA SGIP.

CDP-STAT-05

Fuel Type Capacity

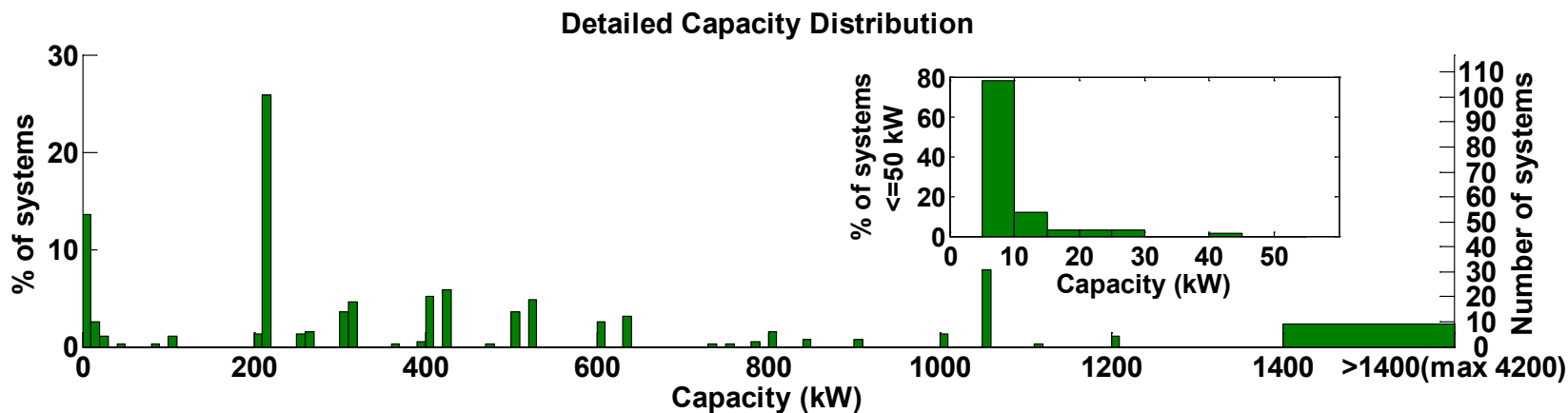
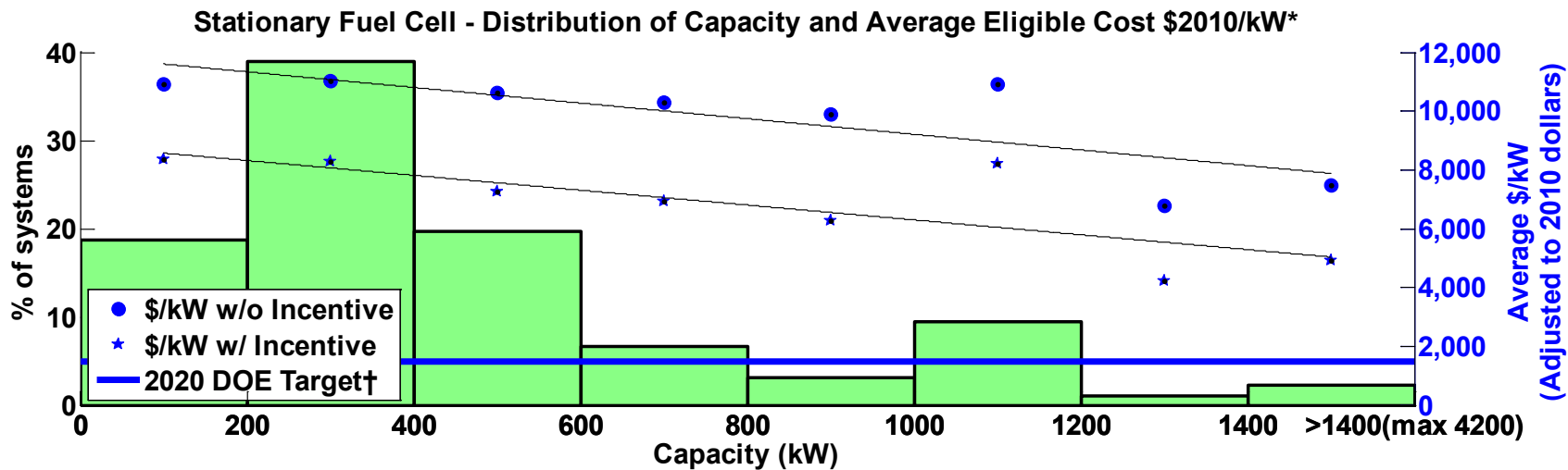


NREL cdp_stat_05
Created: Apr-21-15 11:13 AM | Data Range: 2001Q2-2014Q4

[1] The renewable fuels exclude those defined as conventional in Section 2805 of the California Public Utilities Code and are categorized here as gas derived from biomass, digester gas, or landfill gas.

*Data from the CA SGIP.

Fuel Cell Stationary Capacity and Average Prices

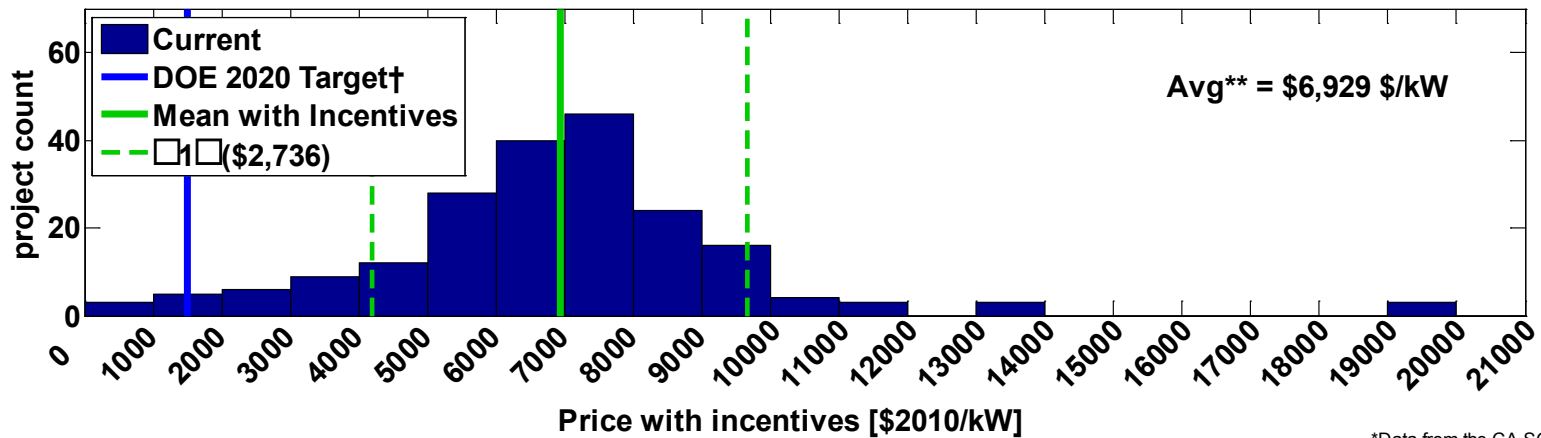
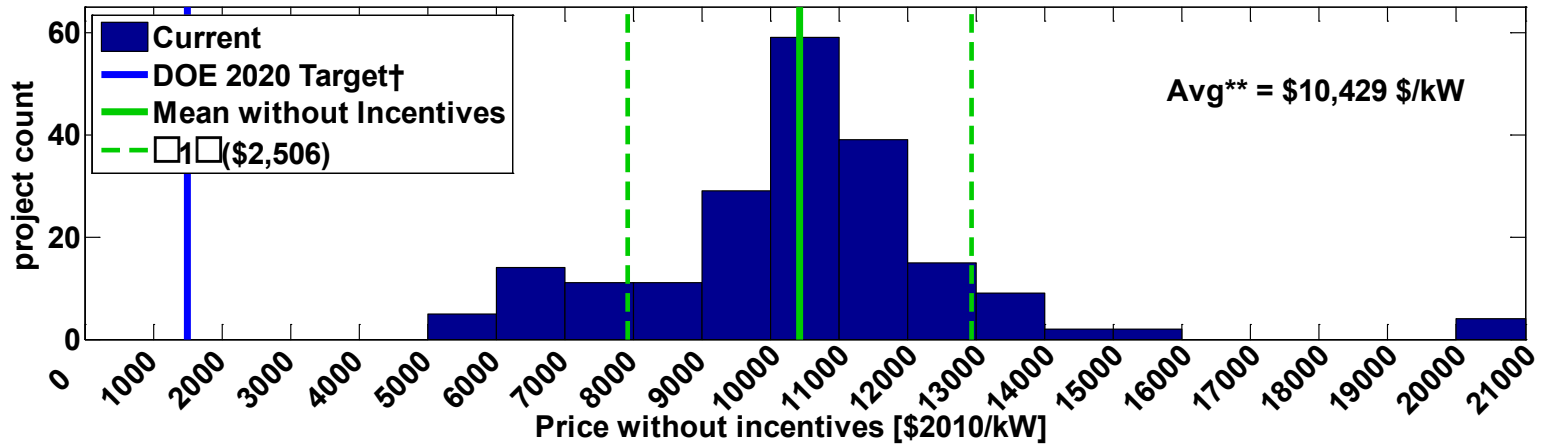


Eligible Costs May Include: Planning & Feasibility Study, Engineering & Design, Permitting, Self-Generation Equipment, Waste Heat Recovery Costs, Construction & Installation Costs, Gas & Electric Interconnection, Warranty, Maintenance Contract, Metering, Monitoring & Data Acquisition System, Emission Control Equipment Capital, Gasline Installation, Fuel Gas Clean-up Equipment, Electricity Storage Devices, Bond to Certify Renewable Fuel, Sales Tax, Fuel Supply (digesters, gas gathering, etc.), Thermal Load, & Other Eligible Costs

*Data from the CA SGIP.
 †installed cost for the year 2020, operating on natural gas. May not include all costs reported in CA SGIP.

Distribution of Stationary Fuel Cell Install Price with and without Incentives

Stationary Fuel Cell - Installed Eligible Cost Per kW*
Adjusted To 2010 Dollars



Eligible Costs May Include: Planning & Feasibility Study, Engineering & Design, Permitting, Self-Generation Equipment, Waste Heat Recovery Costs, Construction & Installation Costs, Gas & Electric Interconnection, Warranty, Maintenance Contract, Metering, Monitoring & Data Acquisition System, Emission Control Equipment Capital, Gasline Installation, Fuel Gas Clean-up Equipment, Electricity Storage Devices, Bond to Certify Renewable Fuel, Sales Tax, Fuel Supply (digesters, gas gathering, etc.), Thermal Load, & Other Eligible Costs

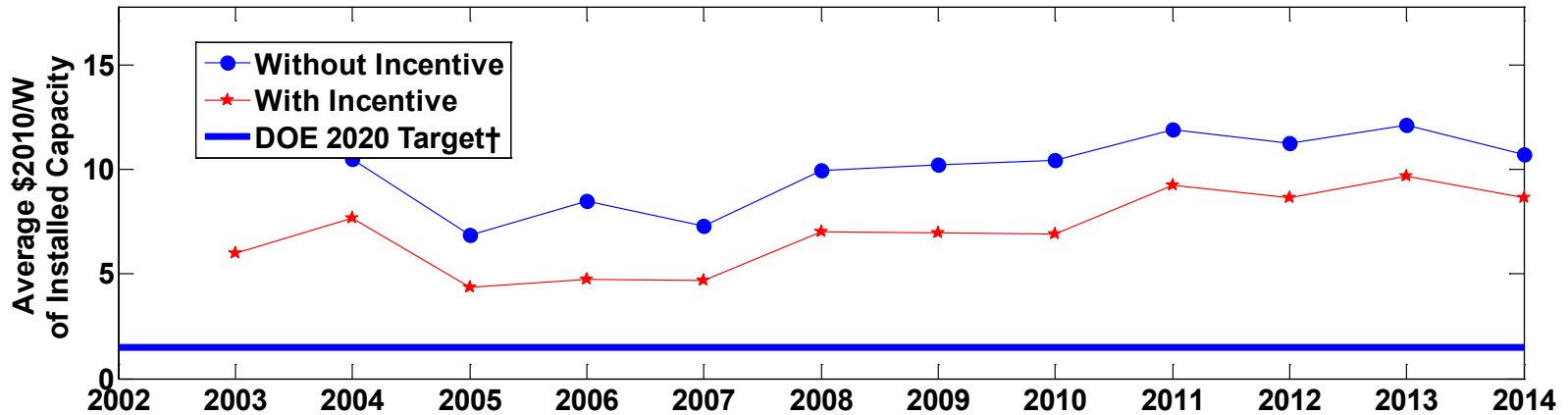
*Data from the CA SGIP.

**Data bins with less than 2 projects filtered.

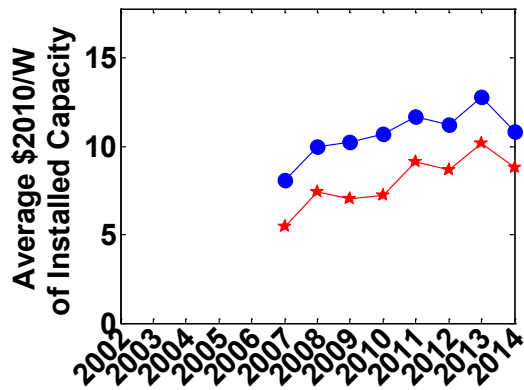
†installed cost for the year 2020, operating on natural gas. May not include all costs reported in CA SGIP.

Stationary Fuel Cell Install Price Over Time with and without Incentives

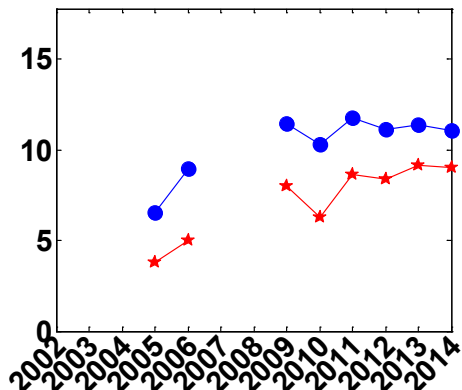
Stationary Fuel Cell - Average Eligible Cost \$2010/W Trend for Overall Deployments*



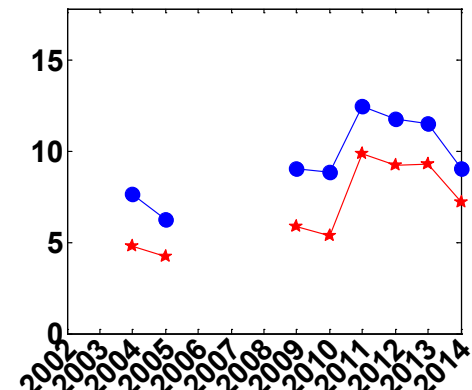
Capacity < 500 kW



500 kW <= Capacity < 1000 kW



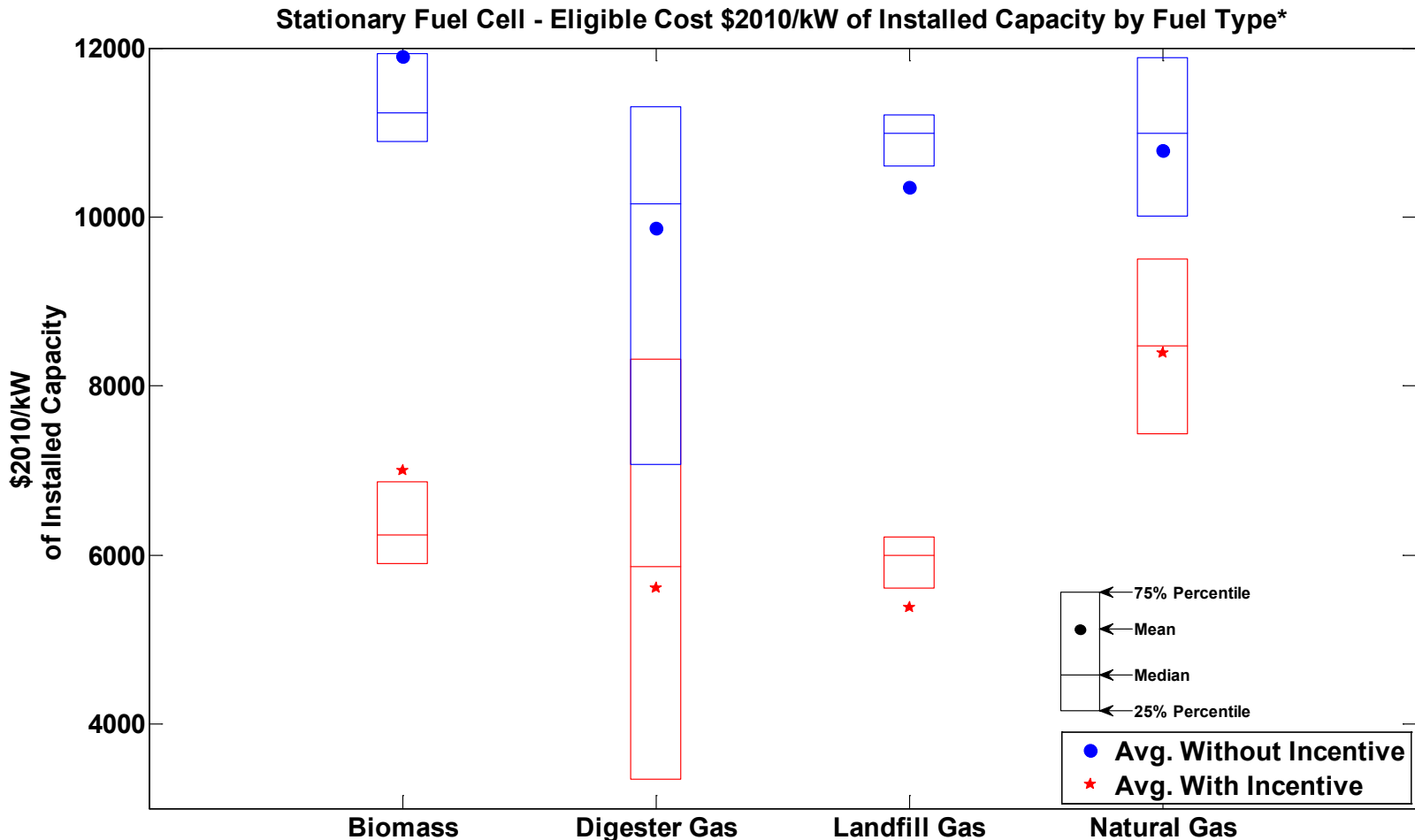
Capacity >= 1000 kW



Eligible Costs May Include: Planning & Feasibility Study, Engineering & Design, Permitting, Self-Generation Equipment, Waste Heat Recovery Costs, Construction & Installation Costs, Gas & Electric Interconnection, Warranty, Maintenance Contract, Metering, Monitoring & Data Acquisition System, Emission Control Equipment Capital, Gasline Installation, Fuel Gas Clean-up Equipment, Electricity Storage Devices, Bond to Certify Renewable Fuel, Sales Tax, Fuel Supply (digesters, gas gathering, etc.), Thermal Load, & Other Eligible Costs

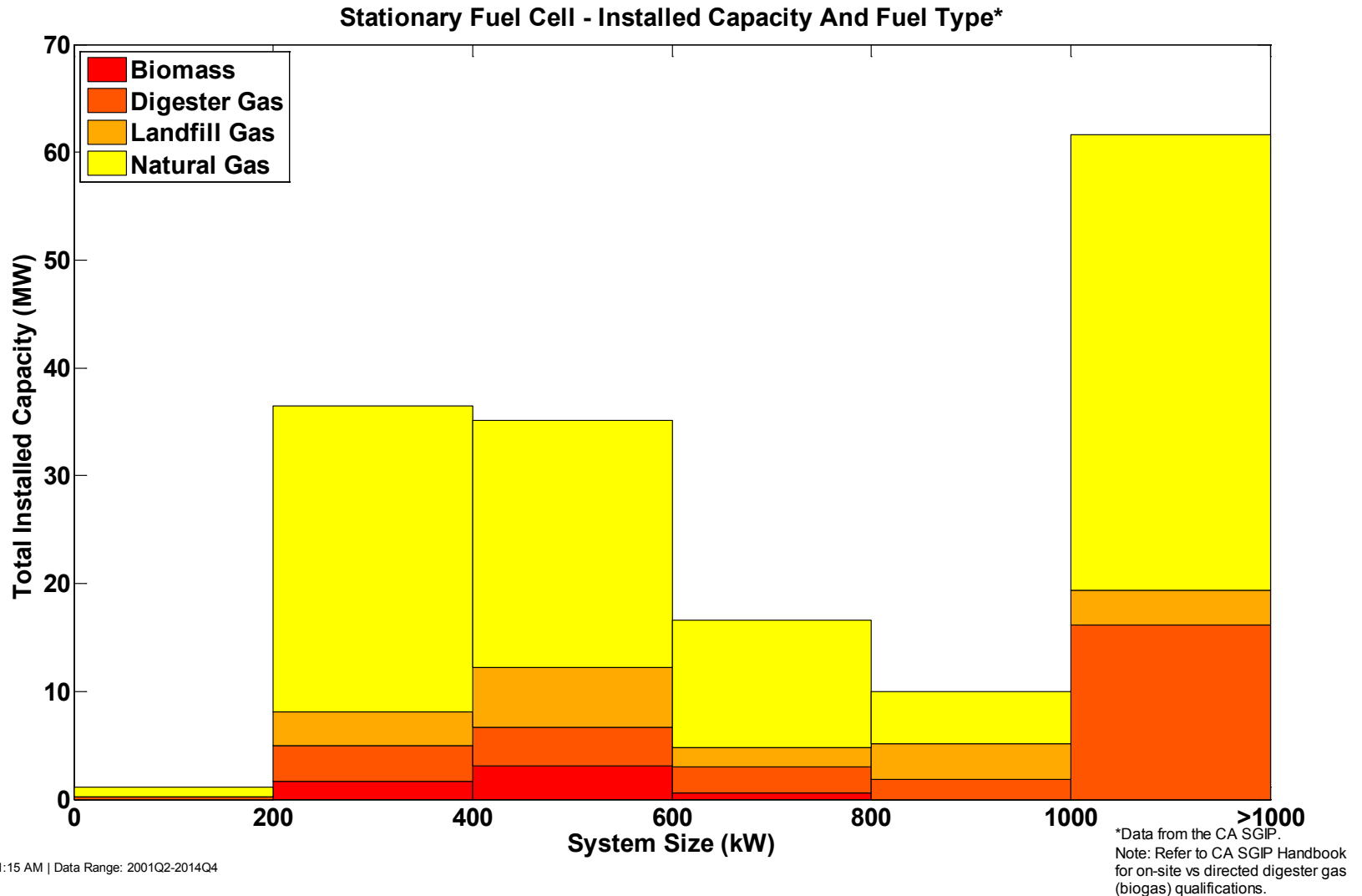
*Data from the CA SGIP.

Note: Data points are omitted where only one system would be represented in a given year.
†installed cost for the year 2020, operating on natural gas. May not include all costs reported in CA SGIP.

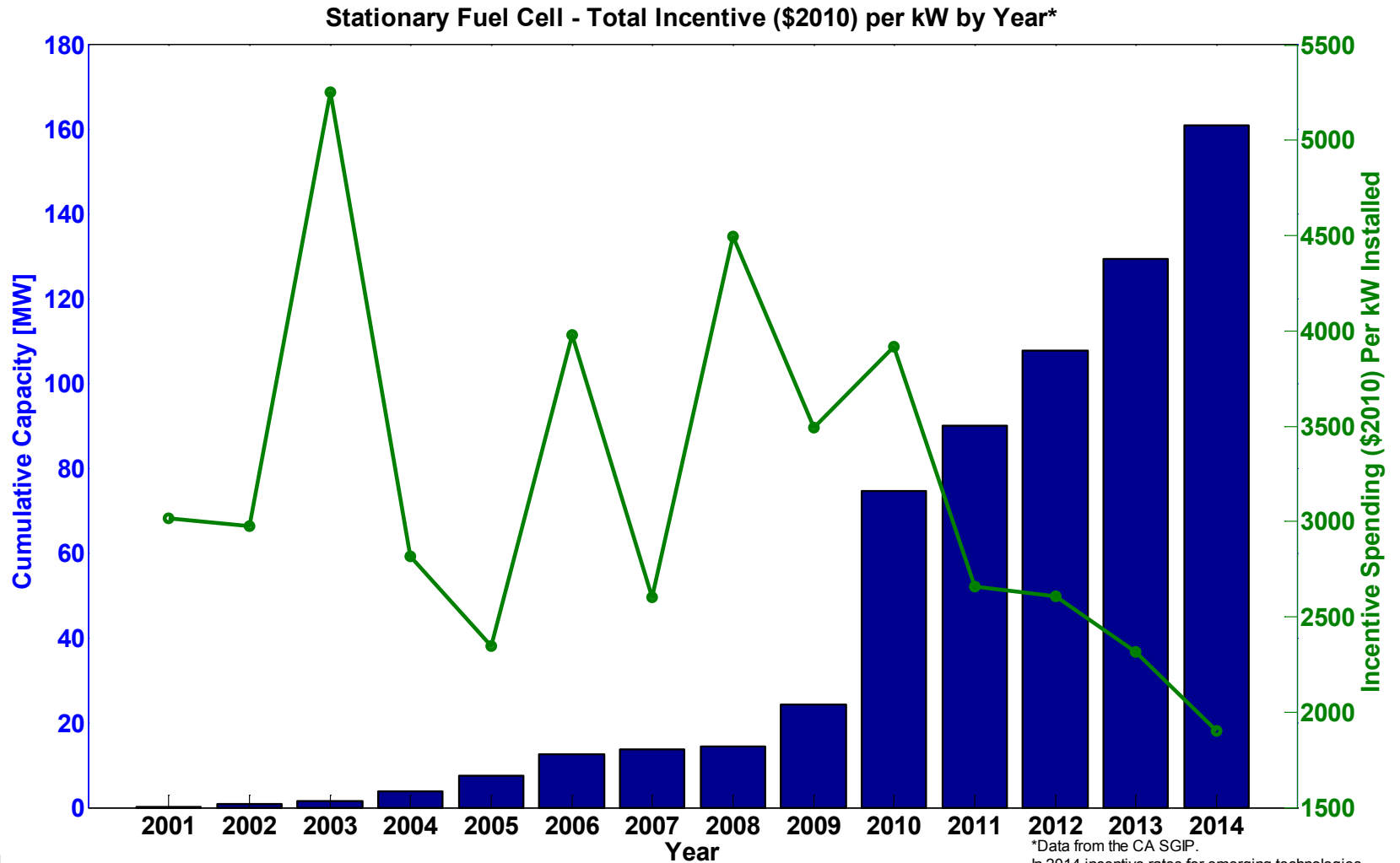


Eligible Costs May Include: Planning & Feasibility Study, Engineering & Design, Permitting, Self-Generation Equipment, Waste Heat Recovery Costs, Construction & Installation Costs, Gas & Electric Interconnection, Warranty, Maintenance Contract, Metering, Monitoring & Data Acquisition System, Emission Control Equipment Capital, Gasline Installation, Fuel Gas Clean-up Equipment, Electricity Storage Devices, Bond to Certify Renewable Fuel, Sales Tax, Fuel Supply (digesters, gas gathering, etc.), Thermal Load, & Other Eligible Costs

*Data from the CA SGIP. Note: Refer to CA SGIP Handbook for on-site vs directed digester gas (biogas) qualifications.



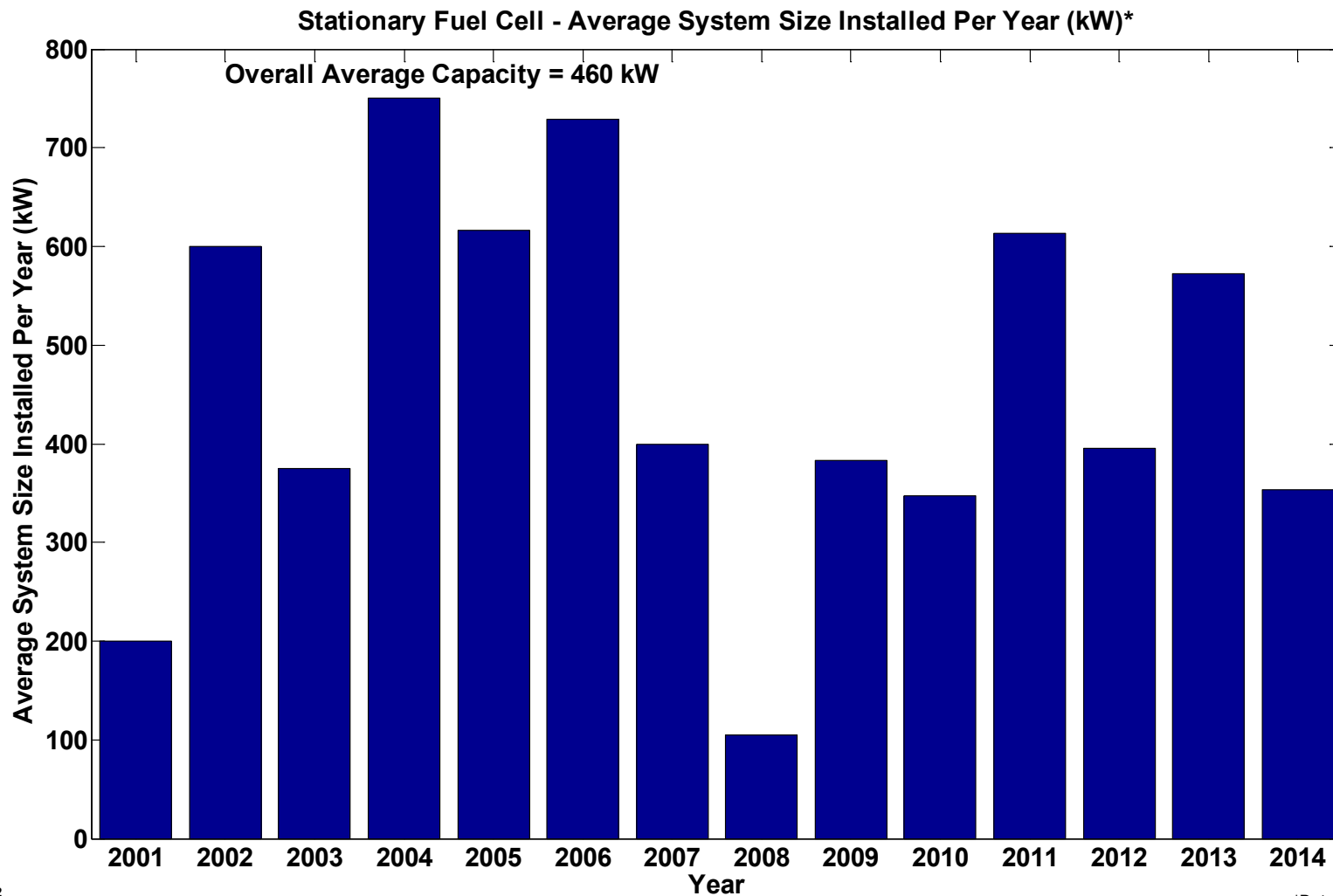
Total Incentive Spending (\$2010) per kW by Year



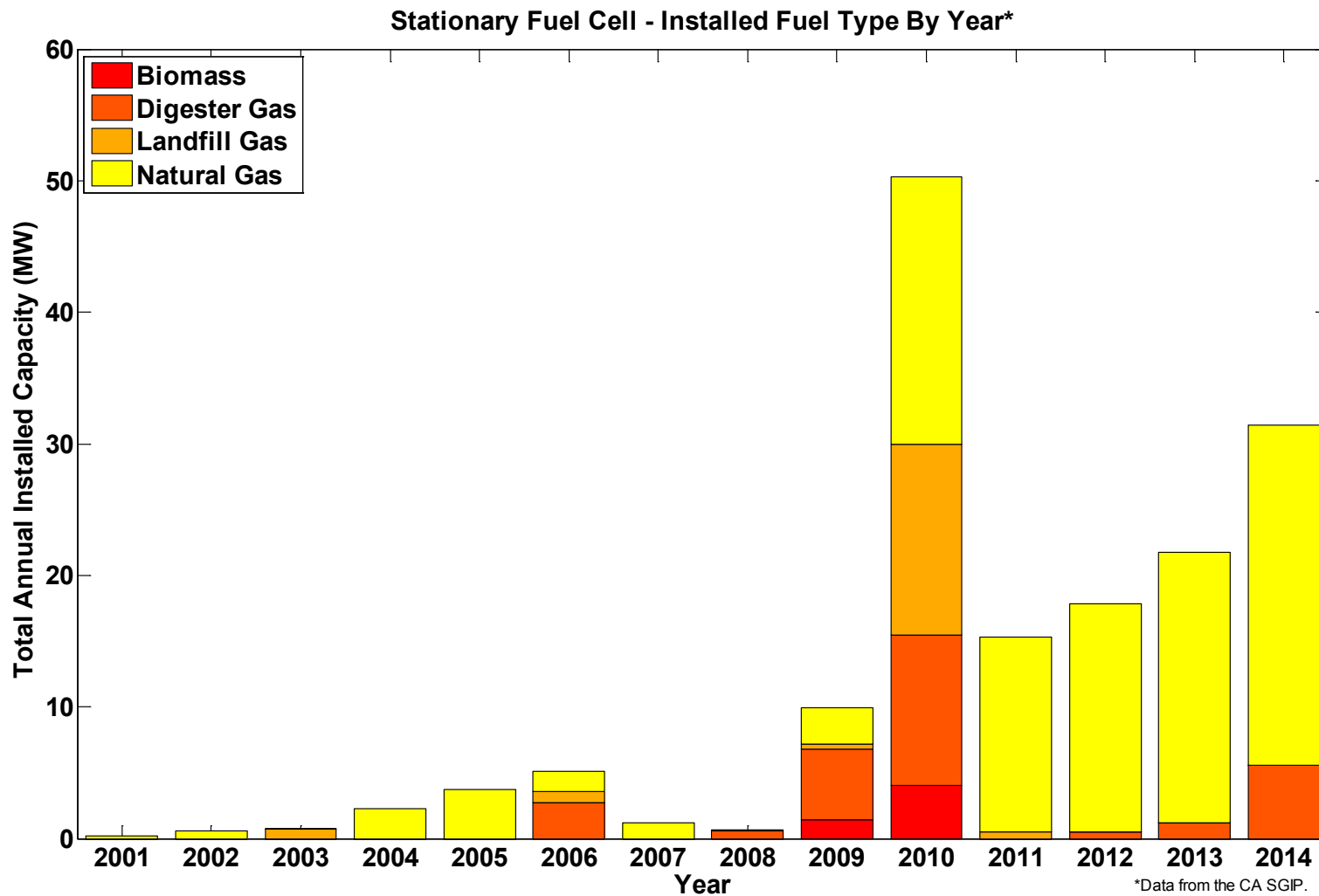
NREL cdp_stat_11
 Created: Apr-21-15 11:16 AM | Data Range: 2001Q2-2014Q4

*Data from the CA SGIP.
 In 2014 incentive rates for emerging technologies (including fuel cells) and biogas will decline 10% and all other technologies 5% annually. (2014 SGIP Handbook)

Average System Size Installed Per Year (kW)



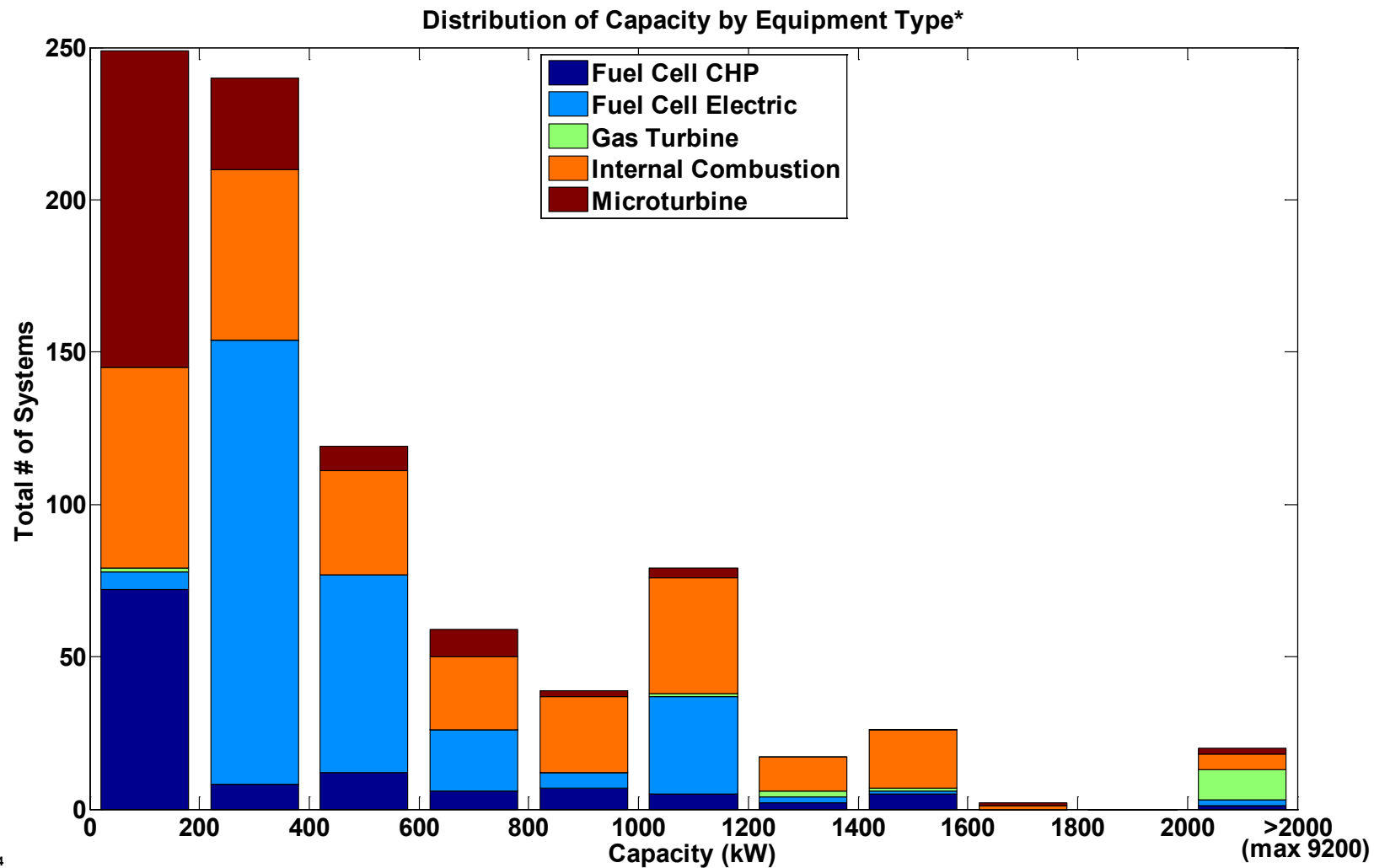
Installed Annual Capacity by Fuel Type



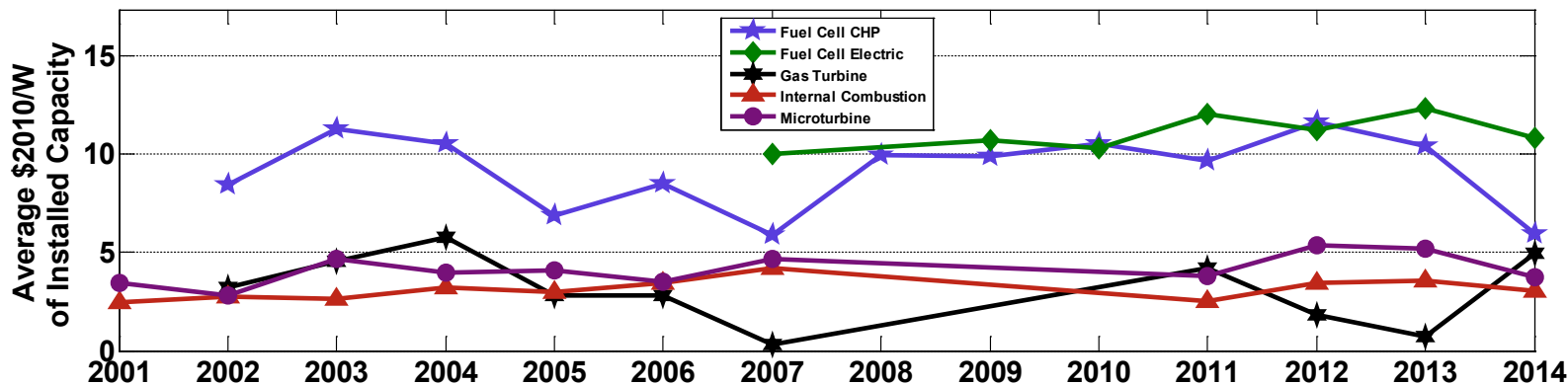
NREL cdp_stat_13
Created: Apr-21-15 11:16 AM | Data Range: 2001Q2-2014Q4

*Data from the CA SGIP.
Note: Refer to CA SGIP Handbook for on-site vs directed digester gas (biogas) qualifications.

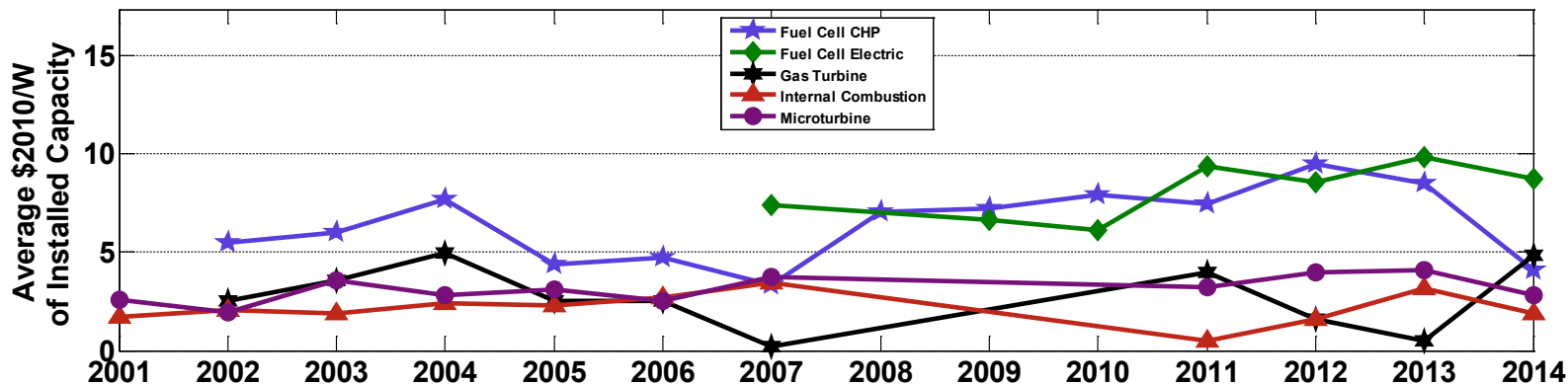
Distribution of Capacity by Equipment Type



Average Eligible Cost \$2010/W Trend for Overall Deployments*
Without Incentives



Average Eligible Cost \$2010/W Trend for Overall Deployments*
With Incentives

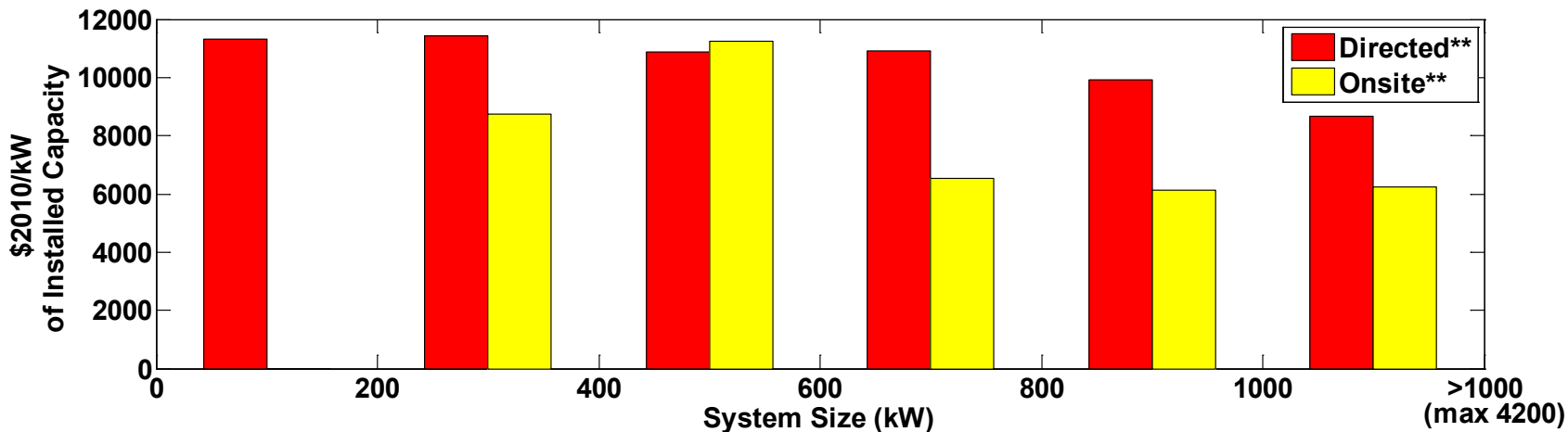


Eligible Costs May Include: Planning & Feasibility Study, Engineering & Design, Permitting, Self-Generation Equipment, Waste Heat Recovery Costs, Construction & Installation Costs, Gas & Electric Interconnection, Warranty, Maintenance Contract, Metering, Monitoring & Data Acquisition System, Emission Control Equipment Capital, Gasline Installation, Fuel Gas Clean-up Equipment, Electricity Storage Devices, Bond to Certify Renewable Fuel, Sales Tax, Fuel Supply (digesters, gas gathering, etc.), Thermal Load, & Other Eligible Costs

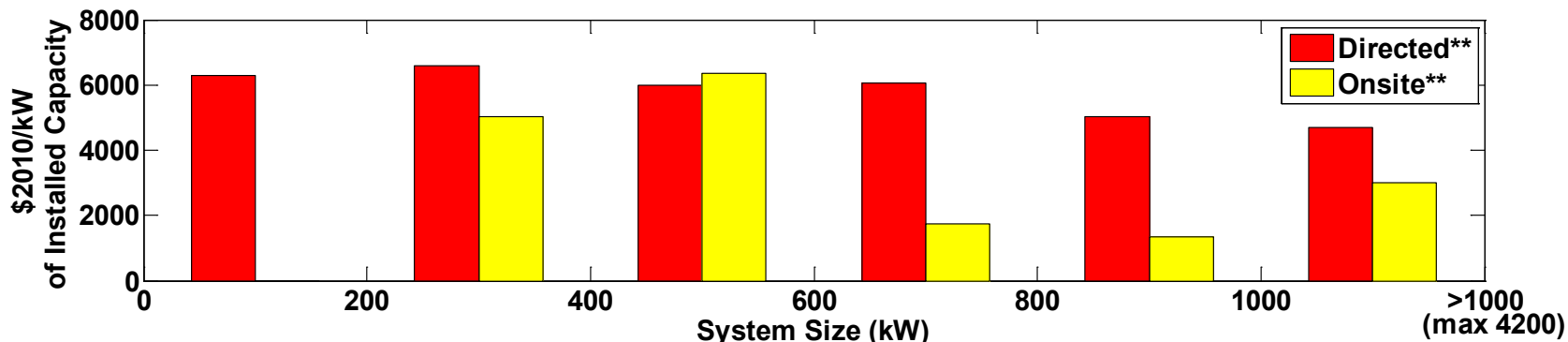
*Data from the CA SGIP.

Average Eligible Cost for Biogas Sources

Stationary Fuel Cell - Average Eligible Cost \$2010/kW Biogas Source*
Without Incentives



Stationary Fuel Cell - Average Eligible Cost \$2010/kW Biogas Source*
With Incentives



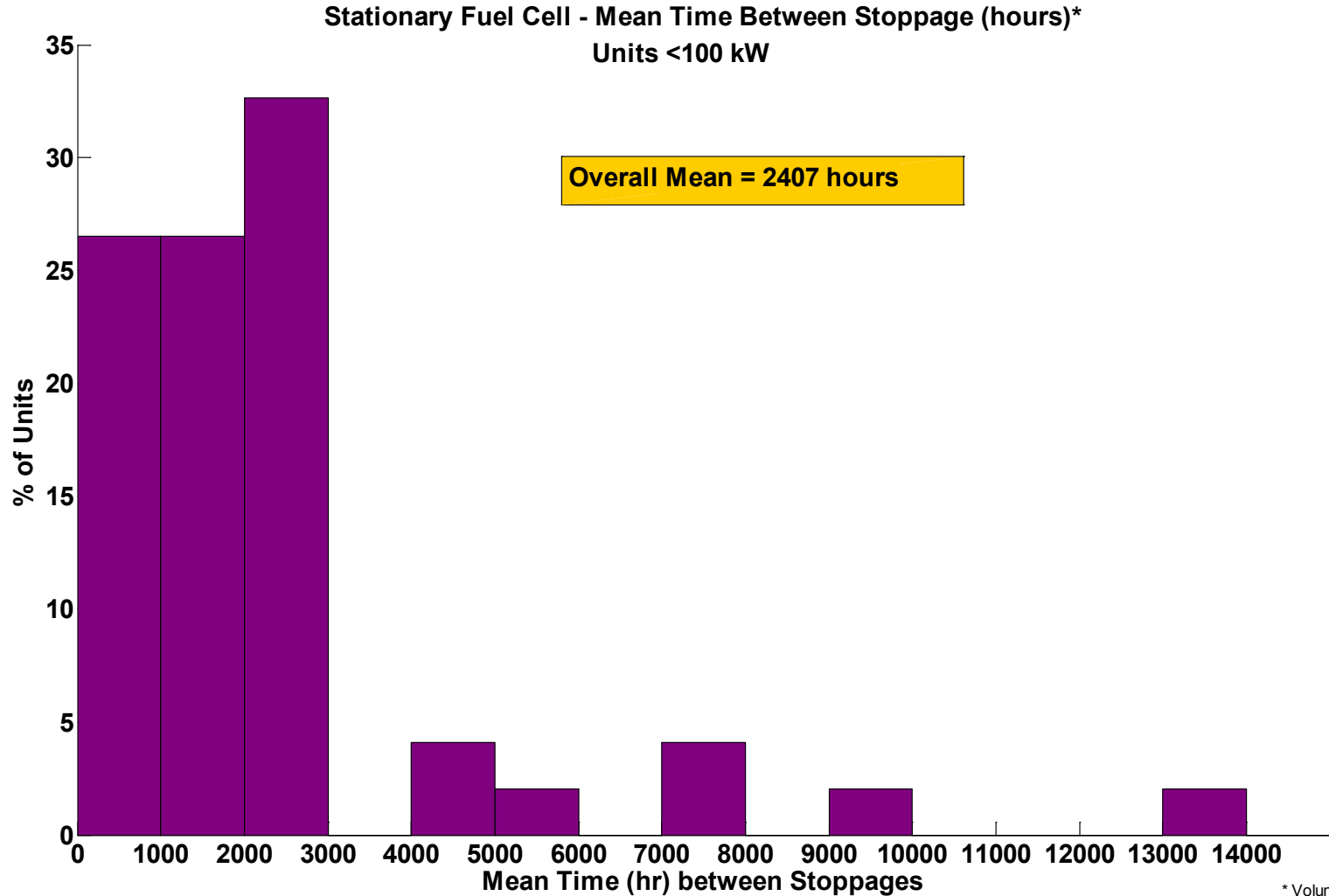
Eligible Costs May Include: Planning & Feasibility Study, Engineering & Design, Permitting, Self-Generation Equipment, Waste Heat Recovery Costs, Construction & Installation Costs, Gas & Electric Interconnection, Warranty, Maintenance Contract, Metering, Monitoring & Data Acquisition System, Emission Control Equipment Capital, Gasline Installation, Fuel Gas Clean-up Equipment, Electricity Storage Devices, Bond to Certify Renewable Fuel, Sales Tax, Fuel Supply (digesters, gas gathering, etc.), Thermal Load, & Other Eligible Costs

*Data from the CA SGIP.

** Refer to CA SGIP Handbook for on-site vs directed digester gas (biogas) qualifications.

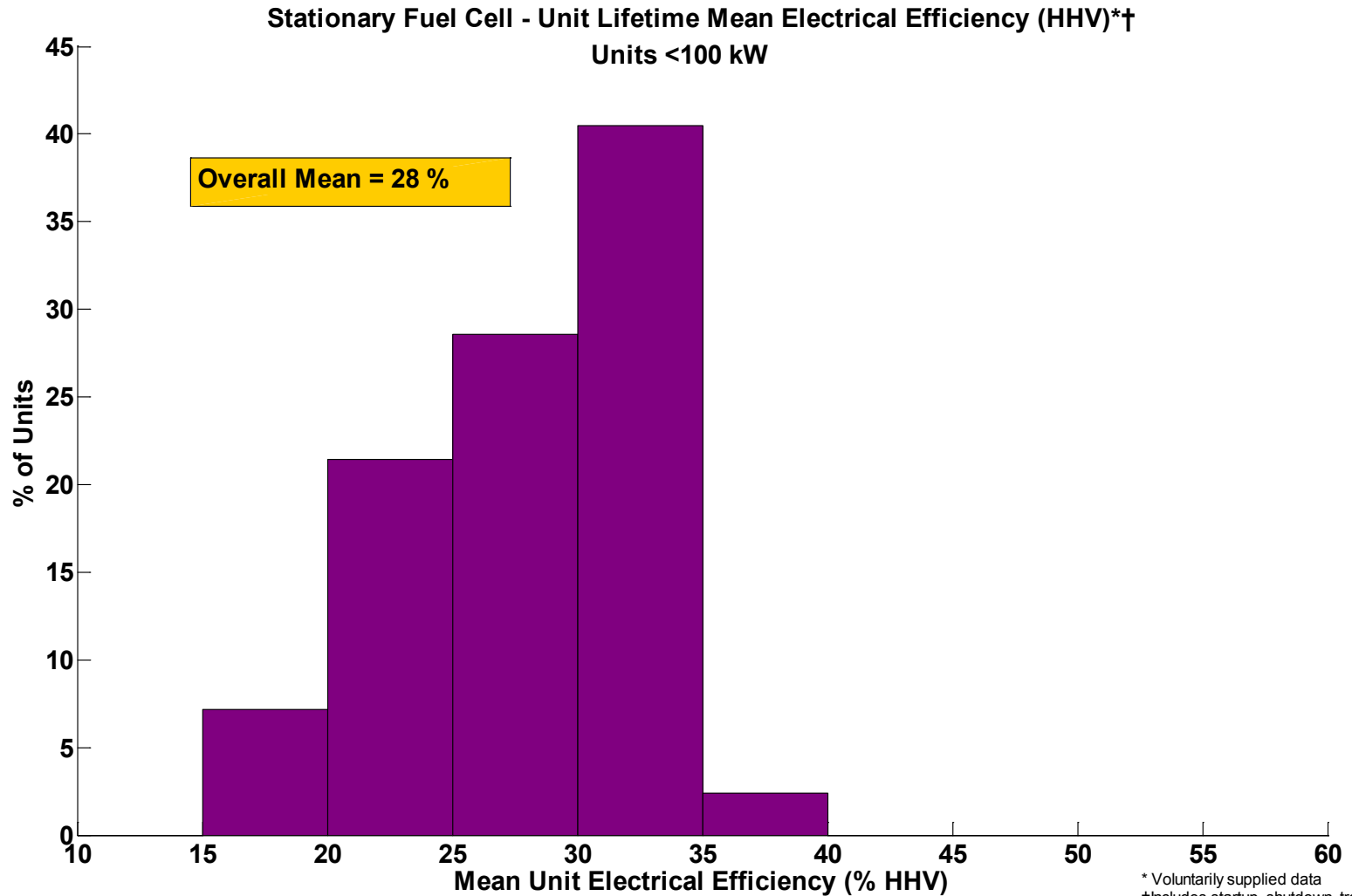
CDP-STAT-17

Mean Time Between Stoppage (for any reason) for Units <100 kW

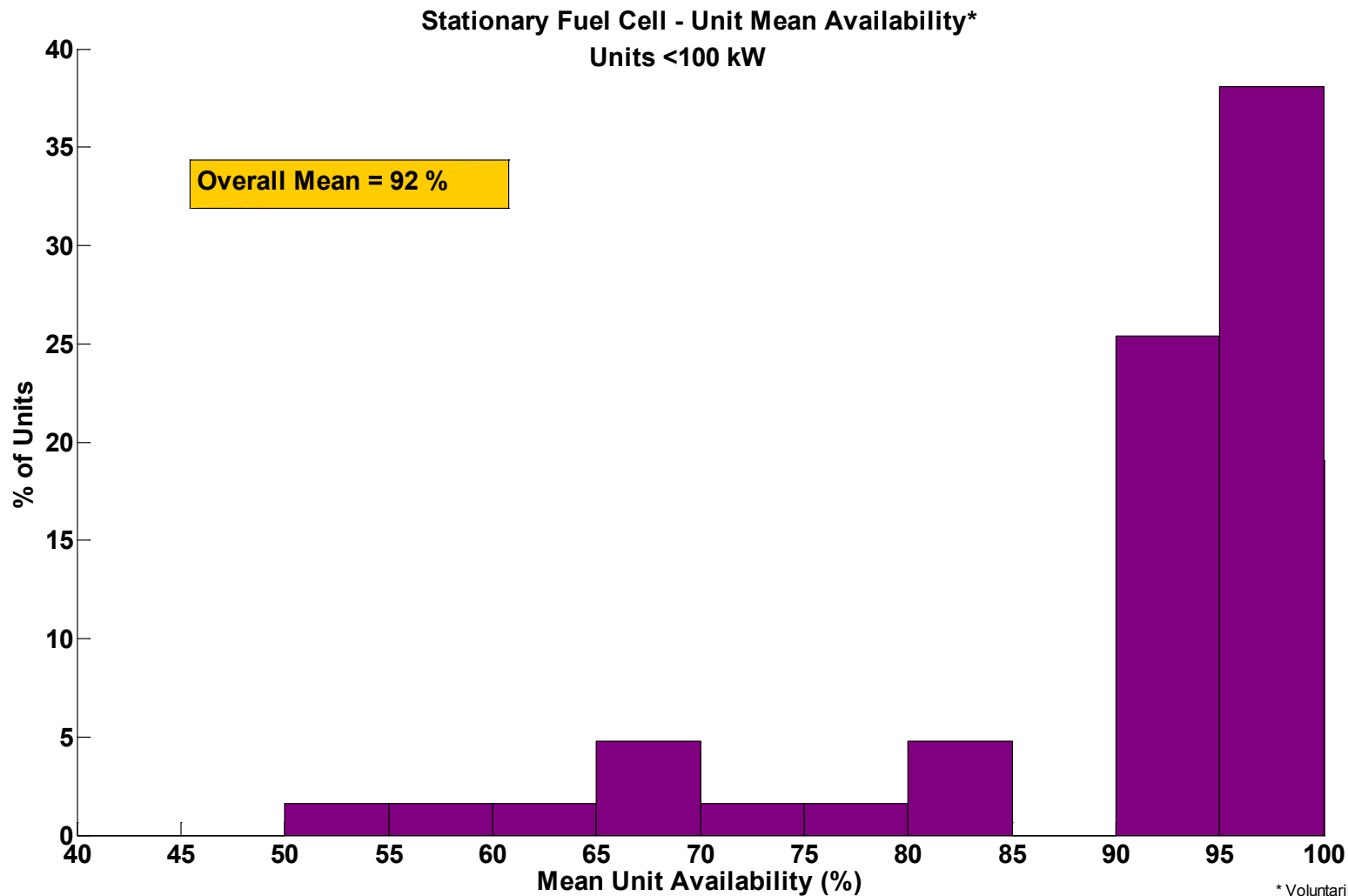


CDP-STAT-18

Mean Unit Lifetime Electrical Efficiency (%HHV) for Units <100 kW

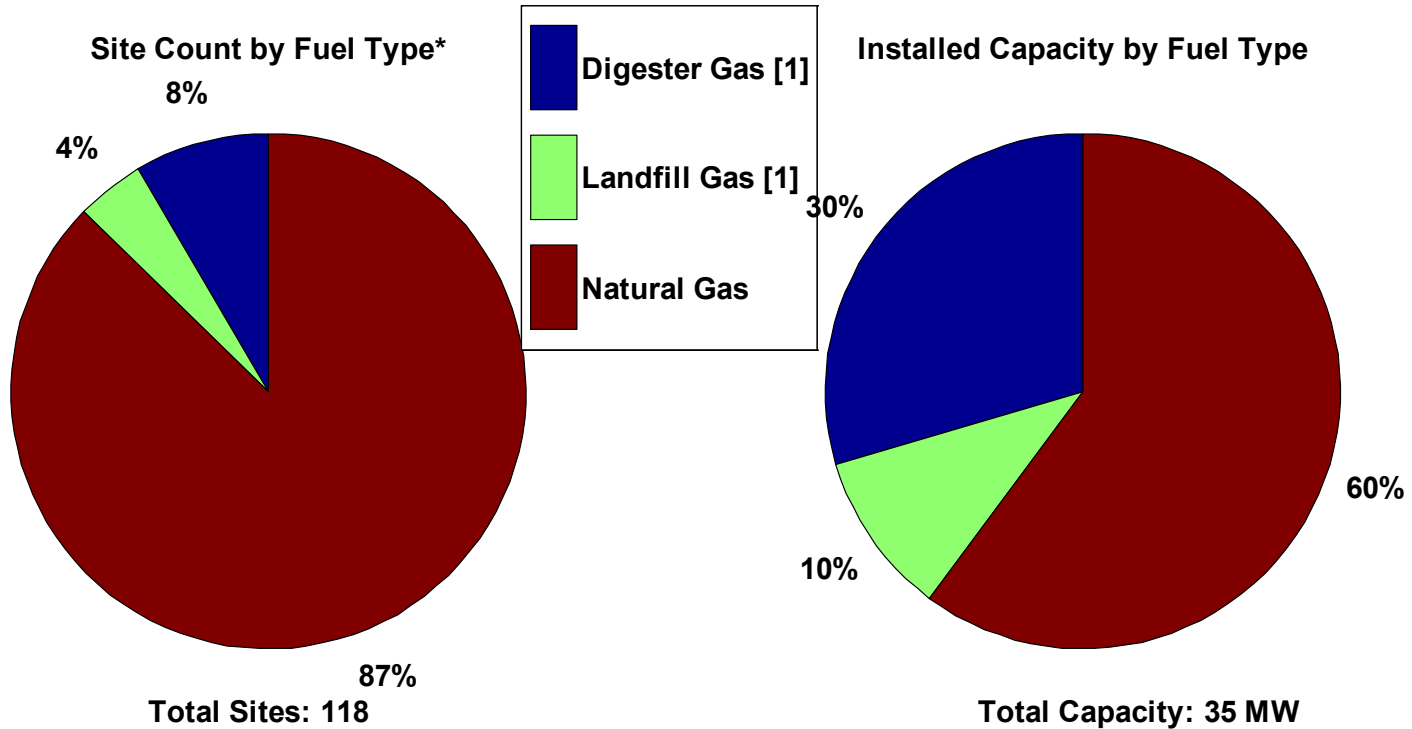


Mean Unit Lifetime Availability for Units <100 kW



Installations By Fuel Type (CHP Fuel Cells)

Installations by Fuel Type
(CHP Fuel Cell Systems)

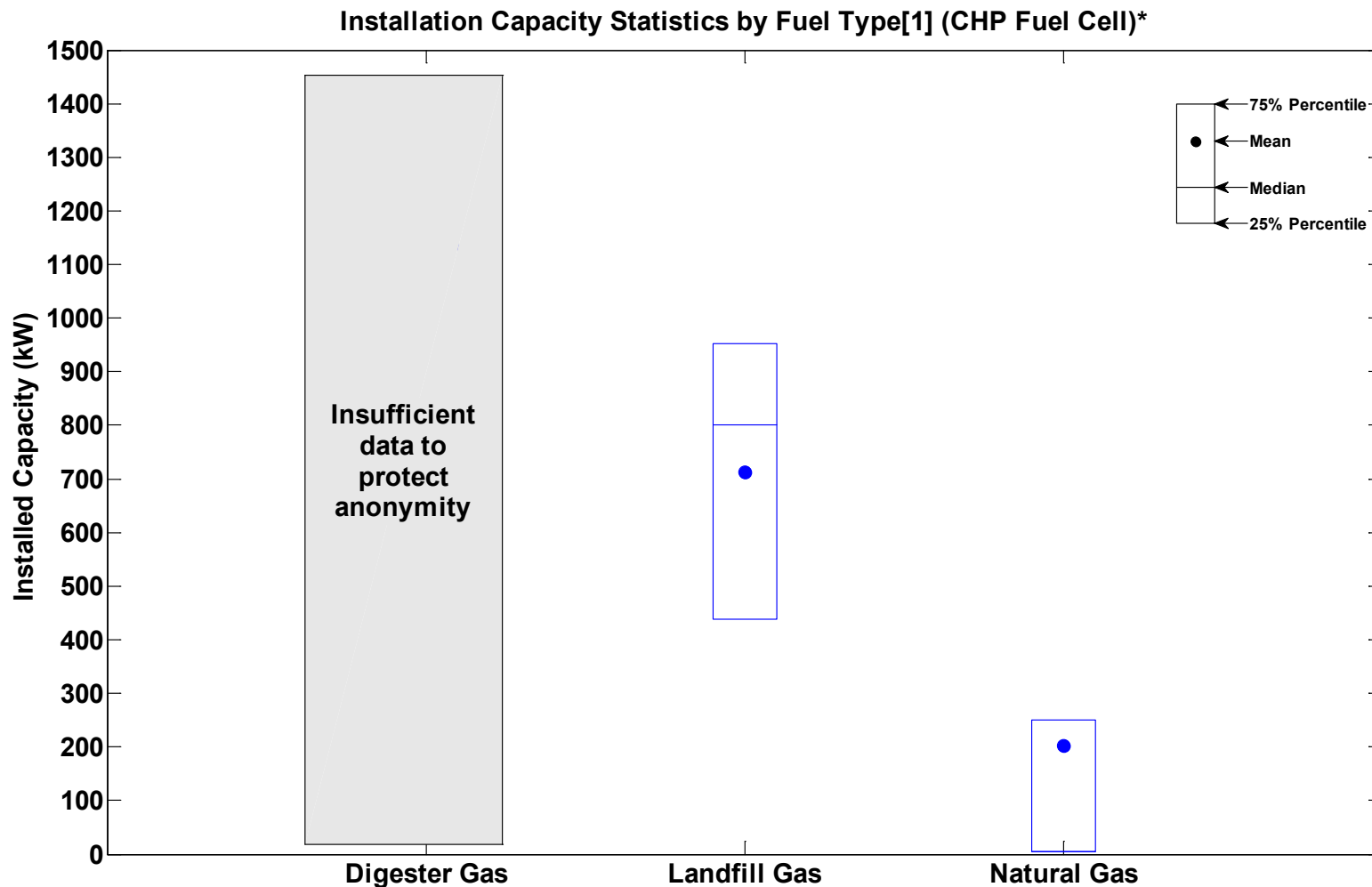


[1] The renewable fuels exclude those defined as conventional in Section 2805 of the California Public Utilities Code and are categorized here as gas derived from biomass, digester gas, or landfill gas.
 Definition of Included Status:
 [2] Includes CA SGIP projects in Reservation Request Form (RRF) phases.
 [3] Includes CA SGIP projects in Proof of Project Milestone (PPM) phases.
 [4] Projects are in operation and pending confirmation of incentive claims, including CA SGIP Incentive Claim Form (ICF) phases.
 [5] Includes projects that are receiving performance based incentives, includes CA SGIP Performance Based Incentives (PBI) In Progress.
 [6] Includes installed projects with unknown operation status, includes CA SGIP Payment Completed and Payment Recalled status.

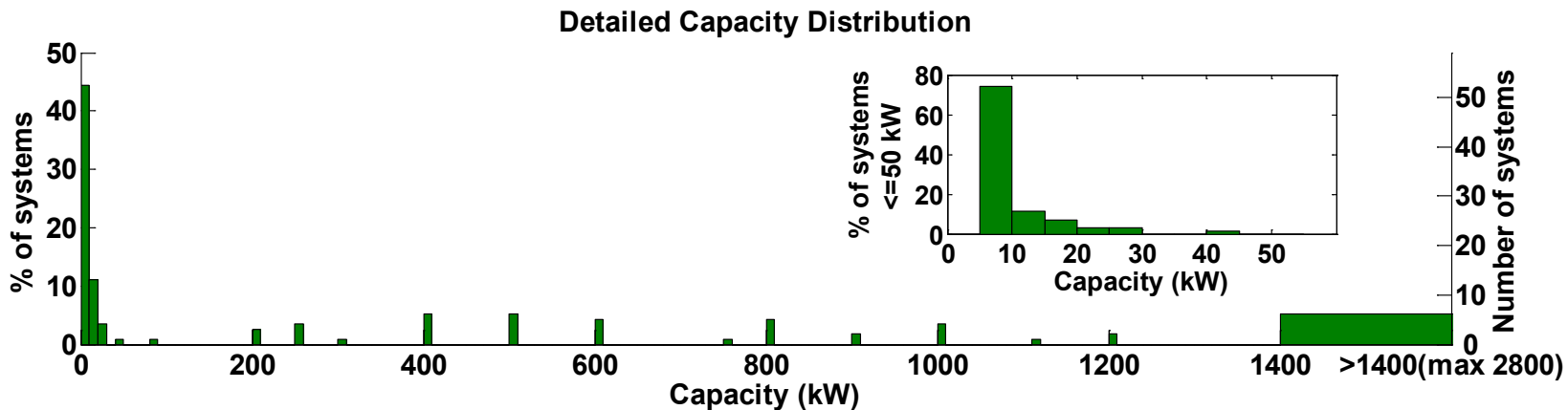
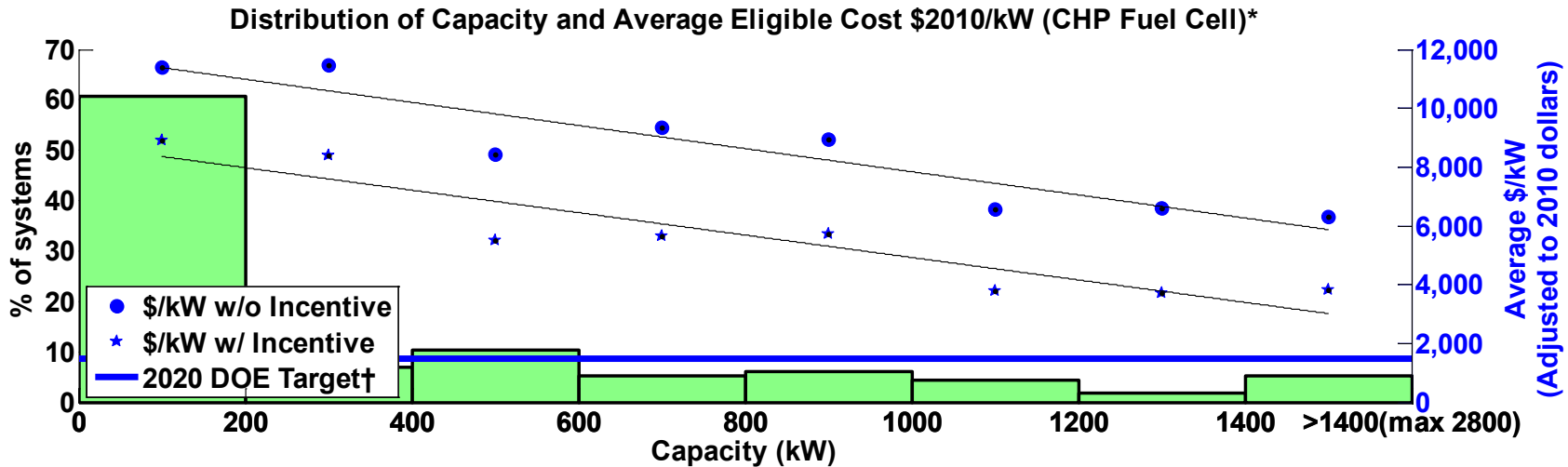
Includes Status Categories:
 Application Review [2]
 Project Execution Review [3]
 Incentive Claim Review [4]
 Project In Operation [5]
 Project Completed [6]

*Data from the CA SGIP.

Installation Capacity by Fuel Type (CHP Fuel Cells)



Distribution of Capacity and Eligible Cost (CHP Fuel Cells)

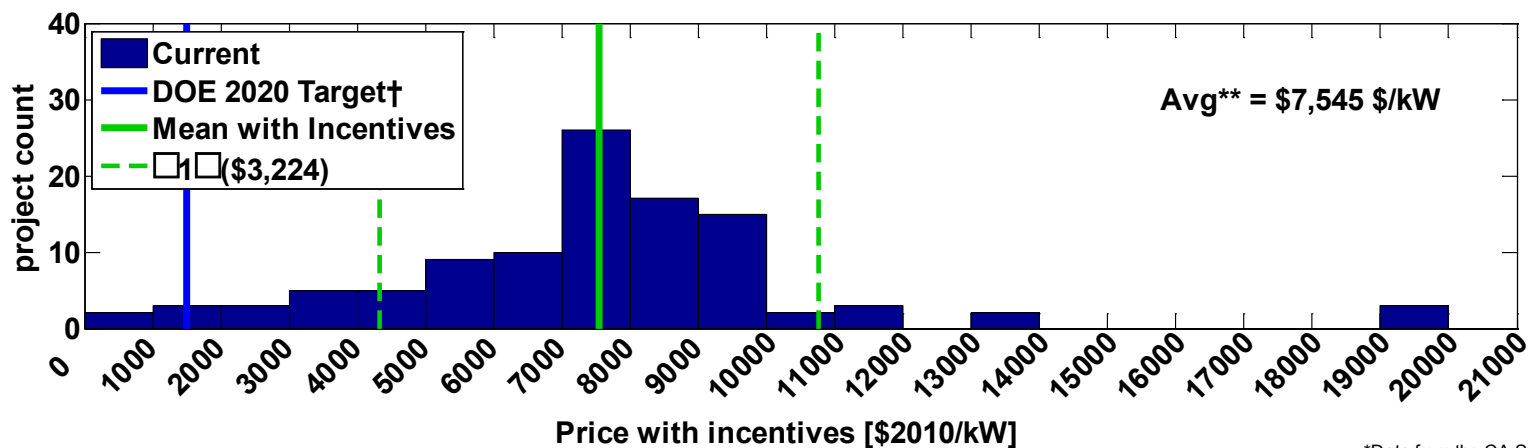
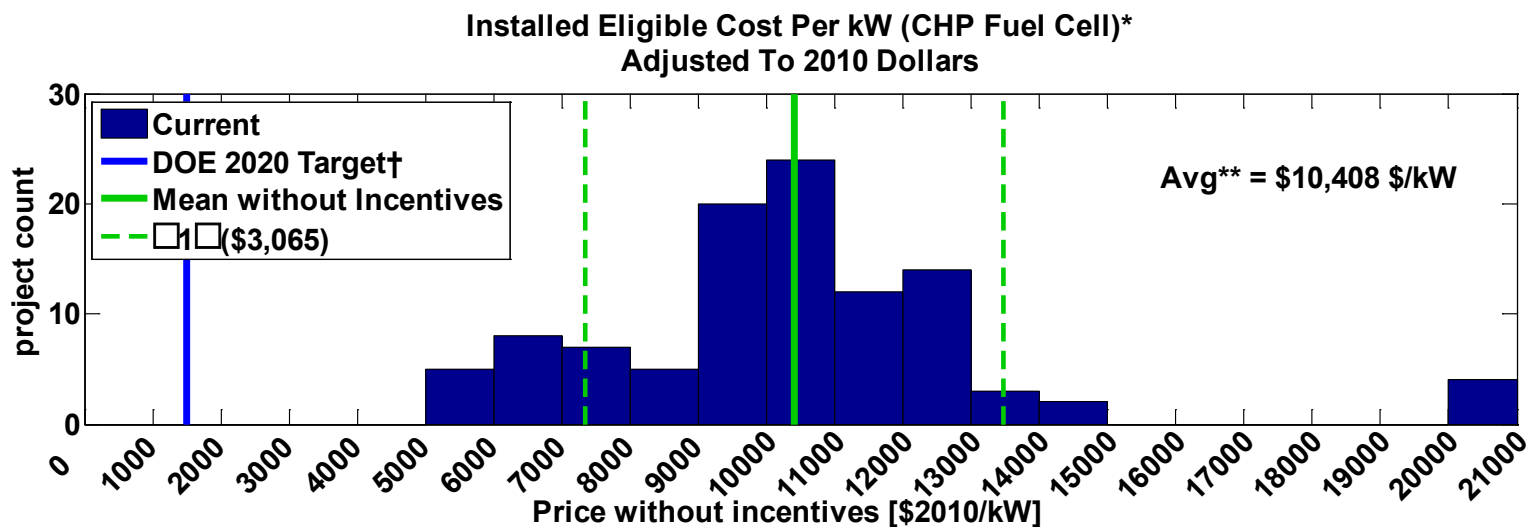


Eligible Costs May Include: Planning & Feasibility Study, Engineering & Design, Permitting, Self-Generation Equipment, Waste Heat Recovery Costs, Construction & Installation Costs, Gas & Electric Interconnection, Warranty, Maintenance Contract, Metering, Monitoring & Data Acquisition System, Emission Control Equipment Capital, Gasline Installation, Fuel Gas Clean-up Equipment, Electricity Storage Devices, Bond to Certify Renewable Fuel, Sales Tax, Fuel Supply (digesters, gas gathering, etc.), Thermal Load, & Other Eligible Costs

*Data from the CA SGIP.
 †installed cost for the year 2020, operating on natural gas. May not include all costs reported in CA SGIP.

CDP-STAT-23

Distribution of Eligible Cost with and without Incentives (CHP Fuel Cells)

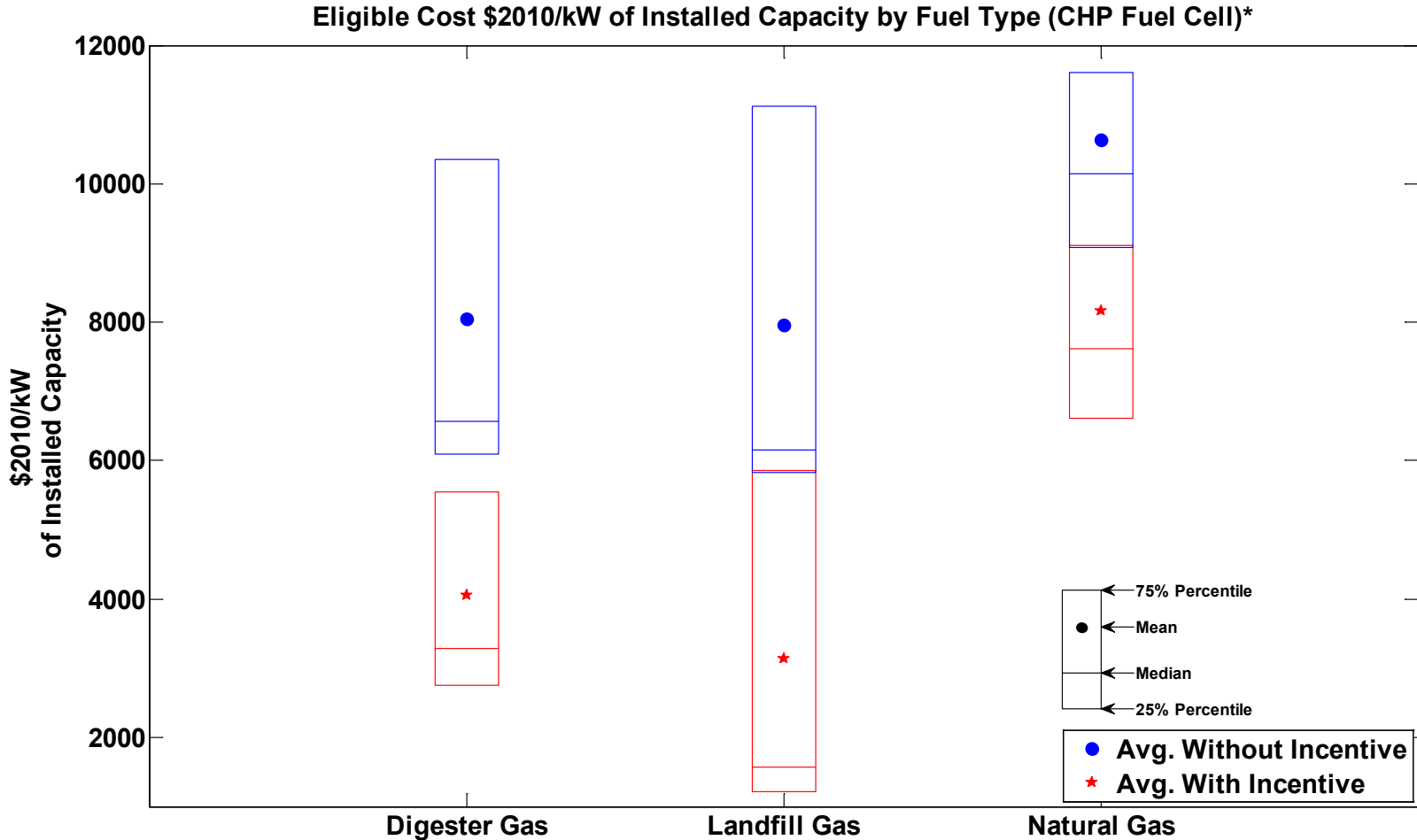


Eligible Costs May Include: Planning & Feasibility Study, Engineering & Design, Permitting, Self-Generation Equipment, Waste Heat Recovery Costs, Construction & Installation Costs, Gas & Electric Interconnection, Warranty, Maintenance Contract, Metering, Monitoring & Data Acquisition System, Emission Control Equipment Capital, Gasline Installation, Fuel Gas Clean-up Equipment, Electricity Storage Devices, Bond to Certify Renewable Fuel, Sales Tax, Fuel Supply (digesters, gas gathering, etc.), Thermal Load, & Other Eligible Costs

*Data from the CA SGIP.
 **Data bins with less than 2 projects filtered.
 †installed cost for the year 2020, operating on natural gas. May not include all costs reported in CA SGIP.

CDP-STAT-24

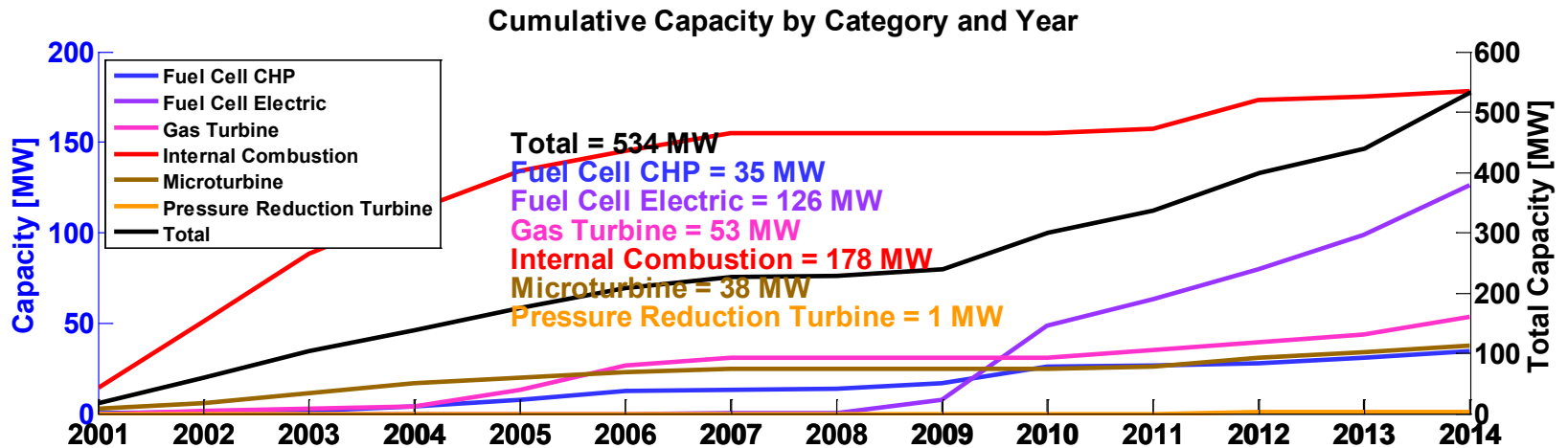
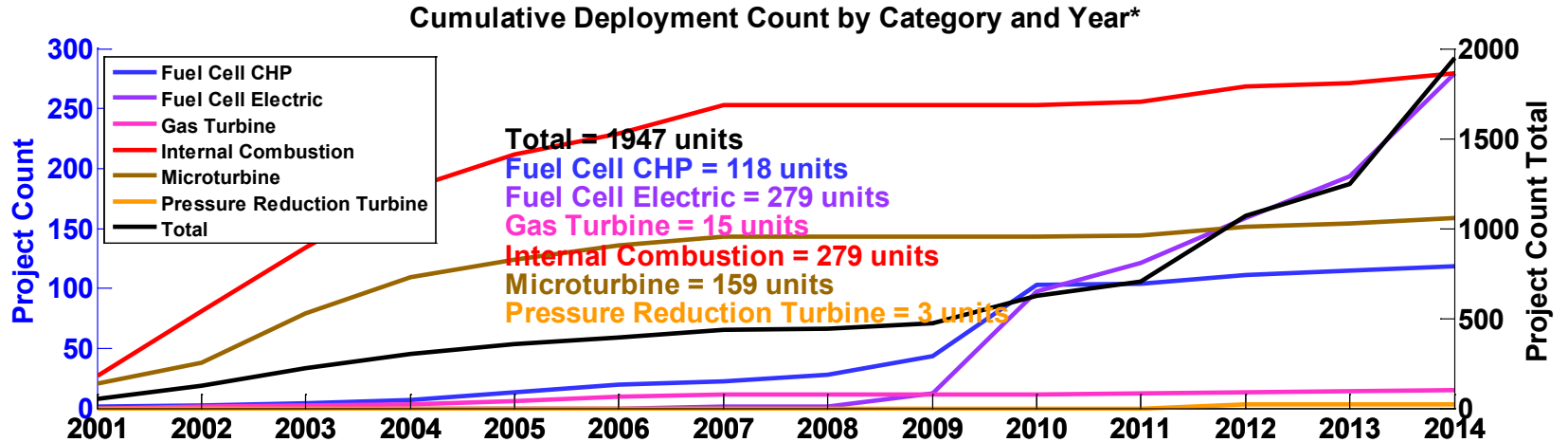
Eligible Cost By Fuel Type with and without Incentives (CHP Fuel Cells)



Eligible Costs May Include: Planning & Feasibility Study, Engineering & Design, Permitting, Self-Generation Equipment, Waste Heat Recovery Costs, Construction & Installation Costs, Gas & Electric Interconnection, Warranty, Maintenance Contract, Metering, Monitoring & Data Acquisition System, Emission Control Equipment Capital, Gasline Installation, Fuel Gas Clean-up Equipment, Electricity Storage Devices, Bond to Certify Renewable Fuel, Sales Tax, Fuel Supply (digesters, gas gathering, etc.), Thermal Load, & Other Eligible Costs

*Data from the CA SGIP. Note: Refer to CA SGIP Handbook for on-site vs directed digester gas (biogas) qualifications.

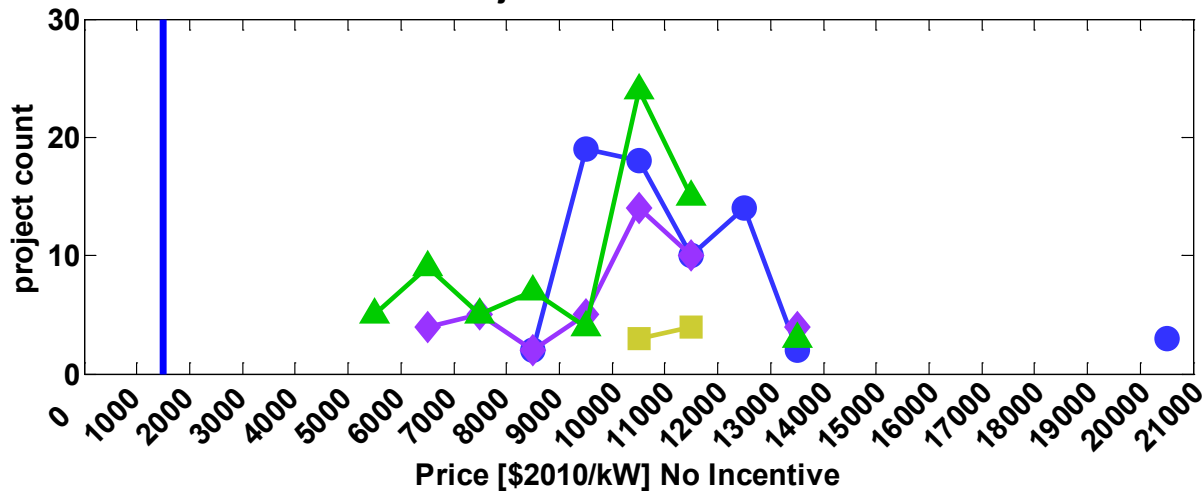
Cumulative Deployment Count by Category and Year



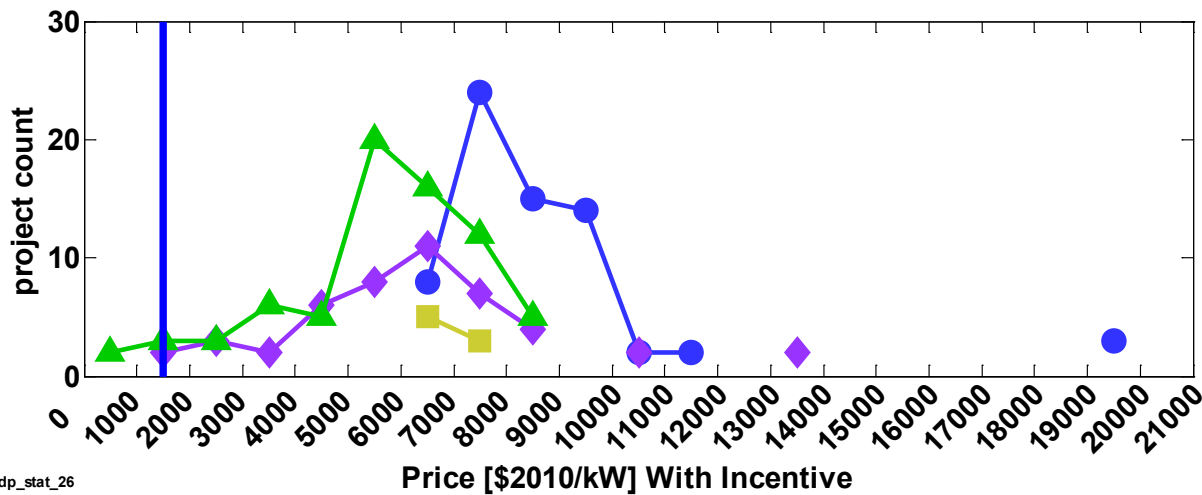
CDP-STAT-26

Installed Eligible Cost per kW By Capacity

Stationary Fuel Cell - Installed Eligible Cost Per kW By Capacity*
Adjusted To 2010 Dollars



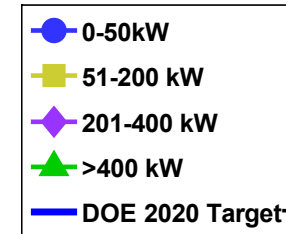
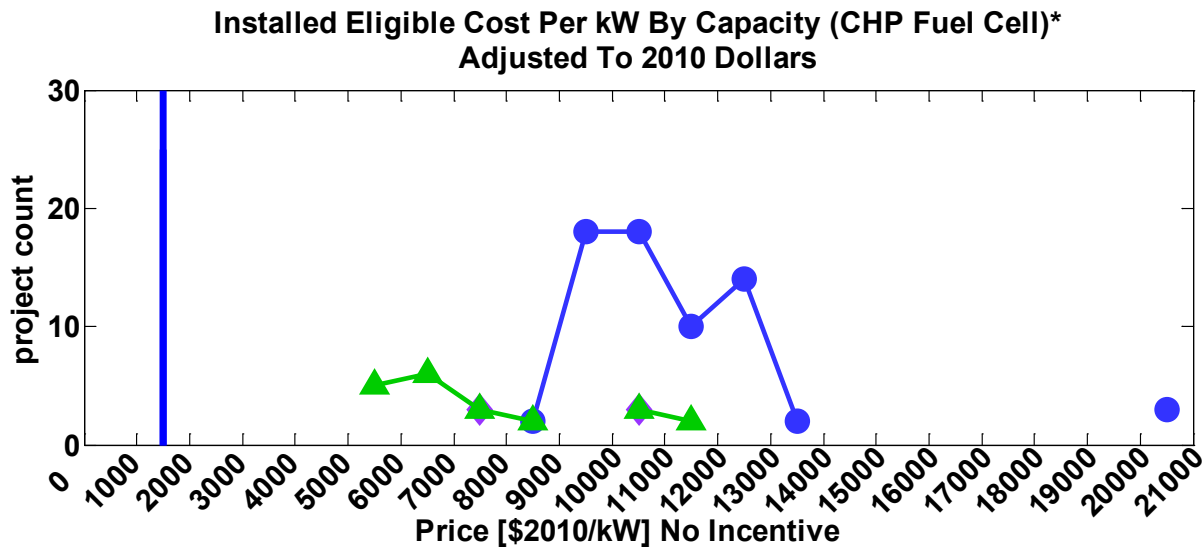
Average Prices No Incentive, Incentive
 0-50 kW = \$11,275/kW, \$8,782/kW
 51-200 kW = \$10,927/kW, \$6,715/kW
 201-400 kW = \$10,022/kW, \$6,220/kW
 401+ kW = \$9,537/kW, \$5,620/kW
 Data points with less than 2 projects filtered.



Eligible Costs May Include: Planning & Feasibility Study, Engineering & Design, Permitting, Self-Generation Equipment, Waste Heat Recovery Costs, Construction & Installation Costs, Gas & Electric Interconnection, Warranty, Maintenance Contract, Metering, Monitoring & Data Acquisition System, Emission Control Equipment Capital, Gasline Installation, Fuel Gas Clean-up Equipment, Electricity Storage Devices, Bond to Certify Renewable Fuel, Sales Tax, Fuel Supply (digesters, gas gathering, etc.), Thermal Load, & Other Eligible Costs

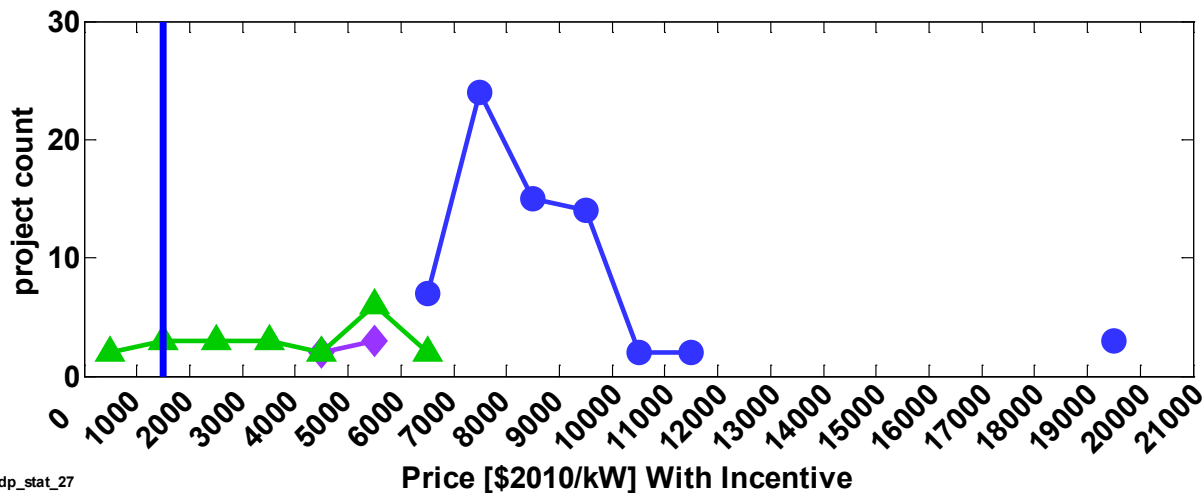
*Data from the CA SGIP.
 †Installed cost for the year 2020, operating on natural gas. May not include all costs reported in CA SGIP.

Installed Eligible Cost per kW By Capacity (CHP Fuel Cell)



Average Prices No Incentive, Incentive

0-50 kW = \$11,303/kW, \$8,809/kW
 51-200 kW = \$NaN/kW, \$NaN/kW
 201-400 kW = \$9,165/kW, \$5,316/kW
 401+ kW = \$7,608/kW, \$3,706/kW
 Data points with less than 2 projects filtered.



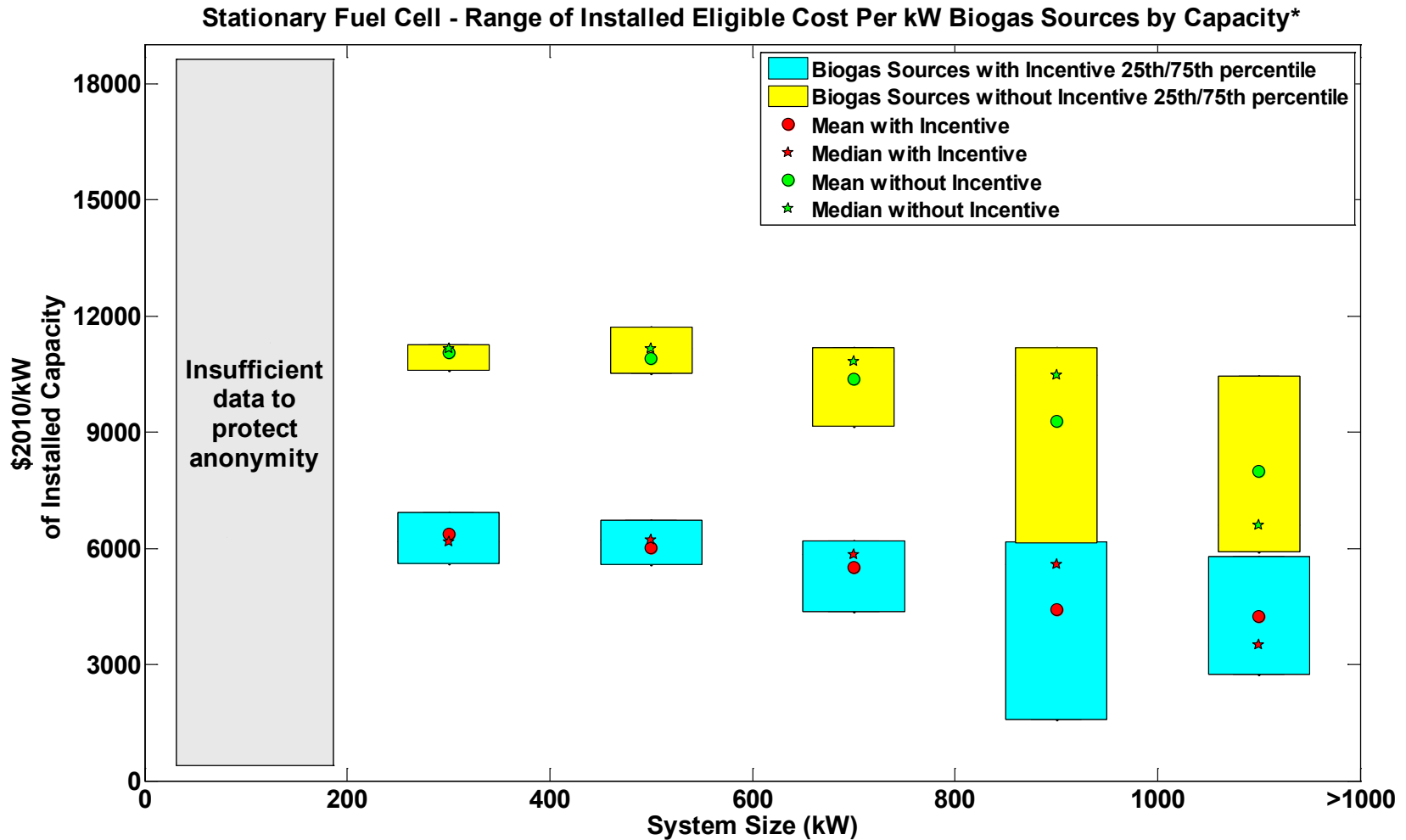
Eligible Costs May Include: Planning & Feasibility Study, Engineering & Design, Permitting, Self-Generation Equipment, Waste Heat Recovery Costs, Construction & Installation Costs, Gas & Electric Interconnection, Warranty, Maintenance Contract, Metering, Monitoring & Data Acquisition System, Emission Control Equipment Capital, Gasline Installation, Fuel Gas Clean-up Equipment, Electricity Storage Devices, Bond to Certify Renewable Fuel, Sales Tax, Fuel Supply (digesters, gas gathering, etc.), Thermal Load, & Other Eligible Costs

*Data from the CA SGIP.

†Installed cost for the year 2020, operating on natural gas. May not include all costs reported in CA SGIP.

CDP-STAT-28

Range of Installed Eligible Cost per kW Biogas Sources by Capacity



U.S. Deployment Map of Stationary Fuel Cells

USA Stationary Fuel Cell Installations (2001 - 2015)

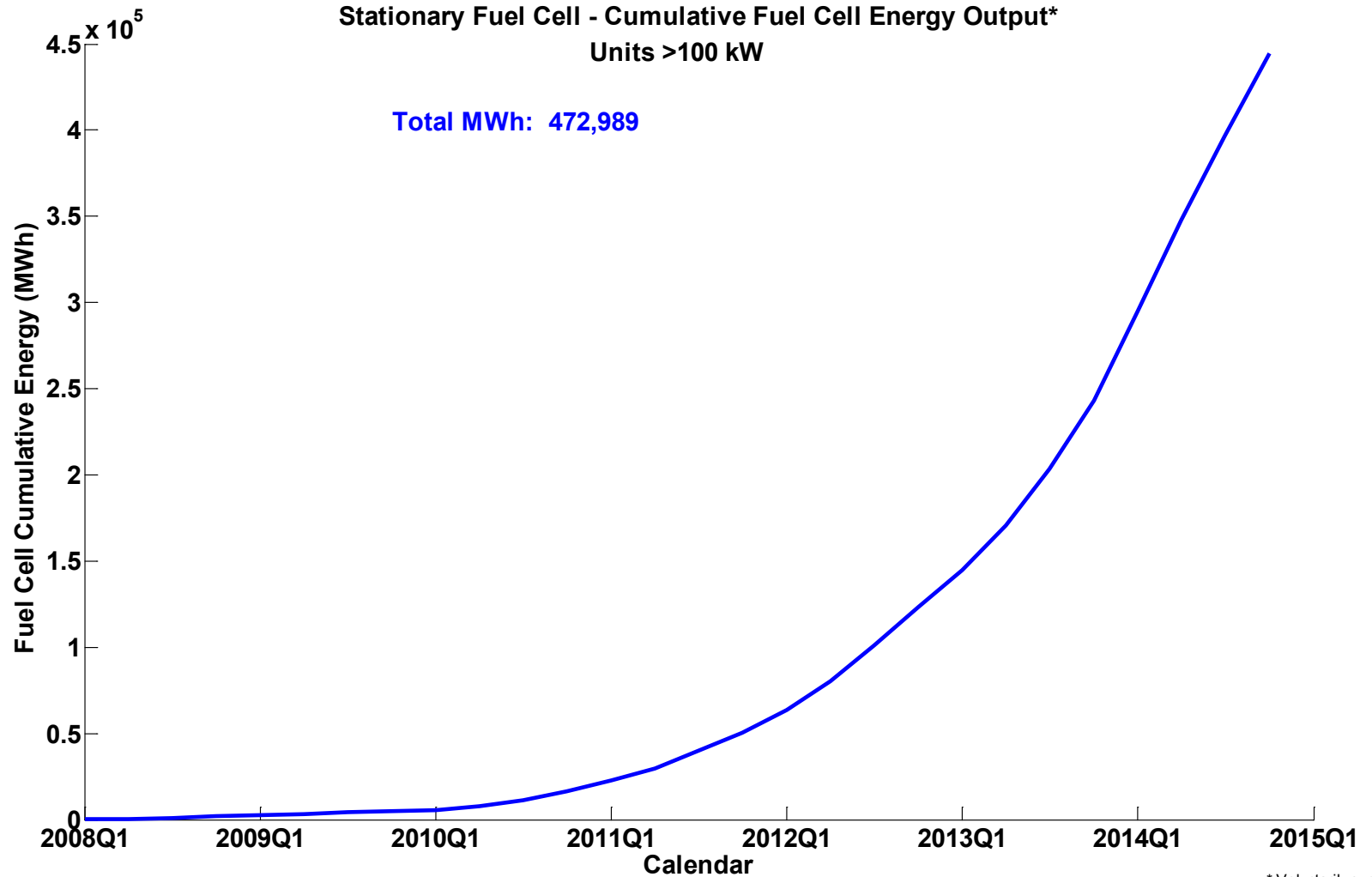
Includes CA SGIP data as well as sites supplying voluntary data.



Total Count of Sites in Continental US: 447

CDP-STAT-30

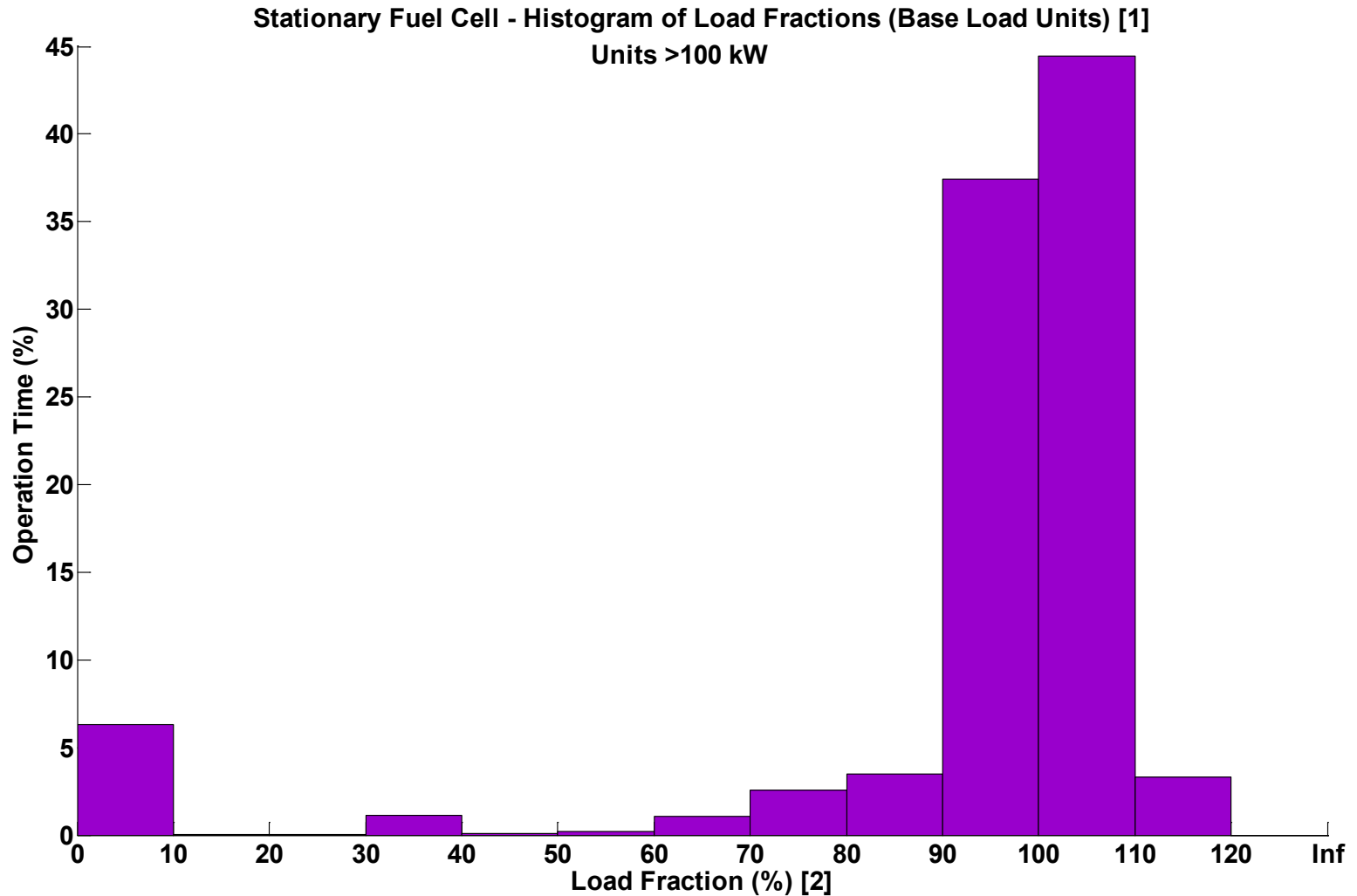
Cumulative Fuel Cell Output of Voluntarily Supplied Data for Units >100 kW



NREL cdp_stat_30
Created: Apr-24-15 11:46 AM | Data Range: 2001Q2-2014Q4

* Voluntarily supplied data for units > 100 kW

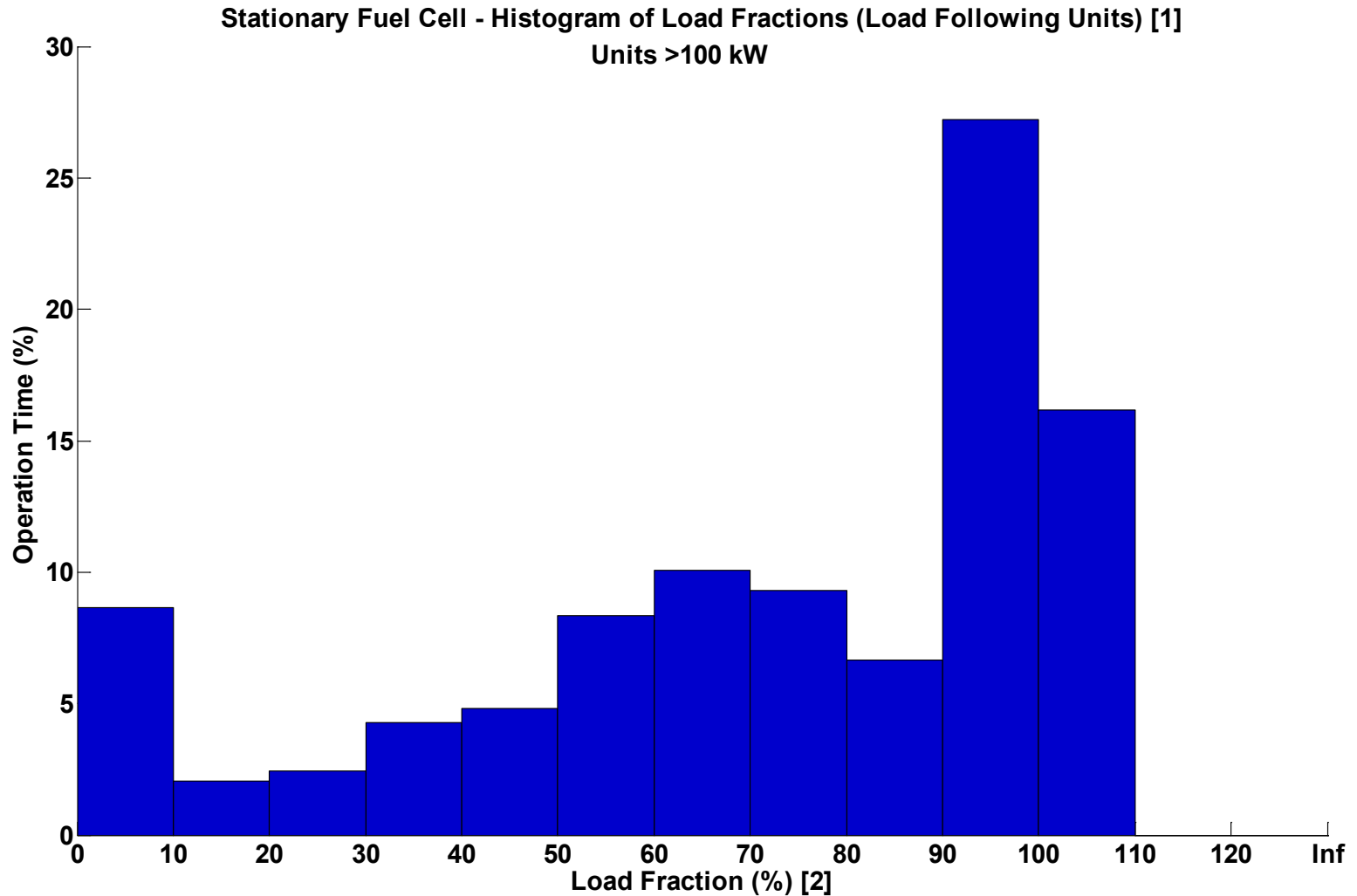
Histogram of Load Fractions for Base Load Units >100 kW



NREL cdp_stat_31
Created: Apr-24-15 11:37 AM | Data Range: 2001Q2-2014Q4

[1] Voluntarily supplied data for units > 100 kW, fuel cells running as building base load generation
[2] Load fraction is the ratio of electrical output per rated capacity of the fuel cell unit.

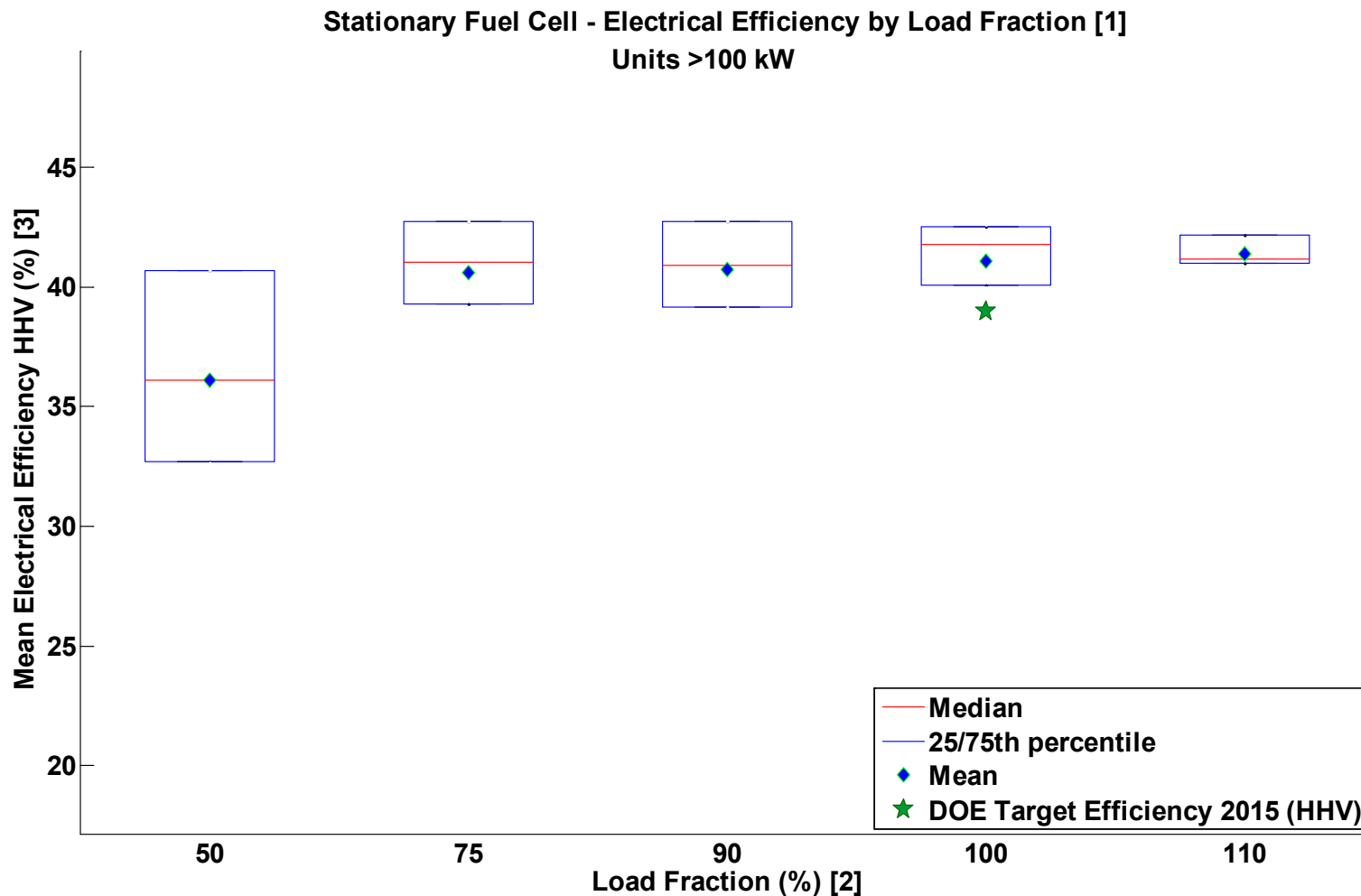
Histogram of Load Fractions for Load Following Units >100 kW



NREL cdp_stat_32
Created: Apr-24-15 11:37 AM | Data Range: 2001Q2-2014Q4

[1] Voluntarily supplied data for units > 100 kW, fuel cells running as building load following generation
[2] Load fraction is the ratio of electrical output per rated capacity of the fuel cell unit.

Electrical Efficiency by Load Fraction for Units >100 kW



[1] Voluntarily supplied data for units > 100 kW
 [2] Load fraction is the ratio of electrical output per rated capacity of the fuel cell unit. Efficiency data points for each load fraction are +/- 2% of the target load fraction.
 [3] Mean efficiencies by unit are calculated as the percentage of electrical power output to higher heating value of fuel input. The natural gas higher heating value used is 48.956 MJ/kg and the lower heating value used is 44.294 MJ/kg.