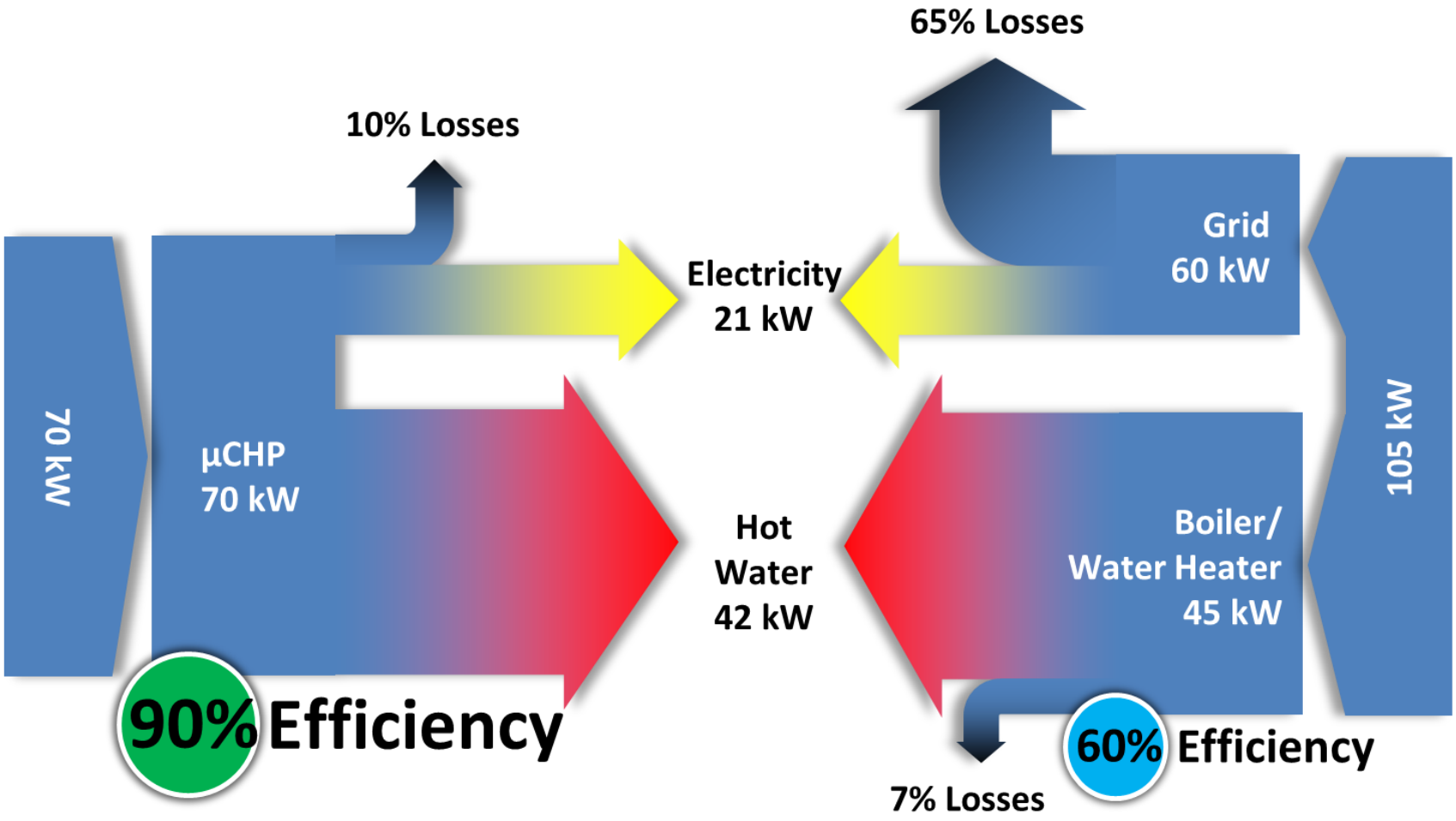
Demonstration of µCHP in Light Commercial Hot Water Applications

2016 Building Technologies Office Peer Review



U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

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Project Summary

Timeline:

Start date: Oct 1, 2014

Planned end date: September 30, 2017

Key Milestones

1. Identification of Demonstration Sites; 7/1/15
2. EPA Certification; 12/23/15

Budget:

Total Project $ to Date:

- DOE: $143,121
- Cost Share: $143,121

Total Project $:

- DOE: $675,000
- Cost Share: $863,300

Key Partners:

Briggs & Stratton	DOE - EERE
YANMAR America	MicroCogen Partners
ORNL	

Project Outcome:

Provide stake-holders with the information needed to build a sustainable market. Specifically:

1. Verify value proposition of a three year installed cost payback
2. Identify and simplify installation and maintenance
3. Create effective training for installation & maintenance personnel

Purpose and Objectives

Problem Statement:

- Commission eight field demonstration sites across specified target markets and geographic regions in North America to address the following market barriers:
  1. Lack of value proposition – payback longer than product life
  2. Complexity of system/sale – customer, installer, distributor
  3. Complex end market interface – lack of a trained installer base
  4. Lack of States' regulatory consistency – net metering and feed in tariff

Target Market and Audience:

- Light commercial buildings with high hot water demand: Full service restaurants, hotels & lodging, multifamily housing (75+ units), inpatient healthcare, education, fitness, car washes & Laundromats. More than 370,000 potential buildings in NA in 2012, growing at 1% CAGR[1].
- Geographic regions with favorable µCHP criteria: North-East, Mid-West and CA
- Stakeholders: Distributors, building contractors, building owners, specifying engineers and contracting installers

[1] ***Micro-CHP: Light Commercial Market Opportunity Analysis in NA, BRG, Sept. 2013***

Purpose and Objectives

Impact of Project:

Demonstrate µCHP technology in light commercial buildings.

- Provide independent verification of cost and performance from validated demonstration results.
- Identify and simplify installation and maintenance/service techniques
- Create effective training programs for both installation and service personnel
- Develop an effective technology to market path for µCHP technology

Near-term

Manufacturers and building industry gain a greater understanding of technical and economic merits of µCHP technology and how it can best be used to reduce energy use

Intermediate

Building on technology to market assessments, manufacturers bring µCHP technology market allowing building owners a avenue for adopting µCHP.

Approach

Approach:

- Install 8 µCHP systems in target market segments with high hot water demands.
- ORNL measure and verify the cost and performance of each installation.
- Focus on reducing cost by 1. developing best practices to train personnel and 2. improve product to simplify installation methods.

Key Issues:

- Finalizing installation plans.
- Complete installation

Distinctive Characteristics:

- Turnkey ‘plug and play’ system solution to reduce unnecessary costs
- Develop a “best practices” approach for reducing installation and maintenance costs
- Working closely with gas utilities to solicit feedback on best approach to market

Progress and Accomplishments

Accomplishments:

- Identified demonstration sites
- Obtained EPA emission certification

Market Impact:

- Demonstration systems not yet installed.
- Lab testing demonstrates that target technical performance is achievable and economic merits meet product objectives

Lessons Learned:

- Regulatory requirements and variability from location to location is one of the most significant barriers to entry.

Project Integration and Collaboration

Project Integration:

- Two engine suppliers are each supplying four engines plus controls and providing cost share. One of these (YANMAR) is a leading supplier of µCHP systems in Japan
- There is also direct utility engagement, state/regional agencies, industry trade group outreach

Partners, Subcontractors, and Collaborators:

- YANMAR America/Briggs & Stratton: engine suppliers, engine controls
- Oak Ridge National Lab: field test measurement and verification
- Microcogen Partners: consulting; identification of sites

Communications:

- Webinars describing the project presented to natural gas utilities and utility trade groups

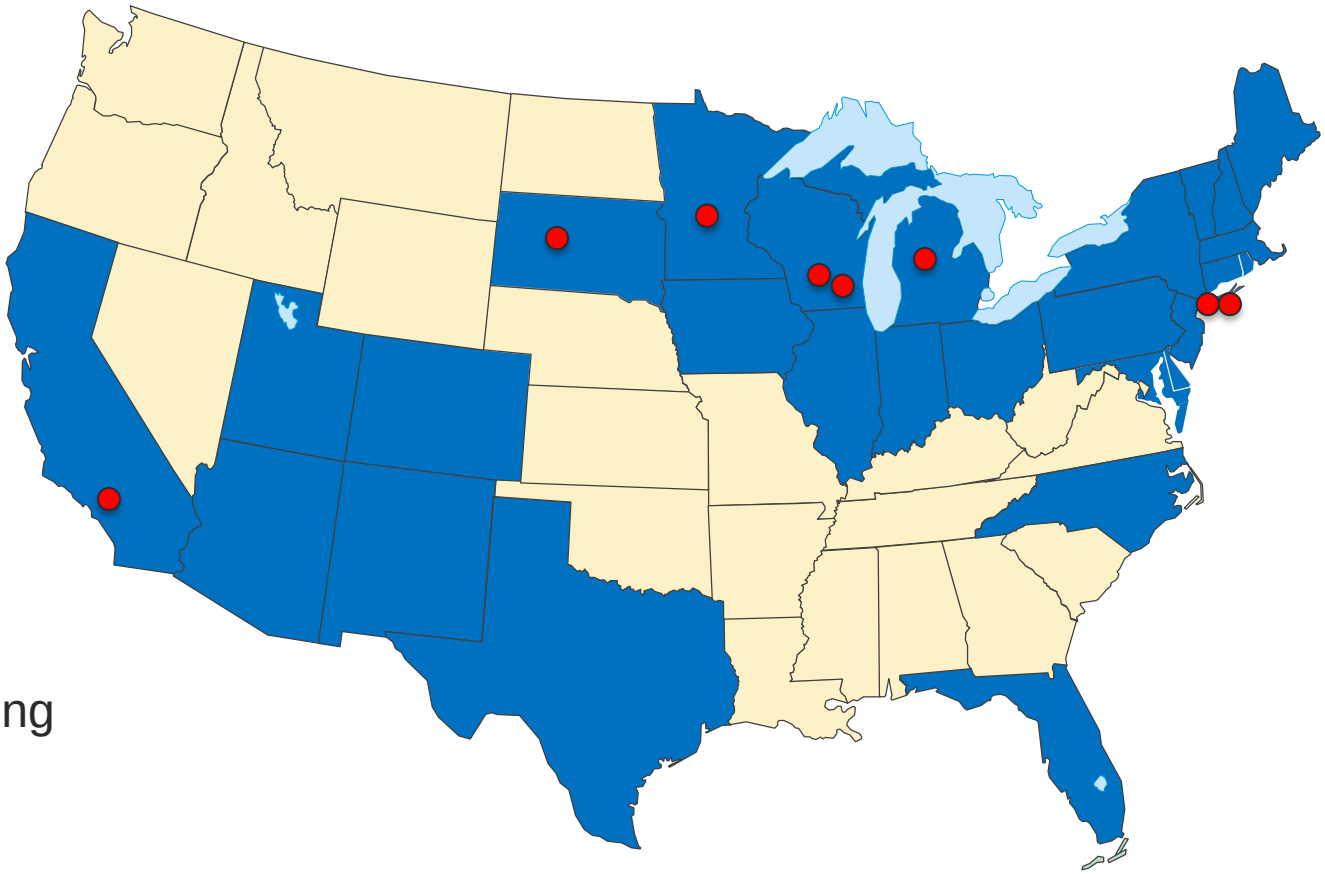
Next Steps and Future Plans

Next Steps and Future Plans:

1. Complete the installing planning for all targeted demonstration sites.
2. Complete the installation of all systems
3. California Emissions




Demonstration Sites



- Commercial Laundry
- Hotel
- Fitness Club
- Multifamily Housing
- Assisted Living
- Food Service

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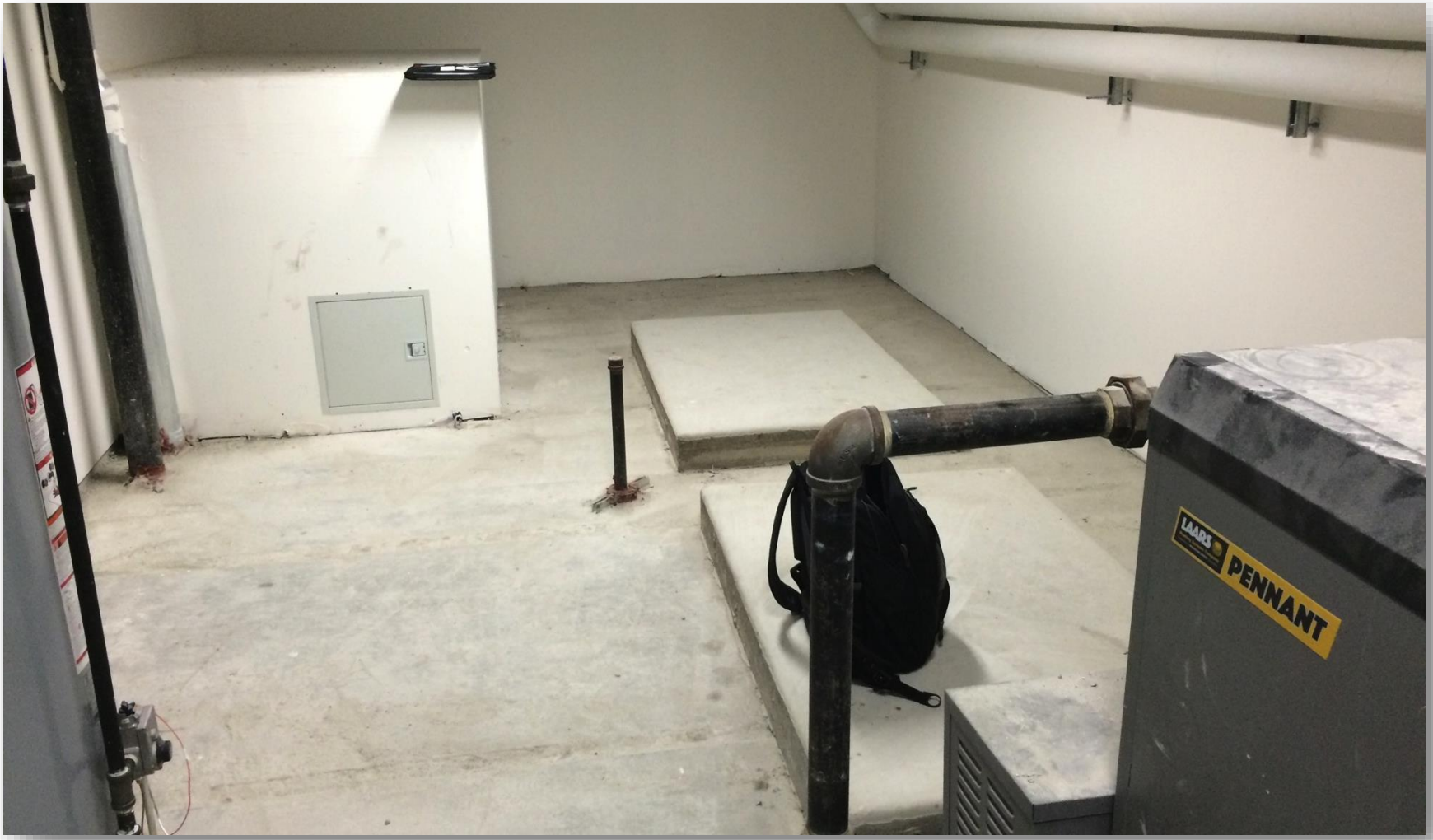
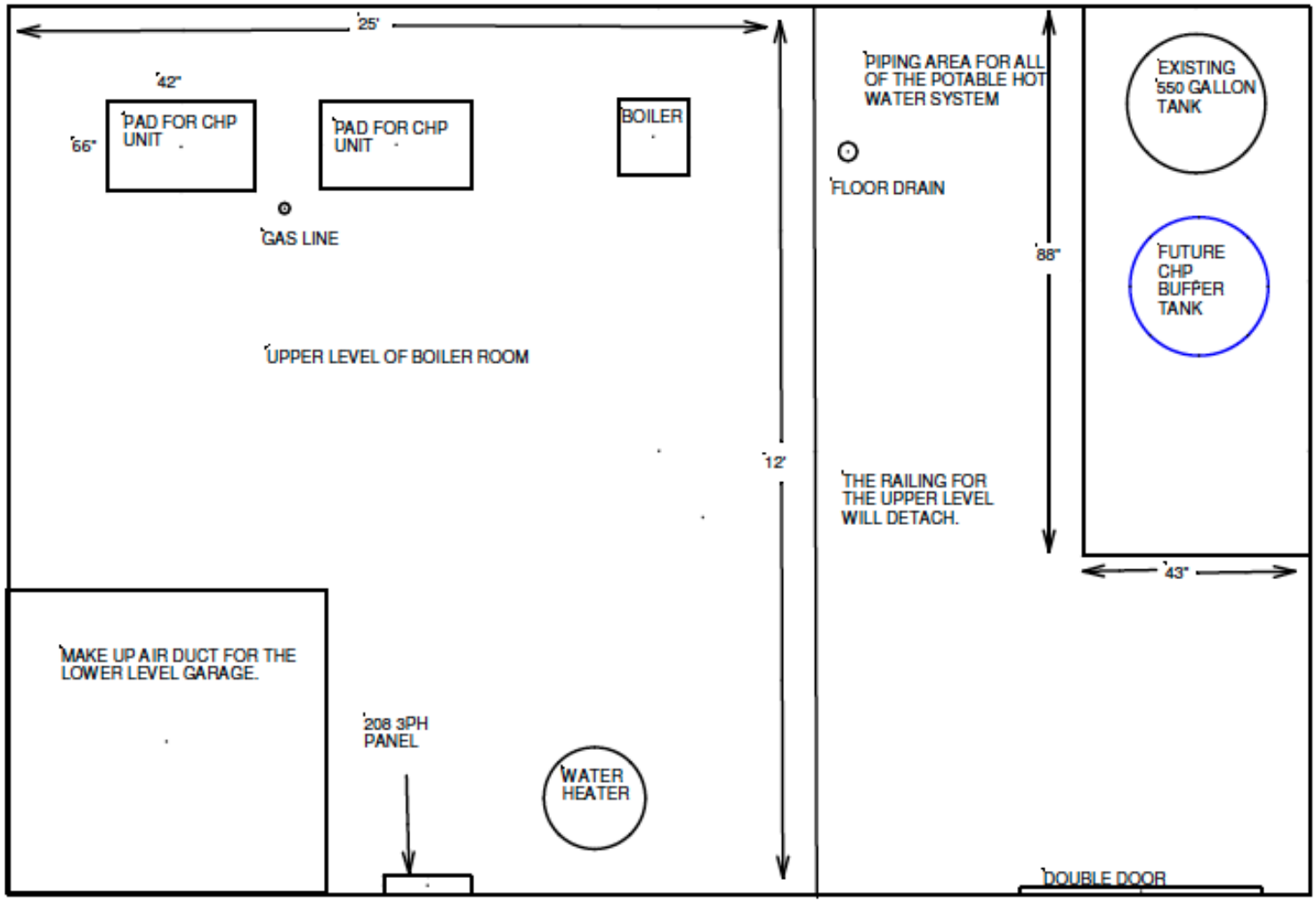
Multi-Family, Jamaica, NY

- New Construction
- µCHP ready
- Common DHW and power
- Preheat DHW

Multi-Family, Boiler Room



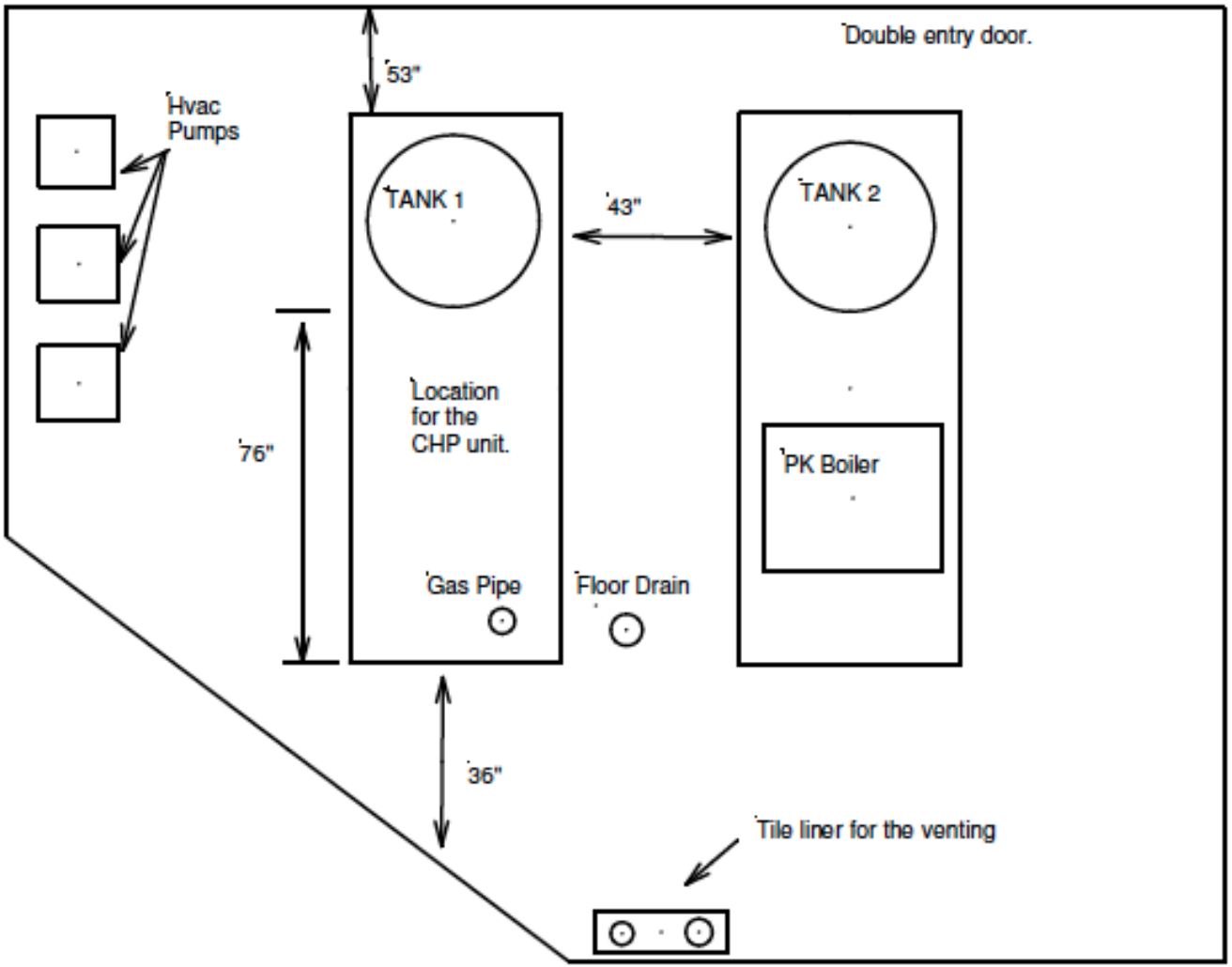
Multi-Family, Layout



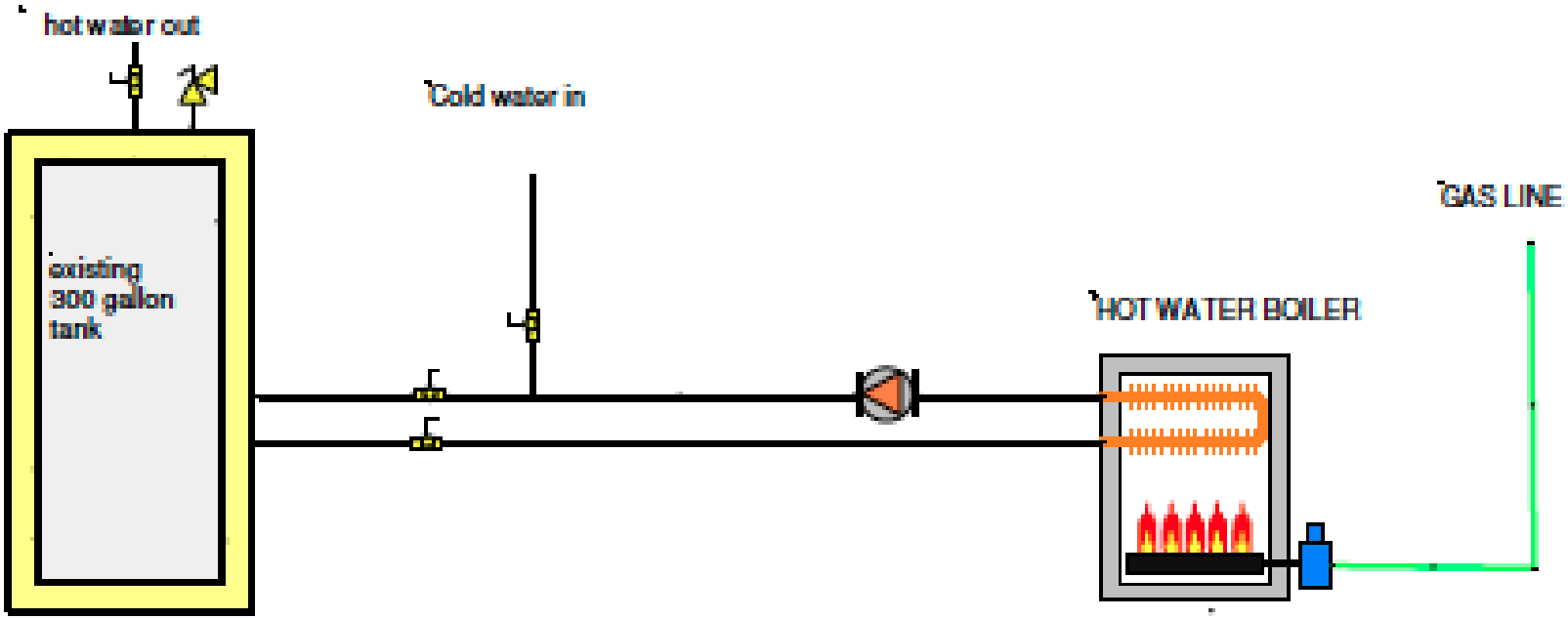
Resort and Spa, Michigan

- 600 rooms, 5 restaurants, 4 pools
- Kitchen DHW

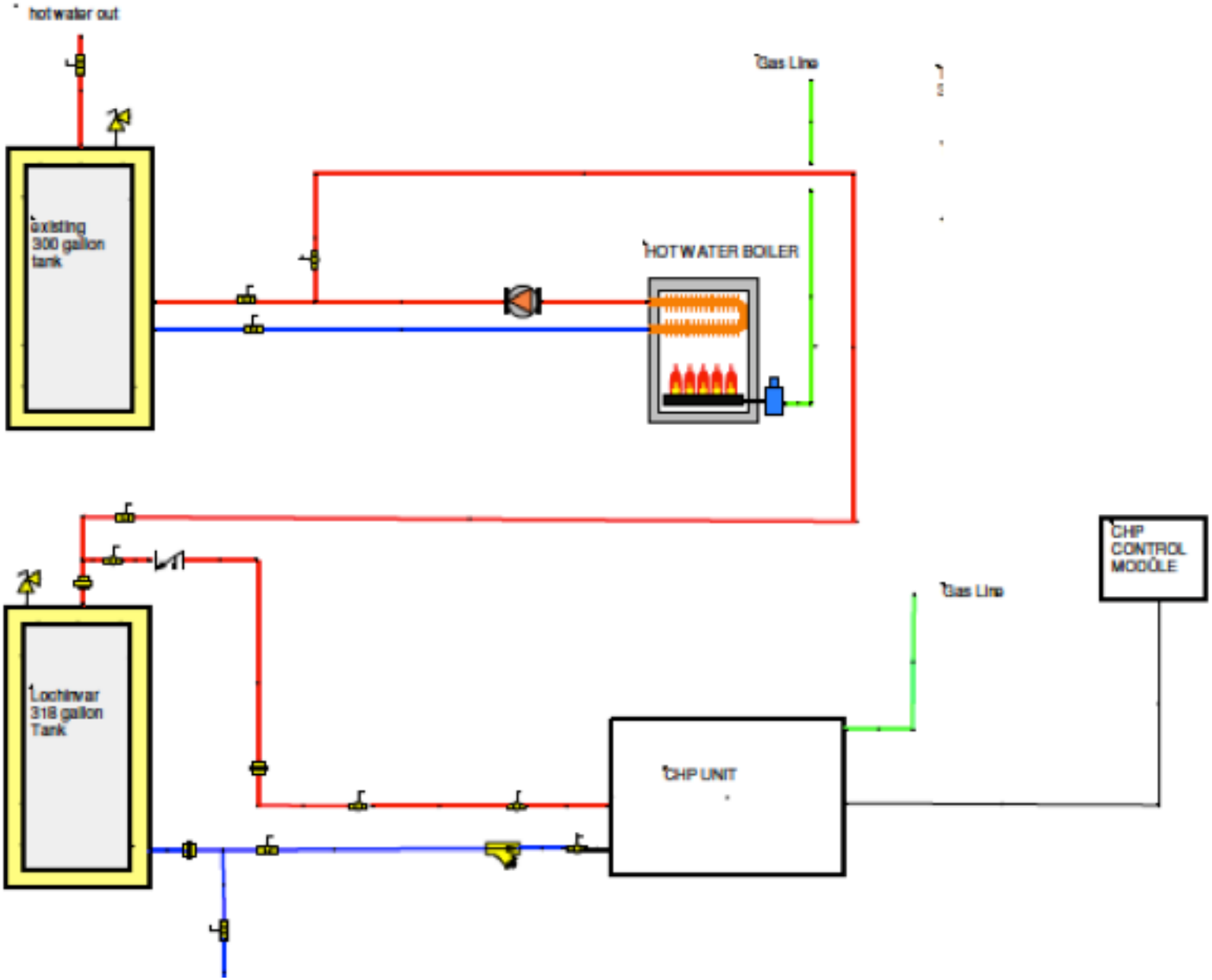
Resort and Spa, Layout



Resort and Spa, Existing Configuration



Resort, System Configuration



Emission Certification

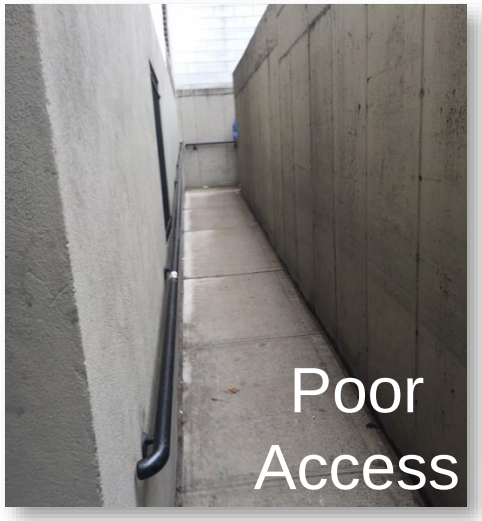
EPA (US except California)

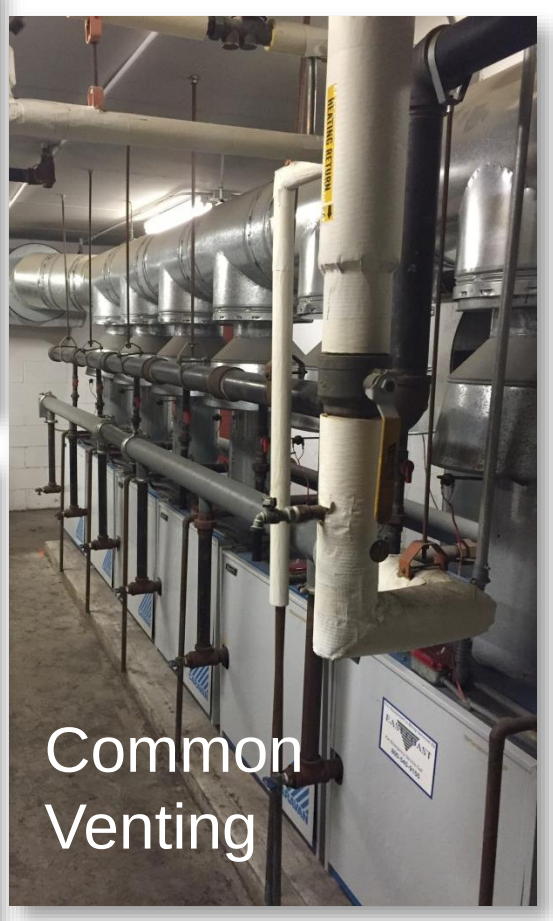
- Engines qualify for EPA certification

CARB

- Nox < 0.07 lb/MW-hr
- CO < 0.10 lb/MW-hr
- VOCs < 0.02 lb/MW-hr
- 1/10 EPA requirements
- Durability requirements

Potential Difficulties – Installation





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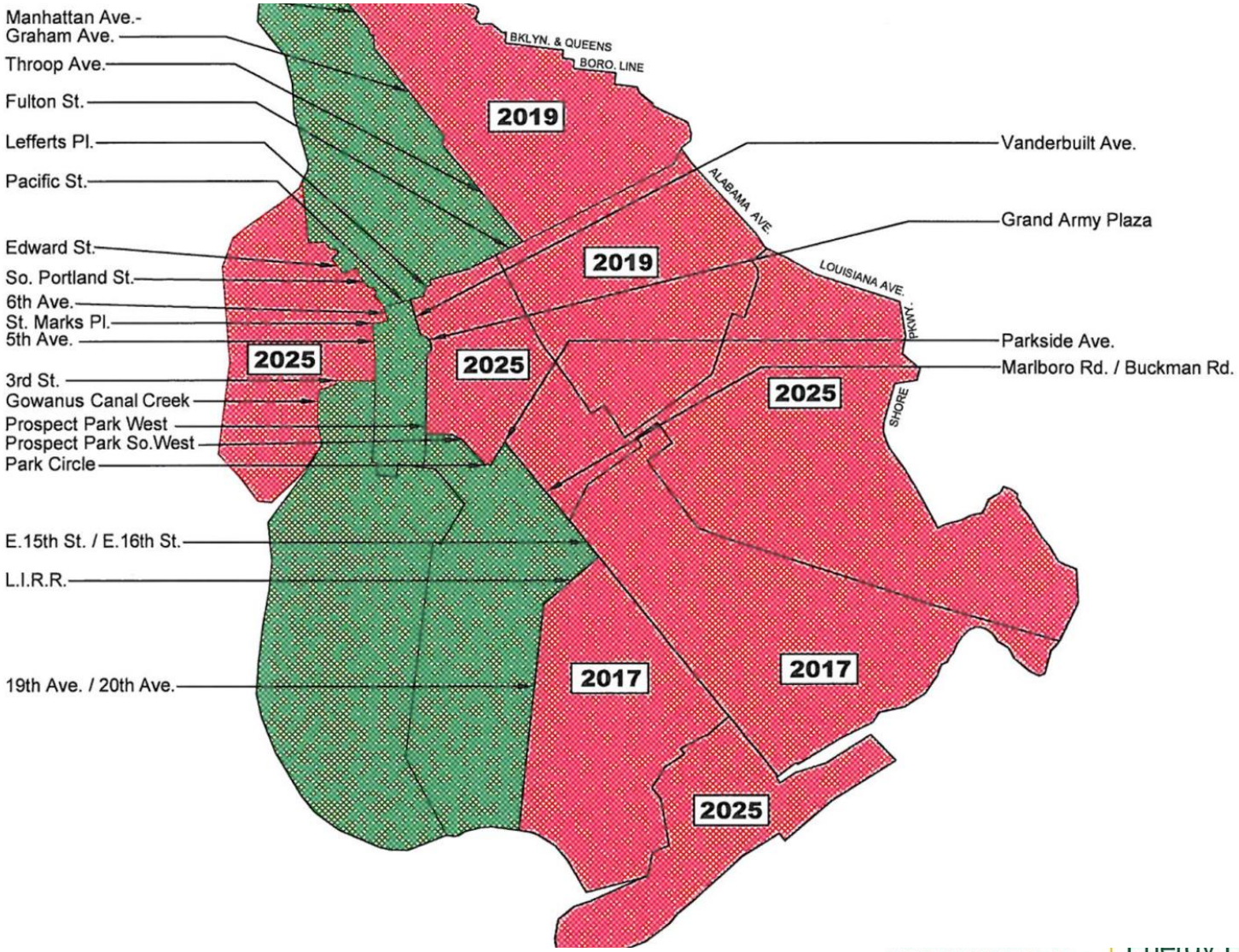
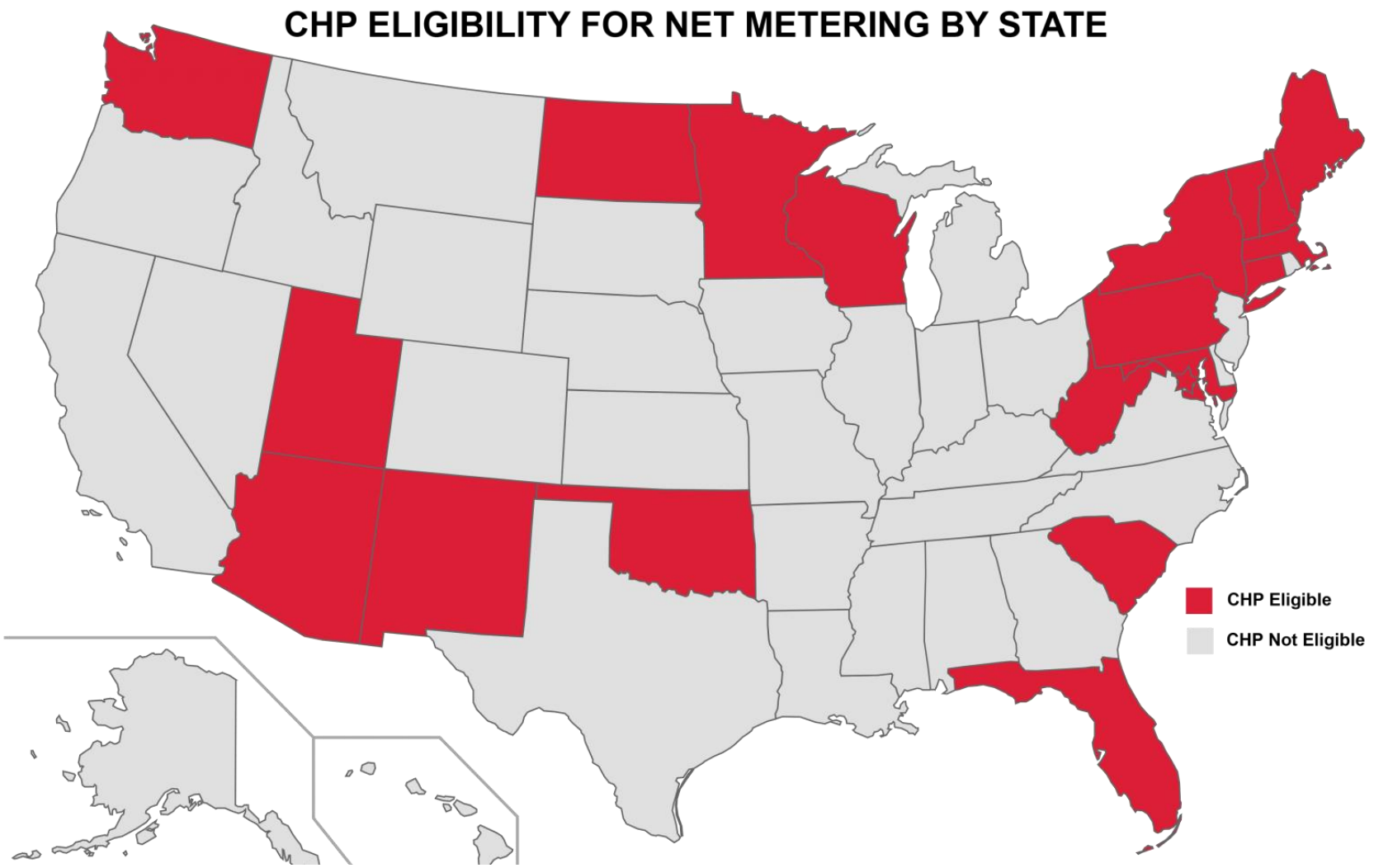
Potential Regulatory Difficulties– ConEd Brooklyn, NY



Potential Regulatory Difficulties – Net-metering



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REFERENCE SLIDES

Project Budget

Project Budget: $1,538,300 ($675,000 DOE, $863,300 Cost Share)

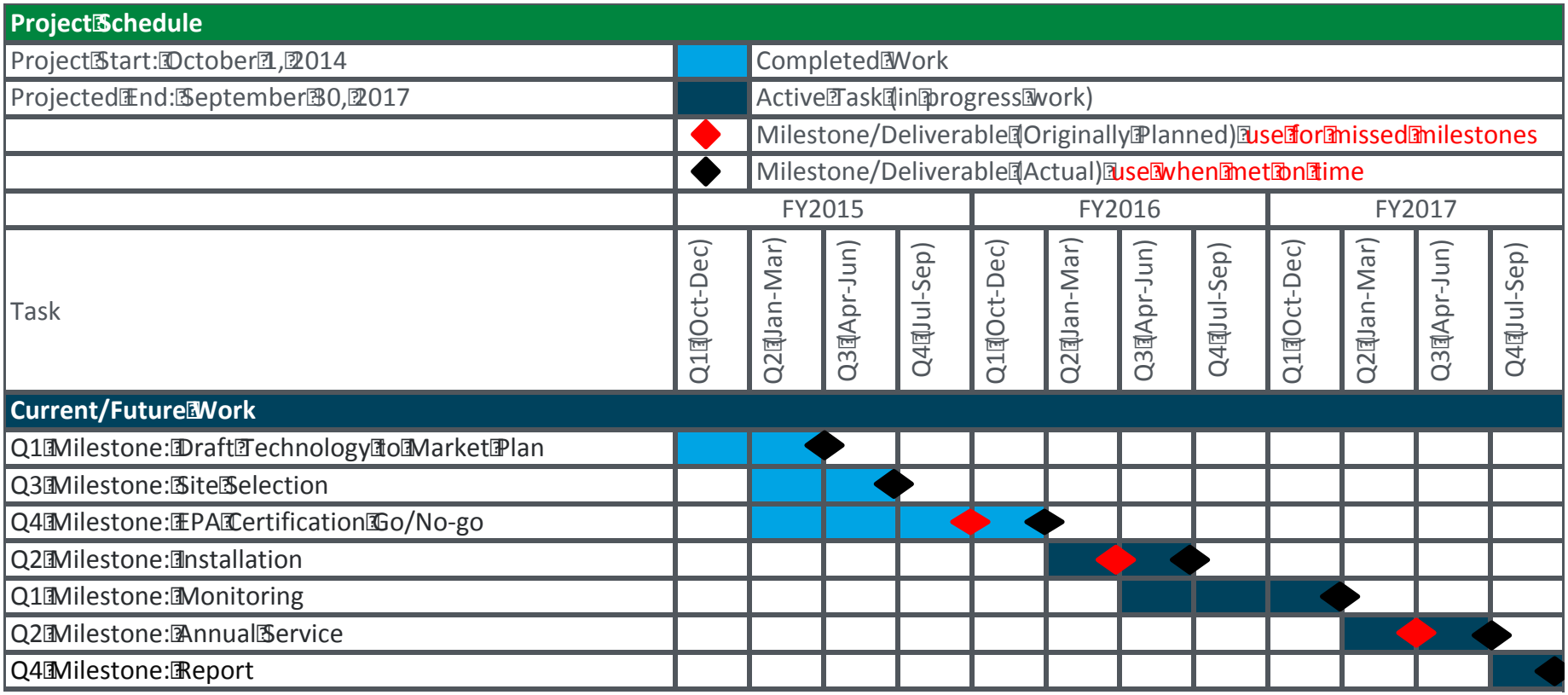
Variances: Delay in obtaining EPA certification resulted in a 6mo extension to first budget period

Cost to Date: $286,242

Additional Funding: None.

Budget History					
October 1, 2014– FY 2015 (past)		FY 2016 (current)		FY 2017 – Sep 30, 2017 (planned)	
DOE	Cost-share	DOE	Cost-share	DOE	Cost-share
$188,121	$188,121	$486,879	$520,000	$0	$155,179

Project Plan and Schedule



Questions?