Combined Heat & Power

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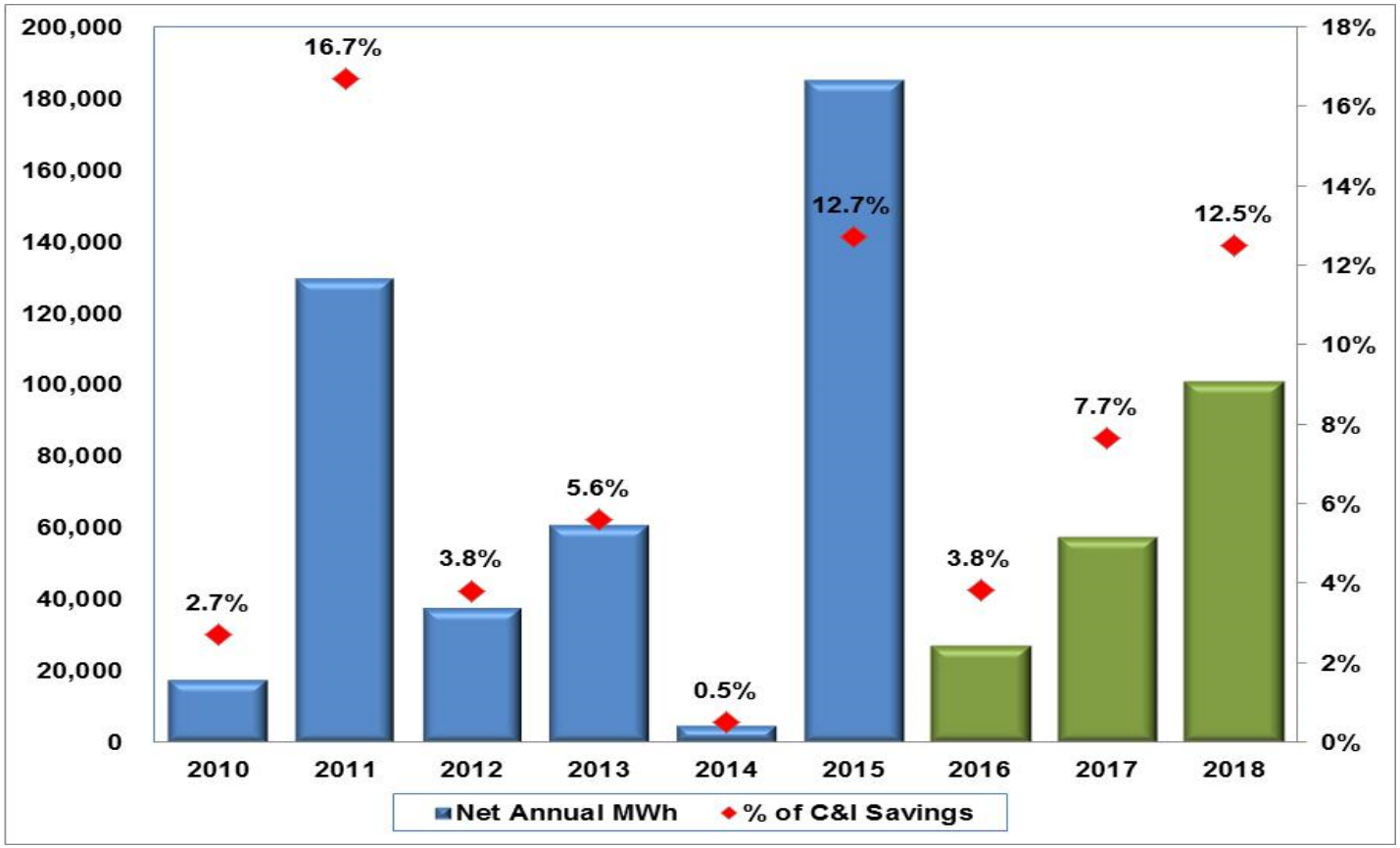
What is CHP?

Combined heat and power (CHP), also known as cogeneration, is the simultaneous production of electricity and heat from a single fuel source, such as: natural gas, biomass, biogas, coal, waste heat, or oil.

- **Criteria for Energy Efficiency:**
  - BCR ≥ 1.0
  - 60% overall system efficiency driven by thermal utilization
  - Rule of thumb: minimum 5,500 hours
- **Eligible types of CHP prime movers include**
  - Reciprocating engines
  - Gas turbines
  - Microturbines
  - Fuel Cells
  - Back pressure steam turbines

CHP Results & Plan

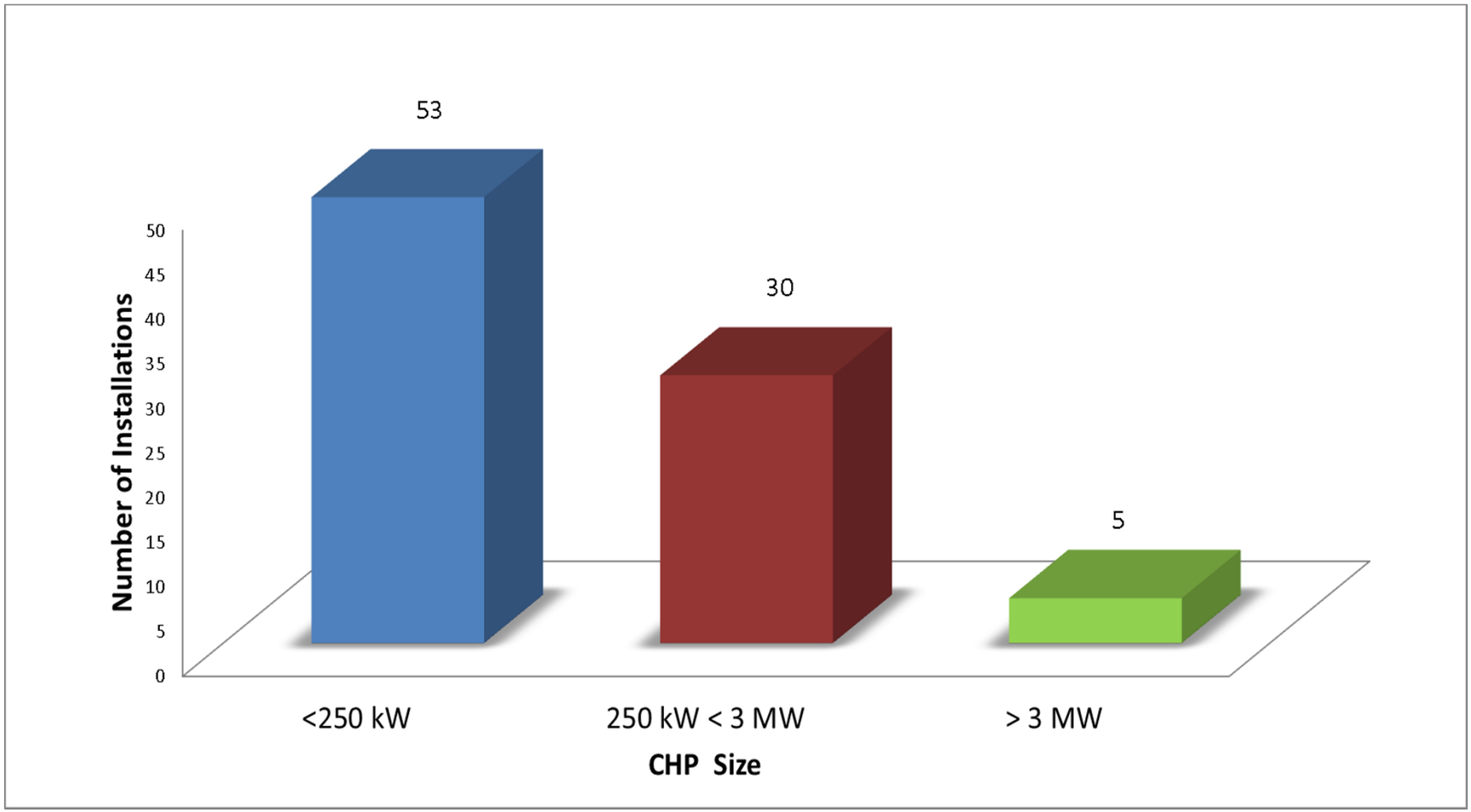


Big contributor to achieving statewide goals

Remains "lumpy"

Acquisition cost CHP = $0.14/kWh
C&I Portfolio = $0.35/kWh

CHP Installations by Size 2011-2015



Considerations

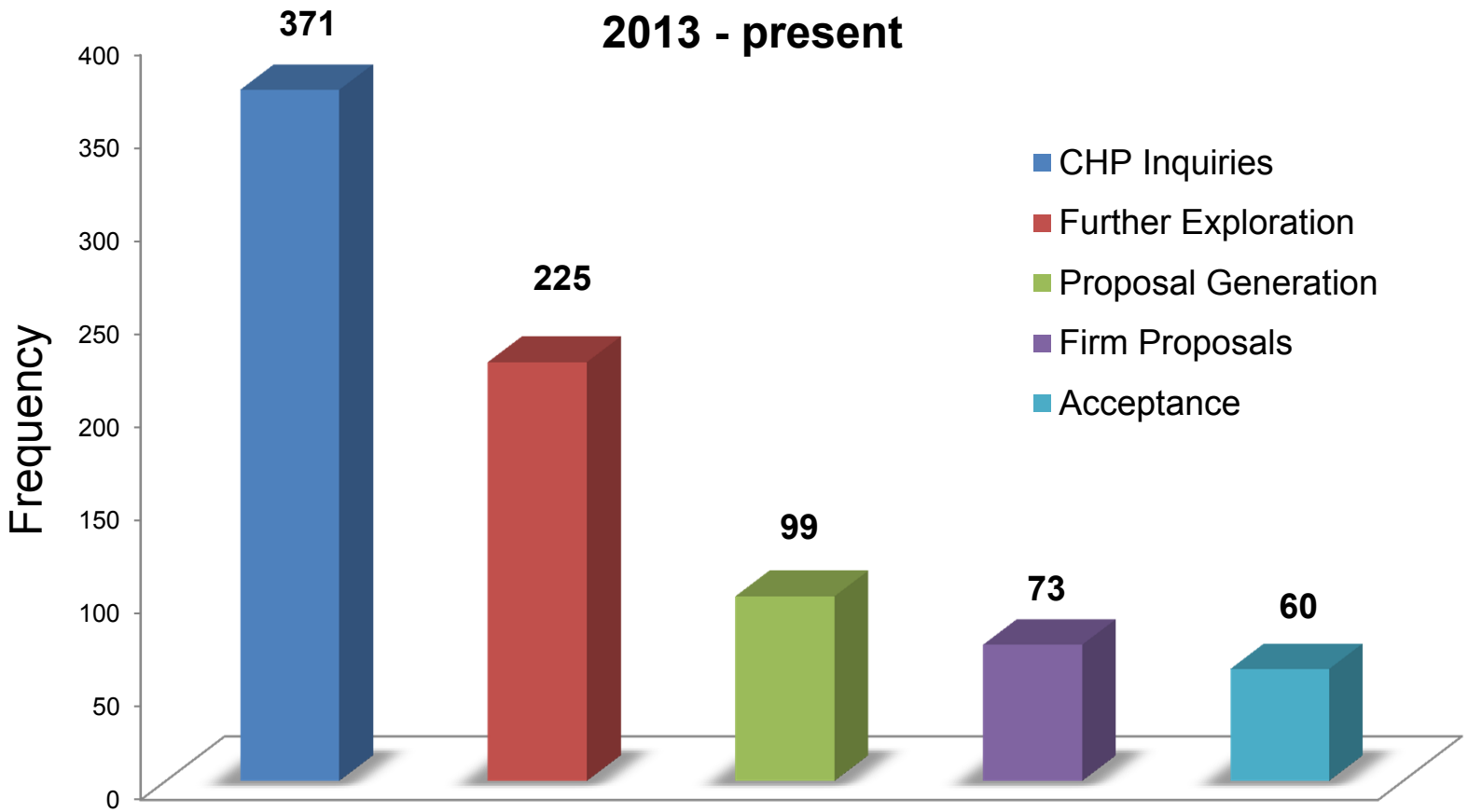
Challenges

- Who: Complexity of CHP – typically site specific, long timelines, and complex
- Where: Existing distribution system compatibility – interconnection and customer distribution system limitations
- Why: Financial Commitment – substantial investment in capital and long term commitment
- What: Perceived Need – customers consider all impacts vs actual need of CHP
- How: Uncertainty of energy commodity market/prices – impact of spark spread

Non-traditional Benefits / Drivers

- Resiliency – Facility systems operation integrity
- Carbon Reduction – Customers reducing carbon footprint due to global initiatives, corporate mandates, and potential regulation
- Business Growth – Data centers and food waste examples
- LEED Certification – CHP offers a pathway for attaining certification

CHP Market Flow



CHP Process

- **Identify**: Does a "real CHP opportunity exist" i.e. challenges/requirements. Engage customer with expertise to identify potential combined heat and power plant opportunities.

- **Educate**: Provide customers with a pathway for the entire CHP process from conception, economic impacts, business requirements, feasibility, interconnection process, energy efficiency opportunities, commissioning, and operation and maintenance commitments.

- **Develop**: Business Partnership – communication and technical conduit between customers and the CHP business community

CHP BCR Challenges

- **CHP, fundamentally, is an on-site generator**
  - It's more efficient than a stand-alone generator because it makes use of the 'waste' heat
- Total benefits calculation must include the fuel used to run the generator, which appears in the BCR as negative gas savings
- Depending on the usage of the building and the prices of natural gas vs electricity, CHP may not be cost-effective.
  - It's always on the margin, around 1.0
  - Very important to ensure that waste heat is being utilized
- Not all sites are appropriate sites for CHP, and efforts in this area must be carefully undertaken, with adequate study

Future Plans and Advancing Technology

- **Updates to MA CHP Guidelines**
  - Ensure that requirements and criteria is in line with technology advancement in CHP equipment
  - Review of TIER $/kW approach to facilitate and promote traditional energy efficiency measures and thermal utilization

- **CHP Business Partner Annual Meeting – Q2 2016**
  - CHP developers, equipment distributors, manufacturers, engineers,
  - Promote and advance CHP in MA as an impactful resource
  - Educate on program requirements, interconnection, and regulations,
  - Facilitate discussion on implementation best practice

CHP Process Evaluation

- In the 2016-2018 plan, program administrators committed to "commissioning a best practices review of other programs nationally and a reassessment of the CHP market in Massachusetts in 2016."
- Commitment is intended to be addressed via a process evaluation currently being scoped by the C&I evaluation contractors (DNV GL / Itron)

2016-2018 Plan	CHP Process Evaluation
"…are there barriers to doing more CHP projects with customers of each size…" "…are the barriers technical, policy, financial, legislative, or market issues…" "…can potential solutions to overcome the barriers be identified…"	Literature Reviews – *assessing recent changes in energy and policy landscape and reviewing findings from other studies on market barriers.* Interviews – *to be conducted with PA staff, developers, equipment suppliers, participants, and non-participants to understand how markets, policies, and customer characteristics impact market barriers.* Performance Analyses – *examination of past project performance to gain insight into those factors that make for favorable projects.*

Thank You