High Efficiency Motors for Refrigerated Open Display Cases

2015 Building Technologies Office Peer Review

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

PJ Piper, pjpiper@qmpower.com
CEO, QM Power, Inc.

Project Summary

Timeline:

Start date: 10/1/14

Planned end date: 3/31/18

Key Milestones

1. OEM Acceptance; 7/1/15
2. Site Demonstrations; 6/30/16-3/31/18

Budget:

Total DOE $ to date: $165,784

Total future DOE $: $838,869

Target Market/Audience:

This project is demonstrating and testing high efficiency Q-Sync fan motors in application with support from commercial refrigeration OEMs, retrofit contractors, utilities and grocery sites (end users).

Key Partners:

Oak Ridge National Labs	Hillphoenix
National Grid	Retrocool
Supermarkets	Utilities
Installers	Distributors

Project Goal:

QM Power is targeting the demonstration, testing and deployment of replicable, cost-effective, low-risk, higher efficiency fan motor solutions with market leaders. Using Q-Sync technology instead of incumbent solutions would be the equivalent of taking at least one of every two existing fan motor solutions off the grid.

This is a new project!

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Purpose and Objectives

Problem Statement: Grocery sites are typically 1-2% net margin businesses with significant energy costs. Even with a much more efficient and more reliable product at the same cost, OEMs and end-users often rely on product demonstrations before adopting new solutions.

Target Market and Audience: The project will demonstrate and test high efficiency Q-Sync fan motors in application with support from commercial refrigeration OEMs, retrofit contractors, utilities and grocery sites. QM Power's technologies have the potential to achieve over 0.6 quads and over $1 billion of energy savings in HVACR building applications.

Impact of Project:

- **Near-term**: Up to 10,000 motors will be installed in up to 50 sites across the US during the course of the project. Demonstrations will expedite customer adoption and the development and use of QM Power's technologies in other HVACR fan applications.
- **Intermediate-term**: QM Power HVACR fan motors exceed $100 million per year in sales. Additional building system solutions utilizing QMP's technologies, such as for pump and compressor applications, will be commercialized.
- **Long-term**: Synchronous motors become the de facto standard in the industry, displacing shaded pole, PSC and ECM offerings. DOE minimum efficiency and Energy Star designations are easier for OEMs to achieve, utilities solve major grid congestion issues and end users rapidly deploy cost effective, low-risk energy efficient solutions.

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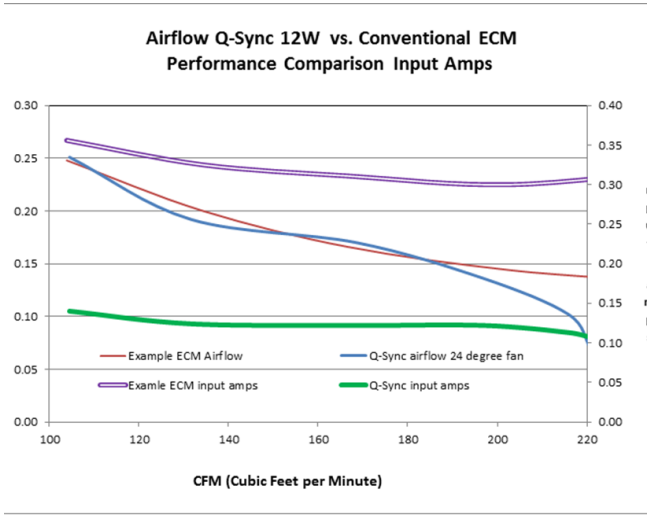
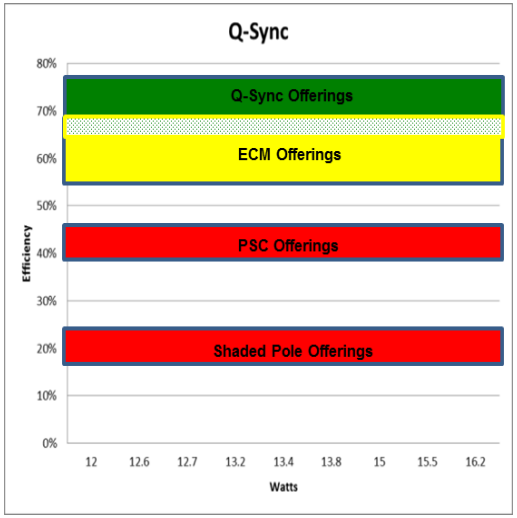
Approach

Approach: QM Power is targeting high visibility demonstrations.

Key Issues: Validating performance with OEMs, refrigeration contractors, end users and utilities. Getting utilities to offer rebates and on-bill financing alternatives, ideally at levels beyond those offered for ECM solutions, is an important goal which would accelerate market adoption.

Distinctive Characteristics: QM Power is looking to reduce amp requirements by over 50% of the next best market offering without a cost premium to the supply chain.





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Progress and Accomplishments

Lessons Learned: QM Power is anticipating potential installation challenges to include varying speeds and fan blades of incumbent solutions impacting targeted cfm in application; and potential variability/complexity within the non-uniform utility rebate programs often financing implementation.

Accomplishments: QM Power has obtained UL approval, gained OEM acceptance and largely completed initial tech to market and deployment plans. The demonstrations are starting about 3 months ahead of schedule with interested participants across all parts of the supply chain. Progress is expected to accelerate, likely allowing the project to be completed well ahead of schedule.

Market Impact: QM Power has demonstrated efficiency and power factor advantages that suggest using Q-Sync technology instead of incumbent solutions would be the equivalent of taking at least one of every two existing fan motor solutions off the grid. The market has shown great interest and most aspects of the project plan are about 3 months (33%) ahead of schedule. Successful initial trials should further accelerate market penetration.

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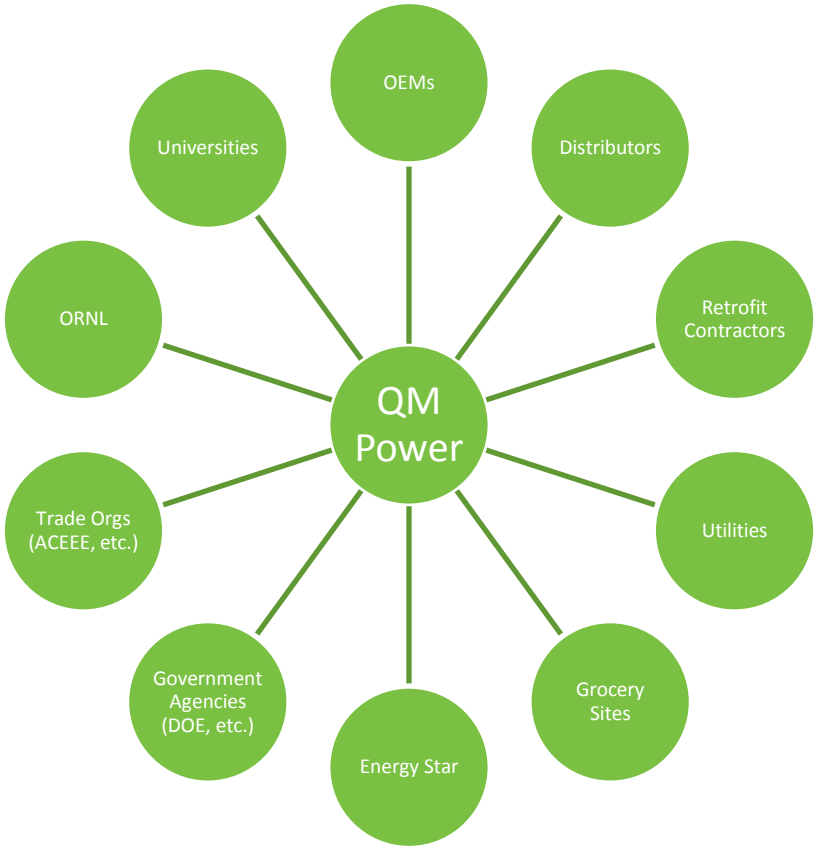
Project Integration and Collaboration

QM Power and ORNL are working directly with a diverse set of collaborators.



QM Power's planned TT&O is targeting presentations at FMI, ASHRAE, the DOE Better Buildings Summit and publications from ORNL, academia and trade organizations.

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Next Steps and Future Plans

QM Power is focusing on a broad and diverse installation of retrofit opportunities. These provide the company with highly visible demonstrations of the value proposition for key participants in the supply chain and ultimately help accelerate commercial sales.

The company anticipates future potential opportunities to scale into additional building applications including larger HVACR fan, pump and compressor systems, each of which are among the biggest consumers of electricity in the building envelope. QM Power is already working on integrating smart motor technologies to allow for remote monitoring (wifi) and control optimization to improve installation, performance, reliability and up-time, as well as advanced fan blades that reduce energy use, are quieter and more durable.

REFERENCE SLIDES

Project Budget

Project Budget: Spending is on budget and expected to be on budget at the end of the Phase I period ending June 30, 2015.
Variances: None in current period. Given market adoption is accelerating and several market participants are interested in full store retrofits instead of starting with single case installations, it is expected that the program will opportunistically request a modification to accelerate some of the Phase III funding into Phase II.
Cost to Date: $184,822 through February ($92,411 DOE)
Additional Funding: Series C venture capital financing in process including leading property developers.

Budget History					
FY2014 (past)		FY2015 (current)		FY2016 (planned)	
DOE	Cost-share	DOE	Cost-share	DOE	Cost-share
NA	NA	165,784	165,784	349,871	349,871

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Project Plan and Schedule

- Project began 10/1/14 and is scheduled to end 3/31/18.
- Schedule and Milestones shown below.
- The project is approximately 3 months ahead of schedule.
- Go/no-go decision points in June depending on UL approval (achieved 12/14), OEM acceptance (ongoing beginning 3/15) and tech to market plan (draft completed 3/15) and deployment plan (in process)