

## Study

### UMass Amherst RCx Turnkey Implementation Projects 2015-2019

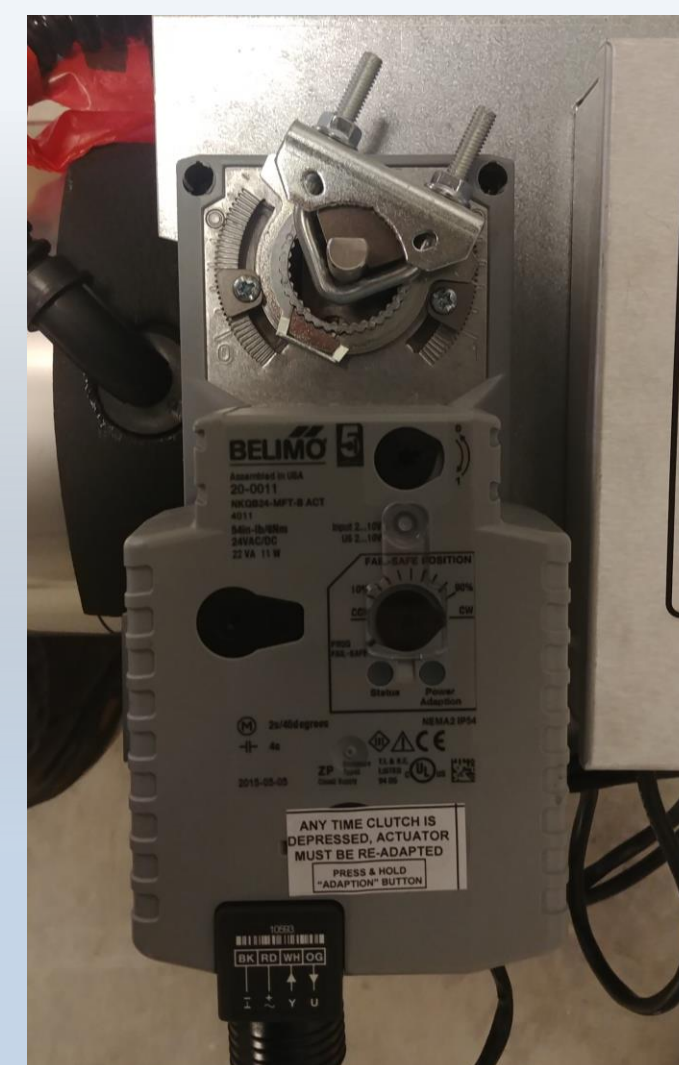
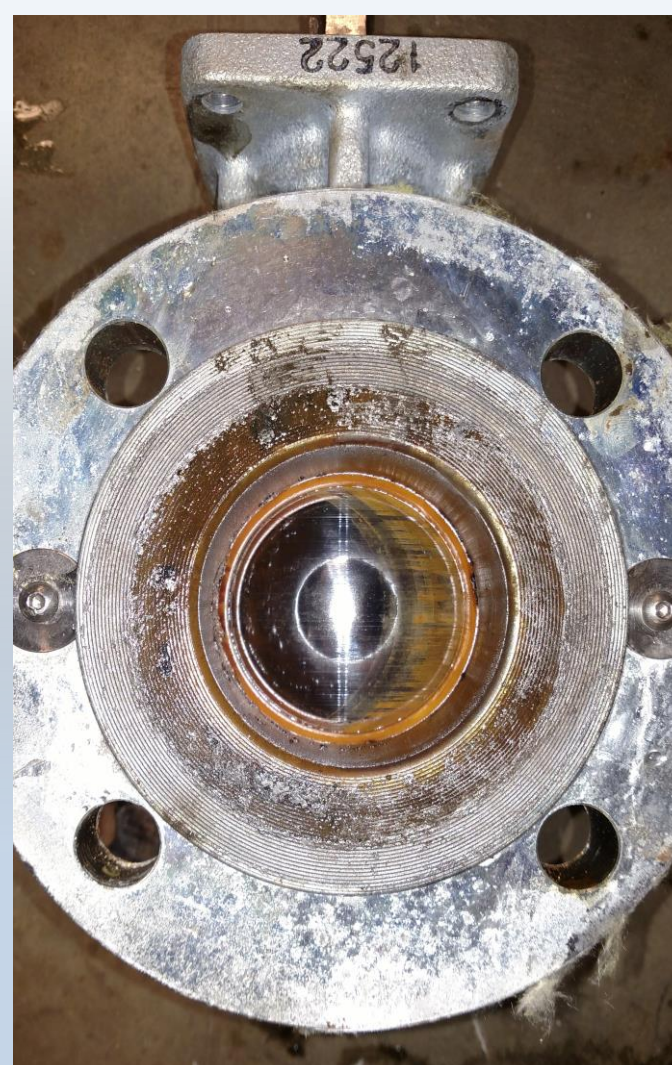
Project Name	Building Type	Building Size	Total Electric Savings	Total Steam Savings	Total Cost Savings	Project Cost
		ft <sup>2</sup>	kWh	MLbs	\$	\$
Integrated Sciences Building	Lab	150,325	1,900,569	11,881	\$427,677	\$590,968
Engineering Lab 2	Lab	60,000	673,995	5,447	\$176,340	\$448,907
Life Science Labs RCx & Facility Improvements	Lab	310,000	1,605,551	2,036	\$201,275	\$1,637,494
Hampshire Dining Commons	Dining Hall	46,000	158,522	2,607	\$67,992	\$97,640
Fine Arts Center	Educational	220,000	458,680	8,462	\$215,108	\$93,102
Recreation Center	Gymnasium	120,000	330,088	1,679	\$66,589	\$75,092
Honors College Residential Community	Dormitory	500,000	942,536	3,607	\$166,394	\$496,299
Studio Arts Building	Educational	50,000	380,995	1,257	\$63,240	\$75,960
Mahar Auditorium Pneumatic to DDC Conversion	Educational	7,500	36,176	344	\$10,498	\$78,968
			<b>6,487,112</b>	<b>37,320</b>	<b>\$1,395,111</b>	<b>\$3,594,430</b>
<b>Total Energy Cost Savings</b>					<b>\$1,395,111</b>	
<b>Total Project Costs</b>					<b>\$3,594,430</b>	
<b>Total Utility Incentives</b>					<b>\$1,621,778</b>	
<b>Overall RCx Turnkey Project Payback (Years)</b>					<b>1.2</b>	

## Implementation & Commissioning

- Collaborated with contractors to implement energy efficiency measures
  - Replacement of hardware such as valves, heat wheels, actuators, etc.
  - Re-Programming of equipment control sequences
  - Balanced HVAC devices with TAB contractor

- Perform comprehensive Cx services:

- On-site functional testing
- Remote trend review
- Field verification for root-cause analysis
- Continuous commissioning through warranty period



## Design & Scope Development

### Stakeholder Review & Planning

- Physical Plant / Design & Construction Mgmt.
- EH&S / Research & Engagement
- Auxiliary Enterprises
- Utility Partner Review & Engagement
- Funding & Approval

### Scope Development & Contractor Engagement

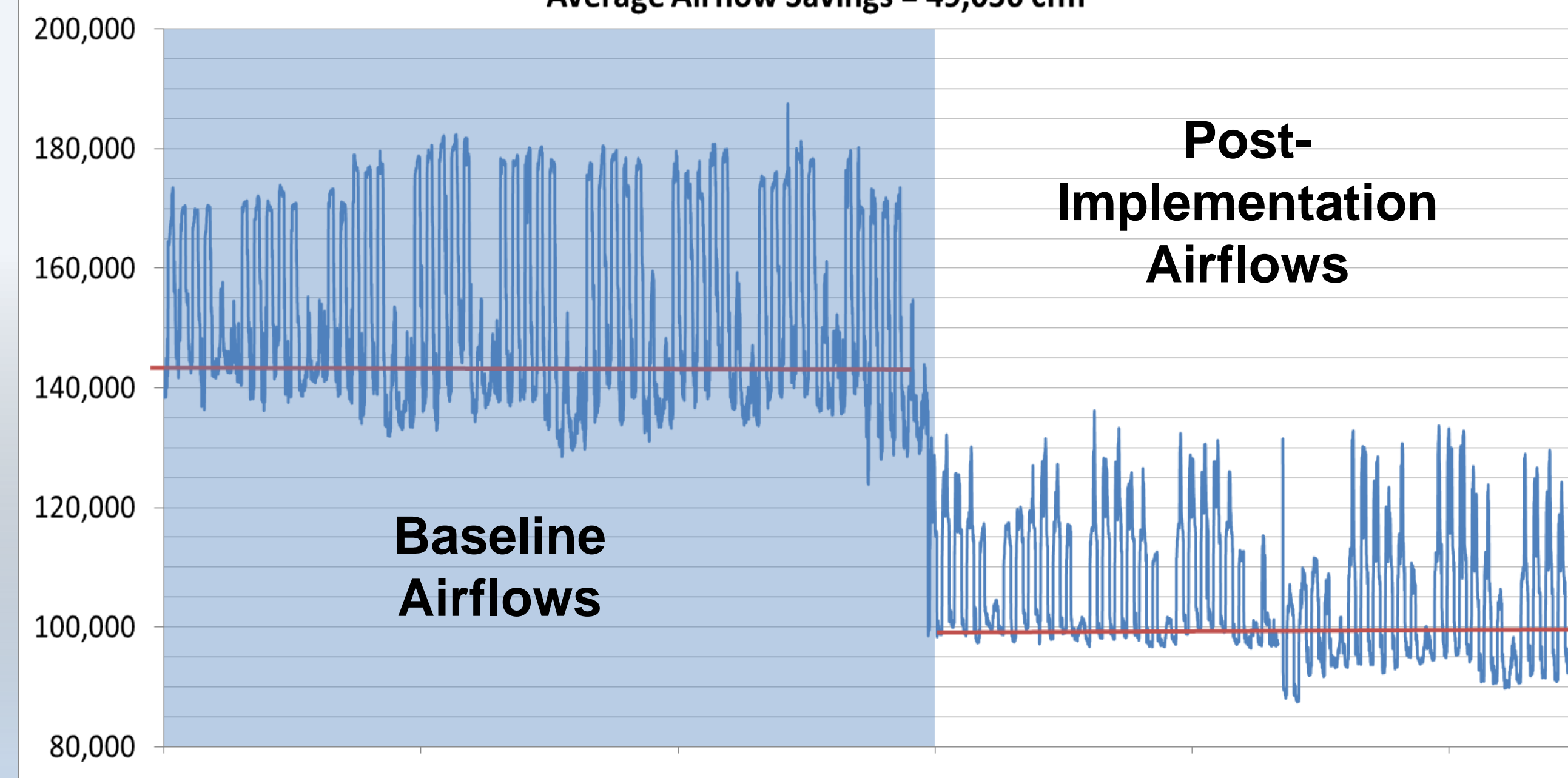
- Develop Implementation Scope
- Contractor review & pricing

### Final Engineering & Planning

- Create Implementation Ready Specifications
- Select Required Hardware
- Produce setpoints & sequences

## Measurement & Verification

UMass ISB - Combined Supply Fan Airflow Pre & Post Implementation  
Average Airflow Savings = 49,056 cfm



B2Q provided comprehensive turnkey EBCx services from scoping level & investment grade studies, to design & scope development, through implementation, commissioning and M&V.



UMass  
Amherst



## Turnkey Implementation Goals

- ✓ Improve energy efficiency
- ✓ Assist UMass Amherst in realizing annual energy and demand reduction targets
- ✓ Improve reliability of mechanical systems
- ✓ Reduce scheduled maintenance time and deferred maintenance backlog
- ✓ Upgrade BAS readability and visibility
- ✓ Lower EH&S risks

## Project Highlights

- ★ Assisted the university in receiving **\$1.6 million** in utility incentives over a 5 year period
- ★ Performed EBCx turnkey implementation projects on **9** buildings
- ★ Reduced annual electric use by **6,400,000 kWh**
- ★ Reduced annual steam use by **37,000 MLbs**
- ★ Achieved **\$1.4 million** in avoided energy costs
- ★ Performed services in **lab, educational, gymnasium and dormitory** building types
- ★ Total of **1.4 million** square feet of building area
- ★ A **team based** project approach collaborating with multiple university stakeholders