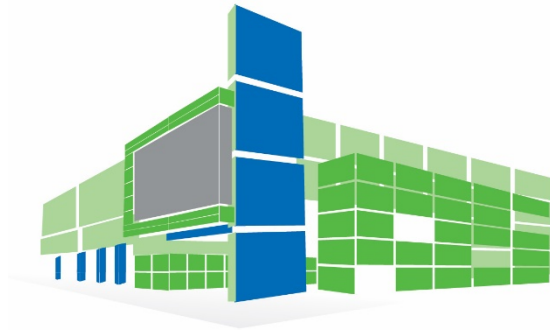


---

# The Next Logical Step: Following Lighting Upgrades With Advance Rooftop Controls Retrofits



Kevin Hopkins Director of Partner Business Development Transformative Wave



---

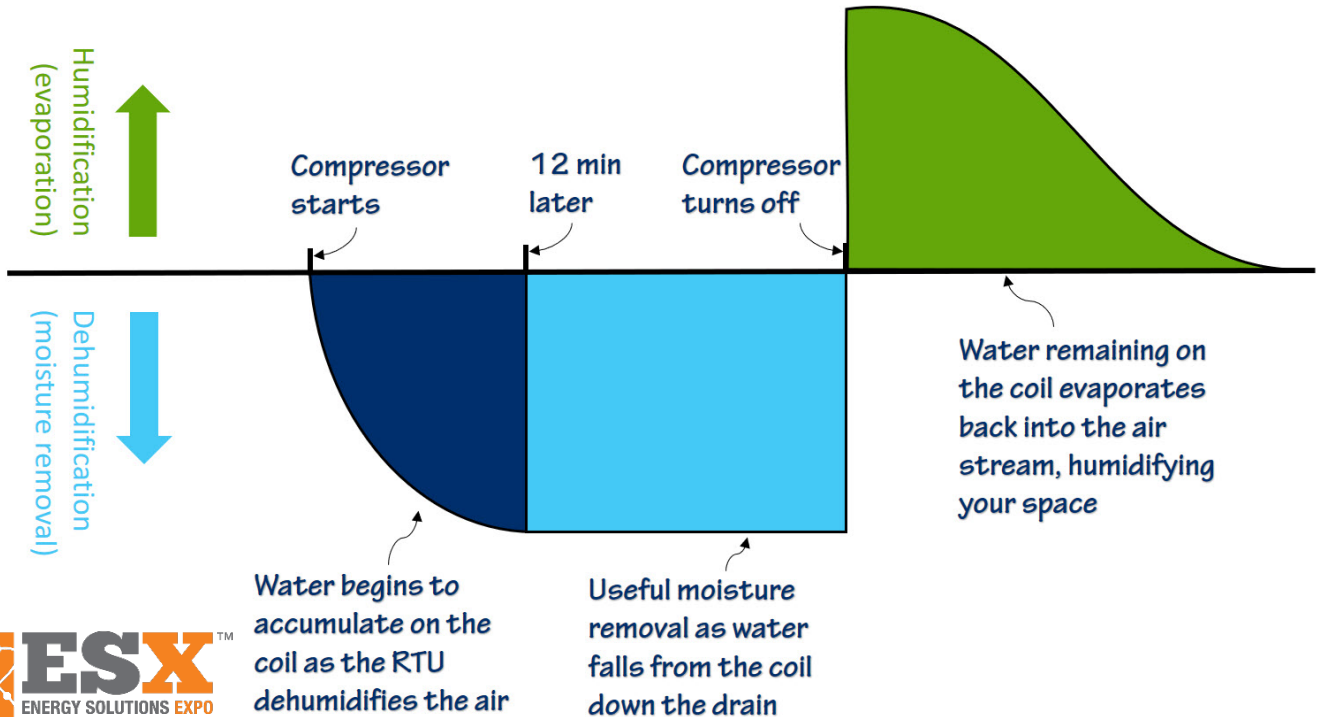
# THE PROBLEM

## LIGHTING UPGRADES CAN LEAVE HVAC BEHIND

# STANDARD RTU OPERATION BEFORE AN LED RETROFIT

Heat and humidity are managed by original equipment design

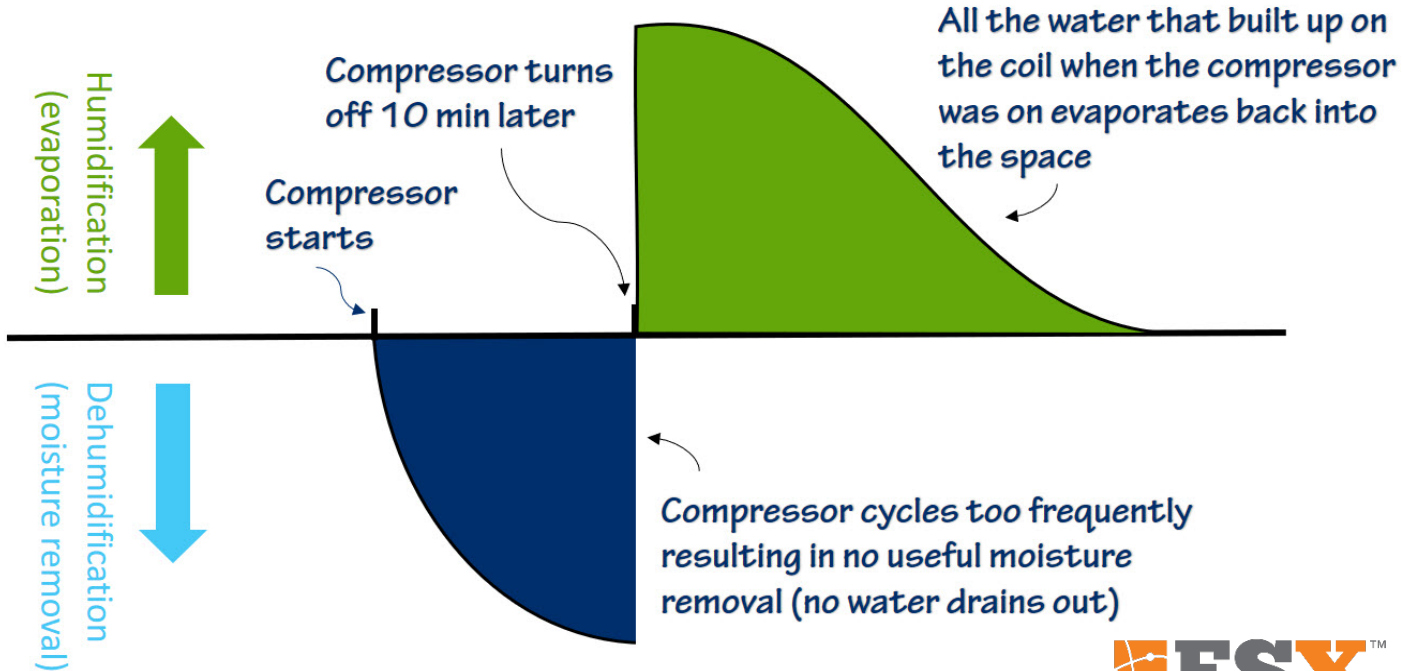
Example of a Good Compressor Cycle for Dehumidification with Sufficient Time for 'Useful Moisture Removal'



# ABBREVIATED RTU OPERATION AFTER AN LED RETROFIT

Heat and humidity become competing issues in space comfort

Example of an Improper Compressor Operation from a Dehumidification Standpoint



---

## HOW ARC RETROFITS ACCOMMODATE CHANGING SPACE NEEDS

With Advanced Sensor Capabilities, ARC Retrofits Deliver Air Service That Suits the Space

- ✓ ARC retrofits make maximum use of outside air resulting in better ventilation and less humidity build-up
- ✓ ARC retrofits allow equipment to function for longer periods of time in first-stage mechanical cooling.
- ✓ At the reduced fan speed of first-stage mechanical cooling an ARC-equipped unit moves air more slowly across the cooling coil, wringing more moisture from the air throughout all stages of cooling operation.
- ✓ If humidity is an on-going concern, ARC retrofits can be outfitted with humidity sensors, for more active humidity management

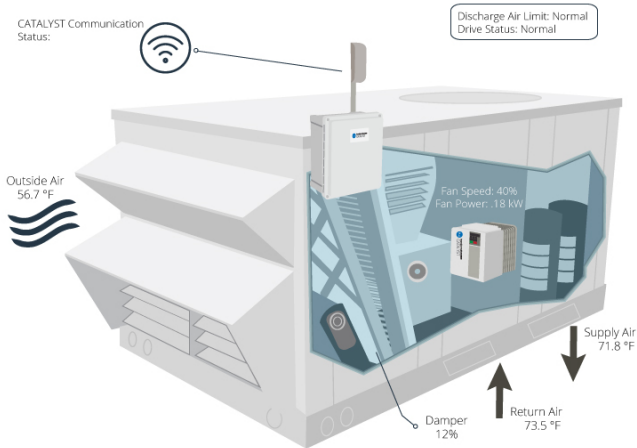


# THE SOLUTION ARC RETROFITS

ARC Retrofits Take Advantage of Over-Design

# THE ADVANCED ROOFTOP CONTROLS RETROFIT

What do the best solutions offer?



## REDUCES OVERALL HVAC ENERGY USE 25%-50%

The CATALYST transforms HVAC assets into smart machines delivering an intelligent solution for RTUs that give you greater control to extend the benefits of your current investments even further.

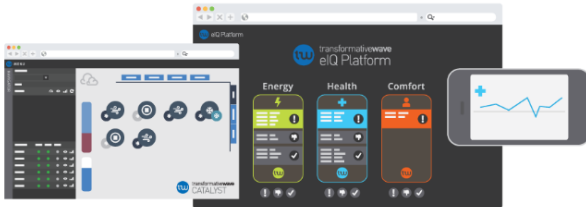
- ✓ **Variable Speed Drive:** The Variable Frequency Drive (VFD) provides savings through supply fan control.
- ✓ **Advanced Economizer Control:** Reduces the compressor runtime to improve efficiency and reduce wear and tear.
- ✓ **CO<sub>2</sub>-Based Demand Control Ventilation:** Makes the most of the available outside air for cooling while ensuring proper ventilation.
- ✓ **Multiple New Sensors & Data Points:** Maintain comfort levels and indoor air quality.
- ✓ **Qualifies for Incentives:** Widespread support of ARC technology enables financial incentives to reduce capital cost.

# THE BENEFITS OF ADVANCED ANALYTICS AND FAULT DETECTION

You can't control what you can't see

## BUILDING AUTOMATION OFFERS ADDED SAVINGS

With the eIQ Platform, you have real-time energy consumption monitoring and control with the assurance that the CATALYST's high-tech monitoring system will give you around the clock access to your HVAC assets.



**Connected 24/7:** The eIQ Platform provides web-based, real-time monitoring for up-to-date reporting with comprehensive diagnostics.



**Works with Existing HVAC Assets:** Integrates with many existing HVAC and Building Management Systems (BMS).



**Fault Detection & Diagnostics:** Actively monitor performance of equipment including abnormalities which trigger alarms and notifications.



**Building Management Controls:** Acts as its own open-protocol BMS capable of controlling lighting, HVAC, sub-metering and more to eliminate day-to-day operational pains.



**Preventative Maintenance / Cost Avoidance:** insight to equipment conditions can enable maintenance work to be scheduled as needed.



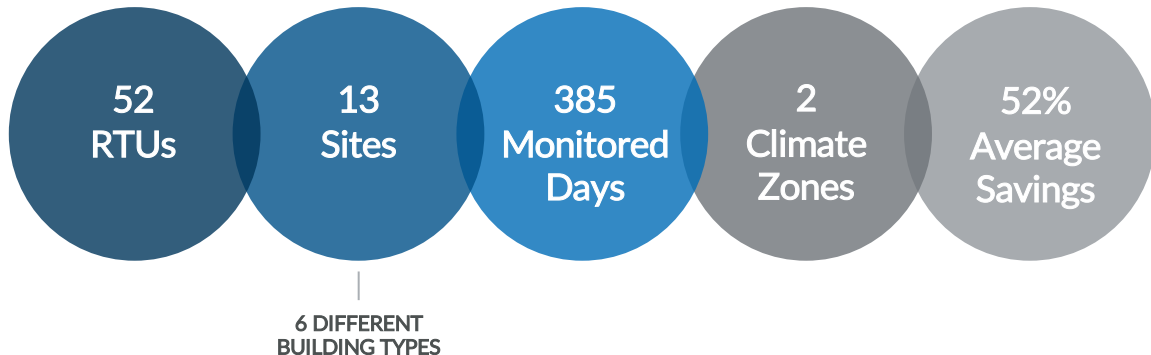


# LET'S SEE SOME VALIDATION

ARC Technology has been tested across the  
United States and Canada

## TORONTO HYDRO PILOT RESULTS

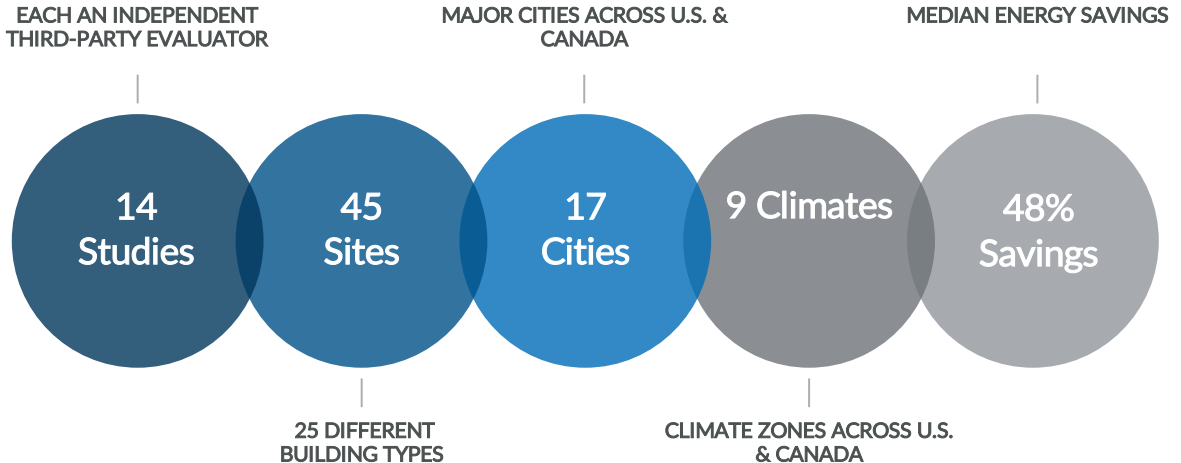
The Toronto Hydro Pilot Study remains one of the most comprehensive studies ever



**RESULTS: ENERGY SAVINGS RANGED FROM 35%-74% WITH A 56% MEDIAN**

# FIELD DEMONSTRATION RESULTS

The CATALYST ARC Technology has proven its value across a significant number of third-party studies



**RESULTS: ENERGY SAVINGS RANGED FROM 29%-73% WITH A 48% MEDIAN\***

\*Excludes the high and low outliers which are outside two standard deviations.

---

THANK YOU

SEE US AT THE TRADEFORCE TECH BOOTH !