FLORIDA SOLAR ENERGY CENTER

Creating Energy Independence Since 1975

Developing Exhaust Air Energy Recovery Credits for the Florida Energy Code

Interim Report

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Contract Overview

- Start date: Nov 3, 2014
- End date: June 1, 2015
- Deliverables:
  - Interim Report: delivered
  - Final Report
- Status: in progress

Task Summary

- ❑ Identify Major Florida Cities
- ❑ Identify Prototype Buildings
- ❑ Computer Simulations
- ❑ Update ERV Credits
- ❑ Write Final Reports

Climate Zones and Cities

- Identified six cities in climate zone 1A and 2A
- Miami for Climate Zone 1A and Five Cities for climate zone 2A (Tampa, Orlando, Jacksonville, Gainesville, and Tallahassee)
- Simulations to determine annual energy use for the climate zone 2A cities for each of the nine prototype buildings identified
- Jacksonville and Gainesville has annual energy use within 1.0%.
- Decided to keep the six cities for this study

Prototype Buildings

Identified Commercial Buildings:

- ❑ Small Size Office
- ❑ Medium Size Office
- ❑ Large Office
- ❑ Standalone Retail
- ❑ Primary School
- ❑ Secondary School
- ❑ Large Hospital
- ❑ Small Size Hotel
- ❑ Large Size Hotel

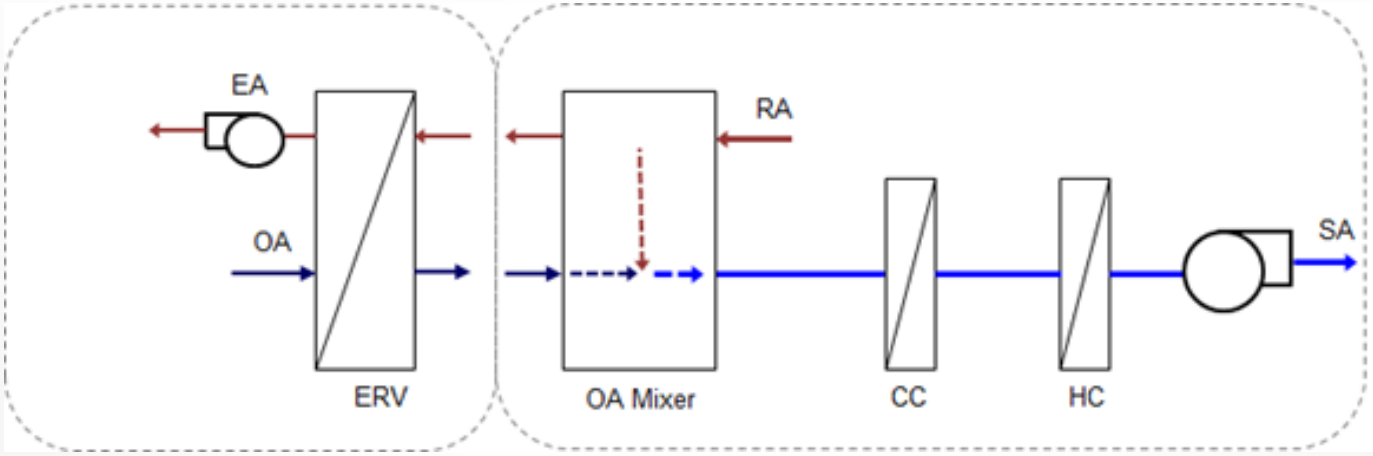
Computer Simulations

- Modified prototype buildings
- Created HVAC systems with and without ERV
- Performed sizing calculations
- Obtained effectiveness and pressure drop data (AHRI certified database)
- Created automated input file processor tool
- Simulations for large office building
- Analyzed results & reviewed assumptions

Computer Simulations

ERV Input Assumptions:

- ❑ Pressure Drop Across ERV Device
- ❑ Heating and Cooling Effectiveness
- ❑ Power Input for Control and Drive Motor



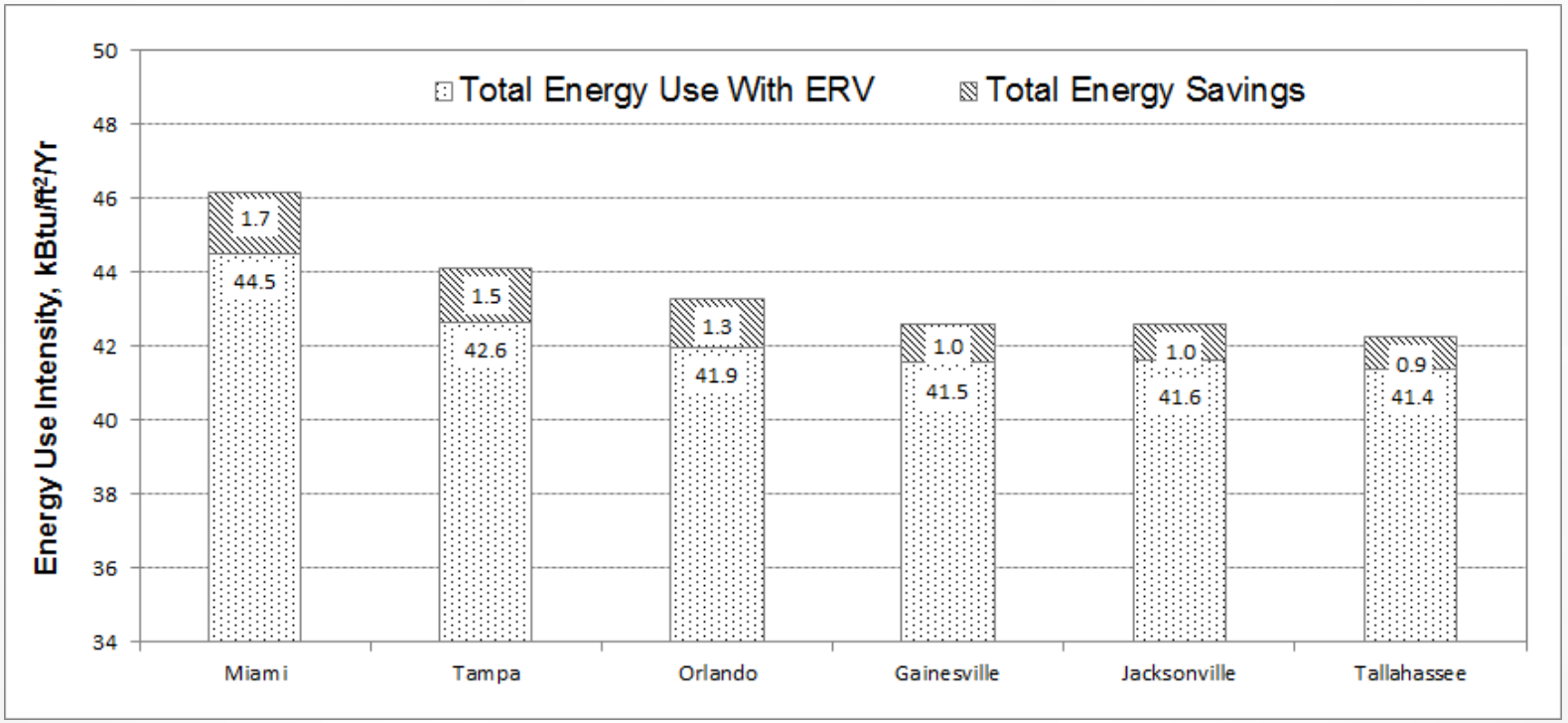
Computer Simulations

Fan Pressure Adjustment Due to ERV Device:

- 2014 Florida Energy Code
  - Section C403.2.10 allows fan pressure adjustment for ERV in the reference building
- Two sets of simulations were conducted
  - With and without fan pressure drop adjustment to the reference buildings
  - The reference building fan pressure difference is adjustment per the standard

Preliminary Results

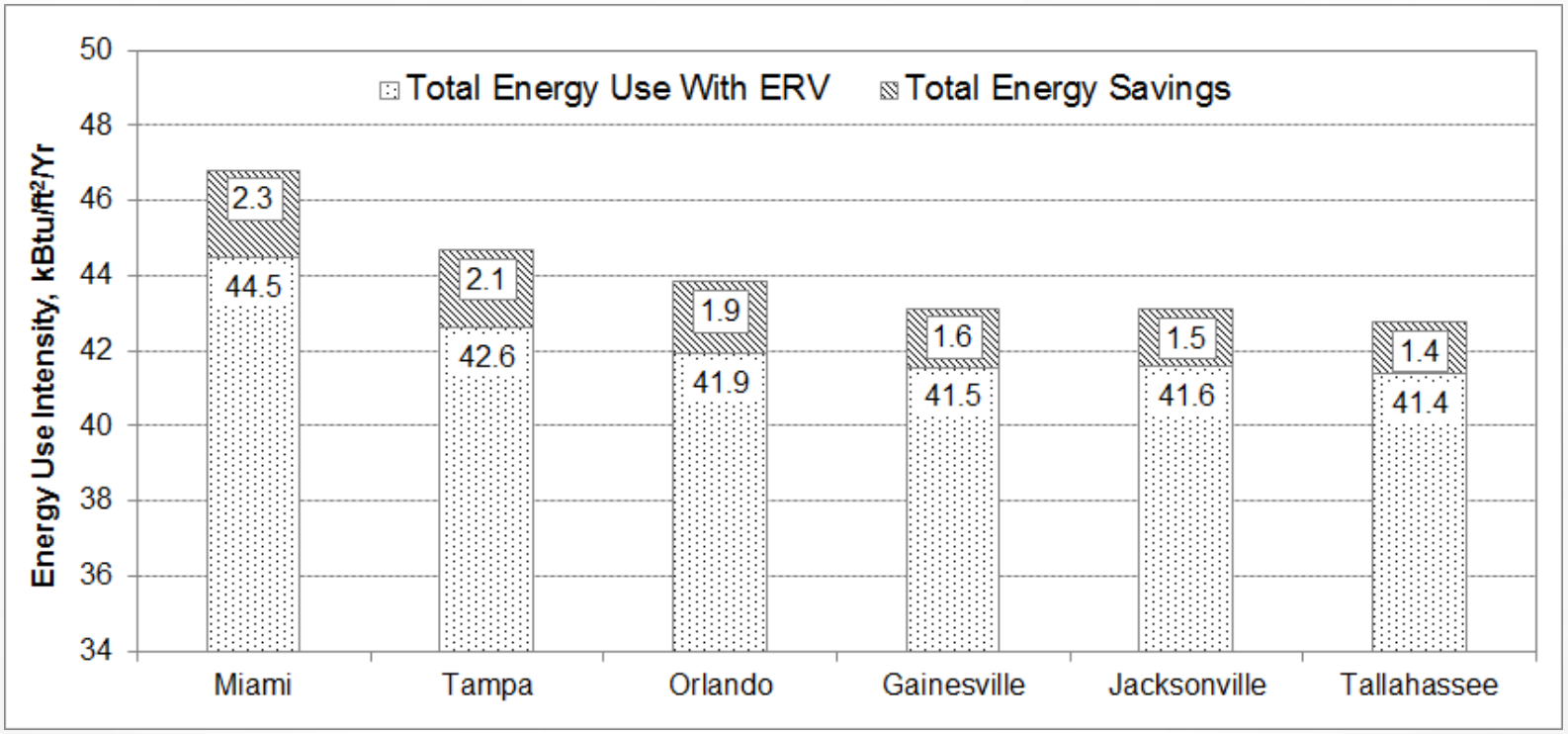
Total energy use and energy savings intensities of the large office building without fan pressure adjustment.



The *reference building total energy use* is the sum of *total energy use with ERV* and *total energy savings* of the building.

Preliminary Results

Total energy use and energy savings intensity of the large office building with fan pressure adjustment.



The *reference building total energy use* is the sum of *total energy use with ERV* and *total energy savings* of the building.

Preliminary Results

HVAC energy intensity and percent savings for the large office building.

	Units	Miami	Tampa	Orlando	Gainesville	Jacksonville	Tallahassee
Without Fan Pressure Adjustment	kBtu/ft^2/yr	1.7	1.5	1.3	1.0	1.0	0.9
	%	**10.1**	**10.1**	**9.5**	**7.9**	**7.6**	**6.9**
With Fan Pressure Adjustment	kBtu/ft^2/yr	2.4	2.1	1.9	1.6	1.5	1.4
	%	**13.6**	**13.8**	**13.3**	**11.7**	**11.3**	**10.7**

HVAC energy percent savings calculation

$$HVACEnergySavings = 100\frac{HVACEnergyUse_{withoutERV} - HVACEnergyUse_{withERV}}{HVACEnergyUse_{withoutERV}}$$

- **Percent HVAC energy savings will be used in the Florida code.**

ERV Credits

- ERV Credits Definition: annual cooling and heating energy savings in percent.
- Annual energy savings due to ERV device installation is estimated as the ERV credit times the annual cooling and heating energy consumption of the reference building.
- The reference building annual cooling and heating energy use is the electric and gas energy consumed to provide cooling and heating including the fan electric energy use.
- $$HVACEnergySavings = ERVCredit \times HVACEnergyUse_{ReferenceBuildingWithoutERV}$$

Thank you

Questions?