

SMART VENTILATION

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Smart Ventilation

- Allows shifting of ventilation to different times and still provide acceptable IAQ...with rules.
- Smart systems can use this flexibility to
 - ▣ Reduce energy consumption
 - ▣ Respond to electric grid needs
 - ▣ Respond to outdoor air quality excursions
 - ▣ Improve IEQ cheaply
- Many levels of Smart Ventilation

Key Requirements

- Extra Fan Capacity (*right-sizing is always too small*)
 - ▣ To allow compensation for under-ventilation
 - ▣ To take advantage of good times to ventilate
- Sensors (or other time-varying inputs)
 - ▣ To determine good/bad conditions
 - ▣ Can be simple or complex (e.g. temperature, run-time, occupancy, ozone, time-of-use charges, etc.)
- Fan controls
 - ▣ To enable smart cycling

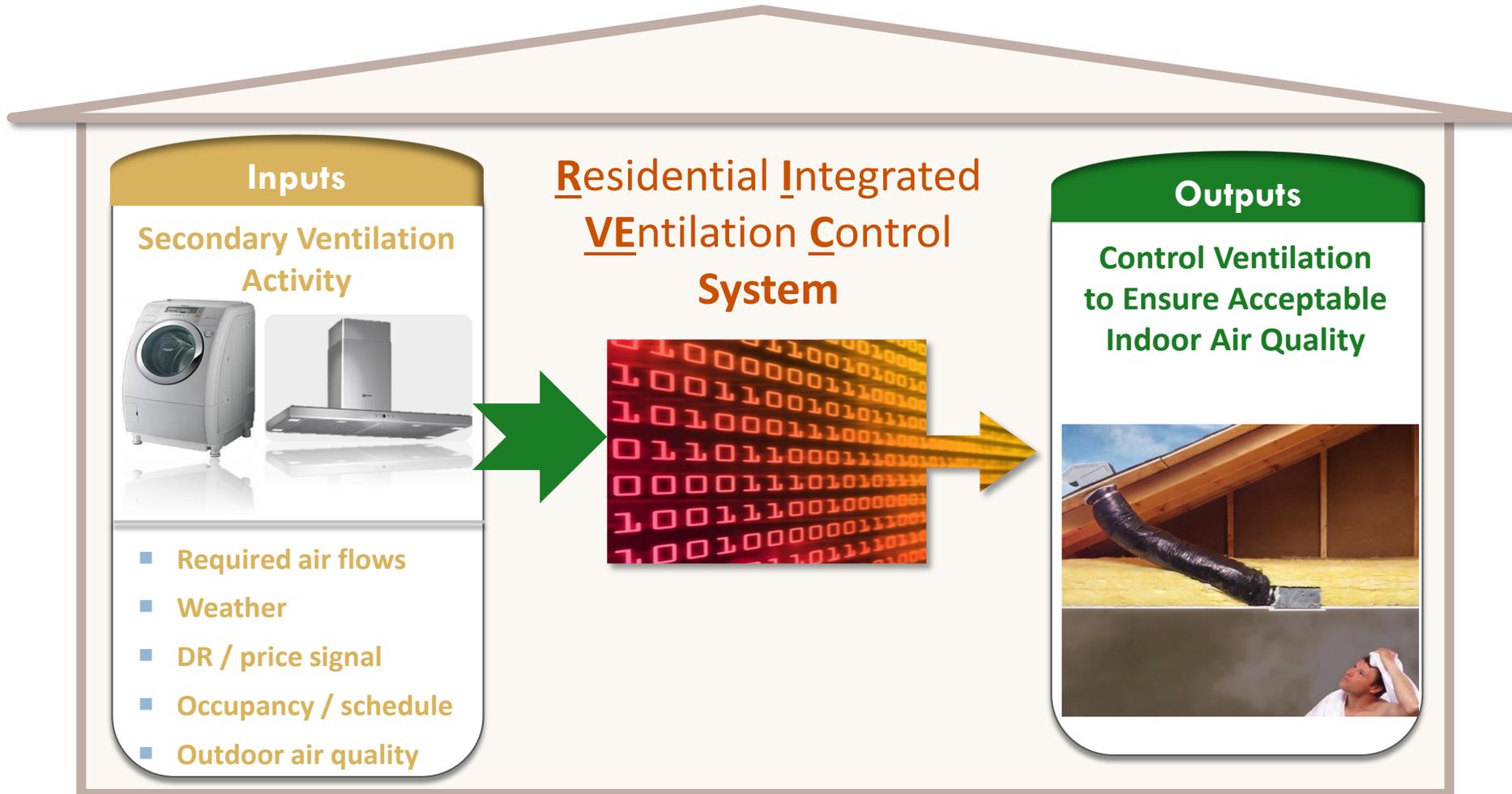
The smart part....

- Use ventilation efficacy analysis to track dose and exposure
 - ▣ Pre-calculated or Real-time
- Calculate dose and exposure for the airflows provided by the smart system (including other fans + infiltration if you want) relative to the non-smart system
 - ▣ Reasonable time periods are 10-15 minutes

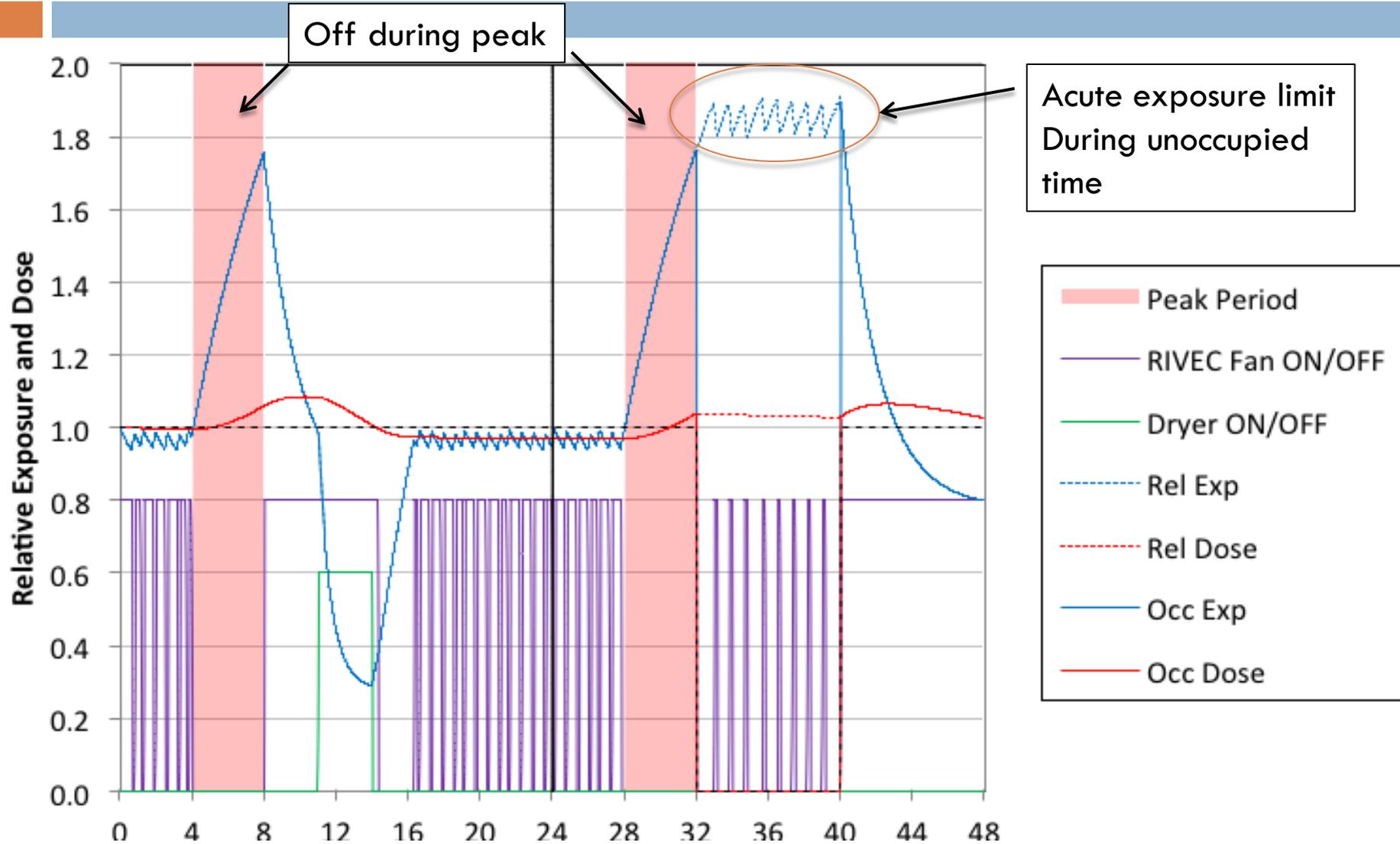
“Smart” Examples

- Temperature Control
 - On/Off depending on outside temperature
 - Pre-calculated set-point
 - Simple & relatively cheap
- *RIVEC*
 - Considers many factors and conditions
 - Real-time control based on relative dose
 - More inputs needed; more benefits possible

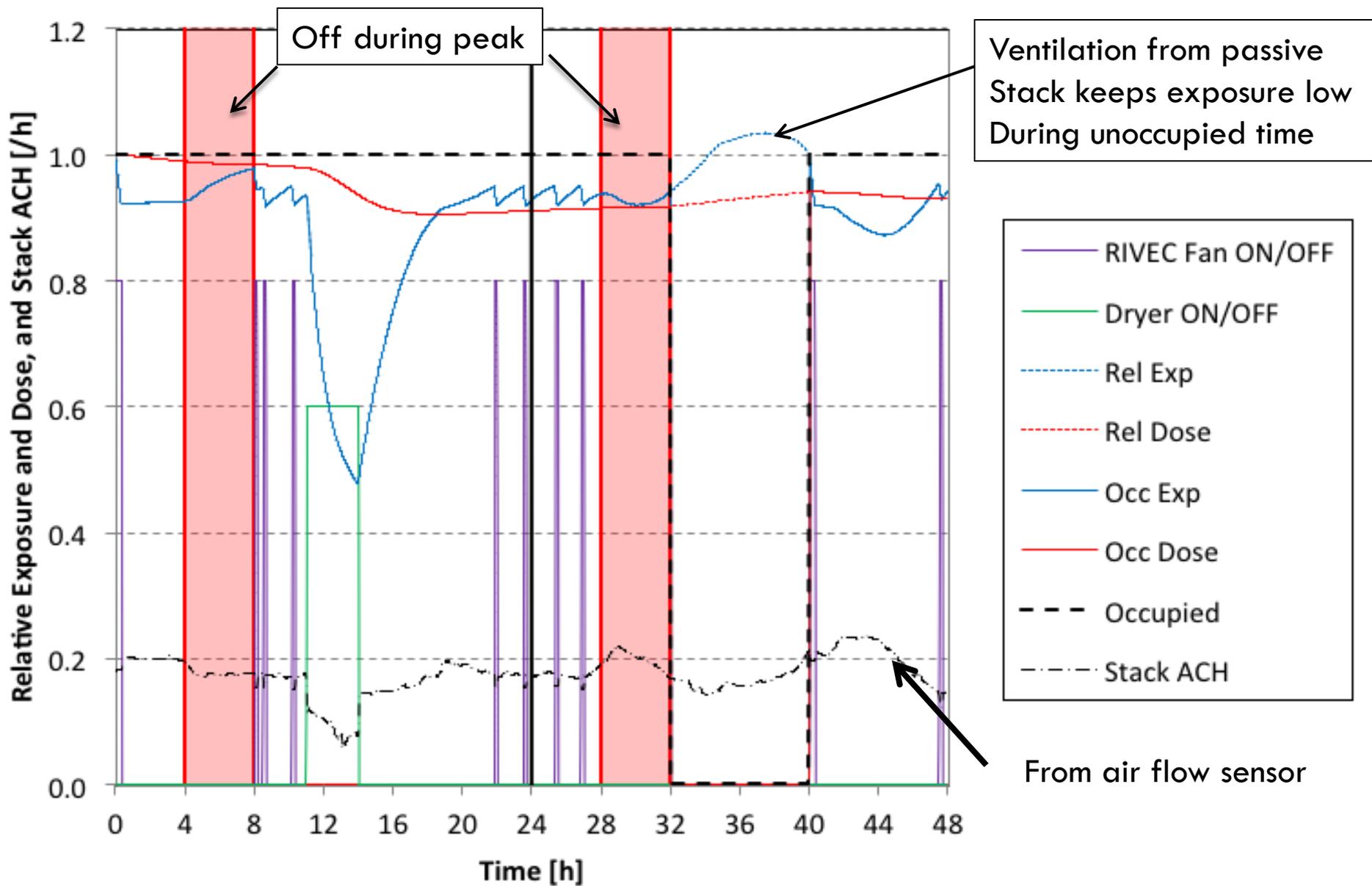
Smart Ventilation - RIVEC



Example 1. Occupancy



RIVEC Operation for the Hybrid System



CONCLUSIONS

- Smart Ventilation Can...
 - ▣ Cut ventilation energy
 - by up to a factor of 2
 - ▣ Optimize other quantities
 - Peak power; comfort; outdoor air expose
 - ▣ Meet programmatic need
 - Integrated or retrofit
- Smart Ventilation Cannot...
 - ▣ Be bought of the shelf today (really)

Going Forward...

- More work on control options
 - ▣ Improved strategies; field data
- Expand Real-time analysis for current conditions
 - ▣ Allow for better comparisons
- Better guidance, but now in ASHRAE 62.2-2016
- Inform utilities, Wx, programs and codes
- Get commercial products in the field

HOUSES ARE DUMB WITHOUT
SMART VENTILATION