

ARGONNE NATIONAL LABORATORY BUILDINGS RELATED LDRD AND SPP



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OVERVIEW



Technology for
Buildings



Urban Science and
Engineering



Building/Grid/EV
Integration

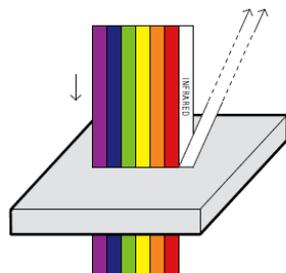


Technology for Buildings

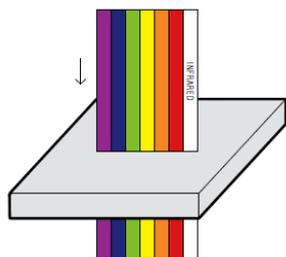
NANOHEATBLOCK



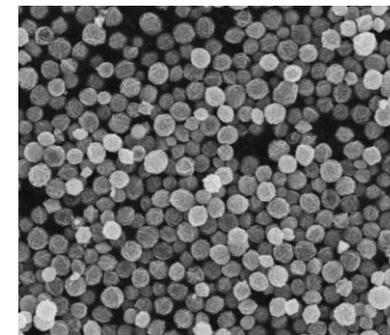
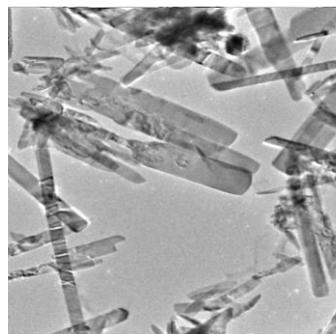
LDRD project to make advanced nanoparticle based thermochromic material



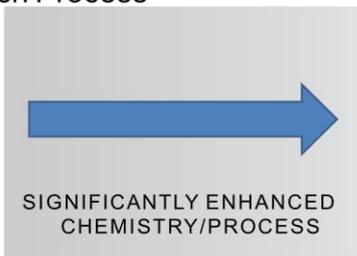
Summer
 + Blocks infrared
 + Reduces cooling load



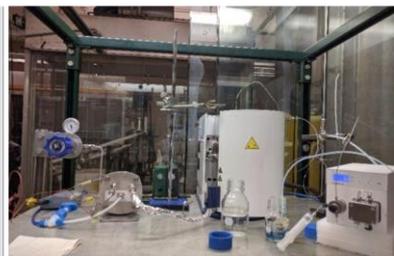
Winter
 + Allows infrared
 + Reduces heating load



Conventional Batch Process



OUR PATENT-PENDING PROCESS

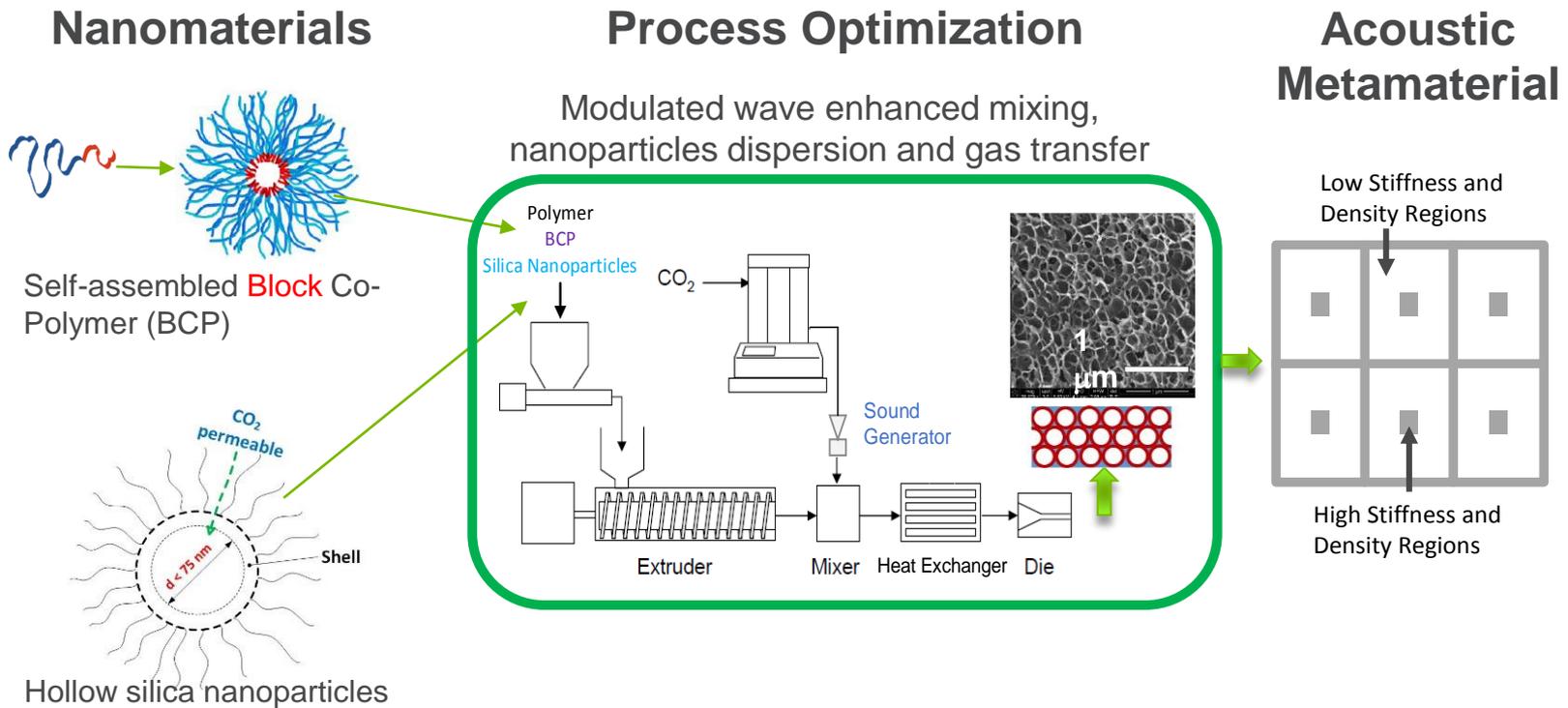


Poor Morphological Control (Poor Quality)	→	Good Morphological Control (High Quality)
Limited Scalability	→	Easy Scale-up
Days-to-Weeks (1-7 Days)	→	Minutes
Explosion Hazard	→	Intrinsically Safe
\$5/gram	→	\$0.5/gram VO ₂ (M)



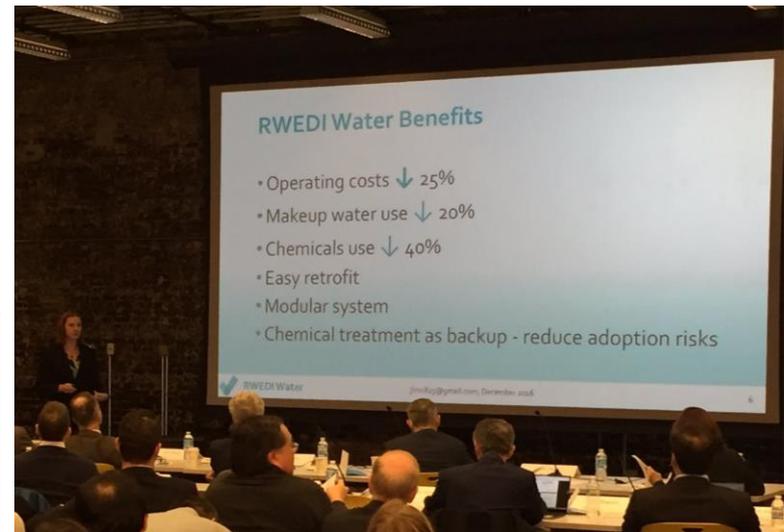
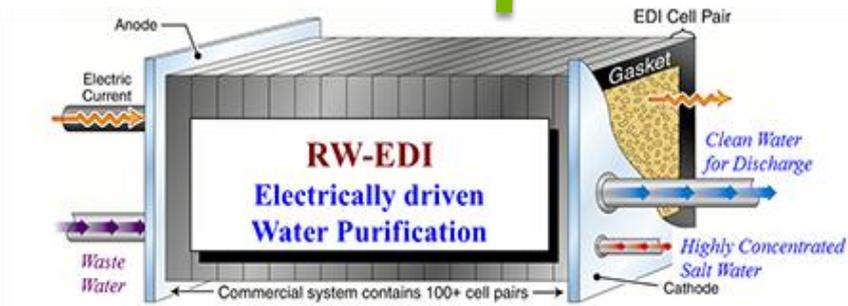
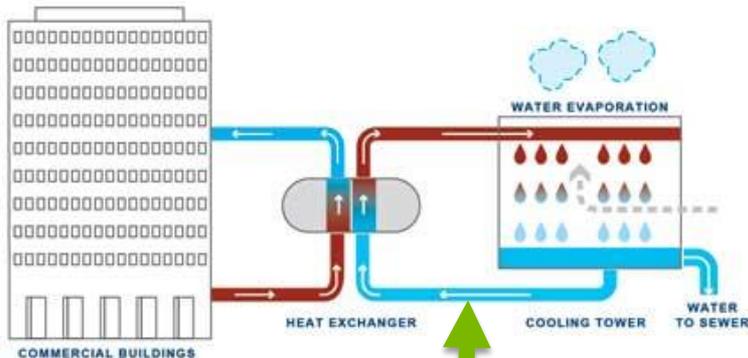
TRANSPARENT NANOFOAM INSULATOR

ARPA-E project to create a transparent, haze free window film to give double glaze performance to single glaze windows



RWEDI-WATER

Argonne Startup applying Resin-Wafer Electrodeionization (RWEDI) purifying cooling tower makeup water



MICRO CHP (INDUSTRY PARTNERSHIP)

Industry Partnership with Capstone Turbine Corp. to improve their microCHP





Urban Science and Engineering

URBAN SCIENCE AND ENGINEERING PROGRAM (USE)



Energy/Grid

Buildings

Transportation

Water

Environment

Socio -
Economics

Critical Infrastructure

Sensors and Data

Coupled System Modeling and Optimization

Resilient Infrastructure Analysis and Design

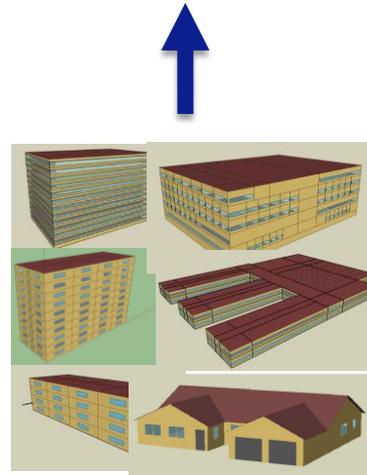
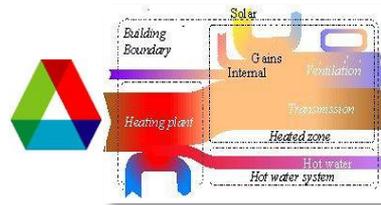
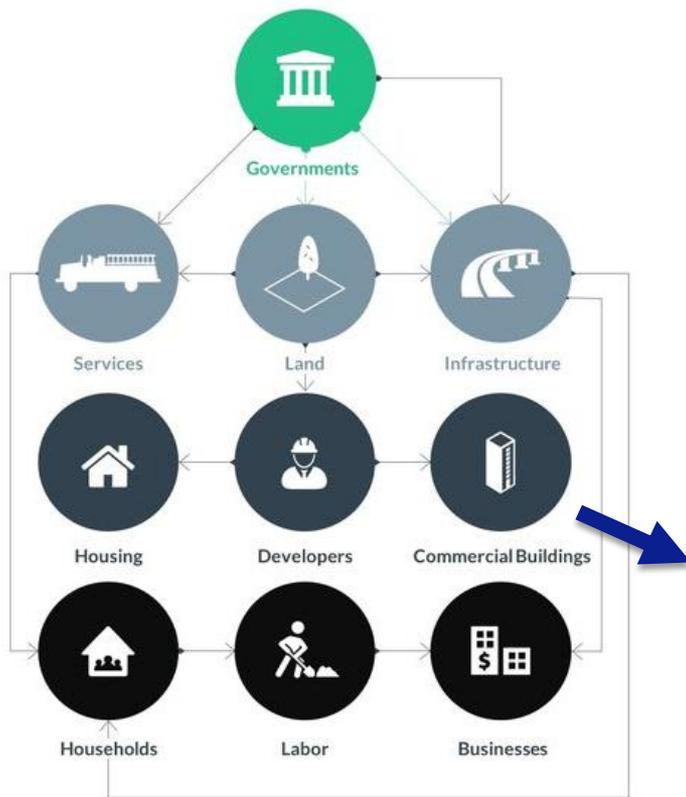
LAKESIM

Urban scale modeling of building and other infrastructure systems for developers

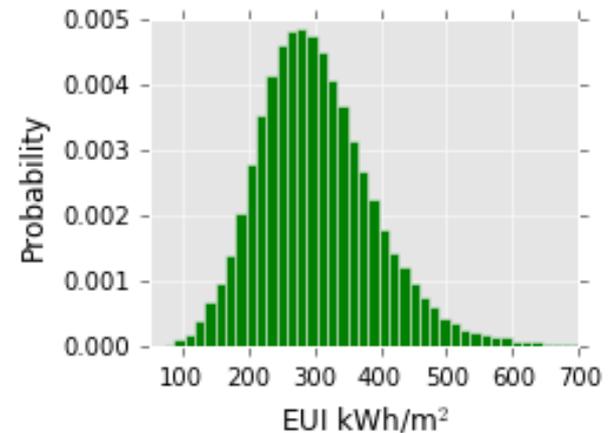


URBANSIM – ISOMODEL COUPLING

Coupling UrbanSIM real estate / urban planning model to Argonne's fast building energy model (ISOmodel)



San Francisco:
113,000 bldgs., 45 min
runtime on 4 core desktop
CPU

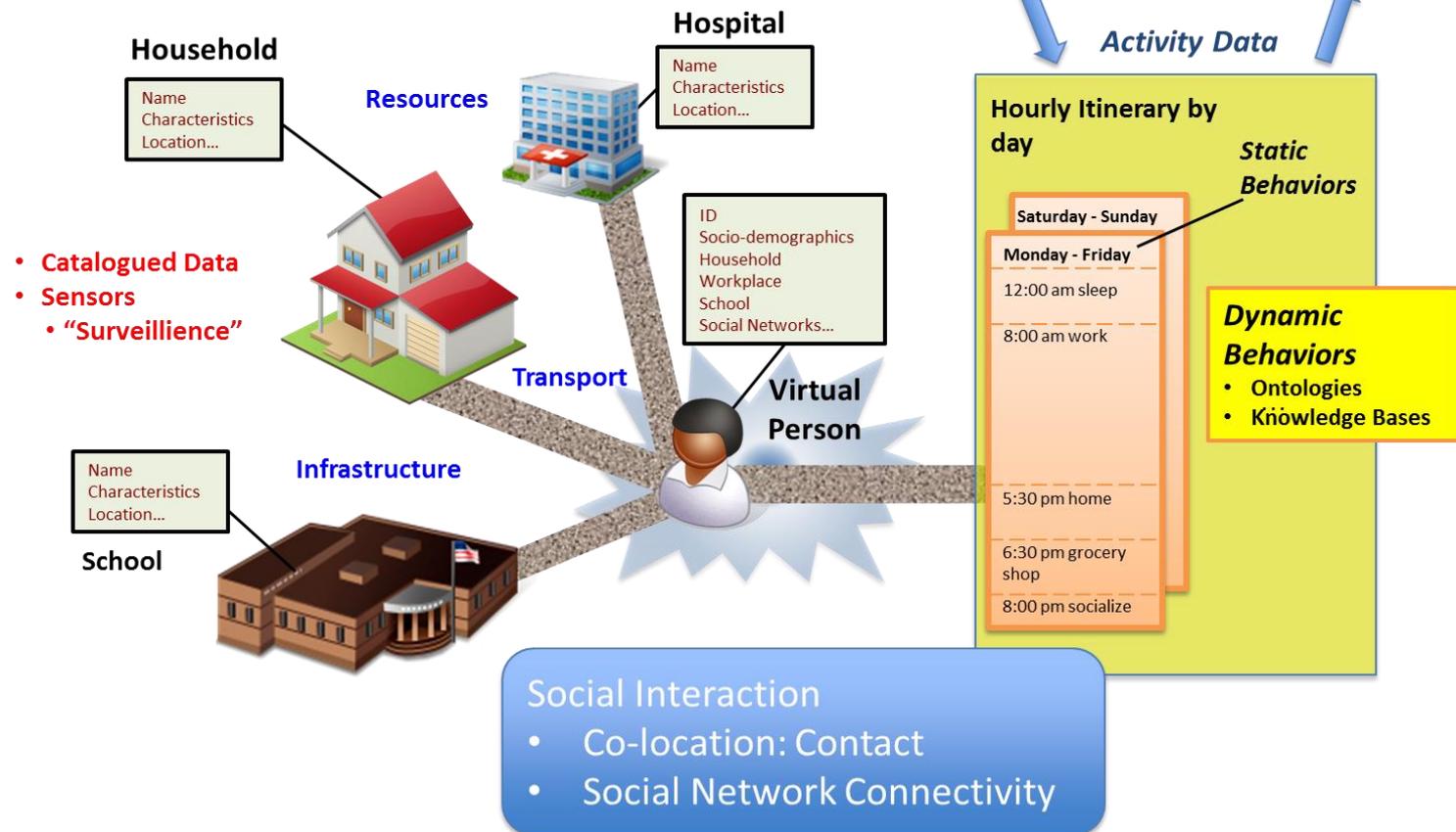


chiSIM – THE CHICAGO SOCIAL INTERACTION MODEL

LDRD project to develop an agent based model of Chicago and everybody in it

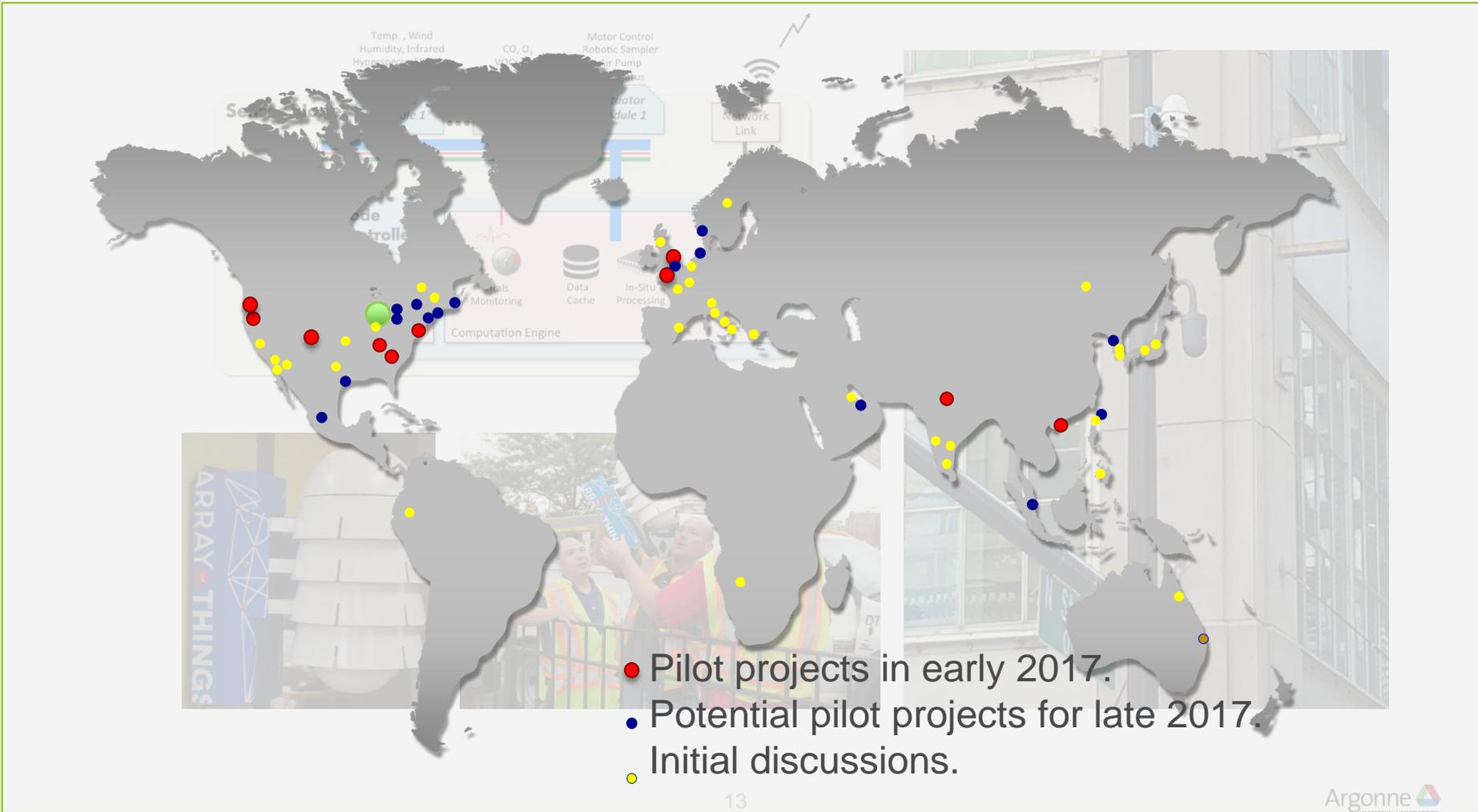
Synthetic Populations:

People, Households, Places, Infrastructure, Resources



WAGGLE – ARRAY OF THINGS

Advanced platform for urban sensing and rollout in Chicago and a dozens of other cities in the Array of Things

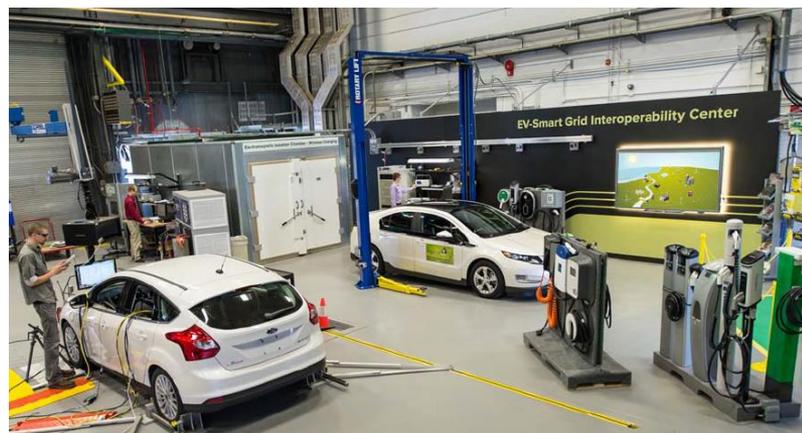
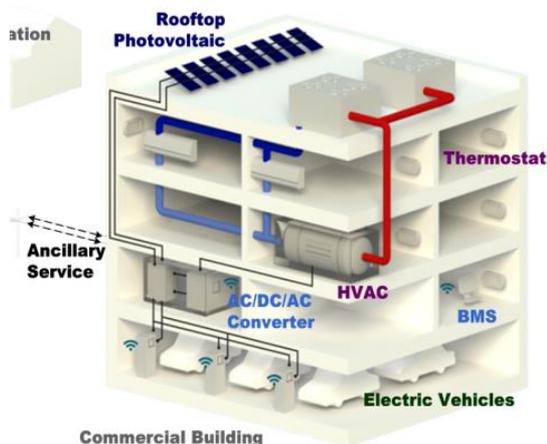




Building/Grid/EV Integration

BUILDING / GRID / EV INTEGRATION

Buildings as a Distributed Energy Resource (Ancillary Service) and a core element in EV Everywhere



QUESTIONS?