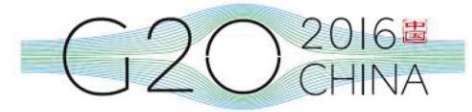
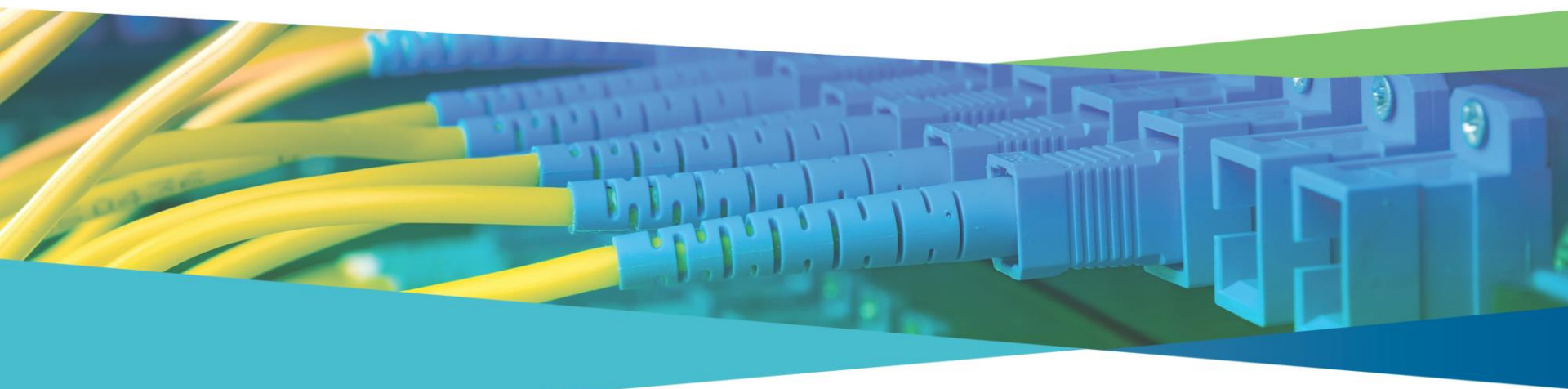


# G20 ENERGY EFFICIENCY ACTION PLAN: Networked Devices Workshop



PARIS | 19-20 MAY 2016



# Energy Savings Potential of Selected Home Automation/Smart Home/IoT Devices and Systems

Doug Johnson

Vice President, Technology Policy  
Consumer Technology Association (CTA)



Fraunhofer USA Center for Sustainable Energy Systems

## Energy Savings from Five Home Automation Technologies: A Scoping Study of Technical Potential

Final Report to the Consumer Technology Association

by Bryan Urban, Kurt Roth, and Chimere (David) Harbor  
April 2016

PI: Dr. Kurt Roth, Director of Building Technologies  
[kroth@cse.fraunhofer.org](mailto:kroth@cse.fraunhofer.org) 617-575-7256

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### Home Automation, IoT Could Cut Energy Consumption 10 Percent, says CTA Study

Arlington, VA, May 19, 2016 - Our increasing use of home automation technology through the Internet of Things (IoT) has the potential for substantial energy savings and greenhouse gas emissions reductions, according to a new study released today by the Consumer Technology Association (CTA)<sup>TM</sup>. The study [The Energy Savings Potential of Home Automation Technology](#) finds widespread adoption of home automation products such as temperature, circuit and lighting control, if used for energy savings purposes, could collectively avoid up to 100 million tons of CO<sub>2</sub> emissions and reduce total residential primary energy consumption by as much as 10 percent - that savings is more than consumer electronics' share of residential primary energy consumption (8.4 percent) according to a separate [CTA study](#).

"This research proves the innovation consumer technology delivers into our hands and homes through the Internet of Things can significantly reduce our carbon footprint - whether that's the household energy we use on our own or the carbon emissions our country produces," said Gary Shapiro, president and CEO, Consumer Technology Association. "With the touch of a screen or button, we can control and manage our homes more easily and effectively than ever - from virtually anywhere in the world - and enjoy all the cost savings and environmental benefits consumer technology offers."

CTA's study reports the overall U.S. technical energy savings potential from several individual approaches ranges from 0.3 to 1.1 quadrillion BTUs (quads) of primary energy consumption, or from one to five percent of total residential primary energy consumption. The study's findings, which represent the best current estimates of achievable savings, highlight several areas where home automation could deliver energy savings, including connected thermostats, HVAC zoning, and control of window shades, circuits and lighting.

# Energy Savings from Five Home Automation Technologies: A Scoping Study of Technical Potential

April 2016

## Home Automation/Smart Home/IoT

- Uses connectivity, sensing, controls
- Provides enhanced comfort, control, convenience, security
- Many applications can also reduce home energy consumption

## Objective and Scope

- Quantify the technical energy savings potential of home automation approaches in the U.S.
- 17 candidate approaches, 5 selected:
  - Connected thermostats
  - HVAC zoning control
  - Window covering control
  - Occupancy-based lighting control
  - Circuit-level control

## Savings Potential

- Ranges from .3 to 1.1 quads, or 1-5% of the total primary energy consumed by U.S. homes in 2015  
(1 quad per year = energy consumed by about 3 million people = electricity produced by 250 coal-fired power plants = 56 MMT of CO<sub>2</sub> emissions)

## Uncertainty Factors

- Limited number and scope of field studies
- Differences in occupant behavior, building construction, climate, HVAC systems
- For some categories, products not yet widely available



## Home Automation Benefits Beyond Savings

- For consumers: greater convenience, control, thermal and visual comfort, privacy, security
- For utilities: enabling demand response capabilities, streamlined evaluation for energy efficiency programs, remotely diagnose and detect retrofit opportunities

## Home Automation Approaches Analyzed

- Connected thermostats
- HVAC zoning control
- Window covering control
- Occupancy-based lighting control
- Circuit-level control

## Key Findings Presented for Each Approach

- Relevant primary energy
- Technical savings potential
- Household savings potential
- Notes regarding uncertainty
- Consumer benefits
- Utility benefits
- High value applications

## Research Needs (General and Specific)

- Problem/Opportunity
- Reason(s)/Key issues
- Research needs

## Additional Value

- **Businesses:** More effective marketing of energy value proposition, increasing consumer appeal
- **Utilities:** Fuller consideration in existing energy efficiency and demand response programs

## Savings Potential

- Reduce total residential primary energy consumption by as much as 10 percent –which is more than consumer electronics' share of residential primary energy consumption (8.4 percent)

## Posted Online

- <http://bit.ly/22hr1xN>

Doug Johnson  
Consumer Technology Association (CTA)  
[djohnson@cta.tech](mailto:djohnson@cta.tech)