# Energy Efficiency

# Residential Appliances

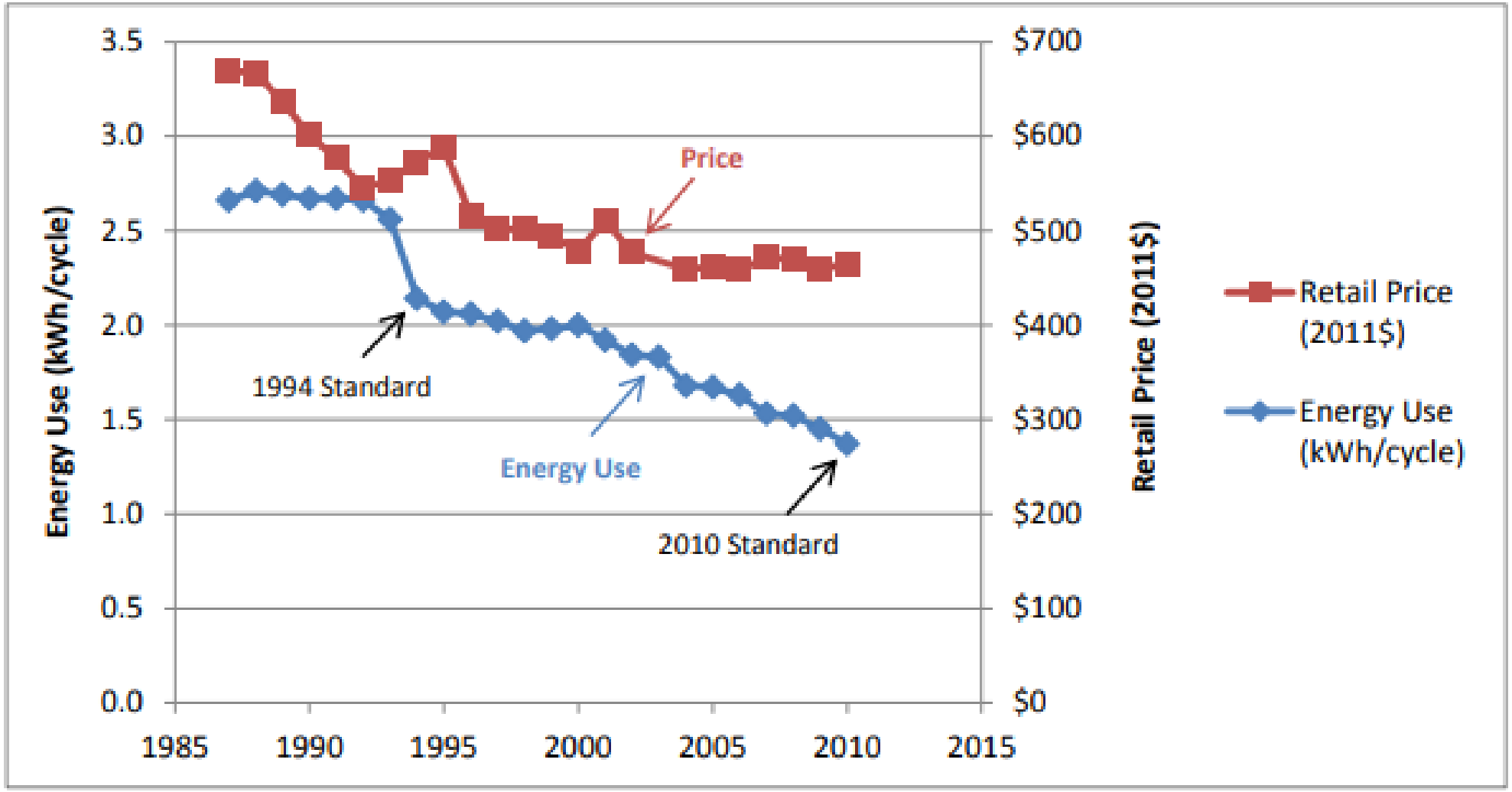
# ENERGY EFFICIENCY

## The World in 2030

**BASF Video: Energy efficiency -- The World in 2030**
https://youtu.be/QG3HNQiEaTM

# Appliance Efficiency Gains – Last 25 years

## Dishwashers – Average Energy Consumption and Price Over Time



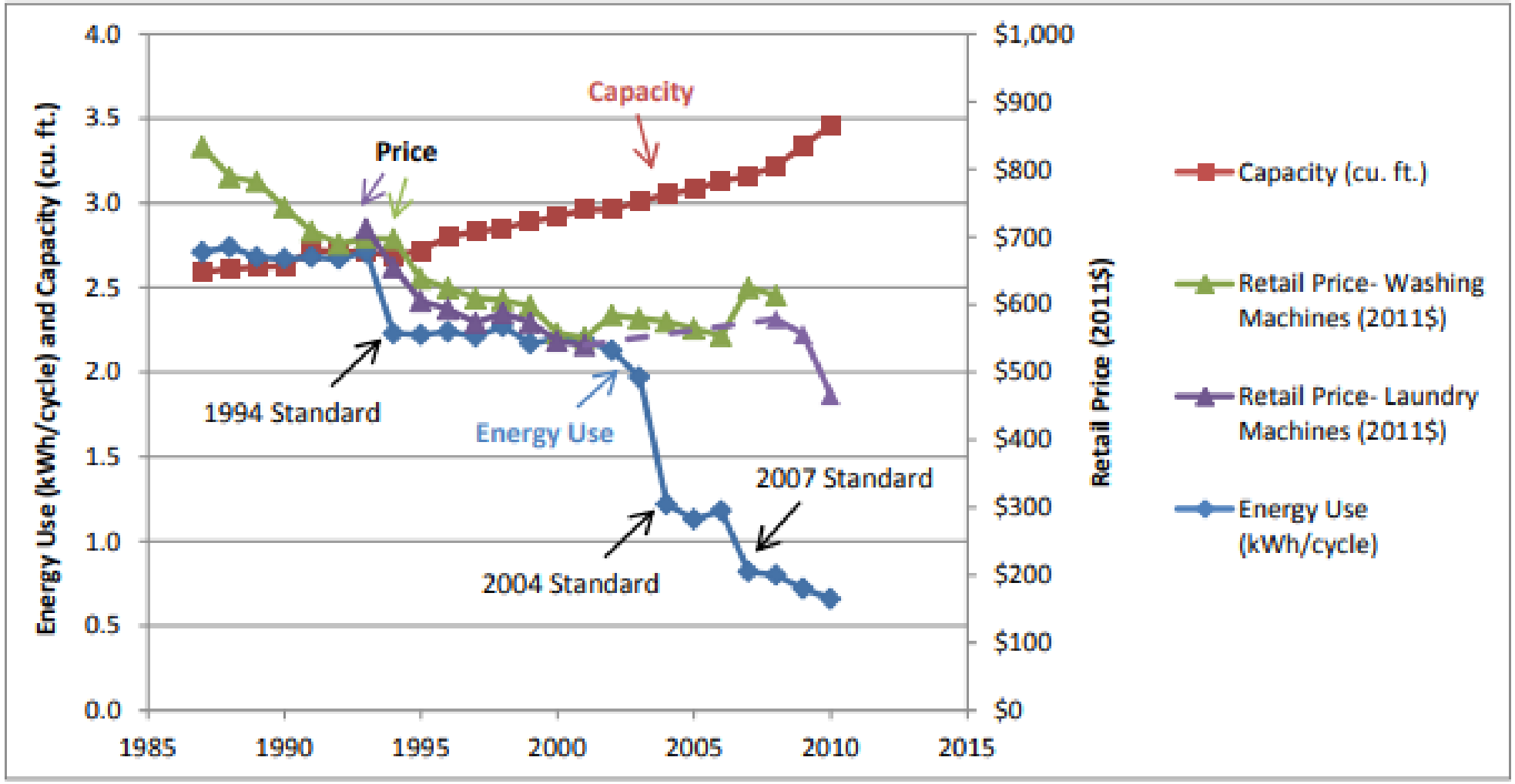

Sources: AHAM (2011) for energy use; authors' analysis of U.S. Census Bureau Current Industrial Reports for price; DOE (2012d) for markup.

**> 50%** Improvement in **Energy Efficiency** since 1990's with improved functionality.

**DOE Standard** & **ENERGY STAR** played key role in shaping product and Technology configurations.

# Appliance Efficiency Gains – Last 25 years

## Clothes Washers – Average Energy Consumption, Price, and Volume Over Time



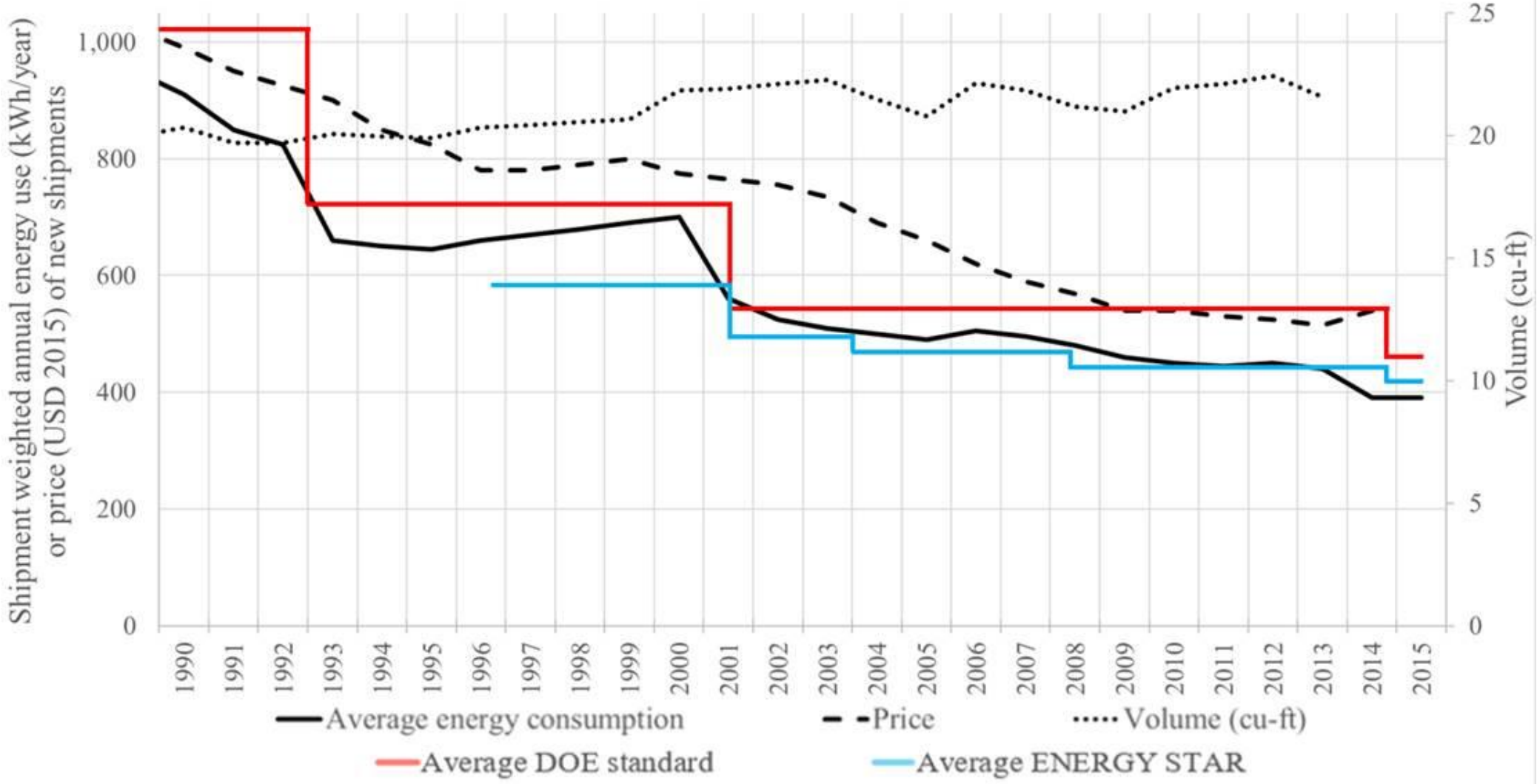

Sources: AHAM (2011) for energy use and capacity; authors' analysis of U.S. Census Bureau Current Industrial Reports for price; DOE (2012c) for markup.

**> 80%** Improvement in **Energy Efficiency** since 1990's with improved functionality.

**DOE Standard** & **ENERGY STAR** played key role in shaping product and Technology configurations.

# Appliance Efficiency Gains – Last 25 years

## Refrigerators – Average Energy Consumption, Price, and Volume Over Time




**> 50%** Improvement in **Energy Efficiency** since 1990's with improved functionality.

**DOE Standard** & **ENERGY STAR** played key role in shaping product and Technology configurations.

# Energy Efficiency:

Are we at an Inflection Point?

Are we at a point of Diminishing Returns?

# Using the Correct Tool (or Test Procedure) for the Job

For Example, brooms were the correct tool for cleaning the floor until carpet became popular. With Carpet, came Vacuums, and more recently Robot Vacuums!

Image Source: Wikihow.com

Image Source: Pinterest – Dyro Productions

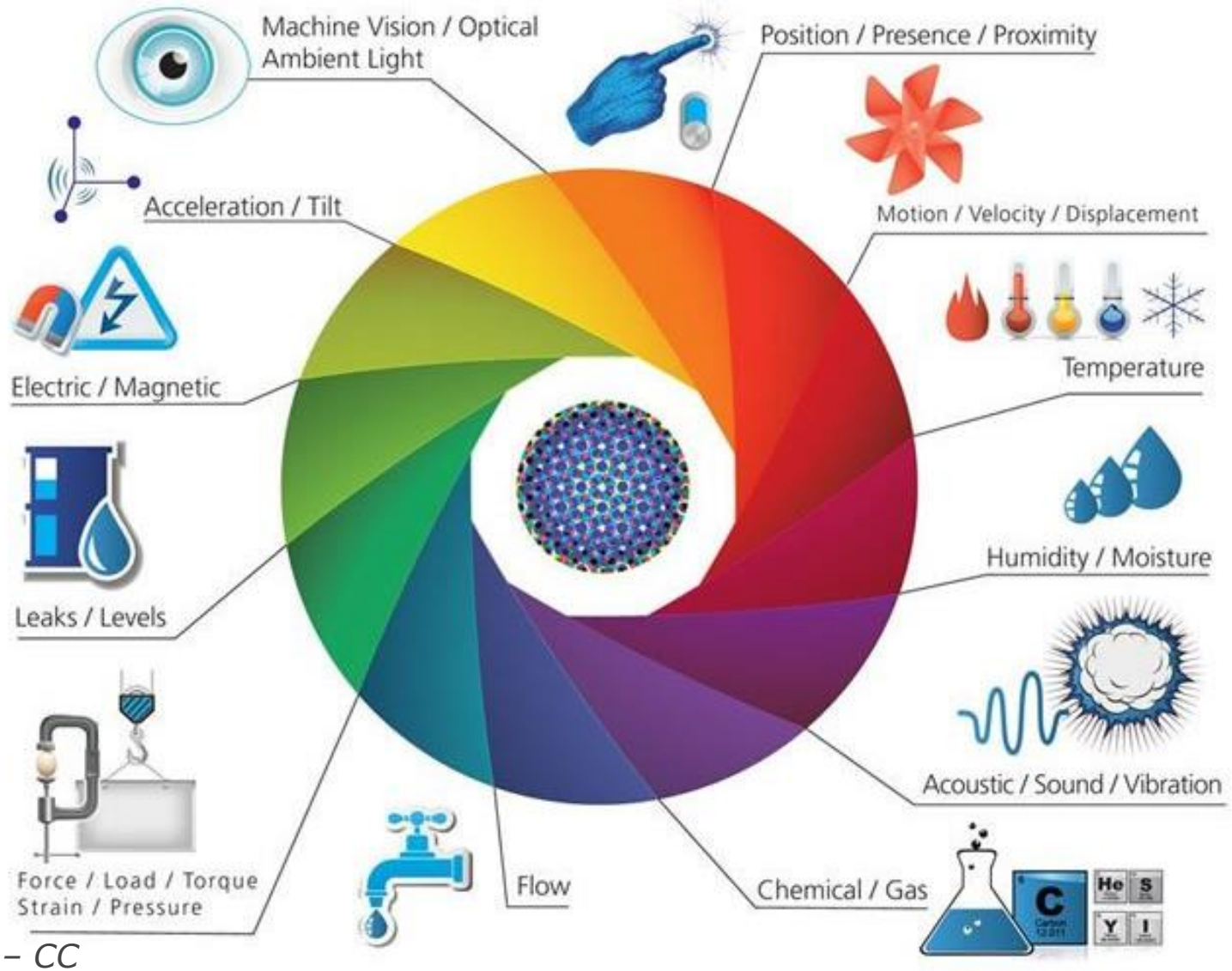

Image Source: Samsung.com

# Appliance Efficiency – Next 25 years

## Adaptive Technologies focused on real world Energy Consumption

Optimizing to Individualized usage conditions:

**Sensor enabled appliances**



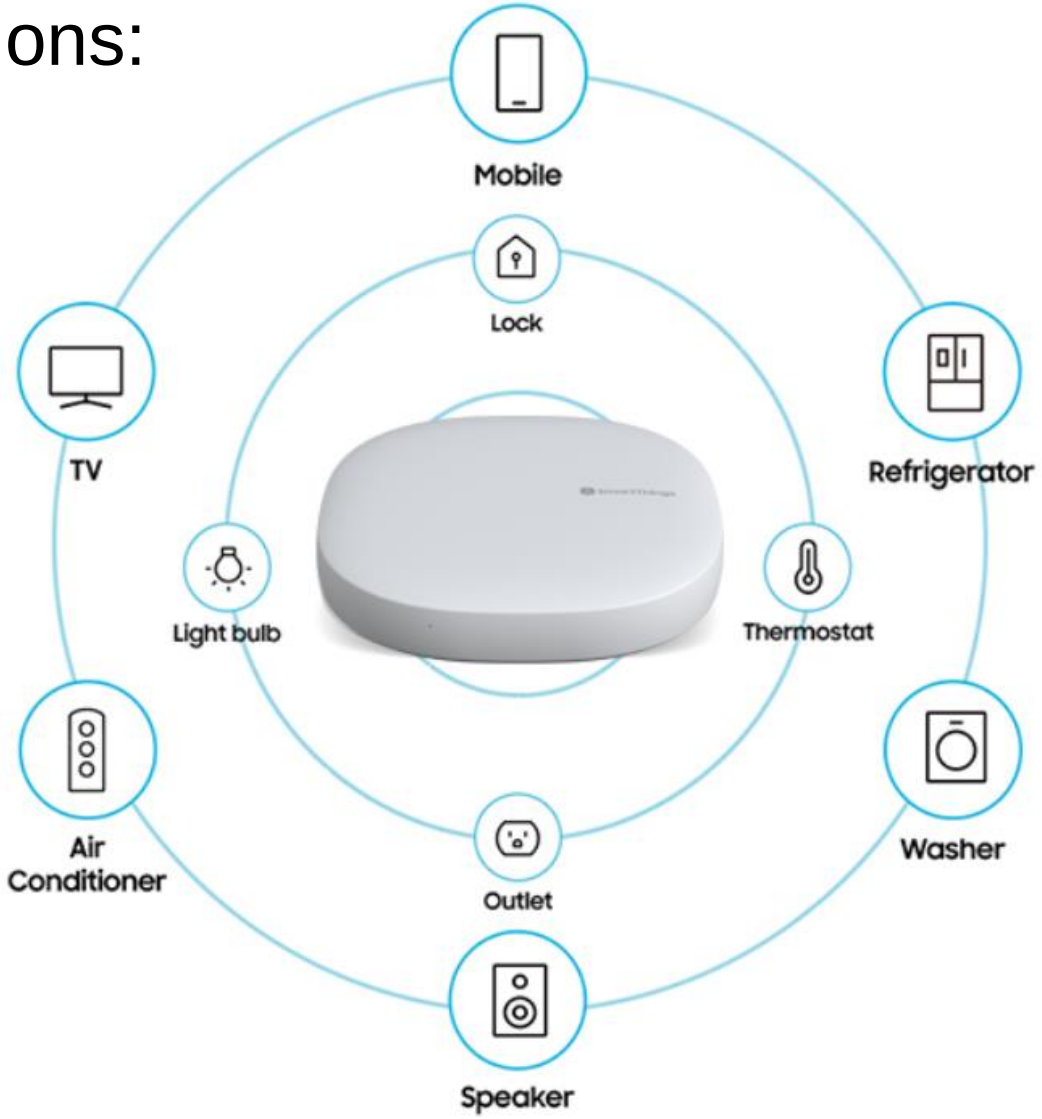

*source: IoT infographic [Postscapes](#) and [Harbor Research](#) – CC*

# Appliance Efficiency – Next 25 years

## Adaptive Technologies focused on real world Energy Consumption

Optimizing to Individualized usage conditions:

**Smart Appliances**



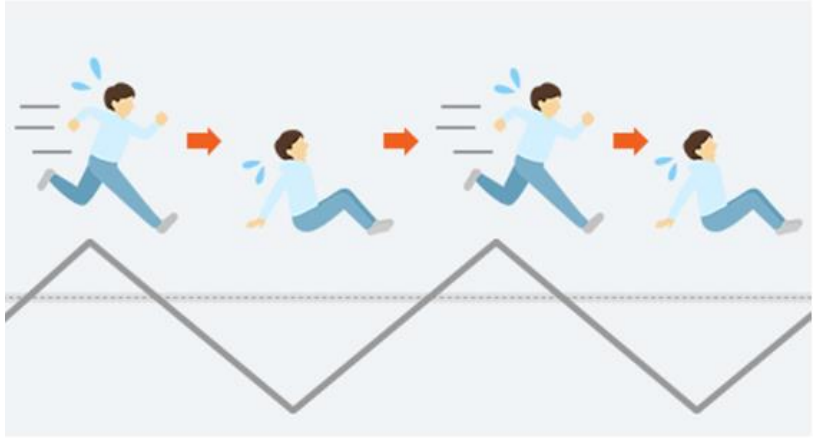

Source: Smart Things

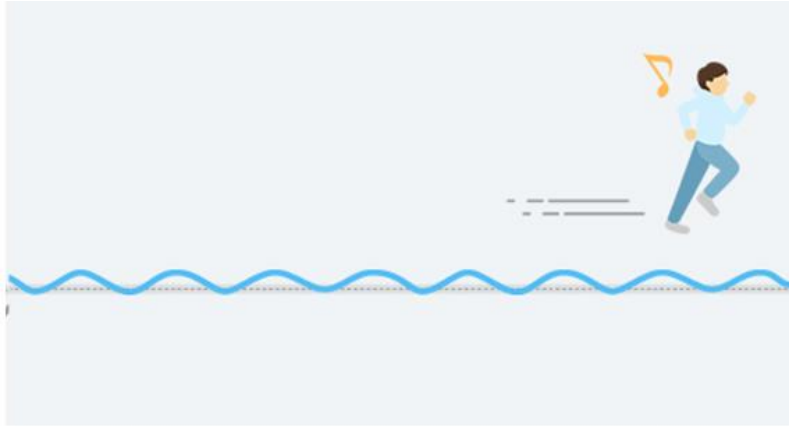
# Appliance Efficiency – Next 25 years

## Adaptive Technologies focused on real world Energy Consumption

Optimizing to Individualized usage conditions:

**Inverter technologies**

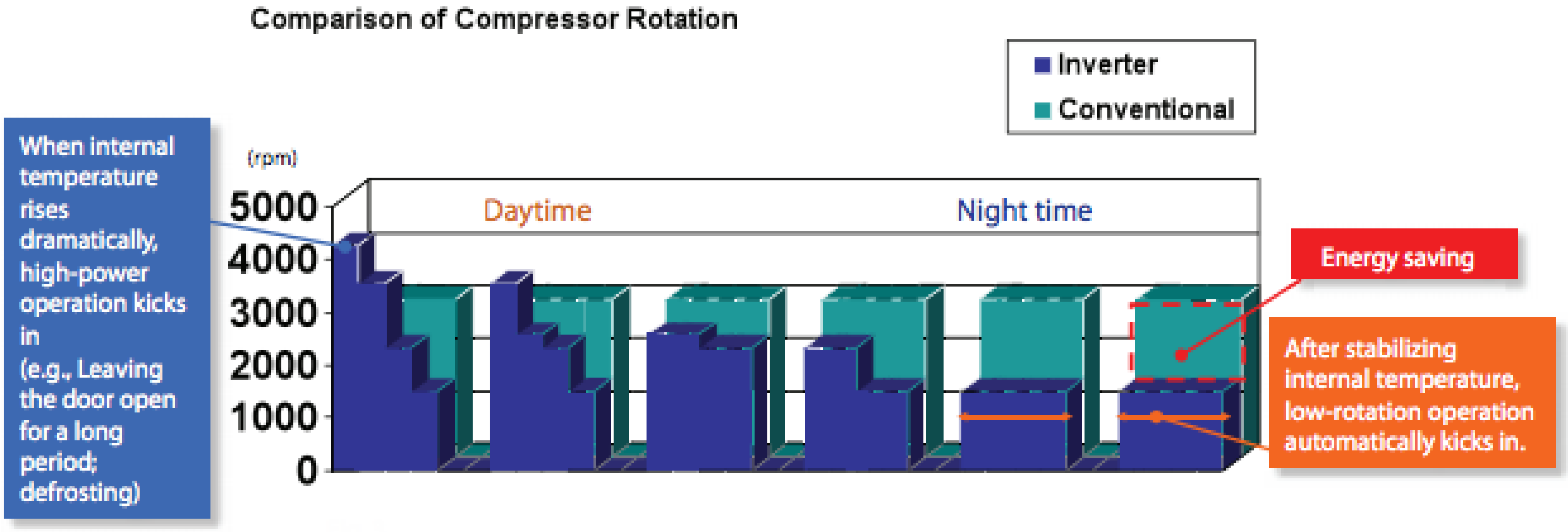




**& More**

Source: Daikin

# Adaptive Technologies – One Example
# Focused on Real World Energy Consumption




Source: bijlibachao.com

Inverter Compressor Technology

# Representative Test Procedures

For accelerated energy savings in the next 25 years

Test Procedures must reflect

- Representative of  use conditions
- Recognize technologies which adapt to use conditions.

# Representative Test Procedures

Test Procedures must adapt to new technologies otherwise, energy savings from innovative technologies are being swept under the rug!

Image Source: Shutterstock.com

**Thank You.**