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# DR shifting to DERs: Opportunities and challenges

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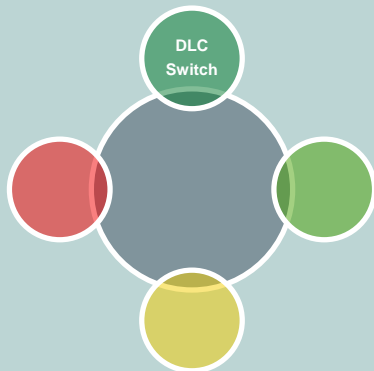
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# Historical demand response

## DR elements

- Ideal... create peak load management resource



## Design

- Install / control switches that interrupt load—mostly in summer
- Pay enrollment and participation incentives
- Layer on pricing programs to support core design (CPP, TOU, etc.)
- Call limited number of time-bound events

## Benefits

- Prevent outages, manage capacity and T&D constraints
- Offsets costly spot-market purchases
- Straightforward design
- Customer is rewarded for participation

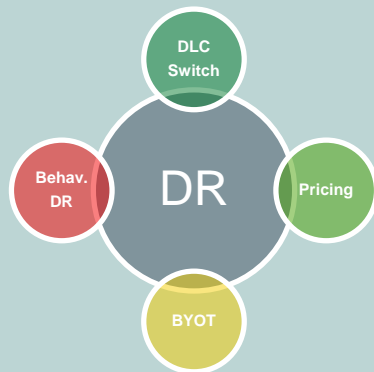
## Issues

- Can be disruptive to customers, potential negative impact to customer satisfaction
- Can be expensive

# Current demand response

## DR elements

- DR portfolios have more options



## Design

- Address winter, summer and sometimes dual peaking markets
- Incentives applied to BYO devices + enrollment + participation
- Pilot and scale BYOT programs (customers buying devices anyway)
- More control options, targeting via data

## Benefits

- Load shed + customer satisfaction
- More flexibility in devices controlled / control strategies
- Greater ability to target load pockets / customer segments, e.g. MF and SMB

## Issues

- Integration with more devices add complexity
- Some systems are proprietary
- Data is not created equal

# Distributed Energy Resources (DERs)

## DERs elements

- BPA definition



## Design

- Comprehensive asset/load management to flatten load curves
- C&I *and residential* solutions available
- Storage complements intermittent distributed generation (PV) growth
- Need reliable DERMS to control more complex asset portfolios

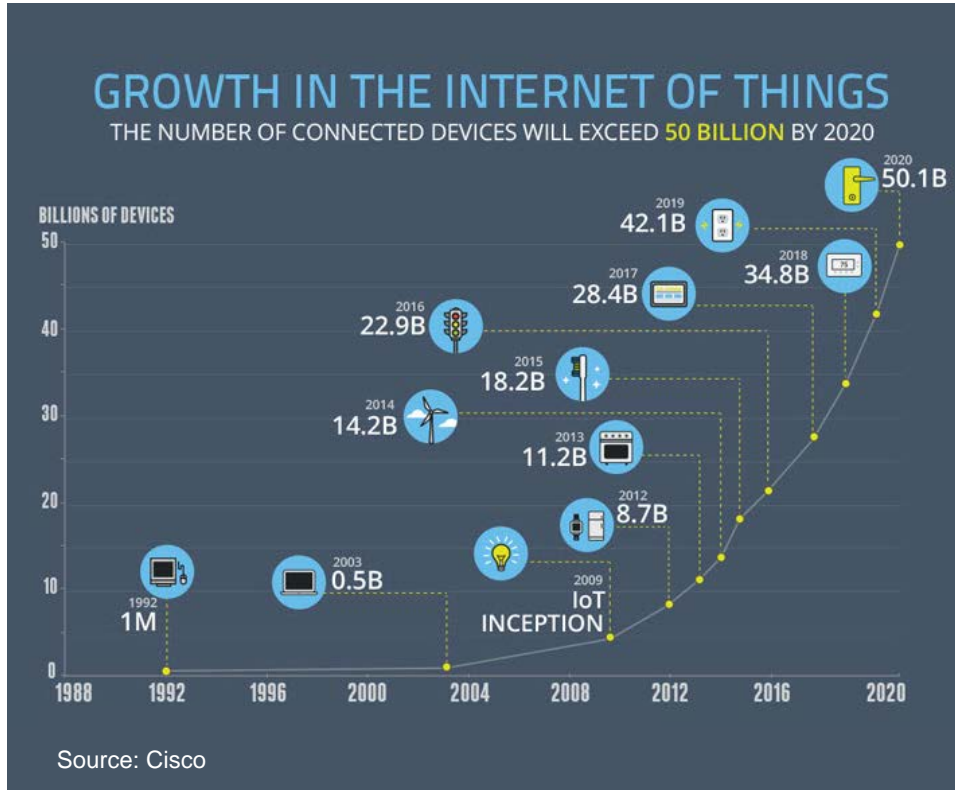
## Benefits

- Turnkey load management portfolio
- Allows sponsors to drive more economic value (wholesale market participation)
- Offers customers more energy management options

## Issues

- DERs options still fragmented
- DERMS still developing
- Policy enablement not in all markets
- Offer to customers can be confusing, costly

# Connected home / IoT evolution

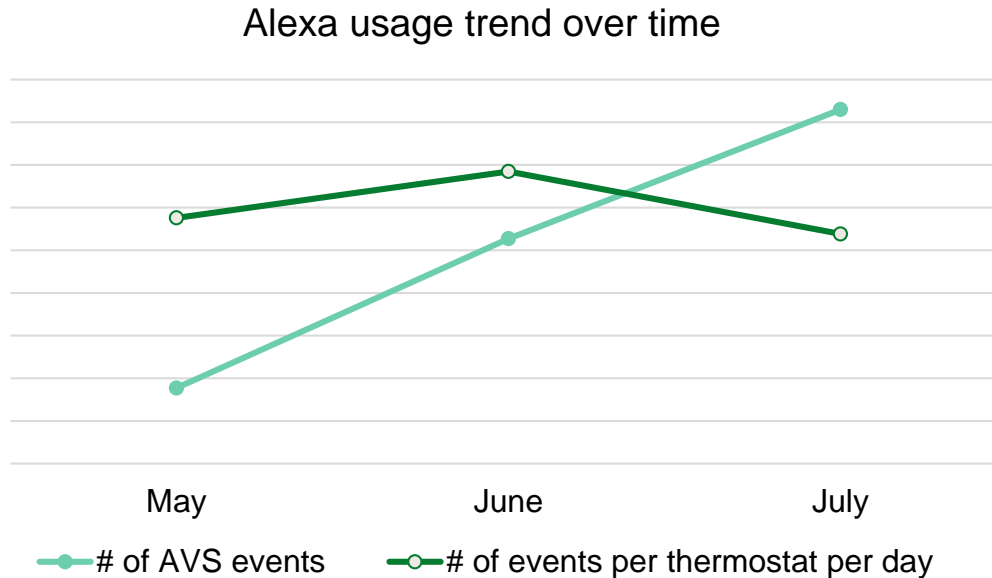


## Trends

- Consumers seek comfort, convenience, and savings from connected home
- Current estimates have IoT adoption between 30-50 billion units by 2020
  - Every category of products is likely to be effected
  - 50 million smart t-stats projected to be installed by 2020
- Consumers are adopting connected devices with and *without* incentives
- Voice assistance is reframing the user experience

# Voice engagement

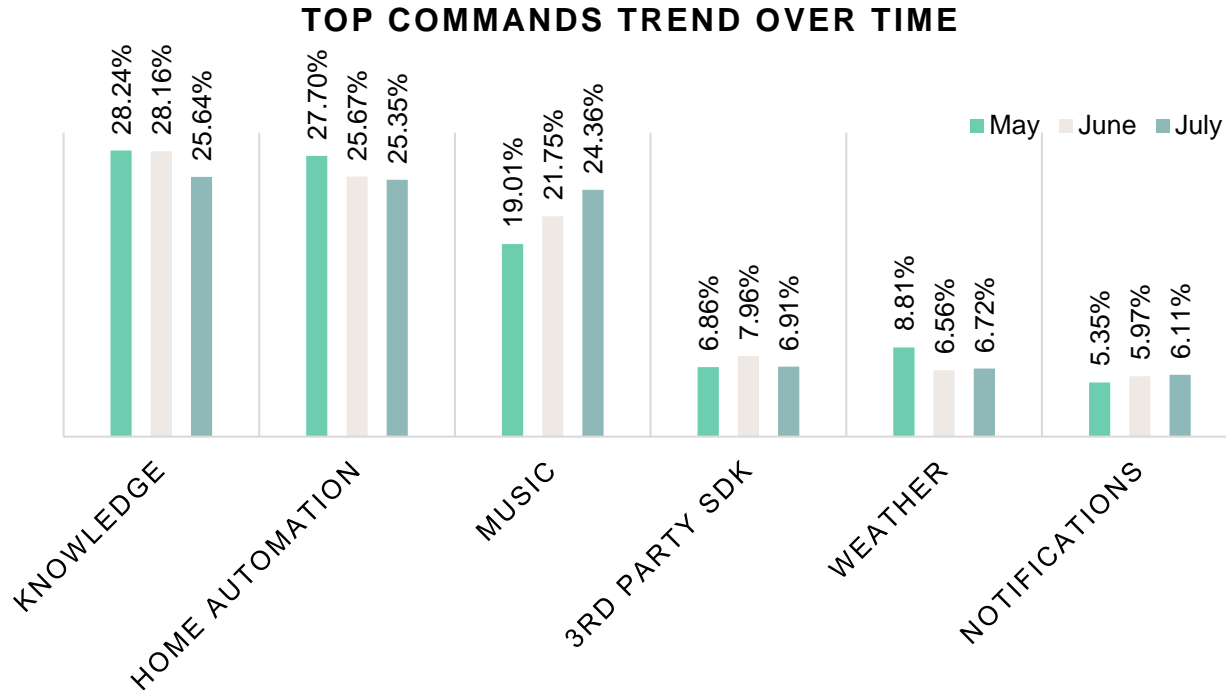
As the number of ecobee 4's grow, the average number of commands issued to ecobee 4 per day has remained consistent over three months



Source: ecobee

# Voice engagement

Although knowledge-based questions are asked more often, music playback on ecobee4 has been increasing over time

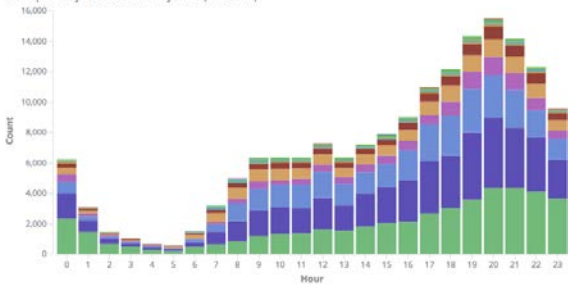


Source: ecobee

# Voice engagement

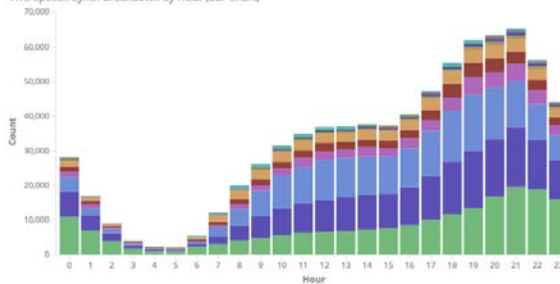
Hourly Alexa usage distribution on ecobee4 has remained consistent over the last 3 months. Bar colors refer to different areas of usage.

AVS Speech Synth Breakdown by Hour (Bar Chart)



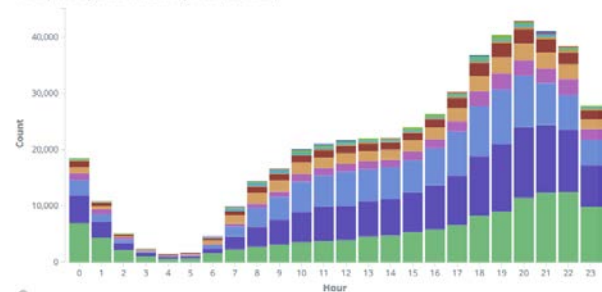
May 2017

AVS Speech Synth Breakdown by Hour (Bar Chart)



June 2017

AVS Speech Synth Breakdown by Hour (Bar Chart)

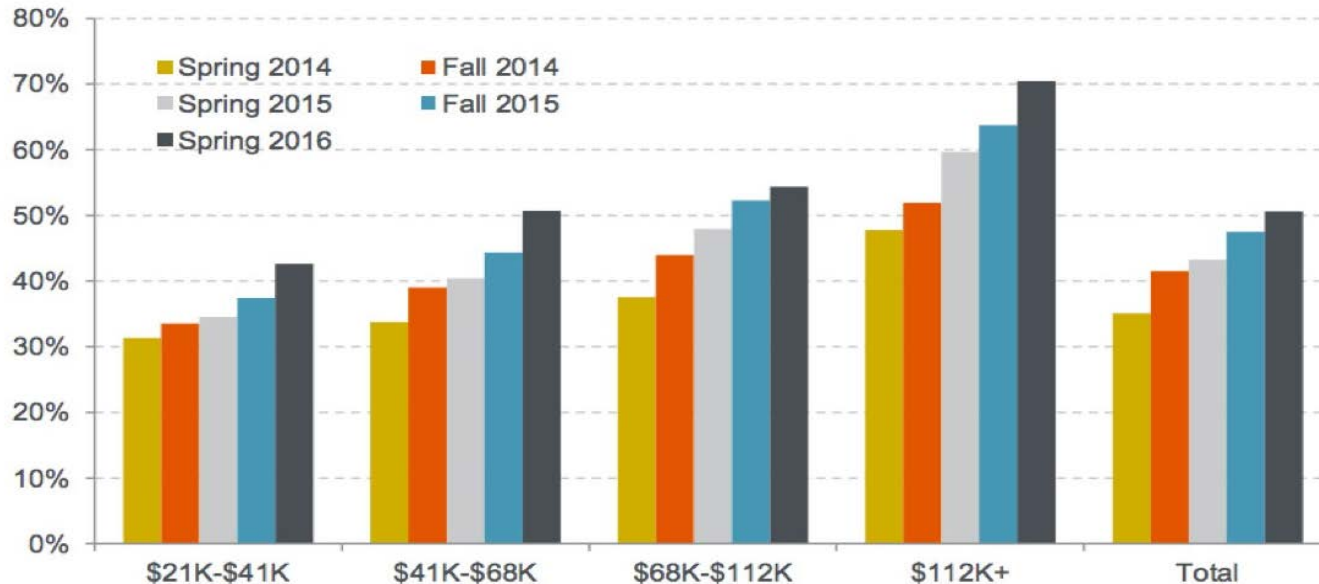


July 2017

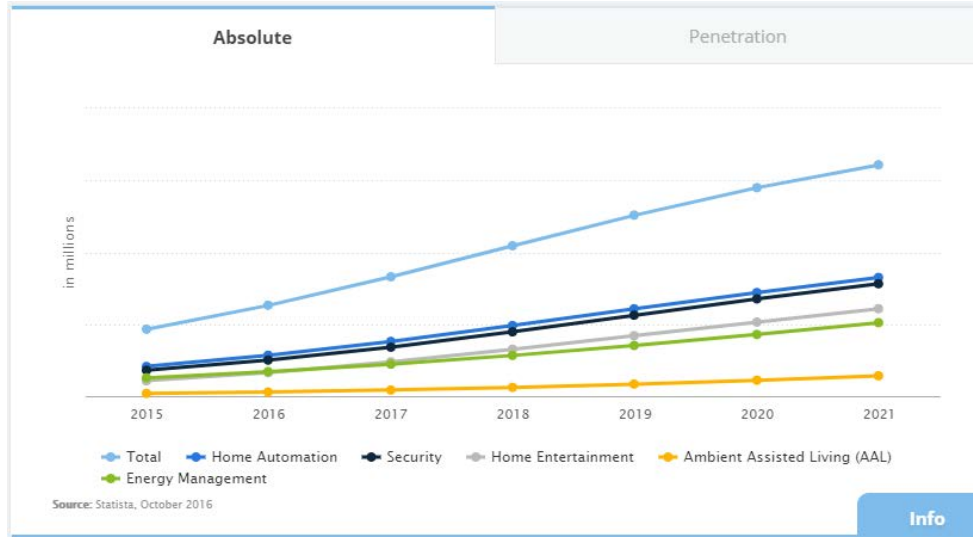


# Amazon US household penetration

## Amazon Prime Membership By Household Income (US)



# Connected home / IoT use cases



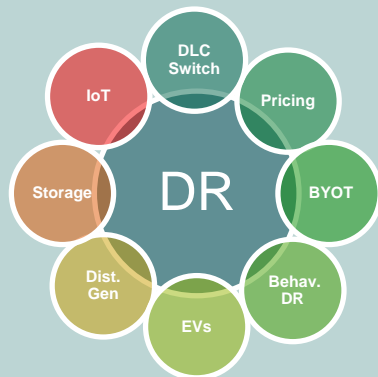
## Trends

- Voice assistance simplifies control of devices across the IoT platforms
  - Amazon has sold 11 million Echo devices since 2014
  - All major tech companies including Apple, Microsoft, and Facebook are investing in voice
- Home Automation + Energy Management create new energy and DR value streams for utilities and customers
- Space is still young—customers seek a *trusted partner* to navigate offers

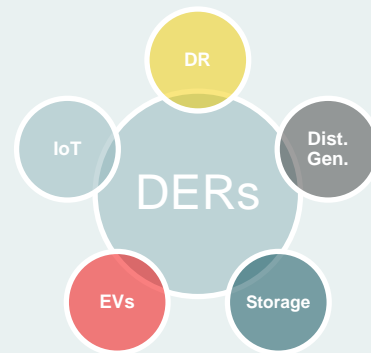
Source: Statista Smart Home USA (does not include connected home appliances, smart TVs, smart gardening devices or B2B sales of any kind) [statista.com/outlook/279/109/smart-home/united-states#market-revenue](https://www.statista.com/outlook/279/109/smart-home/united-states#market-revenue)

# DR or DERs: Which to offer?

## DR elements



## DERs elements



## Pros / Cons

- Good for sponsors looking for iterative, a la carte add-ons to their core DR portfolios
- Creates flexibility in program offers to customers
- Multiple program types may become complex to manage; may confuse customers

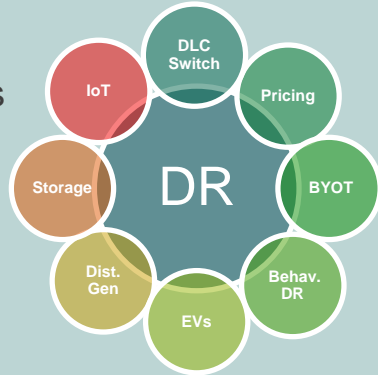
## Pros / Cons

- Takes a more strategic, consolidated view of load management options
- Enables wholesale market participation
- Requires control platforms that aren't yet mature
- Market players aren't easily consolidated

# DR or DERs: Where are they offered?

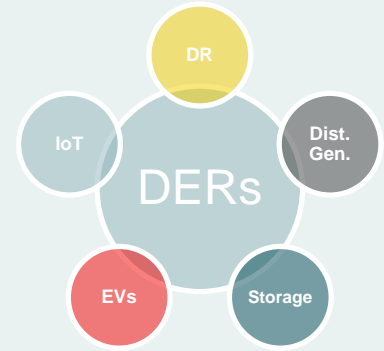
## DR elements

- Nearly all US regions
- Sponsors seeking IoT options
- NW – EIM
- CA – DRAM
- Res, SMB and C&I



## DERs elements

- NY – NWA
- CA
- NW - pilots
- MW – in develop.
- SW – in develop.
- Res and C&I



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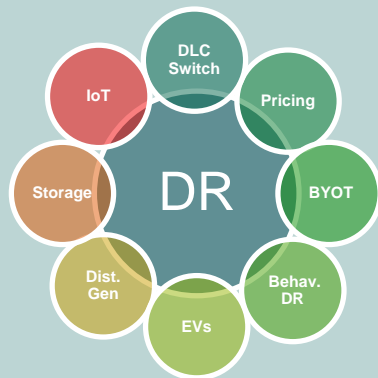
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# Market drivers

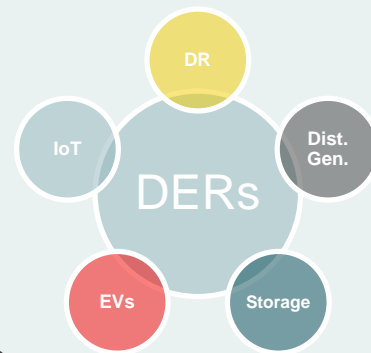
## DR

- Peak load management
- Multi-season peaks
- Customer satisfaction
- Generation retirement
- Smart meter ROI
- Smart home/voice
- Market economics
- Regulatory orders
- Conservation guidance



## DERs

- Clean power mandates
- Market aggregation
- Smart home/voice
- Resilience
- Regulatory orders
- Market economics



# Insights

## DR

- Discrete components give sponsors more flexibility to respond to multi-season peaks
- IoT market is moving FAST – flexible designs are needed to harness that opportunity
- Offers to key sectors (Residential, SMB, C&I) are poised to evolve

## DERs

- A strategic, consolidated approach to comprehensive energy management
- Well suited to sponsors and regions with clean energy or related mandates
- Ideal for broad market participation (utility, customer) where policy allows
- Benefits from reliable control platforms that are still in development
- Not for everybody / every sponsor
- Opportunities in C&I and Residential

# DISCUSSION

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Thank you

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