Policy Options for Energy Aware Devices

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Why Energy Aware Devices?

- People rarely know how much energy end-use devices use, individually or collectively
- Current solutions expensive, cumbersome, non-interoperable
  - Not used

Solution

- Enable devices to track / report their own energy use

=> “Energy Reporting”

- Do this at no incremental cost
- Disperse the technology to all energy-using devices
How does it work?

- Most devices will estimate energy use
  - Use network connection already present
- Basic capability only within building
  - Privacy, security
- Also provide other info
  - Brand, model, etc.
Applications and Benefits

- Energy accounting
  - To make decisions about equipment replacement, repair, operation, etc.

- Billing
  - Billing of tenants or vendors

- Building operation
  - Better controlling energy use for local or grid concerns

- Monitoring and verification
  - Comparing actual energy use to that estimated in design

- Asset management
  - Tracking presence, location, and identity of devices
Policy Applications

- Baseline device / end use energy consumption
  - Assessing test procedure relevance

- Efficiency Programs (incl. rebate)
  - Design, operation, and evaluation

- Tracking performance over time
  - Understanding degradation, maintenance needs

- Principal agent problems
  - Billing entity most responsible / capable on device level

- Reduced uncertainty

- Reduced costs

- Deterring cheating
Recommendations – Technology

- Establish a reference (common) “data model”
- Minimize number of application layer protocols used
  - Using Internet Protocol, any physical layer technology OK
- Harmonize protocols to reference data model (as feasible)
- Provide free reference Central Entity software
- Ensure that technology does not require compromising Privacy or Security
Data Model Issues – General Identity

Manufacturer

vendor-identifier (a 2-byte numeric value) and vendor-name (BACnet)
Vendor (FSGIM)
VendorName (MODbus)
Instrument/Manufacturer (sMAP)
Vendor name (VT)
ENERGY STAR Manufacturing Partner and Brand Name (ENERGY STAR)
Manufacturer and Make (BEDES)
Manufacturer (HPXML)
Manufacturer and Brand (NILM)
Manufacturer (XMPP)
Manufacturer (DMTF)
deviceManufacturer and deviceVendor (Haystack)
MakeModel (CTA 2047)

(Source: Nordman and Cheung, 2015)

Model

model-name (BACnet, 70)
Model (FSGIM)
ModelName and ProductCode (MODbus)
Device model number (VT)
Instrument/Model (sMAP)
Model Name and Model Number (ENERGY STAR)
Model (DMF and VT)
ModelNumber (HPXML)
Model (NILM)
Brand and Product Line / Family Name (TPEx).
Name (XMPP)
Also: SKUs, UPC codes, retail numbers, descriptions, Global Trade Item Number and version
UPC (Universal Product Code), Part Number, …
Recommendations – Policy and EDNA

- Voluntary energy programs (e.g. Energy Star)
  - Encourage or require energy reporting features

- Mandatory energy standards
  - Encourage or require energy reporting features

- Research
  - Create energy reporting technology and use its results

- Future policy
  - Declare that policy development will be informed by data from energy reporting

- EDNA activities
  - Global policy coordination
  - Sponsor infrastructure development
Thank you