



A Portfolio Impact Analysis Tool for Building Energy Efficiency Technologies

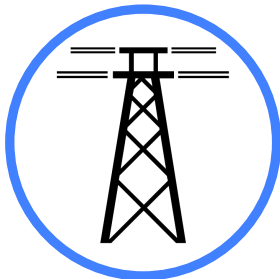
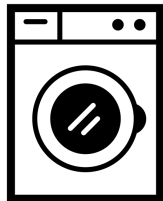
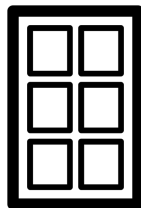
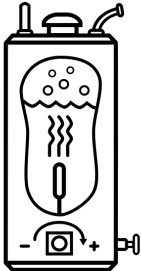
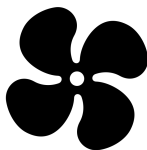
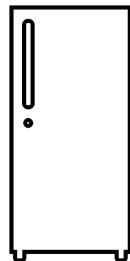
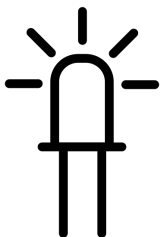
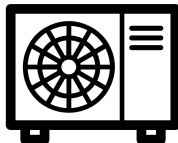
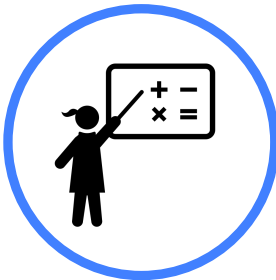
Chioke Harris

EERE Science & Technology Policy Fellow

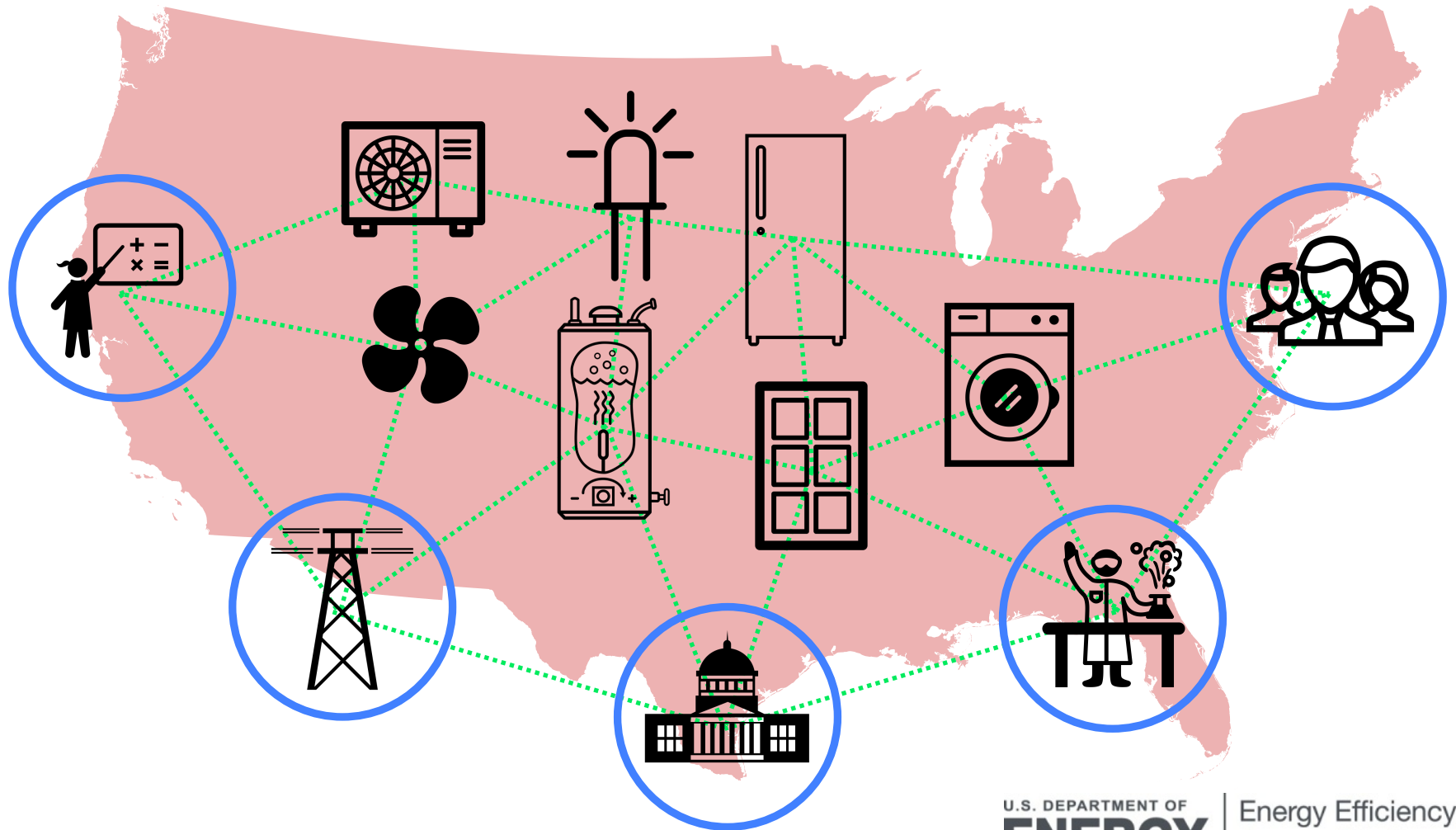
Building Technologies Office

U.S. Department of Energy

The problem: many efficient technologies, multiple perspectives



Scout provides a common framework for evaluating energy conservation measures



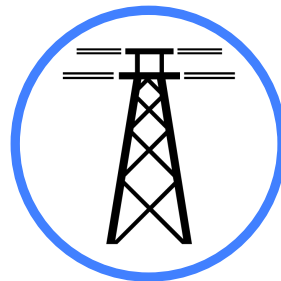
Scout is intended to be adaptable to the analysis needs of BTO and others



Academics, national labs, and industry partners can use Scout to communicate the larger-scale benefits of R&D breakthroughs

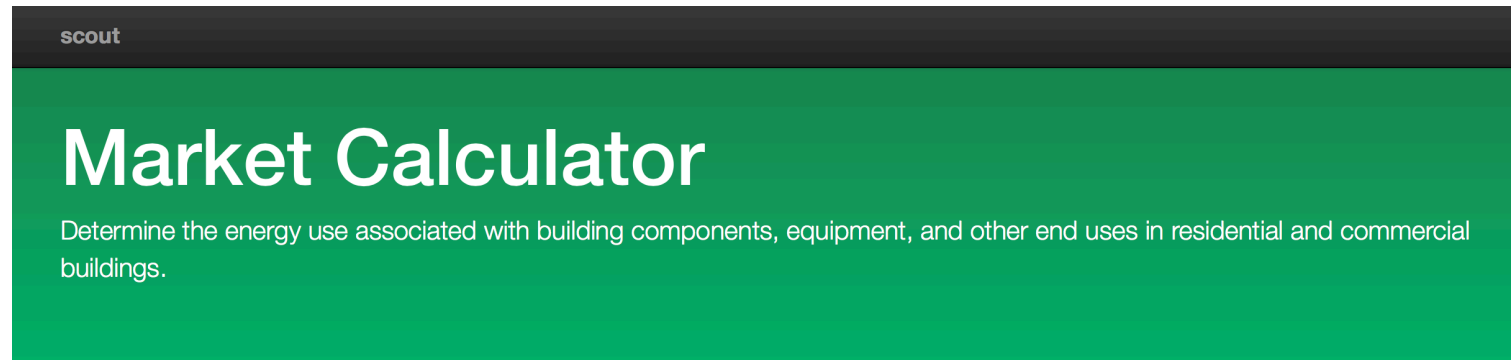


Other Federal agencies can use Scout to estimate the potential impacts of funding in achieving energy and cost savings goals



Utilities can use Scout to develop “deemed savings” values and corresponding incentives for energy conservation measures (ECMs)

The Market Calculator website is a component of Scout



The Market Calculator yields the estimated energy use and CO₂ emissions associated with losses through the building envelope and appliances and devices within residential and commercial buildings in the United States. The energy use and CO₂ emissions can be divided by building type, climate zone, technology type, and other factors indicated below. CO₂ emissions reported here do not include direct emissions associated with losses of working fluids from heating, cooling, water heating, and refrigeration systems.

To obtain an estimate for a market or markets of interest, the appropriate definitions must be selected below. In each category shown, at least one selection must be made to yield a complete market definition. In some categories, multiple selections are permitted. Categories where multiple selections are allowed are indicated as such. Selections for the relevant groups are made by simply clicking

the
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the
as
Th
Administration (EIA). [↗](#)

<https://trynthink.github.io/scout/calculator.html>

Market Size Update

0
TBTU (primary energy)

0

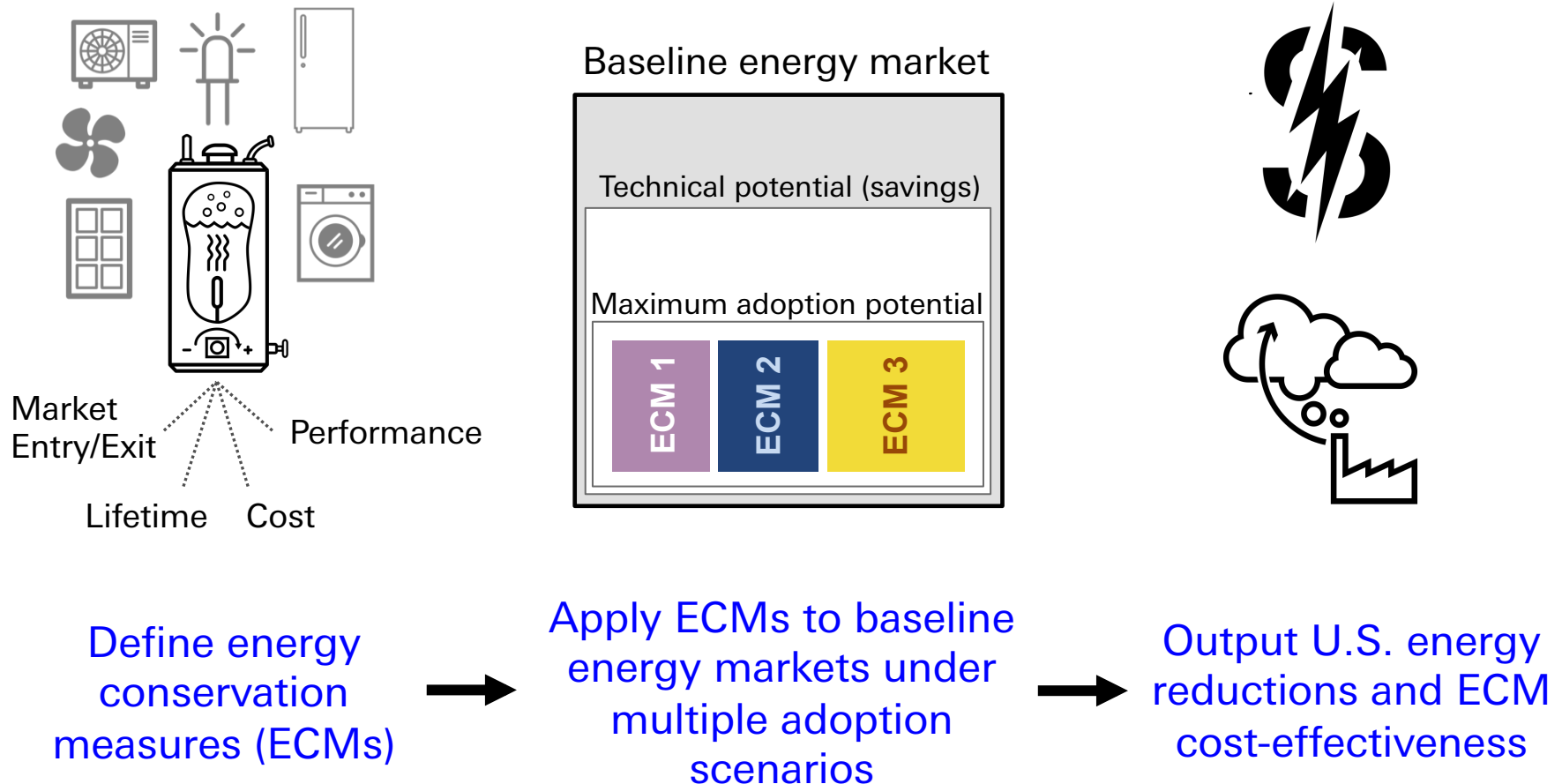
1. Choose a projection year
2. Select all relevant [AIA climate zones](#)
3. Choose residential or commercial buildings

2030

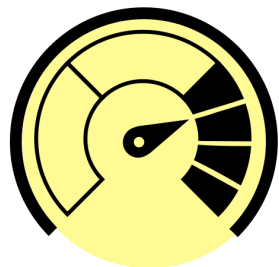
1 2 3 4 5

Residential Commercial

Scout applies individual efficient technologies to the U.S. building stock



Scout ECMs are defined by performance, cost, and lifetime



Performance

Definition: Per unit absolute (e.g., COP) or relative (e.g., savings %)

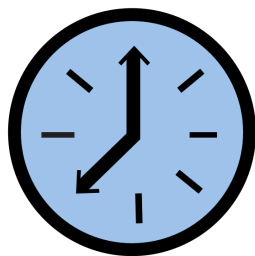
Sources: Reports and publications, EnergyPlus



Cost

Definition: Per unit installed cost

Sources: EIA, RSMeans, public databases (e.g., ENERGY STAR)



Lifetime

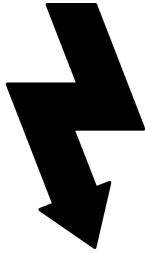
Definition: Useful unit life in years

Sources: EIA, reports, and publications

ECMs apply to baselines drawn from EIA Annual Energy Outlook

Data reported for each year from 2009 to 2040

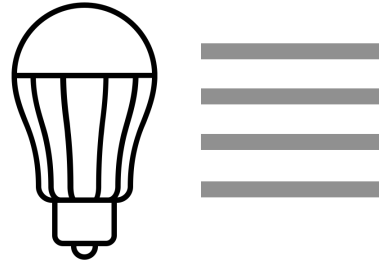
Energy Use



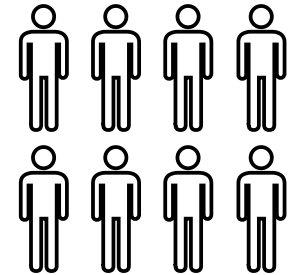
Building Stock



Equipment Characteristics



Adoption Model Parameters



ECMs apply to baselines drawn from EIA Annual Energy Outlook

Data reported for each year from 2009 to 2040

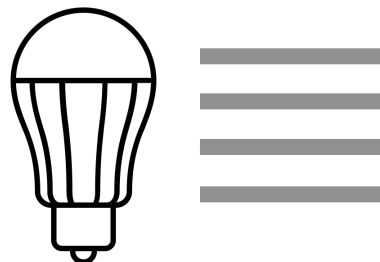
Energy Use



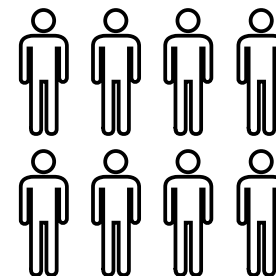
Building Stock



Equipment Characteristics



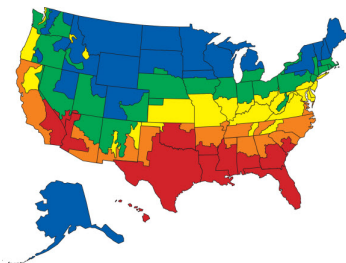
Adoption Model Parameters



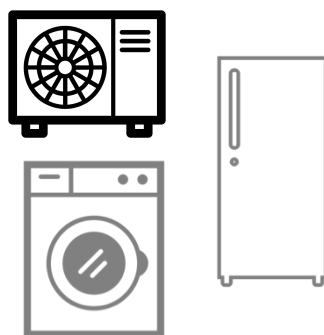
Building Type



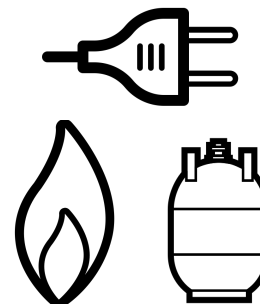
Climate Zone



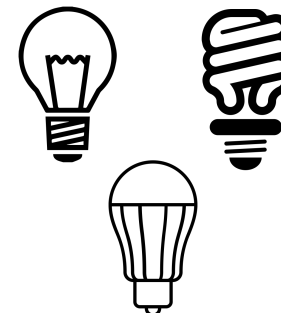
End Use



Fuel Type

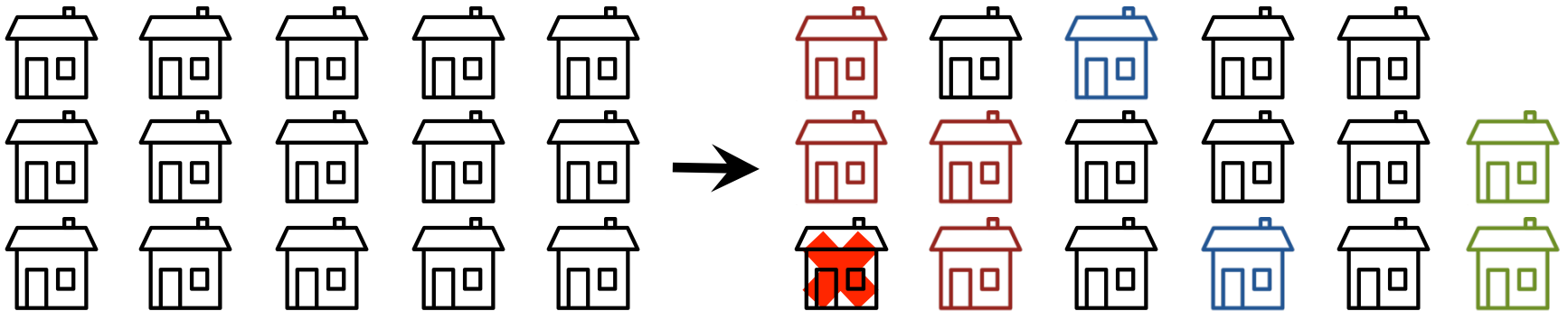


Technology

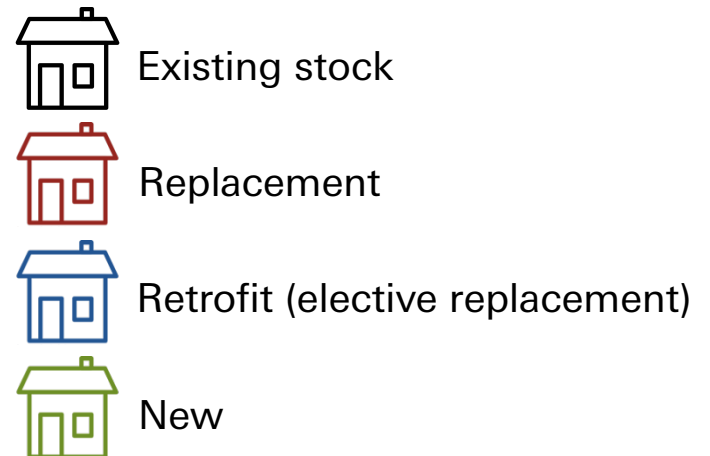
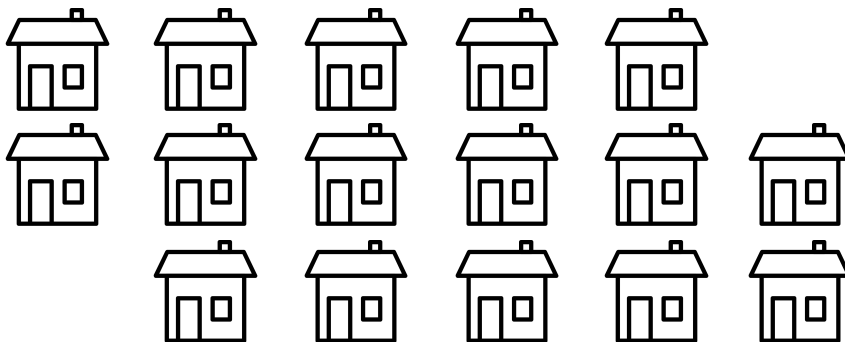


Baseline data define building and equipment stocks and flows

Year Y

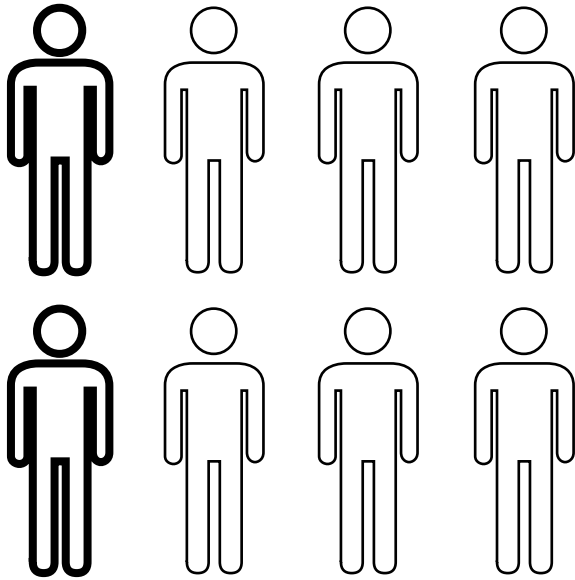



Year Y+1




ECMs diffuse into markets under two adoption scenarios

Total baseline market (Year Y)

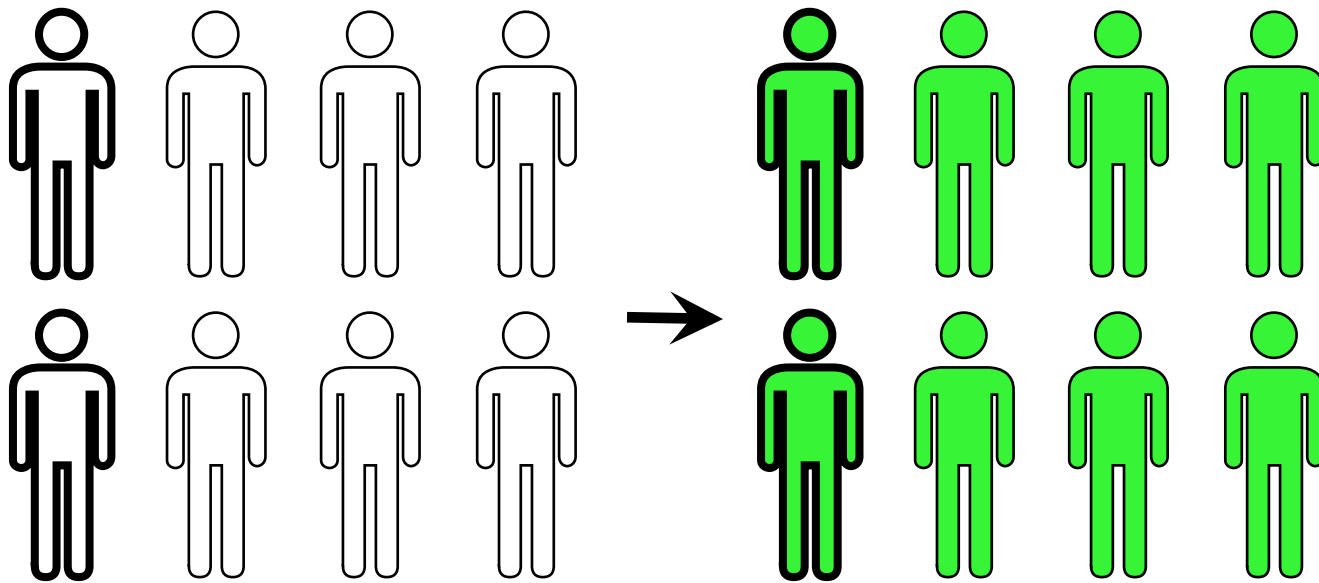



 New/replace/
retrofit
baseline
(‘Completed’)


 Uncompleted
baseline


ECMs diffuse into markets under two adoption scenarios

Technical Potential Scenario: Total market fully captured



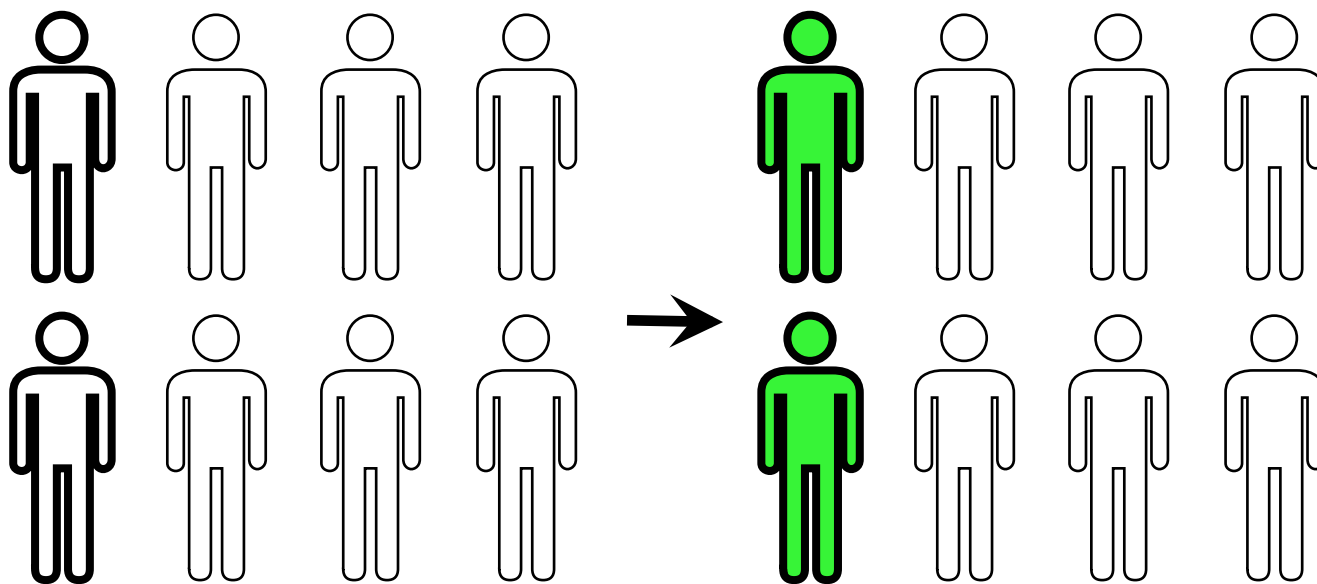
 New/replace/
retrofit
baseline
(‘Competed’)


 Uncompeted
baseline

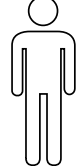
 Captured by an
efficient
measure


ECMs diffuse into markets under two adoption scenarios

Maximum Adoption Scenario: Competed market fully captured

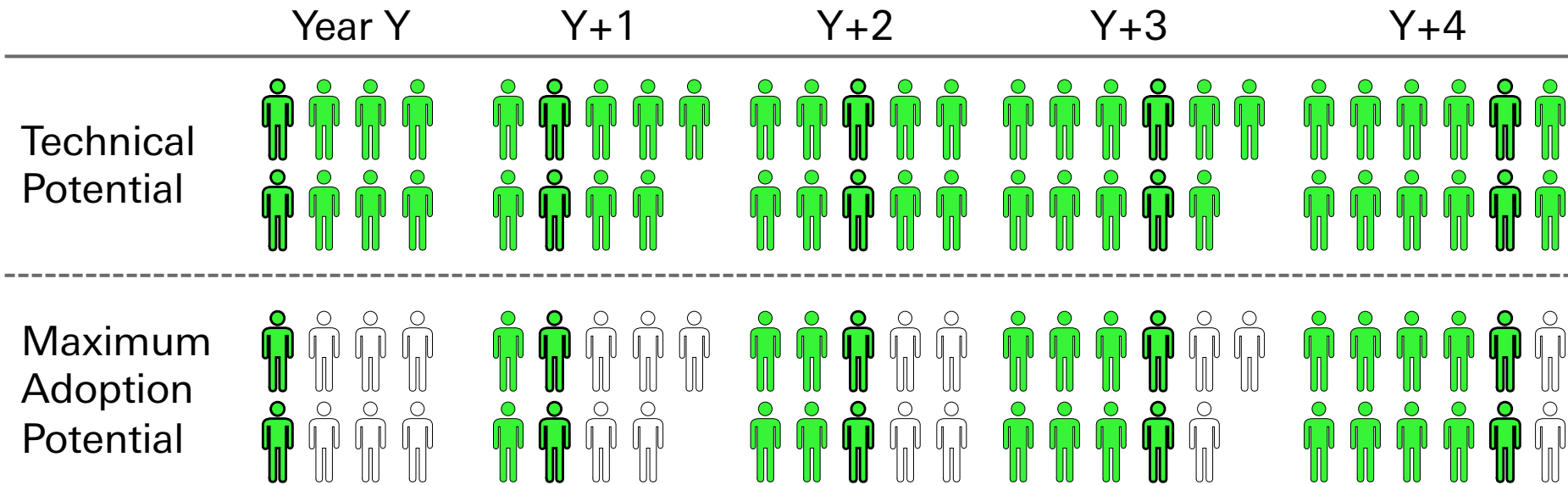


 New/replace/
retrofit
baseline
(‘Competed’)

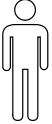
 Uncompeted
baseline


 Captured by an
efficient
measure

Adoption scenarios determine ECM diffusion rates over time

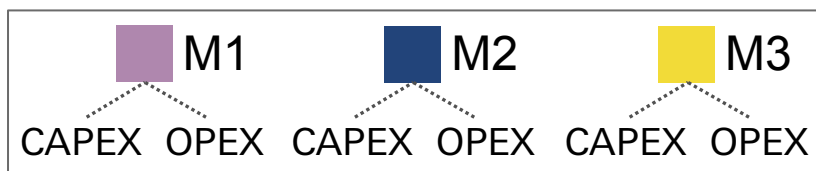


14  Competed baseline

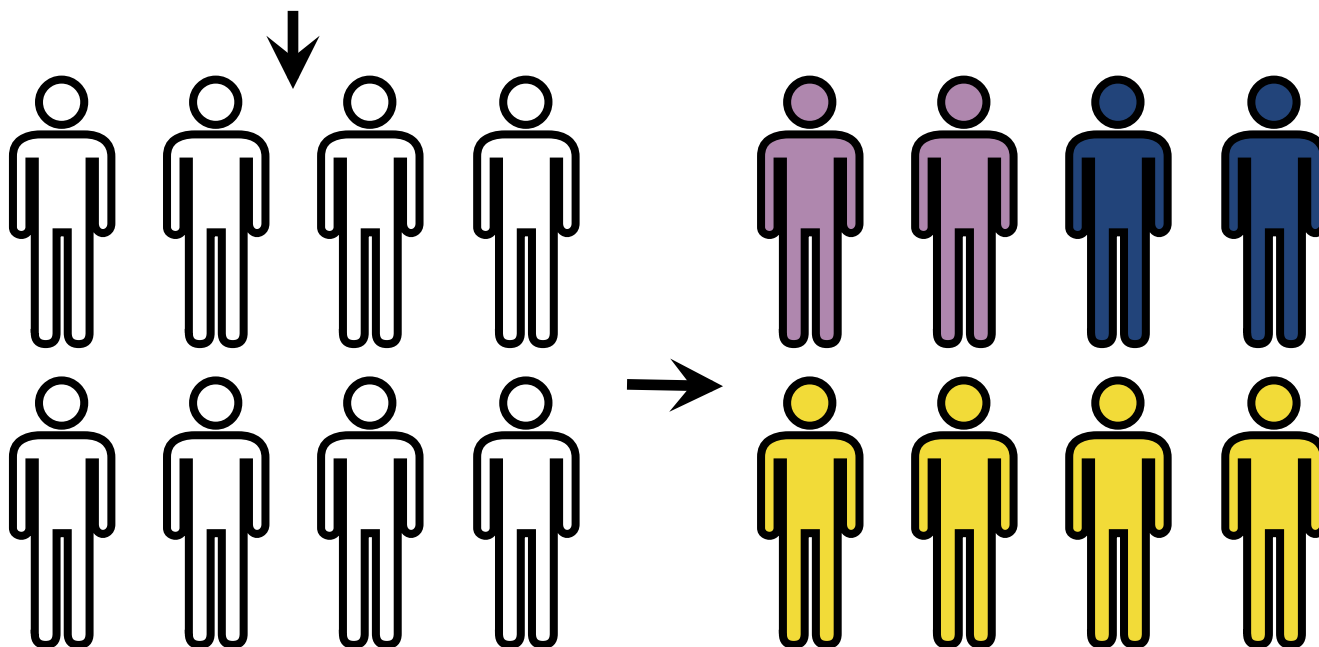
 Uncompeted baseline

 Captured by an efficient measure

Competing ECMs are attributed shares of the competed baseline



ECM market shares determined by per unit capital/operating costs
*(based on NEMS adoption models)



Competed baseline



Captured (M1)

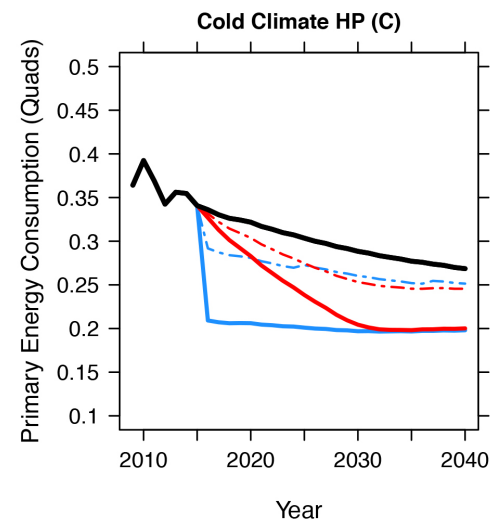
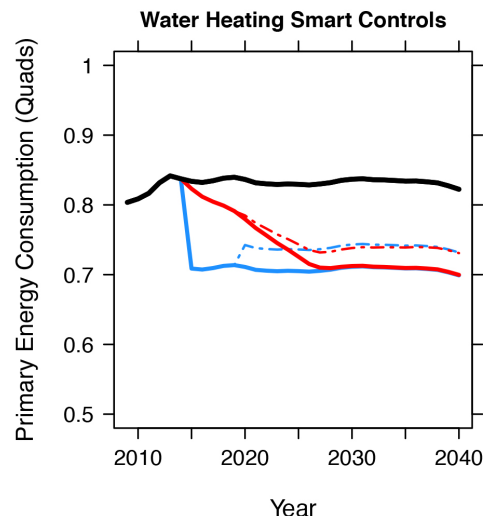
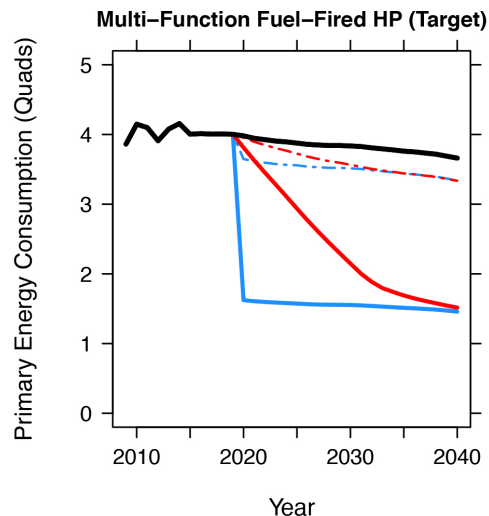


Captured (M2)



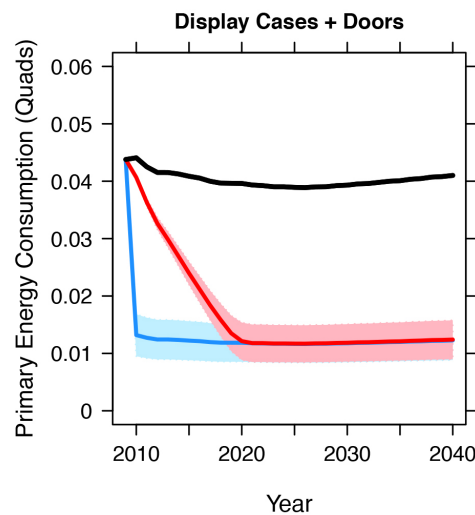
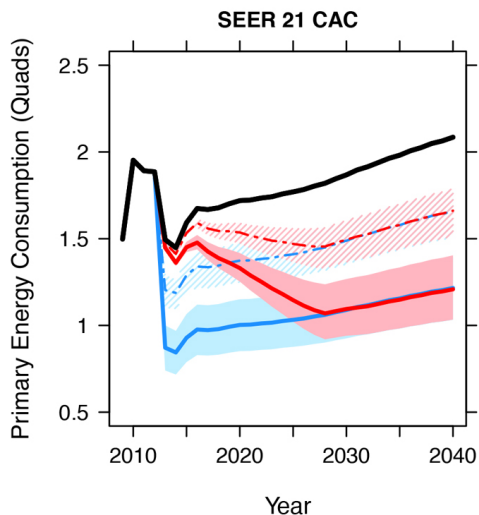
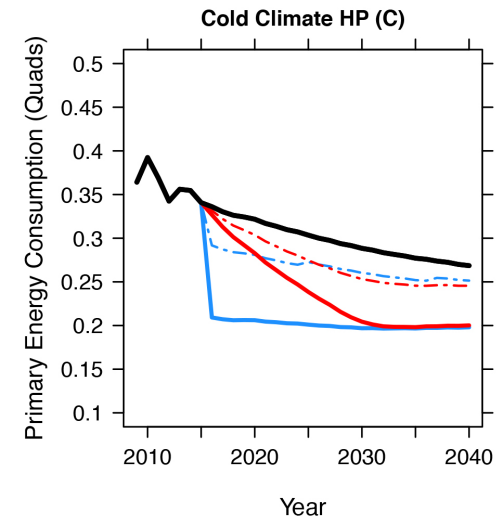
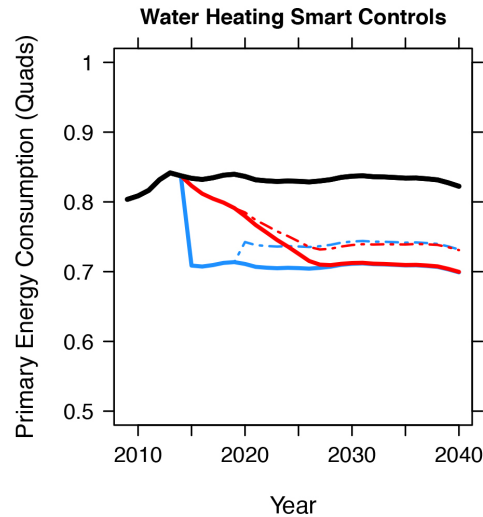
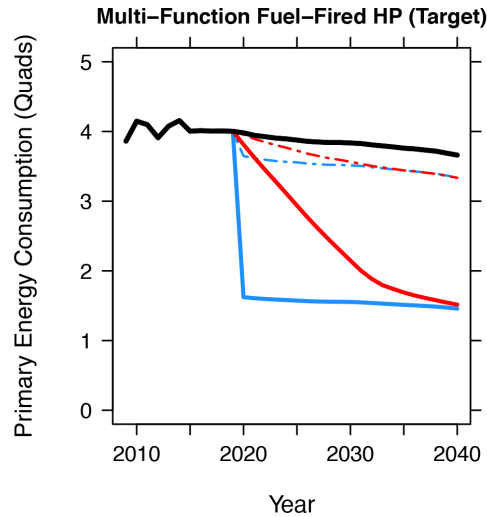
Captured (M3)

Results can show the effect of competition, uncertainty



- Baseline Consumption
- Efficient Consumption (Uncompleted, TP)
- Efficient Consumption (Uncompleted, MAP)
- - - Efficient Consumption (Completed, TP)
- - - Efficient Consumption (Completed, MAP)
- Uncompleted TP (5th/95th pct)
- Uncompleted MAP (5th/95th pct)
- Completed TP (5th/95th pct)
- Completed MAP (5th/95th pct)

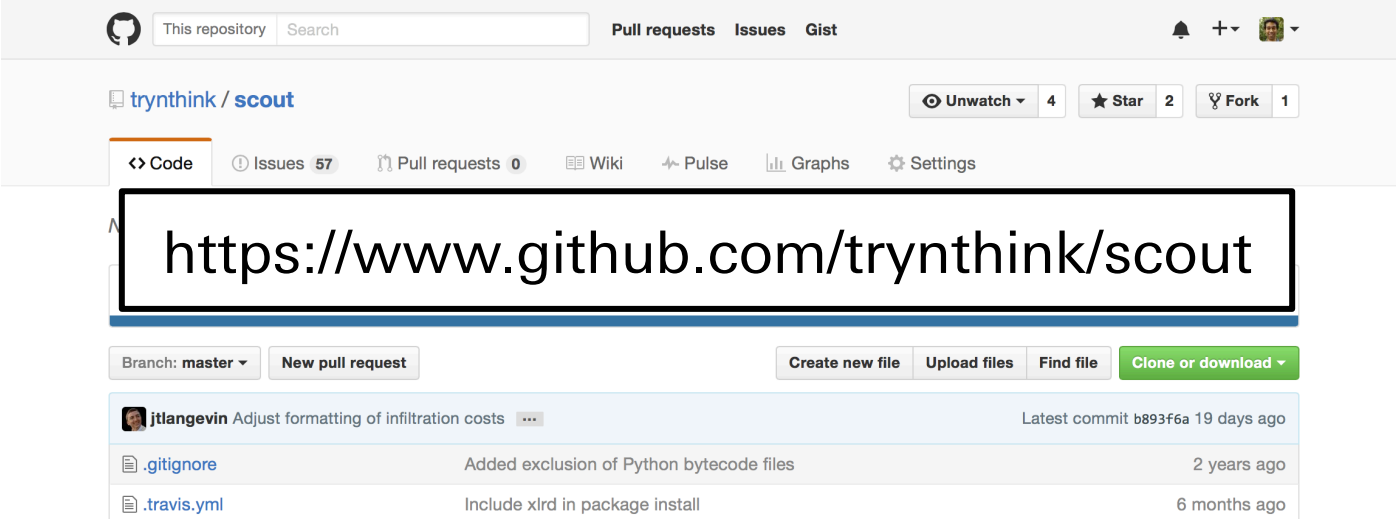
Results can show the effect of competition, uncertainty



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- - - Efficient Consumption (Completed, TP)
- - - Efficient Consumption (Completed, MAP)
- Uncompleted TP (5th/95th pct)
- Uncompleted MAP (5th/95th pct)
- ▨ Completed TP (5th/95th pct)
- ▨ Completed MAP (5th/95th pct)

Alpha testing ongoing, beta slated for late 2016

- Residential and commercial measures tested
- Preliminary measure portfolio defined
- Switch to Building America climate zones
- User documentation available online



The screenshot shows the GitHub interface for the repository 'trynthink/scout'. At the top, there is a search bar and navigation links for 'Pull requests', 'Issues', and 'Gist'. Below this, the repository name 'trynthink / scout' is displayed, along with statistics: 'Unwatch' (4), 'Star' (2), and 'Fork' (1). A navigation bar includes 'Code', 'Issues 57', 'Pull requests 0', 'Wiki', 'Pulse', 'Graphs', and 'Settings'. A large black-bordered box highlights the URL <https://www.github.com/trynthink/scout>. Below the box, there are buttons for 'Branch: master', 'New pull request', 'Create new file', 'Upload files', 'Find file', and 'Clone or download'. The commit history shows a commit by 'jtlangevin' titled 'Adjust formatting of infiltration costs' from 19 days ago, and two files: '.gitignore' (Added exclusion of Python bytecode files, 2 years ago) and '.travis.yml' (Include xlrld in package install, 6 months ago).

Chioke Harris, Ph.D.

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Building Technologies Office
U.S. Department of Energy

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Icon attributions

Slide 3: Buildings (Milky-Digital Innovation); US Dollar (Christopher Beach); Lightning bolt (Tristan)

Slide 4: LED (Nikita Kozin); Water heater (Michael Thompson); Air conditioning unit (Arthur Shlain); Fan (Edward Boatman); Refrigerator (shashank singh); Washing machine (Ed Harrison); Window (Arthur Shlain); Teacher (TukTuk Design); Utility tower (Maurizio Fusillo); Capitol building (Kelcey Hurst); Lab scientist (Edward Boatman); Business team (lastpark)

Slide 6: United States (Bohdan Burmich)

Slide 9: Energy dollar (Nicholas Menghini); Power plant (Francesca Ameglio)

Slide 10: Gauge (Nicolas Vicent); Clock (Nadya Bratt)

Slide 18: Energy (Edward Boatman); buildings, Mosque, House (Creative Stall); School (Tran)

Slide 19: Plug (Arthur Shlain); Flame (Samuel Q. Green); Propane Tank (Carlos Salgado); Fluorescent Light Bulb (Matt Brooks); Light Bulb (Marco Galtarossa); led bulb (Alex Podolsky)

Slide 26: Figure (Alexander Smith)

Slide 35: homepage (Lil Squid)

Slide 38: solar panels (Adam Terpening); turbines (Creative Stall); Power Plant (Iconathon); clock (Karen Tyler)

Slide 39: Faucet (Carla Gom Mejorada)