E SOURCE HUB AT THE FORUM

E Source Toolbox for Engineers

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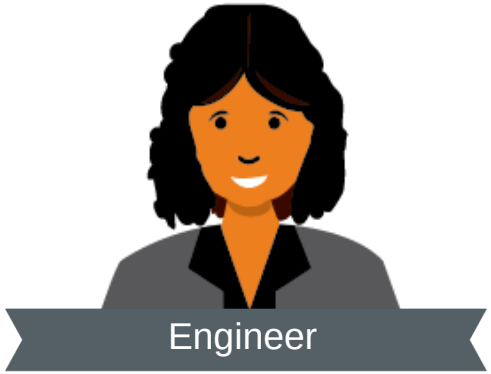
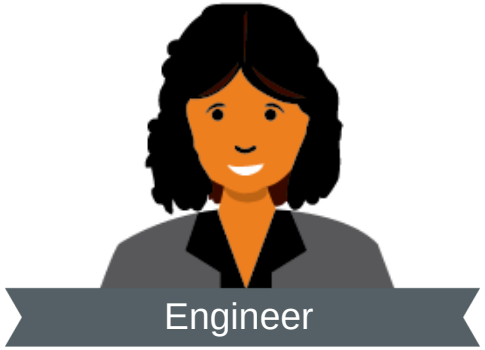
Persona introduction

Responsibilities can include:

- Vetting new technologies for inclusion in programs/pilots
- Developing savings estimates for new measures
- Providing technical support to:
  - Evaluation staff
  - Account managers
  - Program developers
  - Program managers
- Reviewing program marketing materials for technical accuracy



What's the deal with this new widget?



What are the energy-saving mechanisms behind smart thermostats?

Smart thermostats: methods of saving energy

Research

- “Away” settings
- Behavioral notifications
- Geofencing
- Learning algorithms
- Local weather data
- Motion-sensing

Learn more about how various products aim to save energy in **Smart Thermostats Rising**

Smart Home Resource Center

Demand-Side Management Programs and Strategy

- DSM Programs and the Smart Home: The Journey Beyond Smart Thermostats
- Combating Industry Disruption with Smart Home Technology

Energy and Demand Benefits

- Identifying Effective End Uses for Residential Demand Response
- Home Energy Management Is Coming: Are You Ready?

Non-Energy Benefits

- Generating Revenue from Home Energy Management

Vendors, Products, and Ecosystems

- Moving from Smart Widgets to True Home Energy Management: Teaming with Vendors to Take Advantage of Smart Home Interconnectivity
- Two Product Guides Help Bring Order to Smart Home Chaos

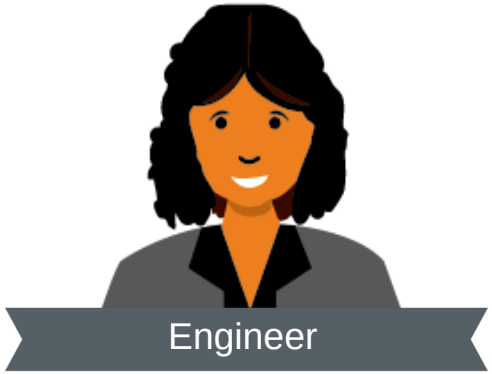
Customer Views and Opinions

- Rely on Data, Not Hunches, When Evaluating Customer Perceptions of the Smart Home
- Customer Insights Around the Connected Home: Results from the Residential Utility Customer Survey 2016
- Customer Perceptions: An Entry Point into the Smart Home
- Consider Marketing Home Energy Management Products to These Distinct Customer Groups

Other Research

- Customers Like Batteries, but They Don't Understand Them
- OK Google, How Much Energy Does Alexa Consume?
- Will Big Data Drive Proliferation of Smart Home Technology?
- Is Accuracy the Achilles Heel of Residential Disaggregation?

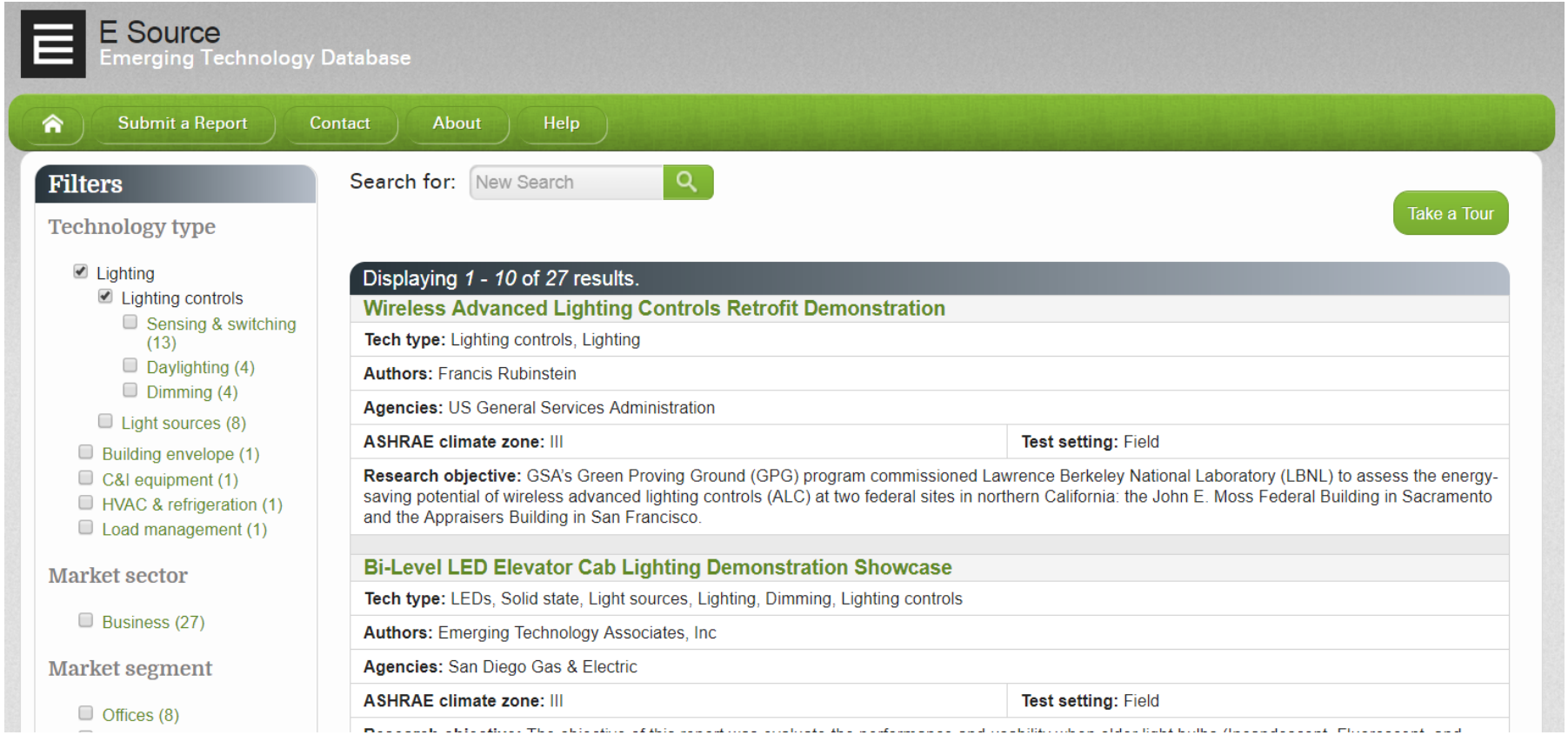
Verifying savings from new technologies



Has anyone done a field study to verify the savings claims for advanced lighting controls?

Emerging Technology Database

Tools

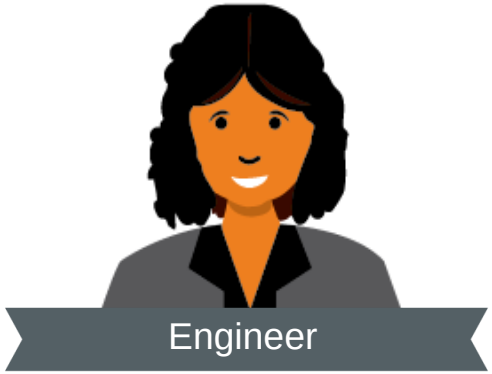


Advanced lighting controls

For networked lighting controls, the DesignLights Consortium offers a technical requirements, a qualified products list, and case studies.

Building type	Number of buildings	Savings (%)
Assembly	5	23
School	7	28
Manufacturing	28	30
Retail	29	44
Restaurant	2	47
Office	39	63
Warehouse	4	82
Overall	114	47

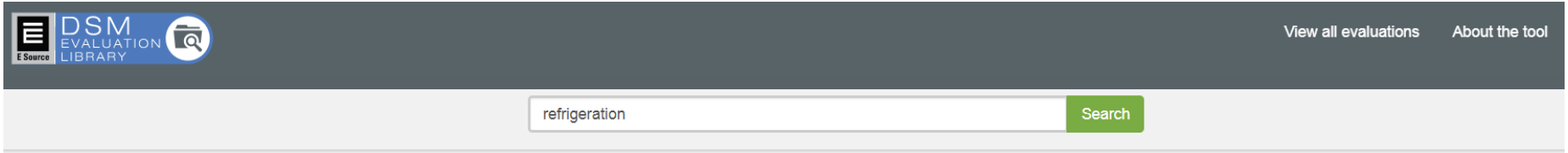
Comparing technical assumptions across evaluations



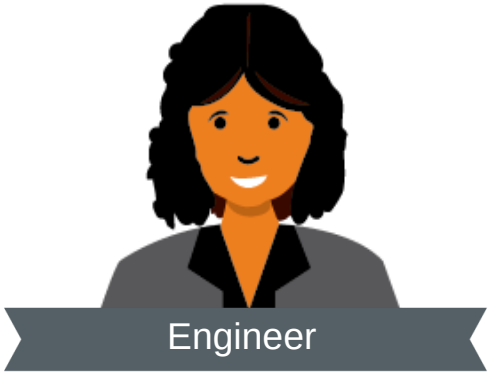
> Who else has done an impact evaluation on commercial and industrial refrigeration measures, and what technical assumptions did the evaluators make?

DSM Evaluation Library

Tools



Comparing assumptions across deemed savings



> How does our estimated savings value for smart thermostats compare to others' estimates?

Measure Insights: TRM values

Tools

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Jurisdiction	TRM Version	Technology Type	Value Type	Value	Unit Of Measure	Comparison Type	Source Link	Description	Attributes	Facility Type
CO	Xcel - CO - 2016	Smart Thermostat	Annual kWh Savings	11.00	kWh/Unit	Difference vs. Baseline	view source	Annual Customer kWh Savings	Static Program Resource Focus: Demand Response (DR)	Residential
				55.00	kWh/Unit	Difference vs. Baseline	view source	Annual Customer kWh Savings	Static Thermostat Pilot Design: Duty-Cycling	Commercial
									Static Thermostat Pilot Design: Pre-Cooling	Commercial
				197.00	kWh/Unit	Difference vs. Baseline	view source	Annual Customer kWh Savings	Static Program Resource Focus: Energy Efficiency	Residential
MA	MA - 2016-2018	Smart Thermostat	Annual kWh Savings	74.80	kWh/Unit	Difference vs. Baseline	view source	Savings for Wi-Fi Thermostats (Controlling AC Only), Listed by HVAC System Fuel Types		Residential
				104.00	kWh/Unit	Difference vs. Baseline	view source	Savings for Wi-Fi Thermostats, Listed by HVAC System Fuel Types		Residential
NY	NY - V4.0	Smart Thermostat	Annual kWh Savings	104.00	kWh/Unit	Difference vs. Baseline	view source	Annual electric energy savings per thermostat unit of 104 kWh.		Residential
							view source	Annual electric energy savings per thermostat unit of 104 kWh.		Commercial
										Industrial
RI	RI - 2016	Smart Thermostat	Annual kWh Savings	104.00	kWh/Unit	Difference vs. Baseline	view source			Residential
WI	Wisconsin 2015	Smart Thermostat	Annual kWh Savings	76.33	kWh/Unit	Difference vs. Baseline	view source	Annual Electric Savings for Smart Thermostat Installed in Home Heated by Natural Gas Furnace	Static Furnace Type: Gas Furnace	Residential
				430.87	kWh/Unit	Difference vs.	view source	Annual Electric Savings for Smart Thermostat Installed in Home Heated by an Air Source Heat	Static Heat Pump Type: Air Source Heat Pump	Residential

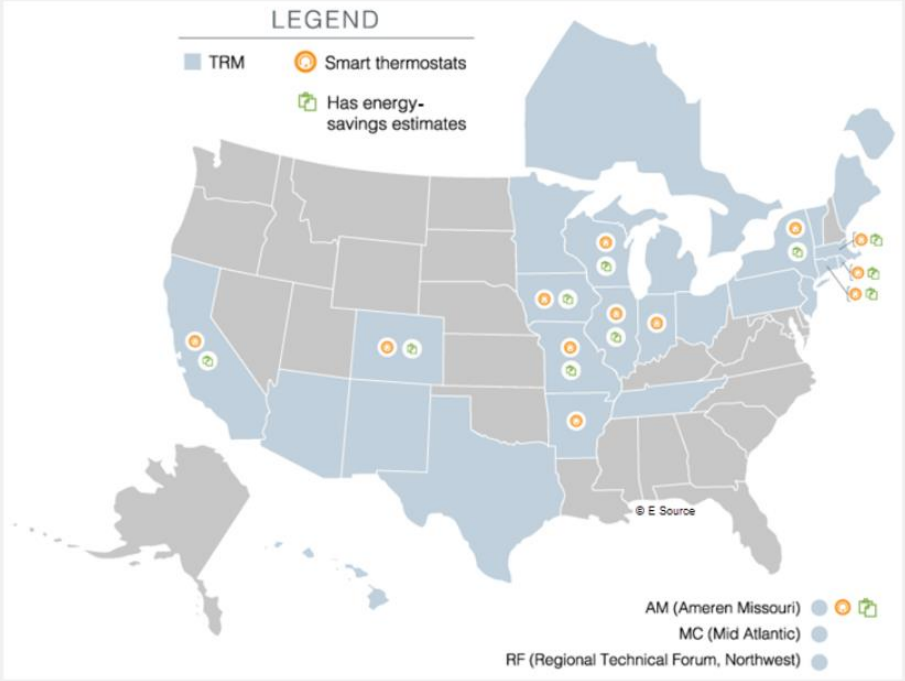
Smart Thermostat Energy Savings Vary Among TRMs

A Snapshot of Assumptions

Research

Figure 1: Nationwide TRMs reference smart thermostats

References to smart thermostats in technical reference manuals (TRMs) span all sectors, climates, heating and cooling equipment, and fuel types. We identified at least 10 different energy-savings units in these TRMs and four or more ways of specifying the energy savings (fuel type, equipment type, seasonal savings, generalized estimates, and others).



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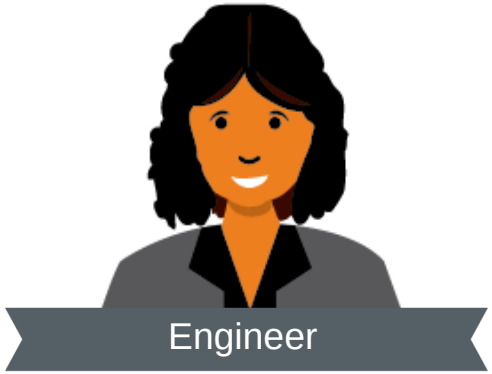
Efficiency measures for key customers



I'm helping a new account manager get up to speed on measures appropriate for data centers. Do you have a list of applicable measures?

Menu of upgraded project options for small or embedded data centers

Research

Measure category	Specific measures	Level of effort	Measure description	Measure savings	Measure cost	Non-energy benefits	Leading vendors	Target customers
Power management	Personal computer (PC) power management	Low	IT administrator centrally manages power settings on employees' PCs, ensuring they're never left on when not in use.	About 10 percent of building energy use; approximately 100 watts per PC	$5 per PC	Extended computer equipment life	PowerSave, Faronics, Verismic	Business customers having both personal computers and centralized IT administration
	Server power management	Medium	Server power dynamically managed, either to limit total server peak demand or to distribute load and limit the number of servers idling or computing far below capacity. Can be implemented as a stand-alone measure or in conjunction with server virtualization (see "Server consolidation.")	Requires custom calculations	$200–$400 per server	Extended computer equipment life	Raritan, SuperMicro, Sentry	Business customers operating servers in-house
	Data center infrastructure management	High	At the facilities level, tracking and minimizing power utilization effectiveness or data center infrastructure management to improve efficiencies and lower operating costs.	Requires custom calculations	Zero or negative cost	Extended computer equipment life	Raritan, Sunbird, Schneider Electric	Business customers operating midsize data centers on-site
Server consolidation	Server virtualization	Low	Use virtualization software and specialized server-management techniques to run multiple servers virtually on a single machine.	Requires custom calculations	Negative capital costs, up to $700 per server	Reduced capital requirements	Microsoft, VMWare, RackSpace	Small business customers operating multiple servers below rated computing capacities
	Server room aggregation	Medium	Closing smaller, less-optimized server rooms or closets and moving their computing requirements and/or physical servers to a centrally managed data center.	Requires custom calculations	Highly variable	Improved security; frees up building space	NA	Business customers operating a campus or office park where multiple server rooms are scattered throughout
	Cloud service migration	High	Migrating on-site server computing functionality over to cloud-based (i.e., off-site) services.	Requires custom calculations	$50–$500 per server per month	Improved security, reliability, and accessibility; frees up building space	Azure, Rackspace, Amazon	Business customers operating multiple in-house servers without legitimate business rational to manage them on-site
Power supply upgrades	Right-sized power supplies	Low	Addressing overprovisioning problems for power supplies. In many cases, power supplies are rated for much higher power draw than what is actually observed in operation. This measure involves specifying smaller power supplies that operate more efficiently.	About 4 percent of server energy use; approximately 16-plus watts per server	Zero or negative cost	Lower capital costs	Intel, HP, Dell	Business customers operating in-house servers
	Direct-current (DC) power supplies	Medium	Supplying servers with either high- or low-voltage DC, thereby reducing power-conversion losses at the computing equipment.	Requires custom calculations	Zero or negative cost	Frees up space in the data center; uses less materials (e.g., copper)	Validus DC Systems, IBM, HP	Business customers operating midsize data centers
	Next-generation rotary uninterruptible power supply (UPS)	High	The most common UPS technology used in data centers is static and typically utilizes battery energy storage. A rotary UPS, by contrast, uses an engine or motor generator to deliver uninterrupted power. While older rotary UPS technologies tended to be less efficient than static systems, new rotary systems are more efficient and functional.	Requires custom calculations	Highly variable	Can provide reliable backup for both alternating-current (AC) and DC loads	e1 Dynamics, Hitachi	Business customers operating midsize or large data centers
Temperature and air management	Warmer temperature setpoints	Low	Raising the upper limit on allowable temperatures within the data center to reduce cooling requirements and the	Requires custom calculations	Zero or negative cost	Extended HVAC equipment life	NA (operational)	Business customers operating in-house servers

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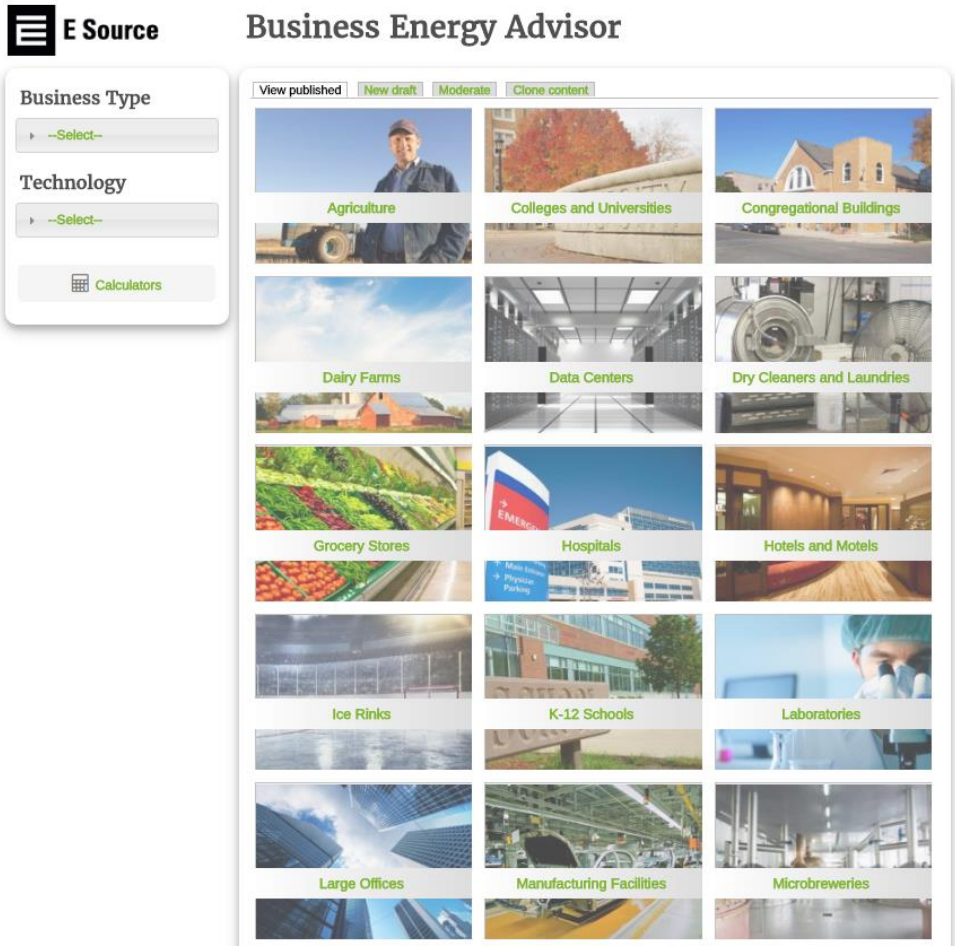

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Recent Ask E Source questions

Ask E Source

"What are the most important characteristics of Cx/RCx providers to ensure the greatest possible savings?

"What technologies, techniques & trainings should we suggest for ZNE home trade allies?

"Can you help me calculate the cost of leaving a TV on all day in terms of Starbucks lattes?

"What are typical savings from energy management and information systems with automated fault detection and diagnostics?

"Who are the vendors in the smart home space, and what are their offerings?

E Source offerings for engineers

- E Source memberships:
  - Technology Assessment Service
  - Demand-Side Management Service
  - Account Management Service
  - Business Energy Advisor
  - Energy Utility Innovation Partnership
- Tools:
  - Measure Insights
- Consulting:
  - In-depth technology, measure or research and development roadmapping
  - In-depth measure analysis and benchmarking
  - Demand-side management (DSM) portfolio optimization
  - DSM and carbon potential study
  - Journey mapping of emerging technologies
  - Energy-efficiency predictor
  - Account management training

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+

Next steps


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