

BARRIERS AND SOLUTIONS TO CORPORATE ENERGY EFFICIENCY

Energy efficiency is often the least expensive way for businesses to reduce GHG emissions and also comes with added benefits of reduced operational costs and risks. Yet, there remains a gap between the available energy efficiency measures and those actually undertaken by companies. The following chart is a compilation of the most common barriers companies face in developing and implementing energy efficiency strategies as well as some of the tools that can help overcome these barriers. Many of the barriers were identified in the Pew Center’s report, “[From Shop Floor to Top Floor: Best Business Practices in Energy Efficiency](#),” a comprehensive study of corporate initiatives to reduce energy use. This chart examines both private and public solutions to the barriers, which are organized under separate categories for internal operations, supply chain, and products and services. “Private solutions” entail internal and external measures companies can take to overcome a barrier. “Internal actions” refer to measures companies can take independently, whereas “external measures” describe various partnerships or other programs companies can participate in that rely on collaboration with another private or non-governmental entity. Under “public solutions,” “public resources” consist of informational guidance provided by federal and state governments, whereas “public policies” refer to regulatory programs and grants, loans, and other financial incentives offered by federal and state agencies.

INTERNAL OPERATIONS EFFICIENCY				
Barrier	Private Solutions		Public Solutions	
	Internal Actions	External Actions	Public Resources	Public Policies
<p>Lack of project funding Companies have limited funds for energy efficiency as projects compete for capital with other corporate priorities.</p>	<ul style="list-style-type: none"> -Set aggressive energy efficiency goals in order to obtain commitment of capital for energy efficiency projects. -Set aside capital specifically for energy efficiency projects. -Set specific spending goals for energy efficiency projects (e.g. UTC set a goal to spend \$100 million on energy efficiency projects). -Establish sustainable screens (e.g. PepsiCo’s screens capital investment projects above \$5 million for sustainability attributes). 	<ul style="list-style-type: none"> -On-bill financing - utility finances a customer’s energy efficiency improvements and is repaid through a surcharge on the customer’s utility bill or direct loan payments, with energy savings to offset the loan payments. -Performance contracting - a third party invests capital in the customer’s facility and executes an energy services agreement in which the energy savings are guaranteed to meet or exceed financing payments. -Low-interest loans - utility or third-party lending partner offers loans for efficiency improvements at interest rates lower than available in the market and 	<ul style="list-style-type: none"> -DSIRE web site provides a list of state incentives for renewable and efficiency initiatives. 	<ul style="list-style-type: none"> -Price on carbon (through tax or cap and trade), levelizes the non carbon investment options making energy efficiency investments more cost competitive. -Incentives provided through a cap and trade program where allowances are set aside to fund energy efficiency projects. -Tax incentives from the federal government such as a deduction of up to \$1.80 per square foot available for commercial buildings that save at least 50% heating and cooling energy; business energy investment tax credit for installing energy efficient/renewable power systems; manufacturing tax credit for qualified investments in advanced energy projects to support new, expanded, or re-equipped domestic manufacturing facilities. States also have incentives such as Kentucky which offers a 30% state income tax credit for installing certain energy

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		<p>loan is repaid mainly through energy savings.</p> <p>-Third party ownership structures -third party installs, owns, and maintains equipment and property owner agrees to purchase power, energy savings, and/or environmental attributes produced for a fixed price and term.</p>		<p>efficiency measures on commercial property.</p> <p>-Loan guarantees such as from the Department of Energy (DOE) for energy efficiency projects; Department of Agriculture’s Rural Energy for America Program (REAP) to agricultural producers and rural small businesses for energy efficiency improvements and renewable energy systems.</p> <p>-Grants such as from REAP awarded to agricultural producers and rural small businesses for energy efficiency improvements, renewable energy systems, energy audits, and renewable energy development assistance; some states (such as California, Maine and Wisconsin) also make DOE’s State Energy Program funding available to commercial entities for energy efficiency measures; states also have loan programs such as Nebraska’s Dollar and Energy Savings which offers low interest loans for residential and commercial energy efficiency improvements.</p> <p>-Property-Assessed Clean Energy (PACE) tax lien based financing programs established by local governments that allow property owners to borrow money to pay for energy improvements and repay the</p>

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				<p>loan through a special assessment on the property over a period of years.</p> <p>-Rebates programs - Proposed programs such as Building Star would offer rebates to building owners for energy saving measures.</p>
<p>Short payback requirements Companies expect fast payback on energy efficiency investments, which disqualify some projects that have positive returns. Additionally, there may be less incentive to invest if the owner plans to leave before the payback period ends.</p>	<p>-Holistic assessment of net payback:</p> <ul style="list-style-type: none"> • Building in assumptions for future energy price increases, supply shocks, and/or future price on carbon. • Identifying co-benefits (increasing productivity, improving product quality, company reputation) to make a financial case that goes beyond the simple pay back. <p>-Bundling multiple energy efficiency projects into one larger budget item.</p>		<p>-DOE's Net-Zero Energy Commercial Building Initiative (CBI) has formed sector specific alliances that identify opportunities for energy efficiency related to sector-specific processes and equipment, and collect accurate data on energy consumption and energy savings. Companies working with the alliances can procure high-efficiency building equipment through combined purchases.</p>	<p>-Price on carbon (through tax or cap and trade), levelizes the non carbon investment options making energy efficiency investments more cost competitive.</p> <p>-Tax incentives (see above)</p> <p>-Loan guarantees (see above)</p> <p>-Grants (see above)</p> <p>-PACE tax lien based financing programs established by local governments that allow property owners to borrow money to pay for energy improvements and repay the loan through a special assessment on the property over a period of years.</p> <p>-State EERS (Energy Efficiency Resource Standards), which require electricity providers (and/or other program administrators) to reduce energy use by a specified and increasing percentage or amount each year, motivating utilities to provide financial incentives for customers.</p>

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				-Rebate programs (see above)
<p>Principal-agent problem/split-incentives Business units that make decisions that affect energy use (such as equipment procurement department) are not the same as the ones that pay the energy bills.</p>	<p>-Establish a program that brings all the “agents” together under the common purpose of energy efficiency performance and connects the procurement policies with billing system with operational and investment decisions.</p>			
<p>Lack of staff time/expertise to develop projects Companies are unable to spare staff time and/or do not have staff with the appropriate technical skills to implement energy efficiency projects.</p>	<p>-Establish internal training programs (e.g. PepsiCo’s Sustainability Summit for employees included workshops on energy efficiency).</p> <p>-Implement standardized energy efficiency initiatives (e.g. UTC’s Energy Management Guidebook provides a detailed “how to” guide.)</p> <p>-Support education/training of staff through tuition reimbursement and paid time-off.</p>	<p>-Electric utilities conduct a variety of industrial energy efficiency programs that offer technical assistance to customers.</p> <p>-Environmental Defense Fund’s (EDF) Climate Corps program assigns MBA students to companies to help them identify and analyze energy saving opportunities.</p> <p>-International Organization for Standardization’s ISO 50001 standard will provide technical and management strategies to increase energy efficiency.</p>	<p>-DOE’s Industrial Technologies Program (ITP) has established Industrial Assessment Centers (IACs), which conduct energy audits and make energy efficiency recommendations at manufacturing facilities.</p> <p>-DOE’s ITP partners with utilities to promote efficiency to utilities’ customers.</p> <p>-DOE’s Save Energy Now program provides technical and financial help to small, medium and large companies which includes onsite assessments, recommendations on technologies and strategies, energy management training for facilities, software tools and webinars.</p> <p>-DOE’s Net-Zero Energy Commercial Buildings Initiative (CBI) has formed sector specific alliances that identify opportunities for energy efficiency related to sector-specific processes and equipment, and collect accurate data on energy consumption and</p>	

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			<p>energy savings.</p> <p>-Environmental Protection Agency's (EPA) E3 program,¹ which provides manufacturers technical assessments, aims to among other things train incumbent workers in a variety of 'green' skills.</p> <p>-Department of Commerce's National Institute of Standards and Technology's Manufacturing Extension Partnership (MEP) program helps manufacturers identify technology and strategies to increase energy efficiency.</p>	
<p>Lack of knowledge of energy saving opportunities Companies may not have the time and/or expertise to identify energy saving opportunities in their operations; energy efficiency initiatives may be concentrated in one business unit and not shared company-wide.</p>	<p>-Develop an energy efficiency solutions database that is available company-wide.</p> <p>-Execute pilot energy efficiency projects and use their success to convince others to implement the measures.</p>	<p>-Various non-profit, academic and industry organizations provide guidance on energy efficiency (see Pew's energy efficiency portal for examples and more information.)</p> <p>-Electric utilities conduct a variety of industrial energy efficiency programs that offer technical assistance to customers.</p>	<p>-DOE's Industrial Technologies Program has established Industrial Assessment Centers (IACs), which conduct energy audits and make energy efficiency recommendations for manufacturing facilities.</p> <p>-Save Energy Now provides technical and financial help to small, medium and large companies which includes onsite assessments, recommendations on technologies and strategies, energy management training for facilities, software tools and web seminars.</p> <p>-DOE's Net-Zero Energy Commercial Building Initiative (CBI) has formed sector specific alliances that identify</p>	

¹ E3 (Economy, Energy and Environment) operates under EPA's Green Supplier Network.

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			<p>opportunities for energy efficiency related to sector-specific processes and equipment.</p> <p>- EPA's voluntary Combined Heat and Power partnership program provides technical and financial help to companies that perform an internal assessment to determine viability of a cogeneration system.</p> <p>-EPA's Building Performance with Energy Star program partners with utilities to help companies identify and prioritize energy-efficient opportunities.</p> <p>-The Department of Commerce's National Institute of Standards and Technology's Manufacturing Extension Partnership (MEP) program helps manufacturers identify technology and strategies to increase energy efficiency.</p> <p>-EPA's Energy Star for Industry helps companies assess areas for improving energy management in plants or facilities.</p> <p>-DOE's ITP partners with utilities to promote efficiency to utilities' customers.</p>	
<p>Availability of technology New energy efficient technologies may be unavailable or in research and</p>			<p>- Advanced Research Projects Agency-Energy (ARPA-E), under the DOE, aims to identify high risk, high payoff concepts and technologies</p>	<p>- Price on carbon (through tax or cap and trade), adds cost to fossil-based energy, creating demand for energy efficiency technologies and products.</p>

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<p>development phase; shortage of supply of existing technologies.</p>			<p>that among other things increase energy efficiency.</p> <ul style="list-style-type: none"> - DOE's Industrial Technologies Program (ITP) conducts R&D to improve efficiency of technologies that are common to many industrial processes and can benefit multiple industries. - DOE's Energy Innovation Hub on energy efficient buildings focuses on commercializing innovative energy efficient building systems technologies. 	
<p>Difficult to measure Measuring avoided energy consumption is inherently difficult, making identification, evaluation and verification of energy savings challenging. Measurement is also complex since energy involves all aspects of a company's operations playing both direct and indirect roles.</p>	<ul style="list-style-type: none"> -Collect detailed data for only the most energy-intensive facilities to make data collection more manageable and useful (e.g. only 24 of IBM's 1,100 facilities have detailed monitoring and control systems) -Create standardized formats, convert energy consumption to common units to allow for a consistent way of calculating energy impacts across all types of operations (e.g. Dow converted its various energy commodities to standard set of BTU equivalents). 	<ul style="list-style-type: none"> - Deutsche Bank Americas Foundation is financing a public database of several hundred retrofitted buildings in New York City and a companion report to determine the savings from such initiatives. - International Organization for Standardization's ISO 50001 standard will provide guidance on benchmarking, measuring, documenting, and reporting energy intensity improvements. 	<ul style="list-style-type: none"> -DOE's Save Energy Now program provides software tools to help small, medium and large companies conduct better energy assessments. -DOE's Net-Zero Energy Commercial Building Initiative (CBI) has formed sector specific alliances that identify opportunities for energy efficiency related to sector-specific processes and equipment, and collect accurate data on energy consumption and energy savings. -Environmental Protection Agency's (EPA) E3 program provides manufacturers technical assessments of production processes which include energy audits. -EPA's Portfolio Manager helps 	

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			track, manage and rate building energy performance. - The Superior Energy Performance² Measurement and Verification (M&V) Protocol is a methodology to verify results and impact from implementing the energy management standard and includes quantifying energy savings. On the international level, the public-private partnership, Global Superior Energy Performance aims to facilitate knowledge sharing on energy saving measures.	
Failure to get company-wide buy in Energy efficiency not established as a priority throughout the company and seen as the responsibility of only a few business units or individuals resulting in uneven implementation.	<ul style="list-style-type: none"> -Implement company-wide mandatory reporting on energy efficiency performance and a system that makes it easy to hold individual business units accountable. -Cross-functional energy teams with representatives from all functional units – from engineering to procurement to help facilitate cooperation on energy efficiency measures. -Establish clear accountability for energy efficiency at every level; tie energy efficiency into individual performance reviews. 	<ul style="list-style-type: none"> -Pew Center on Global Climate Change’s Make an Impact Program partners with businesses to provide employees with tools and resources to reduce their energy use and greenhouse gas footprint. 	<ul style="list-style-type: none"> -EPA’s Energy Star for Industry helps companies assemble an energy organization. -Recognition as a Save Energy Now Leader program commits companies to reducing energy intensity. -The Superior Energy Performance accreditation (a market-based, ANSI³-accredited plant certification program) requires conformance to energy management standard (ISO 50001) and has tiered certifications based on energy performance, encouraging company-wide implementation. The public-private partnership, Global Superior Energy 	

² A market-based, American National Standards Institute-accredited plant certification program.

³ American National Standards Institute

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	<ul style="list-style-type: none"> -Encourage employees to continually incorporate energy efficient thinking and actions in their work. -Execute pilot energy efficiency projects and use their successes to convince others to implement the measures. 		<p>Performance, is a similar accreditation process being established at the international level.</p>	
<p>Lack of senior management response and commitment Corporate level and/or senior management does not see energy efficiency as a priority and/or their responsibility.</p>	<ul style="list-style-type: none"> -Establish multi-level energy teams that include senior staff with corporate level access. -Make performance data visible to senior management to clearly show progress (i.e. energy use dashboards). -Establish clear accountability for energy efficiency at every level; tie energy efficiency into individual performance reviews. 		<ul style="list-style-type: none"> -Partnerships with EPA’s Energy Star and DOE’s Save Energy Now Leader; obtaining Superior Energy Performance, Global Energy Performance accreditation. - Energy Star for Industry provides guidelines on how organizations can commit to improving energy performance. 	<ul style="list-style-type: none"> - Price on carbon (through tax or cap and trade), increases the returns on energy efficiency projects, potentially drawing increased senior management attention.
<p>Energy efficiency is not an intrinsic value within the corporate culture Energy efficiency improvements and innovations are not continually included company operations.</p>	<ul style="list-style-type: none"> -Set aggressive goals, even if unclear how they will be achieved to help encourage innovative, “out of the box” thinking. -Promote the good citizenship values associated with being energy efficient. -Implement change management processes that ensure that new energy efficient practices become a part of company culture. 		<ul style="list-style-type: none"> - Energy Star for Industry helps companies develop and improve their energy management program. -The Superior Energy Performance program provides companies with a framework for implementing an energy management system (standard) and validating energy intensity reductions. (U.S. Council for Energy-Efficient Manufacturing (U.S. CEEM)). (Similar assistance will be provided through international public-private partnership Global Energy Performance program) 	

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	<ul style="list-style-type: none"> -Give formal awards for energy efficiency initiatives. -Hold internal peer competitions/reviews on energy efficiency performance. -Ensure that energy performance data is widely shared internally and externally. -Continually raise energy efficiency targets. -Communicate energy efficiency commitment and progress externally in a visible manner. 			

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SUPPLY CHAIN ENERGY EFFICIENCY				
Barriers	Private solutions		Public Solutions	
	Internal Actions	External Actions	Public Resources	Public Policy
<p>Collection and management of supply chain data Difficulty obtaining data from suppliers, who may not want to measure, gather and share data due to high costs, privacy issues and/or complexity of energy data collection. Companies may find measuring their supply chain footprint a daunting task due to the size, number and/or variety of their suppliers.</p>	<p>-Consider supplier-to-customer reporting in which suppliers incorporate the emissions of their suppliers, so a company's direct suppliers' energy usage represents the total usage across the company's entire supply chain and does not require companies to gather data from tertiary suppliers.</p> <p>-Aggregate and/or mask supplier data to address privacy issues.</p> <p>-Develop a secure online reporting format with simplified inputs and reporting dashboards.</p>	<p>-Various trade associations are developing industry-wide reporting systems such as Electronic Industry Code of Conduct (EICC) and Electric Utility Industry Sustainable Supply Chain Alliance (EUSSCA).</p> <p>-World Resource Institute (WRI) and World Business Council for Sustainable Development (WBCSD) are developing Scope 3 protocol for emissions associated with full life cycle of products and corporate value chains.</p> <p>- EICC supplier reporting system makes it easier for electronic industry suppliers to disclose their carbon emissions using one common template.</p>		
<p>Lack of knowledge of energy saving opportunities Lack of commitment from suppliers due to lack of awareness of the cost reductions from energy efficiency measures and other co-benefits.</p>	<p>-Clear communications from suppliers on benefits.</p>		<p>-Encourage suppliers to leverage government program partnerships such as Save Energy Now and Industrial Assessment Centers.</p>	
<p>Lack of supplier knowledge/expertise on energy efficiency</p>	<p>-Provide suppliers with technical assistance in the form of</p>		<p>Green Suppliers Network⁴ works with large</p>	

⁴ The **Green Suppliers Network** is a collaborative venture among industry, the EPA, and the Department of Commerce's National Institute of Standards and Technology's Manufacturing Extension Partnership (NIST MEP).

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SUPPLY CHAIN ENERGY EFFICIENCY				
Barriers	Private solutions		Public Solutions	
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<p>Suppliers may not have the expertise to identify and implement energy efficiency measures.</p>	<p>documentation, webinars, facility visits.</p>		<p>manufacturers to engage their small and medium-sized suppliers in low-cost technical reviews that focus on process improvement and waste minimization.</p>	
<p>Lack of adequate monitoring and verification of supplier energy efficiency policies/goals Ensuring energy efficiency measures are implemented and monitoring energy performance is difficult since companies do not have direct control over suppliers.</p>	<ul style="list-style-type: none"> -Publicly report on suppliers' energy efficiency measures (e.g. PepsiCo's Outreach Implementation Scorecard reports how many of its suppliers have joined third-party energy efficiency programs such as Energy Star). -Make implementation of energy efficiency measures a contractual requirement with suppliers. -Develop a rating system on how suppliers are performing on energy efficiency. 			<p>Mandatory Greenhouse Gas Reporting Rule: Large sources are required to report greenhouse gas (GHG) emissions to the EPA.</p>

BARRIERS AND SOLUTIONS TO CORPORATE ENERGY EFFICIENCY

PRODUCTS AND SERVICES				
Barriers	Private solutions		Public Solutions	
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<p>Lack of information on products Information on the cost benefit and energy savings of energy efficient products is not available to customers.</p>	<ul style="list-style-type: none"> -Provide easy access to energy efficiency information on products. -Provide comparative information on the cost-benefits of using less efficient products. -For retailers, train sales staff on energy efficiency of products. -Give better shelf space for more efficient products (e.g. Wal-Mart and Best Buy have designated areas in stores for energy efficiency products). 	<ul style="list-style-type: none"> -Some utilities provide customers with bill-related signals that indicate consumption levels and in-home displays which provide real-time information on home energy consumption. -Integrating Smart Grid features into products, showing real-time energy usage of appliances (e.g. Whirlpool manufacturing appliances that can interact with the smart grid). 	<ul style="list-style-type: none"> - Energy Star labeling for products. - Additional public education programs like the Energy Star web site. 	<ul style="list-style-type: none"> - Mandatory disclosure, such as CAFE stickers on cars, Energy Guides on appliances. - Standards, which effectively make lack of information irrelevant.
<p>Higher initial costs/customer willingness-to-pay Difficult to convince consumers to pay higher upfront costs in exchange for future paybacks.</p>		<ul style="list-style-type: none"> -Some utilities offer rebates for energy efficiency measures. 	<ul style="list-style-type: none"> -Federal appliance tax credits for manufacturers of high-efficiency residential clothes washers, refrigerators, and dishwashers. -Federal procurement - agencies must purchase Energy Star and Federal Energy Management Program-designated products and incorporate energy-efficient specifications in procurement bids. This creates a market for energy efficient goods, helping to drive down their costs over time. -Tax credits for energy-efficient home improvements. -Tax credits for builders of all new energy-efficient homes. 	<ul style="list-style-type: none"> -Price on carbon - increases energy prices, creating an added benefit for purchasing energy efficiency products. -Energy Efficiency Resource Standards (EERS), which require electricity providers (and/or other program administrators) to reduce energy use by a specified and increasing percentage or amount each year, have been implemented in some states. Thereby putting indirect pressure on utilities to further promote sales of EE products. -Efficiency standards remove willingness to pay as an issue as customers are required to purchase only efficient products.

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PRODUCTS AND SERVICES				
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			- Rebate program (home appliances, cash for clunkers, etc).	
Engineering barriers Companies can run up against technical limitations when trying to design more energy efficiency products.			-Direct government funding for new energy efficient technologies, such as through ARPA-E , or DOE's Energy Innovation Hubs . -Tax credits for research and development.	-Price on carbon - long-term price signal on carbon drives capital toward developing more energy efficient goods and services.
Regulatory barriers Utilities have little incentive to encourage energy efficiency among their customers when their revenues are based on the number of energy units sold.			-Federal business energy investment tax credit for installation of energy efficient/renewable energy systems to utilities.	- EERS , which require electricity providers (and/or other program administrators) to reduce energy use by a specified and increasing percentage or amount each year, have been implemented in some states. - Decoupling utility revenues from sales has been implemented in some states, allowing utilities to engage in energy conservation/efficiency measures instead of trying to sell as much energy as possible.
Marketing difficulties Promoting energy efficient products/services when efficiency is not a priority factor in consumer buying decisions poses a marketing challenge.	-Set specific goals of selling a certain amount of energy efficient products (e.g. Wal-Mart goal to sell 100 million CFLs.) -Work with suppliers and get them to produce more efficient goods, e.g. Wal-Mart pledge to improve the energy efficiency of the most energy intensive products it sells by 25%. -Run campaigns specifically	-Industry and non-governmental collaborative campaigns (e.g. Climate Savers Computing Initiative , consortium of IT companies, utilities, NGOs, and other companies that promotes development and purchase of highly efficient computers).	- Rebate programs make energy efficiency products more cost effective; if consumers feel they can save money on efficient products, efficiency becomes a bigger priority. (Proposed programs such as Home Star would offer rebates for energy efficiency improvements to homeowners.) - Energy Star labeling clearly communicates energy efficiency as a product attribute.	- Tax credits (make energy efficiency products more cost effective; if consumers feel they can save money on efficient products efficiency becomes a bigger priority) -Cap and trade system gives energy efficiency a high priority. - EERS , which require electricity providers (and/or other program administrators) to reduce energy use by a specified and increasing percentage or amount each year, have been implemented in some

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	<p>promoting energy efficient products (e.g. Best Buy has set aside “green zones” in stores).</p> <p>-Offer energy efficient products with co-benefits (e.g. Best Buy aims to bundle a networked energy management system that shows home energy usage with home security/entertainment systems).</p> <p>-Consumer market research</p>			<p>states. Thereby putting indirect pressure on utilities to further promote sales of EE products.</p> <p>- Efficiency standards (removes willingness-to-pay issue as customers are required to purchase only efficient products)</p> <p>-Super-efficient Equipment and Appliance Deployment (SEAD), an international initiative in which partner governments will collaborate on efficiency policies, incentives and R&D to push inefficient products out and bring efficient ones into the market.</p>