Five Years and Beyond with Supply Chain Engagement: What's Next with Upstream and Midstream?

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ABSTRACT

With increasing frequency nationwide, upstream and midstream approaches are successfully driving rapid adoption of energy-efficient products. The approach includes establishing a clear value proposition for supply chain market actors, framed in business terms familiar to suppliers. This approach helps increase the supply chain's profitability through sales of superior products. In programs meeting these criteria, sales of efficient premium products have soared, increasing 1,000 percent on average across several supply chains. The approach offers increased program impacts and rapid market transformation. However, there are several models of midstream intervention; market maturity metrics typically influence the most appropriate intervention strategy.

This paper explores different ways to apply midstream equipment incentives, based on market maturity metrics that are tracked by the program. The paper shows how market intelligence at each level of the supply chain, from manufacturer to customer, helps identify and quantify the magnitude of market barriers to enable effective, dynamic targeting of program interventions. The paper discusses new models for supply channel engagement that combine different types of midstream interventions to accelerate market transformation.

Introduction

For the 2016 ACEEE Summer Study, VEIC and Energy Solutions offered two papers describing innovative approaches to driving adoption of energy-efficient products. One paper (Merson et al. 2016) detailed the SMIT model—a **s**ales, **m**arketing, **i**nventory, and **t**raining protocol for product distributors. The SMIT model applies a systems approach to engaging, understanding, and influencing the supply chain. The second paper (Kisch et al. 2016) described market development strategies, key performance indicators, metrics, and data for tracking the degree of market maturity for a given energy-saving technology. These papers catalyzed a collaboration between Energy Solutions and VEIC. The collaboration's purpose is to accelerate adoption of high-performing, energy-efficient products by appropriately establishing links throughout the supply chain, and intervening in their practices, on behalf of energy efficiency programs.

Successful such programs apply a systematic approach to understanding and engaging the supply chain, to automating resilient programs to make participation easy, and to accessing key data that highlight market trends and inform program refinements. These data points might involve stocking percentages, full-category sales information, product performance information, warranties, and incremental measure costs. Supply chain actors will not immediately share data without either a pre-existing, trusted relationship or the ability to invest time in establishing that trust. However, once in place, those relationships typically provide access to data such as full

category information. The relationships also offer opportunities for high-value program designs for planned equipment replacement (because those programs enable more data collection), but also for designs enabling emergency equipment replacements.

Understanding and Engaging the Supply Chain

It is important to understand and map the supply chain dynamic, including the relationship between manufacturers and, if applicable, relationships with their representatives. It is also important to understand alliances between manufacturers and manufacturer representatives and their respective distributor networks. Programs should fully understand the relationships that exist throughout the supply chain, existing stocking practices, and product releases planned for the coming 6 to 18 months. Understanding relationships in utility territories is key to facilitating a comprehensive, well-nuanced supply chain engagement plan. In addition to the ten core steps described in Merson et al. (2016), we offer now an eleventh: Having a single point of contact from the program to this part of the supply chain. It is a step that simplifies supply chain engagement with the program and helps inform a program's intervention strategy with the supply chain. Together, these steps have enhanced the value proposition to the supply chain, making it easier for supply chain actors to participate fully in the SMIT plan:

- **Sales.** The data can inform incremental measure costs, provide information about the levels of energy efficiency, and the necessary level of expertise to sell the product.
- **Marketing.** Everything from warranty information to pitching the type of replacement (planned or emergency) can be shared through a strong marketing effort, if an efficiency program has historical and forecasted product sales from market actors, with seasonal factors considered. Other useful data involve established sales and marketing strategies and collaborations with manufacturers, their representatives, and distributors. Staying on point while coordinating both sales and marketing is crucial.
- **Inventory.** Adequate inventory information (stocking percentages, for example) helps programs inform the supply channel about elevating inventory levels, given any new or redesign utility program protocols' forecasts of demand. This is especially the case if the program can inform supply channel plans for adding products to buyers' lists, and for calculating lead times for adding inventory. For example, heat pump manufacturing requires long lead times, because the sources (and the myriad elements for bringing them to market) are predominantly located in Pacific Rim countries.
- **Training.** The program can offer proactive product and program training, information on utilities, delivery (seasonal, project related), and other data necessary for laying the groundwork for achieving speed and scale on market transformation. Knowing a supply chain company's training practices and other protocols can help the program offer streamlined value to the company.

Challenges and Opportunities for Utility Programs

A comprehensive supply chain program accrues economic benefits to nearly all the supply chain market actors, from manufacturer to end customer. Program automation reduces turnaround times to two weeks or less, from the moment a supply chain actor submits the transaction to the moment of reimbursement. By contrast, the supply chain's average turnaround

time with their accounts receivable, or the length of time from the transaction to receiving payment, averages 50 to 55 days from their respective customer base including installers and contractors. The two-week turnaround is essential for the supply chain's performance metrics for increased cash flow, return on net assets (RONA), gross margins, gross profit, and net income. The gross profit incremental increases can range from 150 to 250 percent, per unit, by shifting from baseline to energy-efficient products.

Despite the opportunity to influence supply chain behavior, much of the lighting-related savings utilities have relied on are dimming down. This presents a unique opportunity—and if not acted on, a threat—for utilities. Programs must expand so that electrical distributors continue to see value in participating. There are three areas for development: (1) the role and business model of each supply chain actor, (2) the market and product factors relevant to the next generation of programs (including alternate incentive structures for different scenarios), and (3) examples of program interventions influencing sales and accelerated market transformation.

Creating a Value Proposition at Each Step of the Supply Chain

The supply chain provides R&D, financing, inventory, design and engineering, technical and product expertise and installation, all of which are necessary to deliver a product to customers. Efficiency programs are moving beyond widget-level efficiency, and customer buying decisions are increasingly driven by high-value non-energy benefits (NEBs). These might involve space and maintenance optimization that exceed the value of energy savings alone. A program too must provide a value proposition for each link in the supply chain to gain market actor participation and build on a decade of success. The services offered throughout any supply chain create opportunities for effective—and ineffective—program interventions across several market actors. Thus, a comprehensive supply chain strategy intervenes to (1) create a value proposition all along the supply chain; (2) tracks metrics on technical, market, and regulatory barriers; and (3) targets program resources and interventions to overcome adoption barriers.

Manufacturers

Manufacturers are interested in promoting new products or promoting market position for products that perform well. They also might have larger profit margins on newer models than for baseline equipment, to recoup R&D costs. Thus, a large-scale utility program—especially one guaranteed to last for a long time and / or one covering a large region—is sufficient motivation to participate. In most cases, manufacturers can be the greatest ally in launching a midstream program, because they can identify regional distributors, extend longer credit terms or waive re-stocking fees for distributors / wholesalers, and obtain sales and product data that help create a value proposition for other supply chain actors.

Manufacturers' Representatives

This link in the supply chain is typically a person, sales agency, or company that brings a manufacturer's products to wholesale and retail customers. The manufacturer hires the "rep" to act as an agent in selling, or soliciting sales for, its products in a targeted territory. In return, the rep receives a commission for products sold downstream in the supply chain. The rep is necessary to the supply chain—and can help speed delivery of an efficiency program—when:

- The manufacturer has no sales force.
- The manufacturer introduces a new product into the market.
- The manufacturer wants to enter a new market, and its own sales force is not equipped to make that happen.
- It is more cost-effective than using the manufacturer's staff, because the sales potential is not high enough to justify their use, or the manufacturer wants to limit the fixed-cost risk of an internal salesforce.

Distributors / Wholesalers

Distribution is a high transaction-oriented and cash flow-awareness business model. Distributors can elevate inventories when they expect increased demand from a program, and provide sales and marketing support, with product and program training to regional trade allies. Distributors also offer crucial lines of credit or beneficial financing terms to the trades.

Utility programs benefit wholesale distributors by moving customers from baseline products with lower gross profit dollars to energy-efficient products offering larger gross profit dollars (and in many cases, higher gross profit margins), increasing the volume and velocity of sales, reducing receivables turnover and other risks, and proving insights that can help improve the organizations market strategy and positioning. Typical interventions by the program are:

- Collecting and reporting data on distributors' performance relative to their competitors
- Working with manufacturers to extend credit terms or waive re-stocking fees
- Organize product and program trainings for trade allies
- Buying down the incremental measure cost of premium products
- Providing spiffs to support extended sales timelines and other sales risks

Contractors

Whereas distributors profit best on the volume and size of transactions, contractors profit from the amount of service they provide to a customer. To benefit trade allies, this means adding controls and a maintenance contract to an equipment replacement, and charging more for high-value knowledge and capabilities. Moreover, it follows that utility programs should create incentives and track metrics pertaining to the scope and quality of customer services.

Programs can assist participating contractors win more work by elevating and distinguishing their brands with customers. However, it is also critical that utilities require the correct licenses, insurance, and training and certifications. It is important too to remain product-neutral or service-neutral. Thus, typical program interventions are:

- Offering training to contractors (including in partnership with manufacturers, manufacturer representatives and distributors).
- Allowing contractors to display completed coursework and certifications on utility websites
- Providing performance-based incentives

Customers

The essential benefits to customers, who are at the end of the supply chain, are indoor comfort, and improvements in health and safety. All are products of the expert advice and high-quality installation, brokered by the program. These are lifetime benefits, offering tangible savings from the equipment. Market actors who deliver the equipment to the customer can use equipment packaging and other customer engagement literature to explain the equipment's lifetime benefits, and that the premium efficient equipment was made possible by a utility program (Figure 1). Future programs can then use the initial transaction to upsell maintenance services and energy-efficient products.

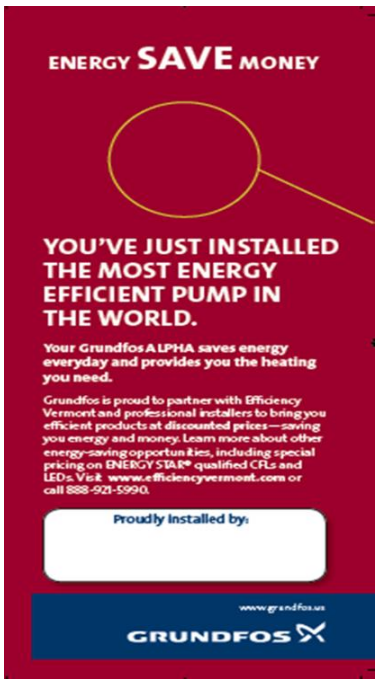

Figure 1. Examples of "leave-behinds" for customers, showing utility sponsorship and manufacturer / program value propositions. *Sources:* Efficiency Vermont and Grundfos.

Key Product and Market Factors

Programs are most effective when supply chain actors understand how energy efficiency programs can provide benefits to their businesses. Such benefits can be increased revenues and profits, or reduced risks. Generally, the higher the real or perceived risk to a market actor, the greater the incentive required to secure their participation in a program. Thus, it is critically important for regulators, and program planners and managers, to understand the type, cause, and ideal incentive structure to address each participation barrier. Kisch et al. (2016) discussed several barriers and indicators that should be tracked to motivate market actors to participate.

- **Downstream awareness and demand.** A new product's life cycle goes from R&D to decline in the marketplace (Figure 2). Sufficiently scaled products have "pull" in the market. Programs need to achieve scale and disseminate results to supply chain actors.

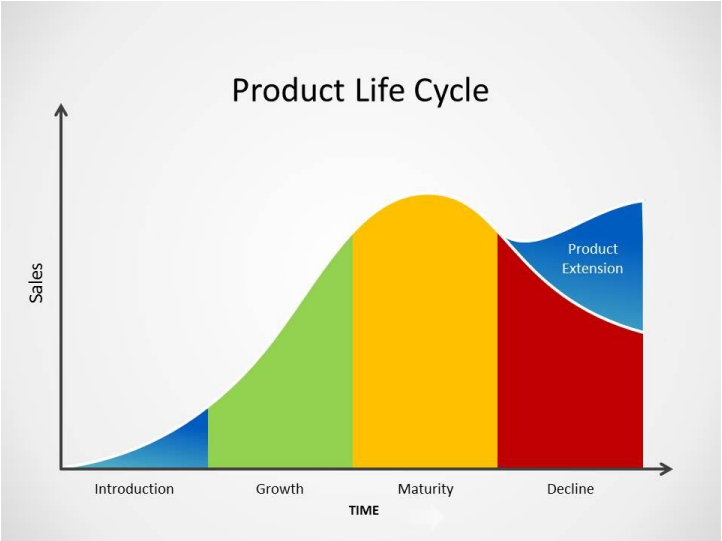

Figure 2. Typical product life cycle, showing effects of extending the product, if it has the potential to avoid a decline.

- **Incremental measure costs (IMC; products).** Early-stage technologies generally have higher premiums and margins because manufacturers need to recoup R&D investments, and distributors and installers need to account for more challenging sales and service projects. Thus, early-stage products require more supply chain engagement, and higher incentives to buy down IMC. As technologies go mainstream, market competition and large volume sales capacity lower margins. The correlation between stage of market adoption and market actor margin is strong. Thus, appropriate intervention strategies and incentive models are also correlated to the stage of adoption.
- **Expertise.** A standard lighting retrofit project does not require much subject matter expertise to make the sale. The project developer solicits bids from suppliers and the lowest bid generally wins. By contrast, a complex HVACR system requires a sales engineer's value-add design support to contractors—often well in advance of the sale—to sell the equipment. Complex sales take longer to close and usually demand higher-wage salespeople. Programs need to account for the level of expertise required to make a sale.
- **Risk.** Stockpiling inventory—that is, bearing the cost of a product's inability to reach either speed or scale—and compromising customer satisfaction on an unproven product are both risks that every supply chain actor wants to avoid. The higher a supply chain market actor's risk, the greater the needed incentive to overcome the barrier. Programs require a standard means of assessing and addressing risk throughout the supply chain.
- **Sales education and lead time.** When a program's upstream transactions involve more time and more technical and engineered system sales, the distributors or specifying engineers invest more effort into making the sale and thus will need more cost coverage to bring these products to market. Conversely, when installers and end users have already acquired sufficient product knowledge to make an informed purchasing decision, the program must ensure the equipment is in stock and competitively priced. An example of this is an emergency replacement where the customer is most concerned about having budget for an unplanned purchase and timing of replacement.

Optimal Program Interventions: Examples, and Opportunities for the Field

Future supply chain programs will need to offer dynamic incentive models, and maintain the simplicity that has led to their 20-year success. Market actors will require different incentives for addressing their various barriers. We describe a framework for replacing classical 100 percent downstream incentives with flexible ones that can be applied throughout the supply chain, from manufacturer to customer, depending on where it will have the greatest influence.

Point-of-sale pass-through incentive

The incentive's full value passes directly from the market actor to the end user. The closer a product is to being a *commodity,*[1] the more a market actor is driven by transaction volume, and not the margin per sale. Incentives are also effective for emergency replacements, where immediately available, competitively priced equipment is the primary driving factor.

Flexible incentive

Market actors maintain flexibility in determining how to apply the incentive. The flexible incentive is essential for equipment with long sales lead times and stocking risks. In some cases, stocking concerns have been addressed by manufacturers extending payables periods, eliminating restocking fees, and enabling distribution centers to replenish their shelves overnight. In such cases, inventory issues go away, because the distributor does not assume risks associated with the premium measure.

Administrative / Management transaction fees with point-of-sale pass-through incentive

The program mandates specific amounts for different market actors. When Efficiency Vermont introduced its heat pump water heater (HPWH) program in July 2014, it offered an aggressive, 100 percent pass-through incentive, and an aggressive, $100-per-unit administrative / management transaction fee to be retained fully by wholesale distributors (see Figure 3). Sales and installation data for HPWHs dramatically increased, relative to effects from the existing downstream incentive program. Ninety-five percent of sales are emergency replacements; thus, the program sought to provide trained wholesale distribution staff an upsell opportunity with more efficient inventory.

Manufacturer credit extensions

Manufacturers are naturally motivated to accelerate adoption of their new products. To overcome perceptions of risk with regional distributors and manufacturer reps, the Midstream Alliance has encouraged manufacturers to extend payment terms to distributors beyond the average of 30-35 days payable, and has sometimes provided the equipment on consignment until the distributor sells it. This reduces the distributor's perceived risk of not being able to sell the equipment, a far greater concern than the space needed by the new product in a warehouse.

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[1] For the sake of this paper, *commodity* refers to the level of stocking required, the level of effort required to make a sale, and the volume of transactions that can be achieved. These are key factors largely contribute to the financial opportunity and risk incurred by a market actor.

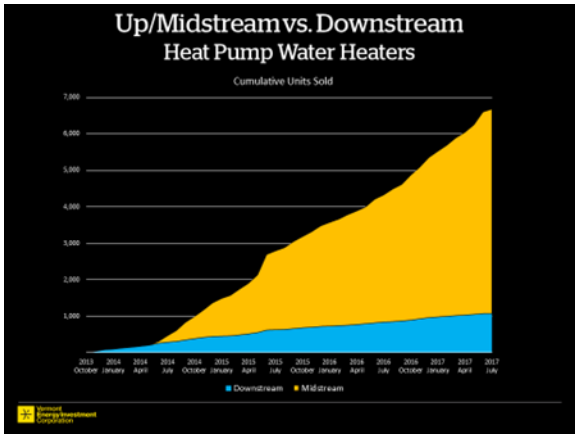

Figure 3. Success rate toward market transformation in HPWHs, from point-of-sale pass-through combined with administrative / management transaction fees.

Efficiency Vermont's High-Performance Circulator Pump (HPCP) Program offered a 100 percent pass-through incentive, with an administrative / management transaction fee ($3 per unit) to distributors. However, HPCP manufacturers extended the payables. Figure 4 shows the results.

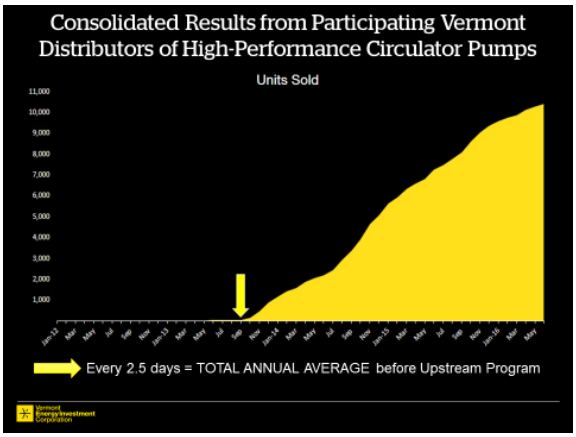

Figure 4. HPCP success rate; pass-through incentive, with an administrative / management transaction fee to distributors combined with HPCP manufacturers extending the payables for distributors.

Some manufacturers now target sales and marketing to areas with midstream programs. From an A.O. Smith promotion (see also Figure 5):

> **Pump up the Heat - Earn up to 10,000 Points!**
>
> From April 1 through June 30, 2018 you could earn up to 10,000 bonus points for buying State Heat Pump water heaters! Every five (5) State Heat Pump water heater codes entered in your Contractor Rewards account earns you 5,000 bonus points. Look for the yellow label and enter the codes online at www.ContractorRewards.com.
>
> Each year, thousands of people buy heat pump water heaters. ENERGY STAR reports that these high efficiency units can save a four-person household more than $3,000 over ten years when compared to electric water heaters. Other benefits include longer warranties and the ability to dehumidify…
>
> Build up the rewards you deserve today!

Cap of 10,000 points

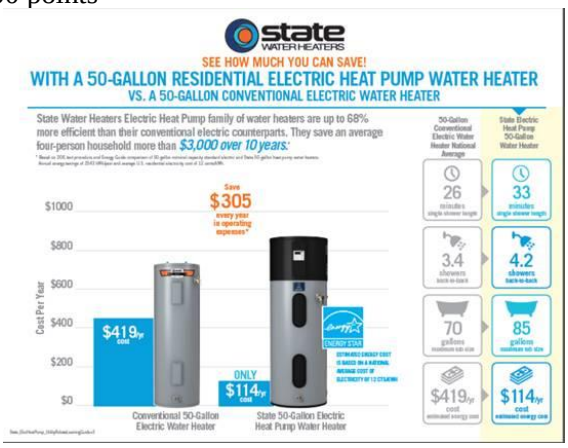

Figure 5. Sample of A. O. Smith promotional literature showing manufacturer incentives directed to a midstream program.

Performance-based Incentives

The success of the SMIT approach—combined with the strength of the systems interface—in achieving market transformation swiftly and massively can be seen in the following case studies.

Northwest Energy Efficiency Alliance: Heat Pump Water Heaters

This project was a risk for the Northwest Energy Efficiency Alliance (NEEA), which wanted to launch a work plan for heat pump water heaters in 2017. VEIC rolled out the SMIT process across four months. NEEA, familiar with energy-efficient equipment efficacy and efficiency program language, but unfamiliar with supply chain business models, was skeptical of its success. The VEIC team examined the market and the supply channel actors, built the platform, and strategized how best to optimize initiatives for NEEA's member utility programs.

Among the results in 2017:

- "2017 was a banner year," ending with 12,400+ HPWHs sold in the region from approximately 6,000 in 2016. For 2018, NEEA is targeting sales of 20,000 units.

Wholesale channel highlights from 2017:

- 11 data-sharing agreements signed with distributor companies
- 2,963 administrative payments ($40 each) made through distribution for qualified HPWHs, August - December 2017.
- 63 distributor branch presentations delivered to introduce Hot Water Solutions resources, using the VEIC SMIT process.
  Lesson learned: Build the supply channel platform fully, paying attention to every detail articulated by the supply chain actor, while meeting the efficiency program's objectives. Test it several different ways (try to break it). Then scale the model.

Efficiency Vermont – Refrigeration: Efficient Evaporator Fan Motor Initiative

Vermont's statewide energy efficiency utility designed an initiative for the refrigeration sector, Efficient Evaporator Fan Motor (EEFM) replacements in supermarkets and grocery stores, convenience stores, commercial kitchens, and the hospitality industry. The state has 16 distributors in 48 locations. The refrigeration subset accounts for 3 distributors in 14 locations.

Because of previous work with same supply channel actors in Vermont, the platform was already built. Thus, the lift in conducting the refrigeration SMIT process was minimal. Further, making additions to existing initiatives was relatively easy and straightforward.

With a launch in 2017, and with a new, emerging technology, the initiative supported 2,200 units installed in its first year. This rate far exceeded internal and external forecasts.

Lesson learned: Once the platform is built, keep it engaged so that future initiatives' costs can be optimized. Building a product and technology road map that contains feedback and engagement with the supply chain is all-important.

Xcel Energy Colorado – Commercial Midstream Cooling Program

Xcel Colorado's Midstream (Distributor) Cooling Program was launched on a tight timeline in 2015 and saw immediate enrollment, participation, and distributor engagement. Energy Solutions continues to refine it with Xcel, expanding opportunities for Colorado contractors. Incentives are for unitary air conditioners (no heat pumps), air and evaporatively cooled chillers, package terminal air conditioners and heat pumps, and water-source heat pumps.

The program launched with the same incentives and minimum efficiency requirements as Xcel's 2014 downstream program, and still managed to outperform it within six months of launch. Within the first nine months, the program enrolled 17 distributors. To date:

- 3,000 applications
- 9.4 MW and 10.1 GWh of potential energy savings submitted and approved

The program won the 2016 U.S. Department of Energy Better Buildings Alliance Rooftop Unit Campaign (ARC) Award for highest number of high-efficiency RTU installations through an efficiency program.

Lesson learned: Move quickly, and commit the utility to ongoing engagement.

Benefits from Laying the Groundwork for Relationships, Data, and Planning

End users realize lifetime energy and cost savings from energy efficiency. For utility program and end users, economic benefits go beyond product savings, offering clean-energy jobs from the value proposition and increased velocity of the value stream's economic benefits. With services and customer engagement marketing, upstream programs also increase customer engagement and satisfaction with utilities, substantially increasing ratepayer benefits.

Getting to Speed and Scale

The SMIT plan identifies critical market intelligence for identifying and quantifying the magnitude of market barriers to enabling effective targeting of program interventions. One

essential program intervention is a strong systems interface to help market actors upload rebate claim information quickly, and by continually fine-tuning the systems interface, new programs throughout the country can be launched quickly and with strong market actor engagement.

Embedding a program's SMIT process into its interface is one option of front-loading high effectiveness, because it easily captures relevant data from participating supply channel actors. Front-loaded SMIT unburdens supply channel actors from supplying superfluous responses to data collection. The supply chain is thus more likely to be fully engaged in their respective participation with an initiative. Less disruption with the supply chain's day-to-day responsibilities means more time can be spent upselling energy efficiency, given the increased value proposition that energy efficiency products deliver for the supply chain.

Opportunities for Expansion

There is no question that energy-efficient equipment and other measures have had a significant effect on how the United States uses energy (Nadel 2015). Energy intensity has decreased in the past 38 years, with lower energy use from appliances, more efficiency in new-home construction practice, energy improvement practices in industrial facilities, greater efficiency in passenger vehicles, and curbed electrical transmission and distribution losses.

Nevertheless, the market continues to hold high potential for even greater achievements in lowering energy use. Engaging upstream and midstream market actors offers opportunities for significantly expanding energy efficiency practice, thus accruing benefits for a wide range of populations. At a minimum, the following technologies are fertile ground for this expansion: heat pumps, heat pump water heaters and other heat pump-related technologies: variable refrigerant flow (VRF) and variable refrigerant volume (VRV), electronically commutated motors (ECMs) fans and pumps, compressors, refrigeration, food services, control-related technologies, smart thermostats, variable frequency drives (VFDs), metering, artificial intelligence, and demand response equipment. This list is not exhaustive, and new additions are frequent. Thus, establishing both product and technology roadmaps to navigate their effective deployment in the marketplace is essential.

The ENERGY STAR® Lamp Specification v2.0, and subsequent v2.1 LED standards, for example, have affected and will continue to affect lighting manufacturers and distributors. The passage in 2007 of the federal Energy Independence and Security Act launched a lengthy period (to 2020) of phasing in LED lamps and fixtures. The LED standards face marketplace challenges, which the industry is currently overcoming (Miziolek 2017).

Heat Pump-Related Technologies

This market has been burgeoning, and it appears to be neutral to the strength of local efficiency markets. That is, markets that have adopted energy-efficient equipment see heat pumps as forms of clean energy or beneficial electrification—particularly in regions whose electricity mix is dominated by renewable generation. In markets that are less attentive to the system benefits of energy efficiency, and which are still oriented around simply providing retail electricity, heat pumps are a product worth promoting. Electrical contractor costs constitute approximately 50 percent of a heat pump's installation cost.

Given the market dynamics, interesting the supply channel in expanding their heat pump sales has not been difficult. The market potential for high growth is still very strong, nationwide.

Controls for Whole-home and Whole-building Strategies

The lighting and electrical distribution supply chain is aggressive in the controls space, driven by the long-established industrial controls that for decades have been introduced and installed. It is also aggressive with lighting controls, which were an early entrant into the controls space. Both are good candidates for performance-based incentives. Electrical distributors have the supply chain relationships with their established global manufacturers that offer an array of products from lighting, demand response, VFDs, and variable speed drives (VSD), security, metering, and micro grids. There are many other technologies that require control expertise and access to the lighting and electrical distributors' expertise, inventory, and resources that understand their respective territories.

Opening the Non-traditional Sector Doors

What's the next strategy? Going deeper with the supply chain by establishing strategic partnerships within traditional vertical supply channel actors in HVAC, refrigeration, lighting, and food services. How? In this case, seeking sectors within the verticals, such as trade associations and related groups. Energy efficiency programs must also build credibility with utilities, and all of the upstream and midstream actors, from manufacturers to end-users. They must use existing and emerging relationships, and create new strategies and partnerships. These must be associated with related technologies and innovation. The next era of supply chain performance in the efficiency marketplace will be marked by how well efficiency programs engage supply chain actors in fulfilling the programs' increasingly complex—and climate-change-appropriate—customer and regulatory objectives.

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