



June 27, 2019

REPORT # E19-385

2019 Reduced Wattage Lamp Replacement Transition Progress Market Evaluation Report

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Executive Summary

At the end of 2018, the Northwest Energy Efficiency Alliance (NEEA) began to transition the Reduced Wattage Lamp Replacement (RWLR) initiative to long-term monitoring and tracking (LTMT). NEEA's decision to transition RWLR was based on a confluence of programmatic and market factors:

RWLR met its market transformational goals. Since launching in 2014, RWLR grew from 5 regional electrical distributors to 14, and saw their collective reduced wattage market penetration (RW MP) quadruple from 12% to 48%. In just five years, RWLR demonstrated the value of RW lamps (relative to their inefficient 32W counterparts) to supply and demand-side market actors alike and fundamentally changed the region's non-residential lighting maintenance market.

Annual double-digit declines in the linear fluorescent lamp (LFL) sales volume are shrinking the opportunity for savings. In 2014, NEEA estimated non-residential customers in the Northwest bought nearly 10 million LFLs. Due to rapidly growing interest in TLEDs and LED fixtures, NEEA estimates that LFL sales in the region are less than 6 million annually. According to interviewed lighting manufacturers, this precipitous decline in LFLs will continue.

A desire to leverage relationships built through RWLR to create a broader and more diverse midstream distributor platform. Given the mutual interest of NEEA and the distributors in exploring new opportunities, NEEA felt the timing was right to shift its resources away from the active delivery of RWLR and toward the realization of other midstream opportunities.

Cadeo's research for this Transition MPER, which consisted of two dozen interviews with RWLR stakeholders, a review of initiative materials, and a midstream literature review, confirmed the appropriateness of NEEA's decision to transition RWLR at this time. Our team also reviewed NEEA's data management plan for LTMT and found it well documented, realistic, and operationally sound. The plan specifies the roles, responsibilities, and associated timelines for collecting all the key data necessary to enable LTMT and assess the persistence of RWLR's impact on the regional LFL market. Our team recommends only modest changes to several assumptions.

Lastly, Cadeo also translated lessons learned from RWLR into specific actions that NEEA can take to increase the effectiveness of future midstream initiatives for distributors. These actions include:

- Identify staff with strong interpersonal skills to lead management teams
- Create a "menu" of incentive design options/participation paths
- Work with distributors to request special pricing agreements
- Encourage distributors' corporate management to engage with initiative
- Make full category sales data a requirement of initiative participation
- Set up targeted performance goals that are branch-specific and near-term
- Focus on transforming product stocking and order practices
- Proactively create a staffing contingency plan that includes back-up distributor contacts

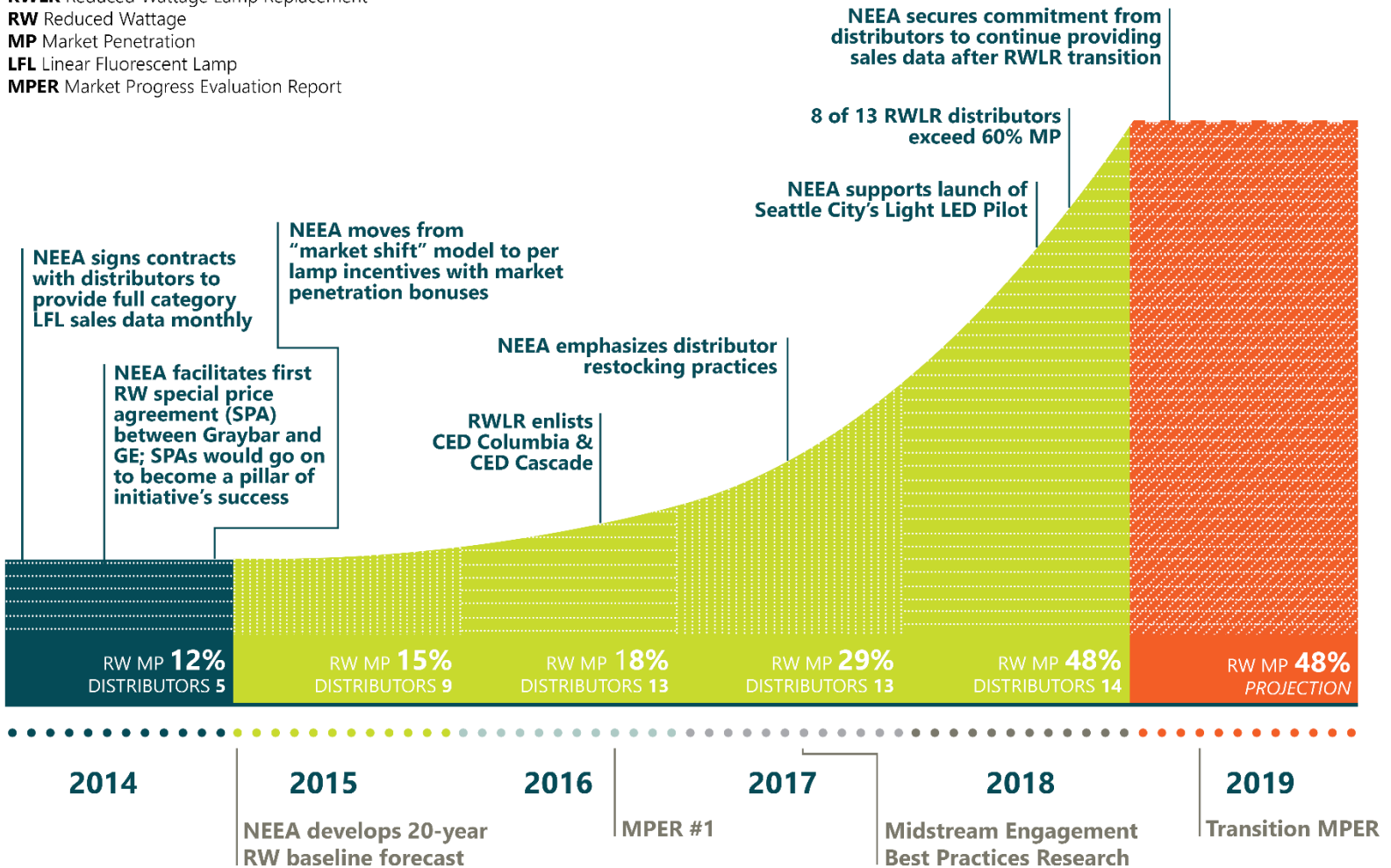
Evolution of RWLR

RWLR's impact on regional LFL market, as well as the initiative's accomplishments and struggles are summarized visually below.

RWLR Timeline

● Market Test
 ● Full-Scale Implementation
 ● Long Term Monitoring & Tracking

RWLR Reduced Wattage Lamp Replacement
RW Reduced Wattage
MP Market Penetration
LFL Linear Fluorescent Lamp
MPER Market Progress Evaluation Report



Introduction

The Northwest Energy Efficiency Alliance (NEEA) contracted Cadeo (the team) in December 2018 to complete a Transition Market Progress Evaluation Report (MPER) of its Reduced Wattage Lamp Replacement Initiative (RWLR). NEEA sought input from this MPER in its decision to transition RWLR from active initiative to long-term monitoring and tracking (LTMT).

To support this decision, NEEA asked Cadeo to:

- Document the initiative's history, including its progress toward the goal of transforming the non-residential lighting maintenance market
- Evaluate the viability of NEEA's nascent LTMT data management plan for RWLR
- Identify opportunities to leverage the infrastructure and relationships NEEA developed for RWLR for future midstream market interventions

About RWLR

Beginning with a pilot in early 2014, NEEA launched its RWLR initiative to transform standard purchasing practices in the non-residential lighting maintenance market. Linear fluorescent lamps (LFLs) have long dominated the non-residential lamp replacement (maintenance) market segment, the largest segment in the lighting market. The most common LFL was the 4-foot 32W T8 lamp. Known as reduced (or low) wattage (RW) lamps, 25W and 28W T8 lamps are more efficient alternatives to the market's standard 32W option. RWLR's objective was to make these 25W and 28W T8 lamps the primary lamps that replace 4-foot LFL in the maintenance market.

Small UES, big market

While the difference between 25W/28W lamps and 32W lamps is only a handful of watts, the number of LFL in the Northwest is huge. In fact, in 2014, NEEA estimated that nearly 10 million LFLs were sold into the region annually. Of those, NEEA estimated that only 12% were RW. Transforming that market by converting the remaining sales to RW would have generated savings in excess of 40,000 MWH in 2014 alone.

RWLR's market transformation effort always centered on engaging regional electrical distributors and shifting their stocking practices, promotion, and sales of LFL away from 32W lamps and toward RW lamps. During the market test phase (pilot) in 2014, NEEA tested its ability to promote RW lamps by providing education, training, and incentives to five regional distributors. Upon the market test's successful conclusion in early 2015, NEEA and NEEA funders authorized a scale up of RWLR. By the end of 2018, NEEA had successfully enrolled 14 regional distributors. Over the life of the initiative, NEEA not only increased the breadth of its engagement, but also deepened its relationship with existing distributors by adding additional branches that did not originally participate in the initiative. Table 1 offers a summary of the distributors that participated in RWLR.

Table 1. Summary of RWLR Distributors

Distributor	NW Branches	US Branches	Classification***	Lighting Only
CED Big Sky	18	21	Full Line	No
CED Cascade	24	24	Full Line	No
CED Columbia	18	18	Full Line	No
CED Puget Sound**	9	9	Full Line	No
Eoff Electric Supply*	12	11	Full Line	No
Grainger	11	350	MRO	No
Graybar Electrical Supply*	11	217	Full Line	No
Interstate Electric Supply	6	6	Full Line	No
North Coast Electric*	29	32	Full Line	No
Pacific Lamp and Supply	1	1	MRO	Yes
Platt Electric Supply*	88	138	Full Line	No
Portland Lighting*	1	1	MRO	Yes
Stoneway Electric Supply	17	17	Full Line	No
United Lamp Supply	1	1	MRO	Yes

Source: BPA Northwest Distributor Database and D+R International

*Original market test participants

**Also known as CED Seattle Metro District

***MRO: Maintenance, repair, and operations; customers are typically maintenance firms/facility managers and most sales are stock-and-flow/counter sales. Full Line: Sell general electric products, including lighting; primary customers are contractors doing project-based work.

An important byproduct of RWLR’s interactions with distributors over the past five years was the development of what NEEA refers to as its “distributor platform.” The distributor platform consists of a suite of operational systems, tools, and processes, including informal and contractual relationships with the electrical distributors that participated in RWLR, which NEEA used to execute the initiative.

NEEA envisions that the distributor platform, which consists in part of the distributors above, could enable NEEA—or others efficiency actors in the Northwest—to implement additional midstream approaches in the commercial and industrial lighting market. NEEA also sees the potential to extend the platform into non-lighting markets served by these and other regional distributors. As evident in Table 1, most distributors participating in RWLR sell more than lighting.

About Transition MPERs

For a variety of reasons—many of which we explore in detail in this report—NEEA made the decision to discontinue active promotion of RWLR and transition the initiative into LTMT in Q1 2019. The transition from active promotion to LTMT is part of NEEA’s typical market transformation initiative lifecycle and

requires a retrospective Transition MPER. This report satisfies that requirement by documenting RWLR's evolution and its success promoting RW lamps, as well as evaluating the plan NEEA has put into place for tracking the persistence of RW sales after the transition. This Transition MPER also offers an important opportunity to document lessons learned that may be beneficial to future midstream channel market interventions.

Because NEEA's process for transitioning initiatives into LTMT requires broader stakeholder communication (within and outside of NEEA), the audience for this MPER is more diverse than NEEA's standard MPERs. Beyond NEEA's RWLR implementation and evaluation teams, the information contained in this report will provide context to the following energy efficiency stakeholders: regional non-residential lighting workgroup members, members of NEEA's Cost Effectiveness and Evaluation Advisory Committee (CEAC), Commercial Advisory Committee (CAC), and Regional Portfolio Advisory Committee (RPAC).

Evaluation Activities

Cadeo completed three primary evaluation activities as part of the RWLR Transition MPER:

1. Stakeholder Interviews
2. Materials Review
3. Midstream Program Literature Review

Stakeholder Interviews

At the heart of this Transition MPER were 25 in-depth interviews with seven types of RWLR stakeholders. The interviews focused on understanding RWLR's accomplishments, as well as identifying lessons learned that NEEA could apply as part of future midstream efforts. Cadeo worked closely with NEEA to identify the range of stakeholders relevant for this research, as well as the specific organizations and individuals that could provide the greatest input on RWLR's impact on the non-residential market.

Table 2 lists the number of interviews our team completed with each stakeholder, as well as the key topics covered during the interviews.

Table 2. Summary of Completed Interviews

RWLR Stakeholder	Interviews	Key Topics
NEEA Management	2	<ul style="list-style-type: none"> ▪ Initiative history, lesson learned ▪ Keys for successful midstream intervention
RWLR Implementation Team	1	<ul style="list-style-type: none"> ▪ Perceived opportunities for improvement/expansion ▪ Reliable long-term market tracking
Participating Electrical Distributors¹	6	<ul style="list-style-type: none"> ▪ Positive and negative experiences in RWLR ▪ Anticipated RW sales without RWLR initiative ▪ Willingness to share sales data in the future ▪ Perceived opportunities for measure diversification
Nonparticipating Electrical Distributors	4	<ul style="list-style-type: none"> ▪ Reasons for nonparticipation ▪ Current and anticipated RW sales ▪ Technologies that would lead to participation in similar effort
Lighting Manufacturers	3	<ul style="list-style-type: none"> ▪ Future of non-residential lighting market, esp. RW and TLEDs ▪ Experience in RWLR, including interactions with NEEA ▪ Feedback on initiative from distributors
Regional Midstream Program Managers	5	<ul style="list-style-type: none"> ▪ Interaction between RWLR and local utility lighting programs
National Midstream Program Managers	4	<ul style="list-style-type: none"> ▪ Experience with their own midstream program ▪ Distributor feedback ▪ Measures and incentives offered ▪ Plans for program diversification and expansion

Materials Review

Cadeo also completed a materials review of available RWLR documentation. Our team’s review included:

- The initiative’s logic model
- Previously completed MPEs and other evaluation deliverables
- Distributor-specific communications logs
- Reporting on RWLR’s progress toward RW market progress indicators (MPIs)²
- A list of RWLR long-term diffusion indicators for long-term tracking
- RWLR’s LTMT data management plan, including information about current and anticipated future data sources, as well as NEEA’s proposed extrapolation approach to assess long-term market changes

The materials review helped inform our team’s retrospective assessment of RWLR, detailed in the next section of this report. More importantly, the review allowed us to evaluate NEEA’s LTMT data management plan, which outlines NEEA’s strategy for watching the non-residential lighting maintenance

market and, potentially, continuing to estimate RW savings resulting from RWLR's previous market intervention. Specifically, our team used the review:

- To determine the comprehensiveness of NEEA's long-term RWLR market diffusion indicators
- Ensure that sufficiently granular data will be available to track the market, calculate RW market share, and calculate LTMT savings

Midstream Program Literature Review

To supplement the primarily RWLR-centric lessons learned identified through the interviews and materials review, our team undertook a literature review of midstream programs around the Northwest and country. The goal of the review was to identify additional best practices for delivering midstream programs that, along with lessons learned from RWLR, would benefit future NEEA midstream efforts. In total, our team reviewed 20 programs.

Report Structure

The remainder of this report consists of three sections that focus on answering the following key Transition MPER questions:

1. Transitioning RWLR

Is Q1 2019 the appropriate time to transition RWLR to LTMT?

2. Planning for Long-Term Tracking

Will the RWLR data management plan support reliable LTMT?

3. Building Off RWLR

Why was RWLR successful?

Where did RWLR struggle?

What lessons learned from RWLR can NEEA apply to future midstream efforts?

This report also includes an appendix that contains:

- Additional stakeholder-specific interview findings (Appendix A)
- Summary of the midstream programs included in the literature review (Appendix B)
- Stakeholder interview guides (Appendix C)

¹ As part of this MPER, the team interviewed a subset of the 14 total distributors participating in RWLR at the end of 2018. The six interviewed distributors, which were identified in collaboration with NEEA, included: Platt, North Coast, Portland Lighting, Graybar, Interstate, and Grainger.

² RWLR's December 2018 StrikeZone report

1. Transitioning RWLR

When NEEA contracted this Transition MPER for RWLR, the initiative had been active for five years. Over that time, RWLR³:

- Increased the market penetration of reduced wattage lamps (RW MP) at participating distributors from 12% to 48% (i.e., 48% of LFL sales in 2018 were RW)
- Grew the pool of participating electrical distributors from 5 to 14
- Collected full-category LFL sales data for an increasing percentage of the overall Northwest LFL market (from an estimated 30% in 2014 to 43% in 2018)
- Helped eight individual distributors increase their RW market penetration to greater than 60%

Progress toward Market Progress Indicators

Our team mapped these achievements to the eight market progress indicators (MPIs) identified by NEEA in the initiative's final logic model.⁴ Based on our recent interviews with RWLR stakeholders, as well as our review of RWLR materials and sales data analysis, we determined that the initiative meets the majority of its MPI goals. In some instances, the scope of the Transition MPER did not include collecting the information necessary for market intelligence to assess RWLR's progress toward a specific MPI. For example, the current evaluation did not include surveys with non-residential customers, so our team did not gather any new information about increased decision maker demand for RW lamps (MPI IV).⁵ In these instances, our team relied on our previous assessments of the MPI as part of prior RWLR evaluations.^{6,7}

³ RWLR StrikeZone report (December 2018)

⁴ Dated July 23, 2018

⁵ The scope of the Transition MPER did not include surveys with non-residential customers because, in part, NEEA deemphasized the initiative's demand-side activities as RWLR matured. The shift away from demand side market interventions was because NEEA determined that focusing initiative resources on the supply-side (i.e., on distributors) provided the greatest value and opportunity for market transformation.

⁶ <https://neea.org/img/uploads/reduced-wattage-lamp-replacement-initiative-market-progress-evaluation-report-1.pdf>

⁷ <https://neea.org/img/uploads/reduced-wattage-lamp-replacement-market-intervention-strategies-market-size-and-next-steps.pdf>

Table 3. MPI Status Summary

#	Outcome	MPI	Status	Related Market Intelligence
Short-Term (1-3 years after scale-up)				
I	Increased distributor promotion of RW T8s	Majority percentage of distributors promoting RW T8s in terms of marketing, stocking, pursuing SPAs, and training staff	Met	<ul style="list-style-type: none"> All participating distributors reported they actively marketed RW lamps and staff trainings Most reported meaningful increases in default RW stocking level
II	Decrease in RW T8 cost	Majority percentage of distributors offering 28W lamps at price parity with 32W and securing special pricing agreements (SPAs).	Met	<ul style="list-style-type: none"> All participating distributors secured RW-specific SPAs, which, in conjunction with NEEA's support, brought RW and 32W into relative price parity
IV	Increased decision maker demand	Majority percentage of decision makers who are a) aware of benefits of RW T8s, and b) implementing order practices that favor RW T8s	Met	<ul style="list-style-type: none"> 85% of surveyed non-residential end users, as part of previous MPER, were aware of the benefits of RW lamps 100% of interviewed RWLR distributors said that awareness was increasing across their customer base
Medium-Term (3-5 years after scale-up)				
III	Increase in sales of RW T8s	Increase in number of RW T8 sold	Met	<ul style="list-style-type: none"> Participating distributors reached 48% RW market penetration in 2018; nonparticipating distributors continue to lag though (<10% MP) 8 of 14 participating distributors have RW greater than 60%
Long-Term (5-10 years after scale-up)				
V	Market momentum supports RW T8 sales	Percentage of distributors who support RW T8 sales in terms of: <ul style="list-style-type: none"> Repeat purchases replacing like with like Customer satisfaction Maintenance specification recommending RW 	Likely Met	<ul style="list-style-type: none"> Distributors reported high levels of repeat purchases and customer satisfaction; future surveys with RW customers are needed to confirm this perception
VI	Distributors are interested in continued collaboration and new initiatives	Percentage of eligible distributors who choose to participate in new programs/collaboration opportunities with NEEA.	Met	<ul style="list-style-type: none"> 100% of interviewed participating distributors expressed an interest in participating in a future NEEA initiative, as did several of the interviewed nonparticipating distributors
VII	Federal standard requiring improved energy performance	Presence of a federal standard requiring energy performance.	Unlikely	<ul style="list-style-type: none"> Uncertain regulatory environment and LED momentum make a focus on LFL standards unlikely in the next few years.
VIII	RW T8 becomes the standard product choice in the T8 lamp market	Percentage of participating distributors for whom a majority of fluorescent T8 sales are RW.	Met	<ul style="list-style-type: none"> RW lamps represented the majority of LFL sales for 57% of participating distributors by the end of 2018 Only two of the five (40%) original market test distributors exceeded 50% RW in 2018

In addition, NEEA worked extensively over the past two years with Seattle City Light (SCL) to design and launch an LED-focused midstream program pilot. The SCL pilot promotes LED “commodity” lighting products, such as TLEDs and LED lamps, to distributors who participated in NEEA’s RWLR initiative. NEEA effectively leveraged the distributor platform developed through RWLR to deploy SCL’s per-unit incentives, while also providing market transformation support. According to interviewed stakeholders, the pilot offers a glimpse of what midstream lighting programs (and other midstream programs) could look like in the post-RWLR.

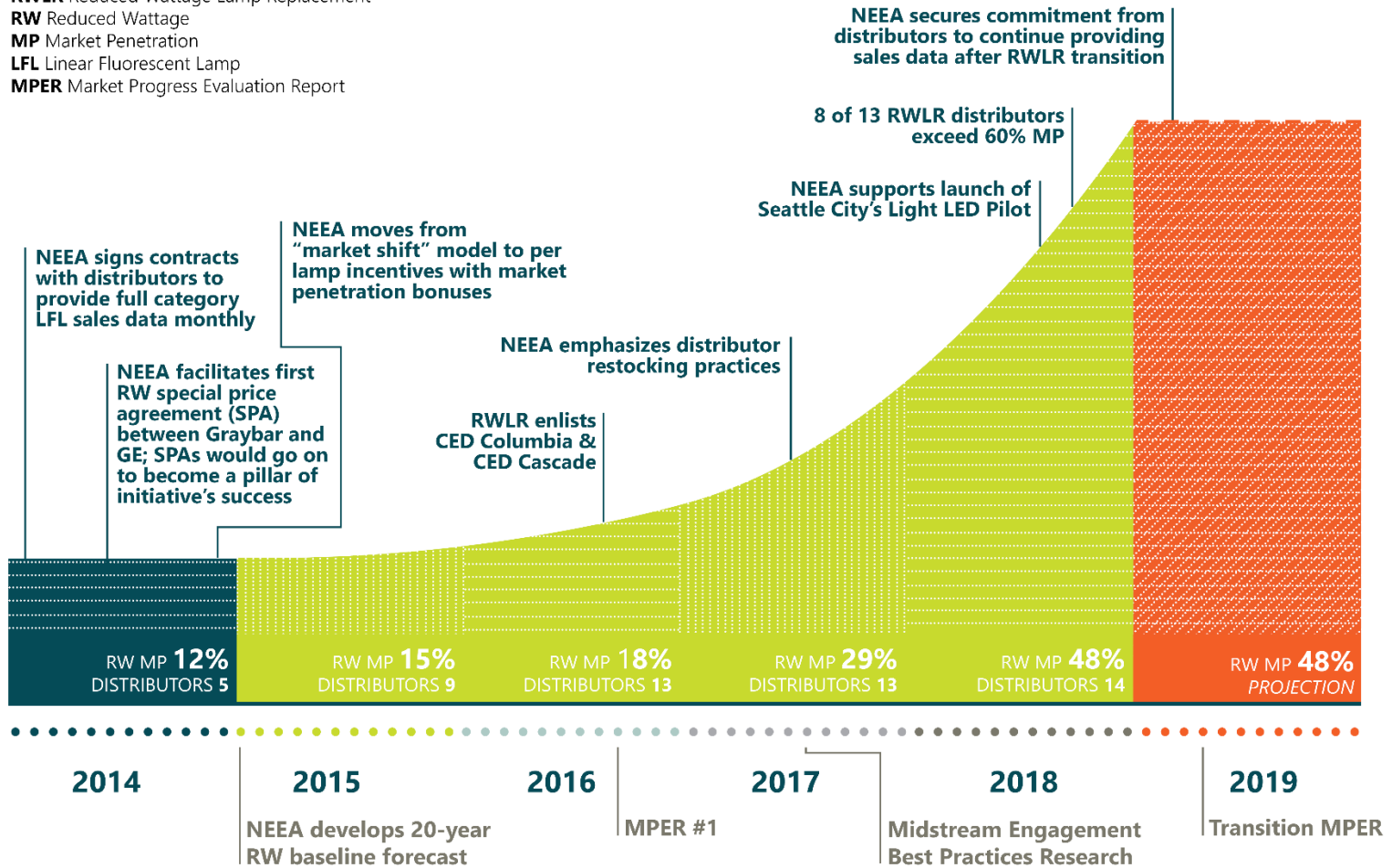
Figure 1, below, summarizes these accomplishments. The figure provides a sense of the RWLR’s evolution over time and offers a snapshot of the RWLR landscape at the time of this Transition MPER.

Figure 1. Initiative Overview (2014-present)

RWLR Timeline

● Market Test ● Full-Scale Implementation ● Long Term Monitoring & Tracking

RWLR Reduced Wattage Lamp Replacement
RW Reduced Wattage
MP Market Penetration
LFL Linear Fluorescent Lamp
MPER Market Progress Evaluation Report



Based on these market transformation metrics, as well as NEEA's assessment of the long-run market for LFLs and feedback from market actors, NEEA felt it was appropriate to end active support of RWLR in December 2018. As part of this Transition MPER, our team sought to answer for the following fundamental question: *Is Q1 2019 the appropriate time to transition RWLR to LTMT?*

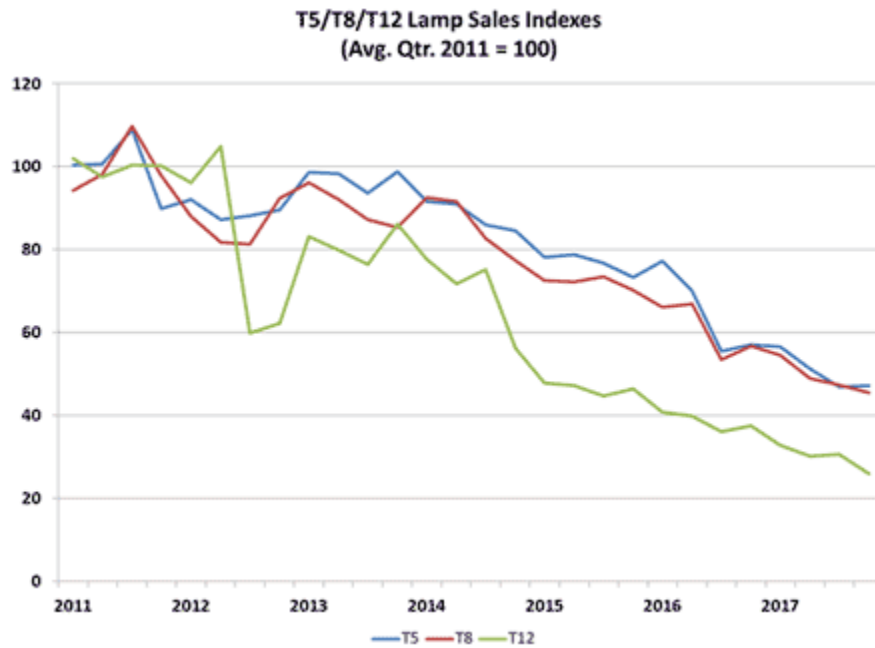
Is Q1 2019 the appropriate time to transition RWLR to LTMT?

Our team believes NEEA made the correct decision to transition RWLR at this time for five reasons. We detail each reason and provide supporting information below.

- 1. Maximized Potential Change.** RWLR had considerable success with most participating distributors—including some with the largest LFL sales volume in the region. In fact, by Q3 2018, 8 of the 14 participating distributors had RW market penetrations greater than 60%. Further, four of these distributors exceeded 70% market penetration, and one virtually stopped selling 32W LFLs entirely (99% market penetration). The opinion of interviewed RWLR managers and distributors alike was that the initiative had transformed participating distributors sales to the realistic extent possible. They indicated that further RW market penetration gains were unlikely or would be less cost-effective, particularly in era of rapid LED penetration and falling LFL sales.
- 2. Stable Distributor Participation.** RWLR's Market Test in 2014 consisted of five participating distributors. Over 2015 and 2016, RWLR ramped up participation to 9 and 13 distributors, respectively. While RWLR added a 14th distributor in 2018, the set of regional distributors participating in RWLR has effectively remained the same for three years. RWLR actively attempted to enlist other distributors in recent years, including non-traditional distributors that primarily sell lamps online. However, these distributors were typically smaller in volume and/or were less focused on the commercial maintenance market, making them a poor fit for RWLR. According to interviewed stakeholders, it was unlikely that the pool of participating distributors would appreciably grow if the initiative remained active. They noted that the initiative had already locked in the reliable participation from the region's largest known sellers of LFLs and any future market share gains would be marginal and require ever higher levels of effort.
- 3. Distributors have Institutionalized RW Sales and Stocking Practices.** Excluding the final distributor enrolled in 2018, the other 13 RWLR distributors participated in the initiative for an average of four years. This long stretch of continued participation resulted in both the RW market penetration gains seen in Figure 1, as well as the time necessary for most of these distributors to fundamentally change their approach to selling and stocking RW lamps. RWLR always took a long-term, market transformational approach (e.g., training managers and sales staff alike, changing stocking and default sales practices, securing better pricing for RWs) aimed at driving persistent RW market penetration after the initiative ended. According to the interviewed participating distributors, most expect to continue selling RW lamps at the same rate despite the initiative stepping back its active engagement.
- 4. Declining LFL Market.** Since the per-unit incremental savings associated with converting non-residential customers from a 32W lamp to either a 25W or 28W lamp is relatively small, the impetus for creating RWLR was always to affect the considerable volume of LFLs sold in the region each year. In 2014, when RWLR launched, NEEA estimated that approximately 10 million LFLs were sold annually in the Northwest. However, the full category sales data provided by participating distributors, as well as national lighting sales indices provided by NEMA, clearly

indicate a dramatic decline in total number of LFLs since RWLR launched. As shown in Figure 2, NEMA reported a 19.8 percent decline in T8 lamp sales between 2016 and 2017, and an overall pattern of declining sales for all LFLs since 2011. In the Northwest, BPA’s annual distributor sales data survey found similar trends, with LFL sales declining steadily through 2017. Per interviewed manufacturers, these declines are likely to continue as TLED prices continue to drop. With the size of the LFL market dropping, RWLR’s opportunity to cause large, regional savings through RWs are increasingly limited.

Figure 2. NEMA Linear Fluorescent Lamp Index, Q4 2017



- Distributors are ready for the “next” thing.** With an increasing number of non-residential consumers turning away from LFLs and toward TLEDs, participating distributors were anxious to expand the scope of RWLR—and their partnership with NEEA—beyond RW lamps. Many of the interviewed distributors pointed out the boom, in what they often called “commodity LEDs” (TLEDs and other LED products (e.g., screw-in lamps, downlight retrofit kits, and easy-to-install kits or panels that replace fluorescent troffers), as a potentially mutually beneficial opportunity for NEEA and the distributors to continue promoting efficient lighting in the commercial sector beyond RW lamps. The RWLR team and other regional and national midstream program managers told our team that distributor engagement—earnest interest and activity on the part of distributors—is an essential element of any successful midstream program. Shifting away from RW lamps at this time and more actively exploring other midstream opportunities will enable NEEA to keep the interest of participating distributors, maintain relationships, and more effectively leverage the distributor platform built by RWLR to generate sustained, long-term success in the midstream space.

Risks

While our team agrees with NEEA's decision to transition RWLR to LTMT at the close of 2018, ending active support of the initiative does come with risks. The most obvious risk that is the distributors who previously received a myriad of RW-related support from NEEA will experience a decline in their RW market penetration. As noted above, interviewed distributors were optimistic that they would maintain the significant RW market penetration gains they made over the last few years. Despite this optimism, it's possible that some distributors will experience at least a modest decline in RW market penetration after their monthly meetings with NEEA, RW per-lamp incentives, and sales staff RW promotions end. However, it's worth noting that the sales data provided by participating distributors for Q1 2019—the first quarter after the transition to LTMT—did not exhibit any backsliding.

While RW market penetration backsliding is a risk, the reasons to transition RWLR now outweigh the rationale for continuing the initiative, especially as the 'cost' of backsliding gets smaller and smaller each year as the LFL market further contracts. And there is an opportunity cost of continuing to support the initiative—not deploying those resources in other NEEA efforts that may better sustain and strengthen their relationship with participating distributors.

As for the potentiality of RW market penetration backsliding, NEEA will need to monitor the persistence of RW market penetration closely, particularly in the near term. NEEA documented its plan for doing so in its RWLR LTMT data management plan, which our team also reviewed.

2. Planning for Long-Term Monitoring & Tracking

Successful LTMT requires the ability to reliably collect and analyze data for the affected market to assess the persistence of NEEA's cumulative market intervention. Cadeo reviewed NEEA's LTMT data management plan for RWLR to answer the second fundamental question associated with RWLR's transition: *Will the RWLR data management plan support reliable LTMT?*

Will the RWLR data management plan support reliable LTMT?

Our review of NEEA's LTMT data management plan consisted of three complementary assessments.

The first assessment was reviewing the 12 LTMT diffusion theory indicators identified by NEEA in its data management plan. Our team assessed the identified indicators individually (e.g., *Does the indicator provide the market insight NEEA seeks? How feasible is it to gather the identified data?*), as well as collectively (e.g., *Are there any missing indicators? Are any of the indicators unnecessary or redundant?*).

Our second and third assessments focused on evaluating the viability of the data collection and analysis methods that NEEA proposes for estimating the size of the Northwest LFL market and the share of those sales that are RW. Understanding market size and RW market penetration after RWLR transitions is critical for understanding the long-term impacts of NEEA's intervention in the non-residential lighting maintenance space.

Market Indicators

NEEA identified a dozen market diffusion indicators for RWLR LTMT in its data management plan for the initiative. Because NEEA will fund data collection efforts in the future LTMT stage of the initiative's lifecycle period to inform these indicators, it was important for our team to evaluate the indicators, individually and collectively, to ensure NEEA can appropriately focus its RWLR LTMT evaluation and market research resources. A subset of the indicators will directly inform NEEA's calculation of LTMT savings (e.g., regional RW MP). Most, however, are qualitative indicators that will provide NEEA with a sense of how lasting their market transformation efforts were, as well as convey general trends in the regional and national LFL

market. In total, NEEA identified 12 different LTMT market diffusion indicators across 5 different focus areas:

1. Sales (n=3)
2. Stocking (n=3)
3. Sales Practices (n=1)
4. Fluorescent Manufacturing (n=3)
5. Demand Side Awareness (n=2)

Table 4 lists each indicator and summarizes our team's assessment of whether the indicator will provide the market insight NEEA seeks, as well as the feasibility of collecting the data necessary to determine it. The table also contains any additional data sources that our team suggests using.

Table 4. Review of LTMT Diffusion Indicators

Focus Area	Diffusion Indicator	Data Source	Provide Desired Insights?	Feasible?	Notes and Recommendations
Sales*	Low wattage regional sales market penetration	Quarterly data from previous RWLR distributors; data for nonparticipant distributors from BPA's annual non-residential lighting survey	Yes	Yes	
	Low wattage national sales market penetration	Manufacturers; other market actors	Yes	Yes	NEMA indices provide TLED vs LFL; manufacturer interviews necessary for RW vs 32W
	Price of low watt vs. 32W and TLEDs	Participant sales data, web scraping, survey distributors	Yes	Yes	Also ask manufacturers about pricing nationally, as well as prevalence of SPAs Recommendation: Drop web scraping, only viable for DIY retailers, which are a fraction of LFL sales Recommendation: Consider using state procurement data to track prices
Stocking	RWLR participant stocking practices of 32/25/TLEDs	RWLR participant stocking reports	Yes	Maybe	Stocking is an indirect measure of sales; best to rely directly on quarterly sales data and ask distributor, qualitatively, about stocking during LTMT interviews
	Non-RWLR participants stocking reports	Unknown	Yes	No	Unlikely to obtain this data
	Technology stocking consolidation	Research interviews with distributors, stocking reports	Yes	No	Sales data will provide sufficient insight into RW vs 32W levels
Sales Practices	Are they still pushing LW?	Research surveys of sales staff, secret shopper, interviews with distributors	Yes	Yes	
Fluorescent Manufacturing	Manufacturer 32W models	Sales data and manufacturers interviews	Maybe	Yes	Plant closures are often announced, but they don't announce ramp downs (3 shifts to 2) or retooling. Manufacturers, at least their utility program liaisons, make themselves available for interviews; might not have these specific details Recommendation: Drop all three manufacturing indicators; information gained is not specific enough and costly
	Manufacturing plants close	Manufacturer interviews	No	Yes	
	Manufacturing consolidation	Manufacturer interviews	Maybe	Yes	
Demand Side Awareness	Internet searches for LW	Google analytics key word search	No	Yes	Recommendation: Drop this indicator. Possible to complete search, but results will provide very little market intelligence as Google searches are (likely) minimal and do not reflect awareness (or offer insight into a customer's sales volume)
	Customer purchasing behavior	Target customer interview or survey	Yes	Yes	Possible, but would need to be a larger scale effort to be meaningful; best if piggybacked on other non-residential survey

*Identified in data management plan as priorities for 2019 LTMT research

Market Size

Definition: Total Annual 4-foot T8 LFL Sales—32W, 28W, 25W—in the Region

NEEA's proposed savings methodology requires estimating the total number of T8 LFLs sold in the region every year. To estimate Northwest LFL sales, NEEA plans to continue to use an existing lighting market model, which it adapted in 2014 from a national model, developed by the Department of Energy, to be Northwest specific. NEEA updated the national model with better (regionally specific) historical new construction data and other regional inputs (e.g., hours of use, etc.). This update, which served as the starting point for prospectively estimating regional LFL market size, resulted in a total market size estimate of nearly 10 million lamps (9,784,684) in 2014.

For 2015 through 2018, NEEA applied the percent change in LFL sales, that it observed in the participating distributors' sales data (from whom NEEA collected full category data), to the total market. Because this change was negative for several years, NEEA currently estimates that the total regional LFL market size shrunk to under 6 million lamps (5,751,911) in 2018. The declines that NEEA observed in the RWLR distributor LFL sales were driven primarily by the explosion in popularity of TLEDs. National LFL trends, as reported by NEMA's linear lamp index (see Figure 2 above) corroborate NEEA's assumption that the participating RWLR distributors' overall decline in LFL sales is generally representative of the broader regional LFL market.

According to the data management plan, NEEA will forecast LFL market size in 2019 (and beyond) by assuming a constant rate of decline of 17%. This assumption, which the plan indicates NEEA will update annually using regional distributor data, reflects the average decline in LFL sales over the last two years. Cadeo believes this assumption is sound: it is based on the best available data and corroborated by input from manufacturers during our team's interviews. Specifically, one major manufacturer estimated annual declines between 10-20% declines and another suggested 20% declines were likely.

Reduced Wattage Market Penetration

Definition: 28W and 25W lamp sales as share of Total Annual Regional 4-Foot T8 LFL sales

NEEA separately calculates RW lamps as a share of total 4-foot T8 LFL sales for participating and nonparticipating RWLR distributors using data from each group. We address NEEA's approach to each group of distributors separately below.

Participants

NEEA forecasts 51.1% RW market penetration (aggregating both 28W and 25W lamps) for legacy RWLR participants. This forecast matches the RW market penetration for Q4 2018, rather than the initiative's overall annual market share for 2018 (48%). Assuming no change in RW market penetration in 2019 when the initiative is inactive is neither a conservative assumption nor an unreasonable one given NEEA's long-term intervention strategy and engagement with participating distributors. In fact, when asked to project 2019 RW market penetration during recent interviews, most participating distributors said they expected RW market penetration to remain relatively constant.

Given RWLR’s market transformation approach and speculation by participating distributors that RW market penetration is unlikely to fall off in 2019, the team thinks NEEA’s assumption that 51.1% RW market penetration for participating distributors—as a placeholder value until sales data for 2019 is available—is a reasonable assumption. To be slightly more conservative, we recommend that NEEA reduce the 2019 assumption to 48%, which is consistent with the initiative’s overall RW market penetration in its final year of activity.

Nonparticipants

The data management plan identifies BPA’s annual distributor lighting survey as the source for future estimates of RW market penetration for nonparticipating electrical distributors in the region. Because sales data for nonparticipants has historically been relatively limited (14 nonparticipating distributors contributed data in the most recent survey) and is likely to remain so, it is important to note these data may not be representative of all nonparticipating distributors in the Northwest. However, this was a weakness in NEEA’s regional RW market penetration estimate when the initiative was active and remains a concern now that the RWLR has transitioned to LTMT. Regardless, these data, however limited, reflect the only and best data available for estimating RW market penetration for nonparticipating distributors. As a result, these data are the best resource for NEEA and the appropriate basis for forming the nonparticipant market penetration estimate.

NEEA forecasts an 8.5% market share for nonparticipants. We believe this is the correct value and reflects the region’s most recent and best market intelligence regarding RW market penetration for distributors outside of RWLR. A forecast of 8.5% is also consistent with recent years. Specifically, the nonparticipant RW market penetration has averaged 8.3% over the last four years (2015-2018) and never risen above 9.3%.

During interviews, manufacturers noted that in recent years that the national share of RWLR was less than 10 percent. Collectively, these findings suggest that 8.5% is an appropriate estimate for nonparticipating distributor RW market penetration in 2019.

Recommendation:

Lower the assumed RW market penetration assumption for 2019 participating distributors from 51.1% to 48%.

NEEA’s RWLR LTMT data management plan also includes calculating savings from NEEA’s legacy market intervention using a determined per-unit saving value. The team believes the savings rates NEEA plan to apply to the 28W and 25W are reasonable and informed by the best available data, including an hours of use assumption that the Regional Technical Forum continually updates.

Risks

The most significant risk in the current data management plan is the assumption that participating distributors will continue to provide full-category data on an indefinite basis now that RWLR is inactive. The agreements in place with distributors—to share data quarterly in 2019 in return for a data sharing-specific stipend—mitigates this risk in the short-term. However, the possibility exists that distributors' commitment to sharing data could waver over time. The RWLR management team acknowledge this risk during our interview with them and indicated that NEEA can minimize this risk by maintaining their relationships with these distributors, ideally by involving them in other NEEA and/or regional efforts, as they are doing with, for example, the SCL midstream pilot.

We also asked participating distributors about their intentions to share data with NEEA indefinitely. All indicated they did not have any plans to stop sharing data. They typically cited several reasons why including NEEA's data sharing stipend: the fact that they already established an internal process for querying and sharing these data (which means the marginal effort to continue sharing is minimal), and their desire to maintain a direct connection with NEEA so they can potentially be involved in future midstream offers.

As for the risk for nonparticipating distributors, our team expects a similar level of data, as in the past to be available, whether collected through BPA's lighting survey or NEEA's own efforts. These nonparticipating distributors were already providing data outside of RWLR so the conclusion of the initiative would, presumably, have no bearing on their decision to share data.

We do recommend that NEEA follow through on its plan to interview manufacturers annually, as they represent the best source of national data on the LFL market and RW specifically. While in our experience manufacturers are unlikely to provide data, they will typically comment directionally on market trends, which could be sufficient to corroborate the fact that participating distributor RW market penetration in the Northwest remains substantially higher than the rate nationally.

3. Building off RWLR

The most valuable element of a Transition MPER is its prospective assessment. In short, what did NEEA learn from this initiative and how can that information drive future market transformation and funder midstream programs? To explore this, we first focused on where RWLR succeeded and, conversely, where it struggled. From those accomplishments and shortcomings, we distilled lessons learned that can govern NEEA's future efforts in the non-residential lighting market and, more broadly, in the midstream space.

Why was RWLR successful?

Based on the two dozen stakeholder interviews that our team completed, we identified the following reasons for RWLR successes.

- **A communicative, personally engaged program management team focused on long term relationship development.** RWLR's program management team—NEEA and D+R alike—was instrumental to the initiative's overall success. Every interviewed stakeholder mentioned the team's high-level communication skills, hands-on and collaborative approach to problem-solving, and fundamental understanding that, for the initiative to be successful, it needed to work for distributors' unique business models. The team also fostered strong relationships with participating distributors through a thoughtful balance of persistence and respectful space. This balance resulted in sustained engagement by distributors (few distributors left the initiative once enlisted) and the mutual respect necessary to work through organizational barriers to promoting RW lamps. The RWLR team's approach to working with distributors offers NEEA a blueprint for future market transformation efforts in the midstream space.
- **Creative incentive mechanisms went far beyond simple price buy-downs.** None of the other regional or national midstream programs that we identified through this study offered the wide range of incentive mechanisms that were part of RWLR. RWLR's creative incentive design and financial support included stocking incentives, branch-specific market penetration bonuses, sales staff competitions and incentives, and price buy-downs. Every other midstream program (except for Seattle City Light's [SCL] midstream lighting pilot—due to NEEA's involvement) acted as an additional pathway to simply buy-down the incremental cost of efficient products. In this respect, these midstream programs are no different than traditional downstream point-of-sale rebate programs. NEEA's market transformation mandate, long-term approach to changing markets, and willingness to experiment with different incentive designs allowed the initiative to more effectively engage and motivate distributors. Greater distributor engagement and ambition resulted in both consistent increases in RW market penetration and lasting changes in how distributors sell LFL lighting.
- **An adaptive program management approach allowed for flexibility.** RWLR worked closely with each participating distributor, often through trial and error, to find a set of incentive approaches that best suited each distributor. The initiative's steady increases in RW market penetration over four years—for individual distributors and the region overall—suggests there was not a program or incentive design "magic bullet" that transformed the market. Rather, it was the RWLR team's willingness to continuously adapt, innovate, and tailor offers for individual distributors over time that lead to real market change. All interviewed distributors mentioned that

RWLR's willingness to "work with them" and "find what worked for their business" was a key to success.

- **Collecting full-category sales data empowered data-driven program management.** The trust engendered by the RWLR management team, along with specific data-sharing incentives, resulted in participating distributors sharing full-category LFL sales data (i.e., total 25W, 28W, 32W, and, later in the program, TLED sales) with NEEA on a monthly basis. Energy efficiency program implementers, evaluators, and market researchers have long considered full-category, transaction level sales data to be holy grail of data sources; sought after but almost never provided. RWLR participants' willingness to share the data with NEEA, speaks volumes about the trust-based relationship the RWLR management team fostered with distributors. (None of the other midstream programs identified in our literature review collected full-category data). The completeness of the data collected by NEEA provided the RWLR team with greater visibility into the detailed sales of individual distributors, as well as general market trends. This, in turn, allowed the RWLR team to refine their offers, track the effectiveness of their campaigns first-hand, monitor the market, and, carefully time the transition of the initiative to long-term monitoring and tracking (LTMT).
- **Engaging manufacturers led to special pricing agreements for some distributor partners.** RWLR engaged manufacturers in two main ways: encouraging special pricing agreements (SPAs) and including manufacturers in check-ins with distributors. The most important collaboration with manufacturers was encouraging participating distributors to request special pricing agreements (SPAs) for RW lamps. SPAs are negotiated pricing agreements between distributors and manufacturers, typically for a defined period of time, the intention of which is to drive higher volume sales of a particular product by lowering wholesale prices distributors pay. SPAs are common for many high-volume lighting products, but, prior to RWLR, were virtually non-existent for RW lamps. RWLR's focus on RW lamps increased regional RW volume (and thereby manufacturers' willingness to offer SPAs) and raised general awareness of RW lamps. As one interviewed distributor noted, their company never had a SPA for RW simply because they had never asked their manufacturer for one. This changed, for many participating distributors, as a result of RWLR. In addition to encouraging SPAs, RWLR, increasingly over time, involved manufacturers in monthly check-ins with distributors about the initiative. Manufacturer involvement enabled distributors and manufacturers to align promotions to drive higher RW sales. In general, interviewed manufacturers noted that they appreciated being brought in to support the initiative, which made it easier for them to communicate and support their distributors customers.

Where did RWLR struggle?

Our interviews also identified a several instances where RWLR was less successful during its evolution, including:

- **"Market Lift" model theory clashed with on-the-ground data realities.** At the outset of RWLR's market test, NEEA employed a "market lift" incentive approach. As part of this approach, NEEA worked with each participating distributor to identify and agree upon what their current RW sales were and then paid the distributor a per-unit incentive for every RW lamp the distributor sold above the agreed upon baseline. While conceptually sound (i.e., NEEA only pays for units that are, in theory, attributable to the initiative's intervention), the approach was fraught. The

main issue was determining the appropriate baseline. NEEA quickly learned that a given distributor's LFL sales volume and lamp mix (25W/28W/32W) was highly variable—even on a quarterly basis. A single large customer could dictate a distributor's sales level and mix and thereby render the previously identified RWLR baseline irrelevant. NEEA found that this variability made establishing the baselines necessary for a market lift model to be problematic and frustrating. Prior to launching the RWLR full-scale, NEEA pivoted away from the market lift model and started paying a flat (and lower) incentive for every RW sold.

- **Finding and setting the appropriate goals was challenging.** Moving away from a market lift model did not immediately solve all RWLR's incentive design woes. According to the RWLR management team, they initially had trouble setting effective RW market penetration goals for participating distributing distributors. In theory, these market penetration targets should be important motivating factors for distributors because they received bonuses from NEEA if they surpassed them. Once again, theory was challenged by practice. One issue was that early goals, such as a RW market penetration target for a given year, took too long to realize. NEEA found that it was difficult to retain participant focus over such an extended period and that their staff were not sufficiently motivated by such long-term payoffs. Distributors would lose interest – either because the achievement of the goal was too far away to motivate them or because, after falling behind early in a goal cycle, they would realize reaching the goals was unlikely and give up. NEEA went on to fix this by shifting to shorter-term goals – either monthly or quarterly. A second issue was that many of RWLR's early goals were company-wide volume or market penetration targets. Company-wide goals limited the ability of any single distributor branch to influence the outcome, which decreased motivation. Again, NEEA pivoted, often switching to branch-specific RW market penetration targets and associated bonuses.
- **You have a program champion at a distributor. Until you don't.** The RWLR management team cited having an internal RWLR "champion" at each participating distributor as a key to success. The champion is typically NEEA's primary point-of-contact and the person that drives that distributor's participation in the initiative. The champion sees the value of RWLR, advocates for participation within the organization, and manages RWLR related promotions and data needs. Unfortunately, electrical distributor staff, like staff of any other business, turns over. There were several instances in RWLR history when NEEA lost an initiative champion—either because they moved to a different role within their organization or to a different company altogether. In these instances, NEEA lost much of the time they'd invested in that distributor and the distributor's institutional knowledge about the initiatives. Sometimes NEEA even lost their line of communication with the distributor entirely. In all cases, the RWLR management team was forced to identify a new primary point of contact, re-educate him or her about how the initiative works, and convince them of the value of participating. Over time, NEEA sought to diversify RWLR's networks within participating distributors and not overly rely on any single individual. Losing key points of contact remained difficult but establishing more robust and diversified set of contacts lessens the damage caused by losing any specific individual.
- **Sometimes the needle never moved.** Earlier in this report, we noted that, by mid-2018, RWLR has successfully enabled 8 of the 13 participating distributors to increase their RW market penetration to 60% or better. But what about the other distributors? Several, despite consistent effort by NEEA, were never able to meaningful increase their RW market penetration. In some instances, NEEA gained traction with certain branches, but not others. In other instances, the initiative never took hold within the distributor's organization because they did not see the value

or were concerned about consumer pushback. During interviews, the RWLR management team was always quick to point out that each distributor was unique and that what worked for one distributor would not necessarily work for other distributors. This lesson learned is important, as is the realization that a subset of distributors participating in a midstream effort may never make the institutional changes necessary to promote the market transformation NEEA seeks.

What lessons learned can NEEA apply to future midstream efforts?

From RWLR's successes and struggles, our team distilled a set of lessons learned. These lessons learned reflect the programmatic and market intelligence NEEA gained implementing RWLR over the past five years. Collectively, these lessons learned, summarized in Table 5, define the characteristics of a successful midstream initiative and offer NEEA an actionable roadmap for future market transformation efforts.

Table 5. Applying Lessons Learned from RWLR

	Lessons Learned	How does NEEA apply this?
<p>Success: A communicative, personally engaged program management team focused on long term relationship development.</p>	<p>The success or failure of an energy efficiency initiative, like most endeavors, often boils down to the people involved. As much as the NEEA’s incentive design, creativity and persistence contributed to RWLR’s success, the RWLR management team’s interpersonal skills, ability to engender trust, and forge legitimate partnerships with distributors was the foundation of the initiative’s success.</p>	<ul style="list-style-type: none"> • Identify staff with strong interpersonal skills to lead future midstream initiative management teams • The ideal midstream initiative managers will have a genuine interest in understanding distributors’ business models and be capable of balancing the immediate goals of their initiative with the benefits of a healthy, long-term relationship with each distributor
<p>Success: Creative incentive mechanisms went far beyond simple price buy-downs</p>	<p>RWLR was one of the few midstream programs we identified that provides more than basic pass-through incentives. Traditional buy-down approaches generate more efficient product sales but will not fundamentally change the way supply-side actors think about, stock, or promote an efficient product like RW lamps.</p>	<ul style="list-style-type: none"> • Include a diversified set of incentives as part of all midstream efforts • Incentives approaches should: <ul style="list-style-type: none"> ○ Focus on changing stocking practices ○ Encourage distributor’s corporate management to engage with initiative ○ Motivate branch managers, as well as individual distributor sales staff within branches, to promote the product
<p>Success: An adaptive program management approach allowed for flexibility</p>	<p>Allowing time for experimenting with different communication, incentive, and delivery approaches is essential to long-term success. As is a willingness to iterate through different approaches until one works, a process that can be frustrating for implementer and distributor alike.</p>	<ul style="list-style-type: none"> • Create a “menu” of participation and incentive design options at the outset of future initiatives • Seek to understand participating distributor’s business models and identify the option likely best suited for them • Test selected option for a limited time and then re-evaluate; would another option work better or does that option need to be refined; critical to regularly evaluate, using both sales data and “on the ground” distributor perspectives, and adapt accordingly. • Update the menu of options (at least) once a year such that it reflects the full range of offers necessary to meet distributor’s diverse circumstances
<p>Success: Collecting full-category sales data empowered data-driven program management</p>	<p>The value that comes from having full category sales data merits the level of effort necessary to convince distributors to share it. Also, once trust is established and the distributor sets up an internal data sharing process is set up, inertia likely means a distributor may share data in perpetuity.</p>	<ul style="list-style-type: none"> • Make full category sales data a requirement of initiative participation • Cite RWLR as an example of distributors can trust NEEA to securely collect, manage, and report sensitive sales data • Highlight benefits to distributor (i.e., NEEA can provide the distributor with anonymized data regarding their competitors; like BPA’s non-residential lighting distributor market report)

<p>Success: Engaging manufacturers led to special pricing agreements for some distributor partners</p>	<p>The fact that no SPAs existed for RW prior to RWLR was not due to manufacturer reticence, rather it was because distributors never asked for it. Once NEEA and participating distributors approached manufacturers about a SPA for RW, they found the manufacturers were happy to provide it.</p>	<ul style="list-style-type: none"> • Work with distributors to request SPAs for all relevant products at the outset of an initiative • Explore opportunities to coordinate and piggyback manufacturer product incentives or market funds with NEEA initiative funds • Invite manufacturer contacts to attend periodic check-ins with participating distributors—they are happy to support their customers in selling their products
<p>Struggle: “Market Lift” model theory clashed with on-the-ground data realities</p>	<p>The volatility of distributor sales volume and products mixes do not always lend itself to developing reliable baselines for assessing initiative-induced market lift.</p>	<ul style="list-style-type: none"> • Incentivize the sale of all efficient equipment, or • Target products without significant short-term volatility
<p>Struggle: Finding and setting the appropriate goals was challenging.</p>	<p>Distributors lose focus if a goal is too far-sighted or relies on others in their organization to do their part. It’s critical that all goals be achievable, focused, and near-term.</p>	<ul style="list-style-type: none"> • Set up goal or market penetration targets that are: <ul style="list-style-type: none"> ○ Branch-specific ○ Monthly (quarterly at most) ○ Include staff incentives for more than just the top seller (e.g., top three seller receive some meaningful level of compensation)
<p>Struggle: You have a program champion at a distributor. Until you don’t.</p>	<p>Investing in individual relationships is important (see Success #1) but so is having a larger network of contacts at each participating distributor. This mitigates the overall impact when a key point-of-contact leaves the distributor.</p>	<ul style="list-style-type: none"> • Identify and engage with at least three individuals at each participating distributor • Proactively set up a staffing contingency plan, that includes back-up distributor staff and their contact information • Keep—and regularly circulate—a detailed record of each distributor’s involvement with the initiative. This communication/participation log can preserve the distributor’s institutional knowledge and expedite the new contact’s initiative onboarding process
<p>Struggle: Sometimes the needle never moved</p>	<p>It won’t work out with some distributors, regardless of an initiative’s persistence. Recognizing this and scaling subsequent investment accordingly (in terms of both time and initiative resources), can avoid wasted investment in a distributor with stalled MP.</p>	<ul style="list-style-type: none"> • Carefully balance investment in a “stuck” distributor with the value of those dollars redirected to another distributor (or another purpose) • Stay engaged with these distributors since a) they remain a source of full-category sales data and b) they may be more responsive/better suited for future initiatives oriented around a different efficient product.

Appendix A: Additional Stakeholder Specific Interview Findings

This appendix includes additional high-level summaries of our team’s interviews with participating distributors, nonparticipating distributors, lighting manufacturers, regional midstream program managers, and national midstream program managers. These findings supplement the interview findings woven into the body of the report.

Participating Distributors

- Interviewed distributors consistently mentioned the same elements when asked which aspects of RWLR worked well for them. These included:
 - Flexible and diverse approach to incentives
 - Minimal reporting requirements (i.e., not having to collect and verify customer’s utility account numbers, which they cited as a major pain point of other midstream programs they participate in)
 - Data-driven management approach, as well as the market intelligence about how they compare to other regional distributors, and
 - NEEA’s “commitment to seeing the program through”, which they often described as perseverance or willingness to problem solve
- Several distributors said RWLR, and any other midstream program, had to make “business sense” for them to participate, which RWLR did. They mentioned the lost opportunity table, and, in general, how NEEA framed the various available RW incentives as opportunities for the distributors to increase their bottom line while promoting energy efficiency.
- Several interviewed distributors also noted that internal factors sometimes limit their participation and/or their ability to drive more LFL sales to RW. They cited instances where a certain branch, region of their territory, or specific large customer, prevent larger company-wide RW gains. In some instances, the barrier was something like RWs not being on an approved product list for an important customer. In other instances, the manager of a particular branch did not see the value of participating. They noted that they and NEEA tried numerous times to overcome these barriers, but, in some cases, they could not overcome them. Often the interviews expressed frustration with their own organization and went out of their way to remove any blame from NEEA.
- Distributors were unanimous that LFL market was going to continue to decline, although there was some disagreement on persistence (long tail vs. disappear soon).
- Responses were mixed when distributors were asked what they expect will happen to their RW sales (as a percent of total LFL sales, regardless of volume) after the end of RWLR. Two said they

expected RW sales to continue to climb. Two said it would hold steady. Another distributor (with lower RW MP) expected their limited RW customer to either revert to 32W or go pivot to TLEDs.

- Distributors also weighed in on the future of TLEDs. Again, responses were mixed. Most said TLEDs sales were leveling off, while others thought they'd continue to grow for a few more years.
- Distributors also expressed a preference for RWLR's regional scope (compared to the utility-specific programs). Specifically, they cited liking having a single point of contact for multiple territories.
- When asked for their ideas for future non-lighting midstream energy efficiency initiatives, distributors mentioned the following products: PTACs, steam traps, VFDs, electric vehicles, solar, motors.

Nonparticipating Distributors

- Unlike the participating distributors, many of the nonparticipating distributors said that RWLR did not make business sense for them. They primarily cited two reasons:
 - Lack of interest in LFLs (i.e., either not a big part of their business or not the place the distributor wanted to focus their attention)
 - Not enough of a return (i.e., money) to justify the "perceived" effort (which may, or may not, align with the actual effort necessary to meaningfully participate)
- Two of the interviewed nonparticipants shared that they are now working with third-party implementers (Crossroads Services, Inc. and RebateBus), which they said might better enable them to participate in future programs.
- One nonparticipating distributor said their level of engagement is proportional to the size of the incentives. They noted they are far more active in several rebate programs on the east coast because the incentives are high enough to merit the effort.

Lighting Manufacturers

- Interviewees could not share specific numbers, but all agreed that the national RW market penetration was decidedly lower than in the Northwest (less than 10%) and consisted

predominantly of project sales. This is, the share of reduced wattage lamps in the national maintenance market—the target segment of RWLR—was even lower.

- Manufacturers confirmed that they expect continued declines in the LFL volume nationally. One anticipates annual declines of 18-20%; another expects 20% or greater over the next few years.
- Relatedly, one manufacturer shared that they saw a 3:2 ratio (TLED to LFL) in sales last year and expects that ratio to grow in favor of TLEDs.
- Interviewed manufacturers expressed a general surprise that RWLR worked; the initiative's success exceeded their expectations for RW lamps.
- All manufacturers cited RWLR's flexibility and agile/adaptive approach as a key to the initiative's success. Manufacturers noted they were accustomed to "one size fits all" program designs, which they indicated were problematic given the varied nature of electrical distributors
- All manufacturers asserted that NEEA's ability (and willingness) to engage at the "ground level" was critical to the initiative's success. They specifically noted that branch-level distributor engagement is necessary but not all programs do it. They noted that most other programs use more of a top down approach through the corporate management team, which does not work as well (at least in isolation).
- Lastly, manufacturers also noted that the initiative's limited data requirements (i.e., distributors don't have to collect customer account numbers) were unusual with respect to other midstream programs. They saw the lack of a customer account number requirement as key to program uptake since it lightened the administrative load for the distributor.

Regional Midstream Managers

- Lighting products in midstream offerings are very consistent: "commodity" LED lighting, notably TLEDs and screw-in lamps. Essentially any LED lighting that do not require contractor installation is eligible.
- None of the other regional programs use funding to provide incentives beyond consumer-facing price markdowns and a modest program administration fund.
- All regional programs have made their offerings exclusive to the midstream delivery channel. In other words, utility customers can only access incentives for commodity LED lighting through midstream option; no longer part of C&I custom lighting programs
- Several interviewees mentioned detailed discussions with NEEA and other Northwest utility program managers about the development of regional LED lighting midstream program. According to interviewees, discussion advanced but several utilities pulled out of the agreement to consolidate programs near the end of the process. Reasons cited included contractual

complexities and the fact, for some utilities, their current programs were working well and, therefore, they did not see a reason to change it.

- None of the other regional midstream programs collect full category data like RWLR; repeated mentions that full category data information was hugely valuable for understanding market/pricing.
- RWLR has benefited other regional programs, particularly when it comes to sales data collection and distributor relationships.
- Consensus among program managers are that LFLs are no longer relevant and that managers, and the distributors they work with, agree it's best to focus on LEDs.
- SCL's pilot with NEEA is unique among regional midstream programs; SCL enlisted the RWLR distributors (who, with RWLR transitioning, were looking for what was next) to offer incentives on commodity LED lighting products. SCL pays the customer mark-downs, while NEEA (who was also looking to trial the nascent distributor platform beyond RWLR) layers on funding for market transformational elements. SCL is able to achieve a deeper engagement with distributors and benefit from NEEA, D+R and C+C support and experience.

National Midstream Managers

- Like the regional programs, none of the four programs went beyond pricing buy downs (i.e., no financial or educational support aimed at changing stocking practices, offering sales staff spiffs).
- All four programs were lighting-only.
- Except for the one program, the programs – like their regional counterparts – only offered incentives for eligible lighting products through the midstream offering (i.e., incentives were not available through the custom channel). Interviewees said this was done to avoid customer's double dipping on incentives and to reduce the complexity of program delivery and monitoring. The program manager indicated that she hoped their program would transition to a similar approach soon and that their program was likely to undergo a change in the next year.
- All four programs require customers to provide participating distributors with their utility account number to qualify for the rebate. The distributors confirm and track customer eligibility through PPC.
- All programs included a distributor engagement aspect – including quarterly roundtable to get feedback on program design (measures, incentive levels, etc.). One program went further and held a distributor golf tournament.
- Interviewees reported that they continuously update the measures eligible for the program, the timing of which is driven by a combination of utility desire for more savings and participating distributors pushing for the inclusion of recently available products.
- For the programs delivered by one implementer, participating distributors must perform to stay in the program – inactive distributors are put on probation and provided help to get back on track. The implementation managers said they do not want distributors participating just so they can put the utilities' name on something; they want to see real engagement and results.

Appendix B: Midstream Program Literature Review

Summary

Cadeo also provided NEEA with an EXCEL workbook that contains additional information regarding each reviewed program. In the EXCEL workbook, all 20 programs we researched can be found and reviewed. We included the 12 programs that we found the most relevant research for, to use in the report, below. Some programs are combined because they come from the same utility and/or employ similar incentive designs.

Table 6. Summary of Reviewed Programs

Utility	Relevant Measures	Incentive Design	Notes
DTE Energy – Michigan	Lighting and Food Equipment	Paid directly to distributor then passed to the customer as a discount on the invoice at point of sale.	The lighting program started as a pilot.
Pacific Gas and Energy (PG&E) – California	Lighting	Paid directly to the distributor then passes the rebate (partial or entire) to the customer in the form of reduced prices.	This was a pilot program.
Southern California Edison – California	Lighting	Incentive is paid directly to the distributor who passes rebate through a discounted price to the customer at the point of sale.	
XCEL Energy – Minnesota and Colorado	Lighting and HVAC	Incentives are used to increase stock of the equipment. The discount is passed through to customers.	Ecova and CLEAResult are program implementers of lighting program.
Duke Energy – N. and S. Carolina	Lighting	Distributor discounts a participating product at point of purchase through an instant-off rebate. Discount is shown on invoice.	Changed stocking practices.
Efficiency Vermont – Vermont	Lighting and Water Heater	Distributor discounts a participating product at point of purchase through an instant-off rebate.	Changed stocking practices.
Com Ed – Illinois	Lighting	Incentives will be delivered by distributors at the time of sale as a discount.	Started as a pilot program.
Energy Trust of Oregon (ETO) – Oregon	Water Heater	Provide the discounts to retail stores who then offer the water heaters to customers at an instant discount at the point of sale.	It gives the rebates to retail stores, not distributors
National Grid – Rhode Island and Massachusetts	Lighting	Partnered electrical distributors to offer energy-efficient lamps at discounted prices to customers.	It is a midstream program that is labeled as upstream.

Appendix C: Stakeholder Interview Guide

RWLR Transition MPER

Stakeholder Interview Guide

This interview guide lists the key topics for Cadeo’s in-depth interviews with the following eight types of RWLR stakeholders and non-residential lighting market actors:

1. NEEA RWLR Manager
2. RWLR Implementation Team
3. Non-RWLR NEEA Staff
4. Participating Distributors
5. Nonparticipating Distributors
6. Lighting Manufacturers
7. Regional Midstream Program Managers
8. National Midstream Program Managers

1. NEEA RWLR Manager

We will interview Elaine Miller, NEEA's RWLR initiative manager, and Ray Hartwell (Summit Conservation), who has supported RWLR implementation throughout its lifecycle. The joint interview, which will last approximately an hour, will focus on RWLR's evolution and how lessons learned from the initiative can inform NEEA's midstream efforts.

Administrative

- Can you briefly describe when and how RWLR will transition into long-term market tracking (LTMT)?
- What are the key elements you need to see as part of this MPER to facilitate your transition of RWLR?
- Can you talk a little bit about NEEA's Commercial Distributor Platform? Specifically, how will it compare, in terms of similarities and differences, to your interactions with distributors through RWLR? What is the status of the platform? What are the functions/processes/tools that, taken together, constitute the Platform? (**Probe:** regarding specific activities and functionality)

Initiative History

- Thinking back over the life of this initiative, what were RWLR's most important achievements?
- What were its key struggles? (lessons learned, or unexpected challenges?)
- With the benefit of hindsight, what were the key inflection points for RWLR? That is, what were the milestones or moments that led to change—whether positive or negative?

Long-Term Market Tracking

- At the end of the day, what are you hoping to achieve with the LTMT metrics? What do you need to know and why?
- This might be a separate question. (**Probe:** How does NEEA intend to claim savings for this initiative going forward?)
- Can you describe what NEEA's interactions with participating distributors will look like moving forward? (**Probe:** Will the participating distributors provide information about stocking practices—one of the LTMT focus areas—or just sales?)
- The in-progress data management plan indicates LTMT will rely on data from nonparticipating distributors collected by BPA. Have you discussed BPA's long-term plans to collect that data with them?
- Per the RWLR logic model, the ultimate impact/goal of the initiative was that "LWT8 becomes standard product choice in T8 fluorescent lamp market." Do you still believe this will occur/is the goal? Or do you think that TLED or new LED fixtures will eclipse T8s before RW lamps can overtake 32Ws?

Lessons Learned

- What are the three biggest lessons learned from RWLR?
- How should these lessons learned inform NEEA's future midstream efforts?
- If you had one RWLR "do over", what would it be?

Keys to Successful Midstream Intervention

- If you were starting another midstream program from scratch that was in a new industry altogether, what activities would you focus the most on?
- How about for another lighting product?
- What if you got to pick the ideal product for effective midstream intervention, what sort of attributes (market, players, product features, anything at all) would you look for?

2. RWLR Implementation Team

D+R has worked with NEEA to implement RWLR since the initiative's market test. Our interview with D+R's RWLR team, which will also last an hour, will focus on many of the same topics as our interview with Elaine and Ray.

Initiative History

- From your perspective, what were RWLR's most important achievements and primary struggles?
- With the benefit of hindsight, what were the key inflection points for RWLR? That is, what were the milestones or moments that led to change—whether positive or negative?
- How did your support of RWLR evolve over its lifecycle? What feels like the biggest change?

Long-Term Market Tracking

- Have you seen the list of LTMT metrics that NEEA developed?
- Did you work with NEEA to create them?
- Are there any additional metrics that you think would help NEEA track the long-term impacts of RWLR?
- Do you have any concerns about NEEA's ability to collect the data necessary to inform any of the metrics? If so, which one(s)?

Lessons Learned

- What was key for successfully collecting data from participating distributors? What did not work?
- What changes did you make, over the course of the initiative, that led to meaningful distributor engagement?
- Are there any other lessons learned from RWLR?
- How should these lessons learned inform NEEA's future midstream efforts?

Keys to Successful Midstream Intervention

- If you were starting another midstream program from scratch that was in a new industry altogether, what activities which you focus the most on?
- How about for another lighting product?
- What if you got to pick the ideal product for effective midstream intervention, what attributes (market, players, product features, anything at all) would you look for?
- What is your perspective on RWLR distributors' continued interest in collaborating with NEEA (on the Commercial Distributor Platform and future initiatives), as well as other efficiency stakeholders? Why do you say that?
- Are there remaining opportunities in the non-residential lighting market that NEEA should focus on? What do you see coming?

3. Non-RWLR NEEA Staff

After speaking with the day-to-day RWLR managers (within NEEA, as well as supporting contractors), we will interview four other NEEA staff members (Jeff Harris, Susan Hermet, Julia Harper, and Kathryn Bae) who are involved in planning NEEA's next steps in the midstream space. These interviews will be shorter, lasting a half hour.

Evaluation

- What are the key pieces of information you need to see as part of RWLR's Transition MPER to inform your future midstream efforts?
- What information do you hope to continue seeing once RWLR transitions to LTMT?

NEEA's Midstream Efforts

- Can you talk a little bit about NEEA's Commercial Distribution Platform? What are the functions/processes/tools that, taken together, constitute the Platform? (**Probe:** regarding specific activities and functionality)
- What do you expect will be the role of the Commercial Distribution Platform at NEEA moving forward? **Probe:** What does its role look like in two years, five year, ten years?
- Can you talk about the relationship between XMP and the Commercial Distribution Platform? Are they the same thing, or something different and separate?
- From your perspective, what were RWLR's most important achievements and primary struggles? What were the key lessons learned?
- What specific lessons learned from RWLR will inform (or have informed) your approach to creating the Commercial Distribution Platform?
- What product and/or market characteristics has NEEA identified that make a specific product or market well-suited for a successful midstream intervention?

4. Participating Distributors

Cadeo will interview six participating distributors. Given competing demand for these distributor's time, attention, and data from NEEA, BPA, and other regional energy efficiency stakeholders, we are seeking to minimize our interactions with distributors. For this reason, we have limited our evaluation questions.

Experience

- What aspects of the RWLR initiative worked best for you? Which did not?
- What lessons did you learn from RWLR about promoting energy-efficient products?
- Do you also work with utilities to promote energy efficient products? If so, are there any differences between working with NEEA and these utilities?
- What was the biggest challenge in gathering and reporting sales data? (**Probe** for specifics.)

Post-RWLR

- Will you continue to work with your supplier to maintain special pricing agreements for RW lamps now that the initiative is over?
- Do you anticipate that your sales of 25W and 28W lamps will change now that RWLR has ended? What about your stocking practices?
- What percent of your total 4-foot LFL sales do you expect will be 25W and 28W lamps in 2019? What about beyond 2020?
- And how do you anticipate TLED sales will change in 2019? Beyond 2020? (**Clarify** whether they are talking in absolute or percentage terms, and units or dollars—very important in this category.)
- How long do you plan to provide NEEA with quarterly sales data?
- What, if anything, would change your plan for sharing data?

Keys to Successful Midstream Intervention

- What do you think are the key elements of a successful program like RWLR (i.e., a midstream program)? Why do you say that?
- How open are you to partnering with NEEA in the future to support a different efficient lighting product? (**Probe**: Is there any specific product you have in mind?)
- [**When relevant**] What about a non-lighting product? (**Probe**: Do you have something specific in mind?)

5. Nonparticipating Distributors

NEEA and Cadeo collaboratively identified the following four nonparticipating distributors for an evaluation interview: Fastenal, HD Supply, 1000bulbs, and Pacific Lamp Wholesale. Each of these distributors interacted with RWLR at one point in time but were not active, sustained participants in the initiative.

Like the participating distributors, there are competing interests from energy efficiency stakeholders for these distributors' attention. Again, we have limited our evaluation questions to those we can discuss in approximately 20 minutes.

Experience

- You opted not to participate in RWLR. Why was that? (**Probe:** Was there something about the opportunity that did not work for you?)
- Was there anything specific you needed to be different in order to participate? (**Probe:** Did you share this with NEEA? If so, what did they say?)
- Do you participate in any other utility energy efficiency programs? Which ones?
- What was it about that/those program(s) that led you to participate? (**Probe:** Are there any key program elements that you need in order to participate?)
- **[Only 1000bulbs and Pacific Lamp Wholesale]** I understand that you have previously provided data to BPA as part of their annual survey of the non-residential lighting market. Do you plan to continue doing so in the future?
- What, if anything, would change your plan for sharing data?

Market Forecast

- How do you expect your total 4-foot LFL sales (in units) to change in 2019 compared to 2018? Higher, lower, about the same? By about how much?
- What percent of your total 4-foot LFL sales do you expect will be 25W and 28W lamps in 2019? What about beyond 2020?
- And how do you anticipate TLED sales will change in 2019? Beyond 2020? (**Clarify** whether they are talking in absolute or percentage terms, and units or dollars—very important in this category.)

Keys to Successful Midstream Intervention

- What do you think are the key elements of a distributor-based efficiency program? Why do you say that?
- How open are you to partnering with NEEA in the future to support a different efficient product? (**Probe:** Is there any specific product you have in mind?)
- **[When relevant]** What about a non-lighting product? (**Probe:** Do you have something specific in mind?)

6. Lighting Manufacturers

Cadeo will attempt to complete interviews with four of the following six manufacturers identified by NEEA: Current/GE, Philips, Maxlite, Westinghouse, and Sylvania. Our manufacturer interviews will last a half hour and focus on the manufacturer's expectations for the near-term LFL market, the likely trajectory TLEDs, and, when relevant, their involvement in RWLR.

RWLR Experience (When Relevant)

- I understand that you attended some RWLR meetings with your partner distributors. Can you tell me a little bit about your involvement?
- From your perspective, what aspects of NEEA's RWLR initiative worked best? Which did not?
- What did your partner distributors say to you about RWLR?
- Do you have suggestions for improving the effectiveness of distributor-based lighting initiatives?

Market Forecast

- Have you observed a shift in distributor demand for 25W and 28W lamps in recent years? (**Probe:** Nationally or in the Pacific Northwest specifically?)
- Of your total in the Pacific Northwest 4-foot LFL unit sales last year, what percent would you estimate were 25W or 28W? What about nationally?
- What percent of your total 4-foot LFL sales do you expect will be 25W and 28W lamps in 2019 in Pacific Northwest? Nationally? What about beyond 2020?
- Have you, or do you have plans to, close any fluorescent plants?
- Do you think that TLEDs are a long-term part of the ambient lighting market or just a transitional technology?
- And how do you anticipate TLED sales will change in 2019? Beyond 2020?

Keys to Successful Midstream Intervention

- Are you involved in any other utility midstream programs looking to increase lighting efficiency in the non-residential maintenance market?
- Are there any particularly successful midstream programs? Which ones?
- What do you think are the key elements of a successful midstream energy efficiency program? Why do you say that?
- How open are you to partnering with NEEA in the future to support a different efficient lighting product? (**Probe:** Is there any specific product you have in mind?)

7. Regional Midstream Program Managers

NEEA identified individuals involved in the delivery of programs at the Energy Trust of Oregon, and the following four utilities: Snohomish PUD, Puget Sound Energy, Seattle City Light, and Pacific Power. Our team will attempt to complete interviews with all five entities. These interviews, which we anticipate will last between 30 and 45 minutes, will focus on how these stakeholders deliver their midstream program and/or who they navigate with their downstream programs when they still included RW lamps and their interactions with RWLR.

Context

- Can you please start by describing your lighting offering (both midstream and downstream)? **Probe:**
 - When did it start? What products does it include?
 - What is your incentive structure (i.e., mark-downs only, or distributor stocking incentives and/or sales target bonuses)?
 - What data requirements do you have for participation? (Probe: address or zip code of customer, etc.)
 - How many distributors do you work with?
 - Do they provide you with sales data? If so, is it full-category or only for qualifying products? And at what interval?
 - Do you incentivize any non-lighting products?
 - Are you exploring or considering any non-lighting products?
 - What feedback have you received from participating distributors?
 - Have you made any major changes to your program since it started?

Interactions with NEEA

- Please tell me a little bit about how you interacted with NEEA, or more specifically, with Elaine Miller or other RWLR stakeholders, as you developed and launched your midstream program?
- Did these interactions inform how you designed or delivered your program?
- What aspects of NEEA's RWLR initiative worked best? Which did not?
- Do you have suggestions for improving the effectiveness of any future NEEA mid-stream lighting initiatives?

Keys to Successful Midstream Intervention

- What do you think are the key elements of a successful midstream energy efficiency program? Why do you say that?
- What lessons have you learned delivering your program? (**Probe:** interactions with distributors, incentive design, data sharing, data requirements)
- How open are you to partnering with NEEA in the future to support a different efficient product – lighting or non-lighting? (**Probe:** Is there any specific product you have in mind?)

8. National Midstream Program Managers

The Cadeo team completed a nationwide scan of midstream programs to identify program managers running midstream programs outside the Pacific Northwest could share their experience and lessons learned, which could benefit future NEEA midstream efforts. Our team will spend approximately 30-45 minutes with these program managers discussing the questions outlined below.

Context

- I've read what I could online about your program, but it would be great to hear about it in your own words. Can you please start by describing your midstream lighting offering? **Probe:**
 - When did it start? What products does it include?
 - What is your incentive structure (i.e., mark-downs only, or distributor stocking incentives and/or sales target bonuses, pass through to customers)?
 - What data requirements do you have for participation? (Probe: address or zip code of customer, etc.)
 - How many distributors do you work with? What portion of the distributors in your service territory do you think this represents?
 - Do they provide you with sales data? If so, is it full-category or only for qualifying products? And at what interval?
 - Do you supply any marketing support, sales staff spiffs, restock bonuses, market penetration bonuses?
 - Do you incentivize any non-lighting products?
 - Are you exploring or considering any non-lighting products?
 - What feedback have you received from participating distributors?
 - Have you made any major changes to your program since it started?

Awareness of RWLR

- Have you heard of the Northwest Energy Efficiency Alliance's Reduced Wattage Lamp Replacement initiative?
- If so, what have you heard? Did RWLR have any impact on your program design or delivery?

Keys to Successful Midstream Intervention

- What aspects of your midstream program have been the most successful?
- Which, if any, have struggled?
- What do you think are the key elements / product criteria of a successful midstream energy efficiency program? Why do you say that?
- What lessons have you learned delivering your program? (Probe: interactions with distributors, incentive design, data sharing)