

A Bright Idea in Commercial Lighting: New Brunswick's Success with an Upstream Incentive Approach

*Robin Rocca, Efficiency New Brunswick
Gabe Arnold, Efficiency Vermont*

ABSTRACT

When Efficiency New Brunswick sought to develop a first commercial-sector program for the province, the agency needed a program that could be administered with relatively few staff while quickly establishing a record of success across the province. Meeting these ambitious goals would be challenging for a new organization with little public awareness, few employees, and few internal resources to build and market the program. Given these challenges, ENB opted to take a new, innovative approach that focused efforts entirely on the upstream commercial lighting market. This program was designed to establish a partnership with the lighting supply community and leverage their efforts in program delivery.

The new program, *Bright Ideas Commercial Lighting*, was launched in April of 2007. This upstream incentive approach focused on High-Performance T8 (HPT8) and Reduced-Wattage T8 (RWT8) technology. Market research had shown that these technologies were virtually unknown in the province. The program reimburses commercial lighting distributors for 100% of the incremental cost of qualifying products. Lighting distributors provide sales and project location data monthly to receive reimbursement. The program design entirely eliminates the price and “hassle factor” barriers of typical prescriptive program designs that use downstream, end-user rebates and forms. In less than six months, market share for HPT8s and RWT8s has jumped to near 100% with participating distributors, establishing a level of market penetration that may exceed any jurisdiction in North America. This paper will provide an overview of this exciting new approach, reviewing development efforts, program design strategies, and quantitative results to date.

Introduction

Efficiency New Brunswick (“ENB”), a provincial crown agency, was created in November 2005 with the mandate to:

- Promote energy efficiency measures in the residential, community and business sectors of New Brunswick;
- Develop and deliver programs and initiatives in relation to energy efficiency;
- Promote the development of an energy efficiency services industry;
- Act as a central resource for the promotion of energy efficiency in New Brunswick; and
- Raise awareness of how energy efficiency measures can lead to a more reliable energy supply for New Brunswick.

Being a new organization with limited awareness by the general public, few employees and resources, and a major component of the aggressive New Brunswick's Climate Change Action Plan, ENB was charged with building new programs that would be quickly adopted by

the public and deliver energy savings to the province. As a result, any program ENB developed needed to have a short design and implementation cycle, and be implemented by relatively few program staff.

The first commercial sector program launched by ENB was the Bright Ideas Lighting Initiative (“Bright Ideas”). Bright Ideas sought to leverage the efforts of the regional lighting supply community by quickly bringing new energy-efficient High-Performance T8 (HPT8) fluorescent commercial lighting technology to provincial businesses and establishing a record of success with the general public. Bright Ideas has accomplished this by offering directed “upstream” incentives to commercial lighting distributors, quickly bringing down market barriers and result in high participation rates and near market transformation with some participating distributors.

This paper provides an overview of the market barriers overcome in the commercial lighting sector in New Brunswick, the strategies employed by Bright Ideas, and results and lessons learned to date.

Commercial Lighting Market Barriers

As with many energy-efficient technologies, ENB found several market barriers that limited the implementation of HPT8 technology (HPT8) in the New Brunswick marketplace. These barriers included:

- *Higher initial cost:* While the incremental difference is narrowing HPT8s are more costly than conventional T8 lamps and ballasts. Initial cost to the consumer almost always overshadows other decision criteria, such as better performance or increased life-cycle cost.
- *The pressure of time:* A major factor of any construction project is time. For instance, increasing the amount of time required to complete a project increases billable hours or change orders, both of which raise project budgets. This creates a tremendous bias in favor of known and readily available technology, tried-and-true building design, and conventional lighting specification. This phenomenon applies to HPT8 fixtures, as New Brunswick distributors were not stocking fixtures with HPT8 lamps and ballast. As a result, contractors, specifiers, or end-users required special orders with longer lead time and were reluctant to invest in the HPT8 technology for their projects.
- *Product unavailability/stocking:* Distributors were reluctant to stock high efficiency equipment if demand was uncertain, re-stocking lead-times are extended as compared to standard technology, and competition remained largely initial-cost focused. This perpetuates the problem of low sales volume, and in turn the price difference between standard and premium equipment. This affirmed client reluctance to specify a product that may not be available when needed.
- *Lack of information:* The lack of clear, unbiased information about the price and savings of energy-efficient equipment was also a major issue for professionals designing new buildings and building managers seeking replacement equipment. In order to invest in higher priced, better performing technology, these individuals need to see vendor or manufacturer claims corroborated by outside parties. Additionally, consumers have difficulty identifying reliable technologies and finding contractors to specify and install them properly.

- *Lack of experience with the product.* With little or no experience with a product, design professionals and trade allies were hesitant to specify or install the product, due to unfamiliar installation issues (i.e. how design is affected by incorporation of the product) and a lack experience with equipment reliability.
- *Misplaced incentives:* The inherent structure of the commercial real estate development market, which places first-cost pressure on designers and equipment specifiers, will continue to give highest consideration to the initial installation cost of efficiency measures and design features in new construction. As a result owners and tenants will continue to bear higher life-cycle energy costs.

ENB designed Bright Ideas to address these barriers. An upstream incentive approach significantly reduces time and cost concerns, and also addresses stocking issues by paying incentives directly to distributors, who can then determine how to factor those incentives into their price points. Distributors also serve as a significant medium in which the benefits of HPT8s are directly relayed to installers and end-users. The next section outlines the overall approach of Bright Ideas.

Initiative Overview

Bright Ideas provides incentives to lighting distributors for qualifying equipment based on quantity of HPT8 product sales. Before participating in Bright Ideas, distributors are required to enter into a written legal agreement with ENB regarding the terms of the program. On a monthly basis, lighting distributors submit sales information to ENB in order to receive their incentives. This sales information includes:

- The kind and number of qualifying units sold
- The invoice number
- The purchase order number
- The “ship-to” address, if product is shipped to the job site
- The purchasers name, whether contractor or end-user
- The purchaser’s billing address

Distributors with newer, more advanced computer systems typically provide their sales information to ENB by running a sales report and exporting the data to an Excel spreadsheet. Distributors with older computer systems typically provide copies of invoices. The sales information is used to verify sales of the HPT8 products, determine the location of the installation if applicable, and to assist with measurement and verification.

The initial set of qualifying technologies offered in Bright Ideas was limited to HPT8¹ ballasts, fixtures that contain the HPT8 ballast, HPT8 lamps, and Reduced-Wattage T8 lamps. There are two key reasons for starting with a limited set of efficient products:

- *Narrow focus:* ENB had no experience with incentives for energy-efficient lighting products and lighting distributors were not familiar with HPT8 products. In fact, HPT8s were unknown and unavailable in the province before the advent of this program even

¹ Reference to CEE

though the technology performs with near the best efficacy in the North American lighting market. Starting with only HPT8s, rather than using a wider range of technologies, provided a simpler learning environment for both ENB and suppliers.

- *Narrower product difference:* The difference between a standard fixture and an HPT8 fixture, or a standard lamp and a reduced-wattage lamp, is very straightforward. This difference helps determine the incremental costs and incentive amounts, and explains the energy-efficient products. Having to explain product differences, exceptions and limitations increase when addressing a wide range of products.

Beginning with a narrow focus has allowed ENB to evaluate this new market approach without the confusion and complication associated with a full suite of efficient technologies. Narrower focus has also helped the market to become comfortable with ENB’s first initiative. Because of the initial success of Bright Ideas, ENB is evaluating whether to add additional technologies, and provide the market a broader range of choices going forward.

The incentives for Bright Ideas were designed to offset the entire incremental cost of qualifying products in most situations. ENB determined the incremental cost through a pricing survey of T8 lamp, ballast, and fixture sales representatives in New Brunswick, at varying levels of volume. Because there is a variety of products available for both the T8 and HPT8 lamps and ballasts, incremental costs varied widely, even within a single manufacturer’s product line. To keep Bright Ideas simple and straight-forward, a single incentive was chosen for each type of technology, rather than each option or configuration. Please see the chart below for the Bright Ideas incentive structure:

Table 1. Product Incentives

| Technology | Incentive |
|--|------------------|
| High-Performance T8 Ballasts | \$6 |
| Fixtures with High-Performance T8 Ballasts | \$6 |
| High-Performance T8 Lamps | \$2 |
| Reduced-Wattage T8 Lamps | \$2 |

In addition to the product incentive, distributors were offered a “transaction incentive” of \$0.25 per lamp and \$0.50 per ballast or fixture, to offset stocking, inventory, and participation costs.

Comparison to an End-User Incentive Approach

An advantage to the “upstream” or “distributor incentive” approach utilized by Bright Ideas is that it addresses several market barriers, and provides a comprehensive approach to address all.

- *Higher initial cost:* The incentive offsets the incremental cost of the technology at the wholesale level, before it has been marked-up by the distributor and contractor.

- *Product unavailability/stocking:* With no increased cost, distributors have less risk in stocking the technology, as they believe the stock will turn quickly as and customers will not need to pay more for it.
- *The pressure of time:* The increase in stock of the technology significantly reduces the time associated with obtaining the technology. In the case of new fixtures with the HPT8 ballast, Bright Ideas has reduced the lead-time from four-to-six weeks to less than two days.
- *Lack of experience with the product:* As more of the HPT8 technology is sold and installed, distributors, contractors, and end-users become more familiar with it. Becoming familiar and comfortable with the products ultimately results in more sales volume, and this should lead to a lowering of the incremental cost and associated incentives.

Another advantage of the distributor incentive approach is that it offers many opportunities for resource efficiency to ENB. As opposed to an end-user rebate approach, the administrative costs associated with processing of incentives or rebates are markedly lower. Rather than processing numerous applications from individual end-users, who are usually unfamiliar with program requirements and thus will require additional contact to collect missing data, and mailing out individual rebate checks, New Brunswick receives the same information each month from a small set of vendors who are familiar with the program data requirements. This predictable, straight forward process is far more streamlined, less expensive, efficient, and produces better data.

A final advantage of the distributor incentive approach is that it leverages the existing sales force of manufacturers and distributors. By breaking down market barriers and creating the business case for distributors to sell only the more efficient technology, the goals of the manufacturer's and distributor's sales personnel will be in alignment. This significantly reduces the amount of marketing, outreach, and education that would normally be required to gain equivalent – or less – participation in traditional rebate programs.

The upstream approach has a feedback loop that very quickly eliminates the market barriers of higher first cost, time, availability, lack of knowledge, and eventually lack of experience with the product and results in very quick uptake in the market and high levels of market penetration.

It should be noted that the distributor incentive approach also has inherent disadvantages. First, it can be difficult to secure information about the program beneficiary and the location of the equipment installation. Because distributors often sell products to contractors, who then install it at end-user sites, the distributors cannot easily provide end-user information. Typically this lack of end-user information is associated only with small volume, over-the-counter sales. Larger orders are shipped, and, there is a “shipped to” address identifying the job site. For smaller over-the-counter sales, it is difficult to collect site specific information, such as building type, operating hours, and customer satisfaction. As a result, ENB must make assumptions in place of actual data for some fraction of the sales. This is balanced by the availability of “shipped to” information on larger, more significant projects.

A second disadvantage is that ENB has no guarantee the distributor and contractor pass the incentive-induced price reduction on to the end-user. In most situations, competition and market forces will lead to the passing of the incentive through the supply chain; however, this does not happen in every case. As a corollary, it is more difficult for ENB to obtain credit from

the end-use customer for the incentive, as they are typically unaware there was ever an incentive. These disadvantages can be minimized by making the approach as publicly known as possible through direct marketing to contractors, trade-allies, and end-users.

Initiative Results

Bright Ideas Lighting Initiative, officially launched on April 24, 2007, has completed 12 months of operation and achieved measured success with uptake meeting medium design targets for quantity of HPT8 units sold in New Brunswick. Using evaluation methods and estimations chosen by ENB, product sales translate directly to reduction in energy consumption, demand, and GHG emissions.

Before demonstrating the participation and measured results, it is significant to note the achievements in resourcing and tasks associated with year one operation. Prior to launching Bright Ideas to the marketplace, 100% of New Brunswick commercial lighting distributors signed a participation agreement with ENB which had a large positive impact on year one results. Further to this, ENB staffing resources were not exhausted to implement and administer this program with approximately ½ FTE dedicated to the following tasks:

- Produce marketing collateral materials:
- Develop and enable administrative systems and agreements: Establish data tracking system and accounts payable process to pay incentives.
- Ongoing implementation activity: Include circuit rider visits to distributors, verification that purchased products have been installed, monthly transfers of data from distributors to ENB, and payments (within 30 days) of incentives from ENB to distributors.
- Downstream participant training and outreach: Deliver focused training sessions to contractors and specifiers for the design and installation of HPT8 technology. Outreach such as publication of newsletters /articles and attendance at industry meetings etc.
- Evaluation and Initiative Adjustments: evaluate early results of Bright Ideas and to determine what other technologies to add as eligible products. Currently, ENB is undertaking a more thorough evaluation of Bright Ideas by retaining an outside evaluation expert.

Anecdotally, the program results are positive with over 50% of participating distributors claiming to have completely transformed their stocking skews with HPT8 product, replacing standard T8. For example, when a contractor or maintenance personnel make standard 32 watt T8 product orders, the trained distributor staff will now inform the customer of the 28 watt HPT8 product availability, its benefits and comparable if not more economical price. Both product seller and buyer are conscious of the energy savings.

Participation

The estimated commercial lighting market size in New Brunswick's is 1.3 million linear fluorescent fixtures. Somewhere between 30% and 60% of the existing commercial building stock still has T12 lighting, accounting for 20% to 40% of over-the-counter sales for T12 lamps and ballasts. These estimates of fixtures and lamps indicate the total potential in the commercial

and institutional markets and only a portion of the total will be affected by Bright Ideas in any given year. The initiative will affect two different types of end-user transactions:

- Discretionary retrofit: Either re-lamping / re-ballasting of existing fixtures, or purchase of new fixtures, prior to the end of the equipment life.
- Lost opportunity: Purchase of new fixtures at the end of the useful life of each lamp, ballast, or fixture.

The percent of the overall total achieved in each year is called a “penetration rate,” and represents either the percentage of existing fixtures “turned over” to more energy-efficient versions (retrofit), or the percentage of market activity converted to the energy-efficient options (lost opportunity).

Table 2. Estimated Number of HPT8 Lamp and Ballast Sets Sold per Year

| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---------------|---------------|---------------|---------------|---------------|---------------|
| High | 25,000 | 32,000 | 42,000 | 50,000 | 60,000 |
| Medium | 17,500 | 22,750 | 28,000 | 33,000 | 37,500 |
| Low | 10,000 | 12,500 | 15,000 | 16,500 | 20,000 |

The estimates in **Table 2** are for HPT8 lamp and ballast sets primarily sold for use in existing fixtures. Each set represents, on average, a 3-lamp fixture. Looking at the cumulative numbers, the “medium” penetration rate yields about 140,000 fixtures, or slightly over 10% of the total estimated fixtures in all commercial buildings. This is equivalent to approximately 50% of sales to replace fixtures that failed or are at the end of their useful life.

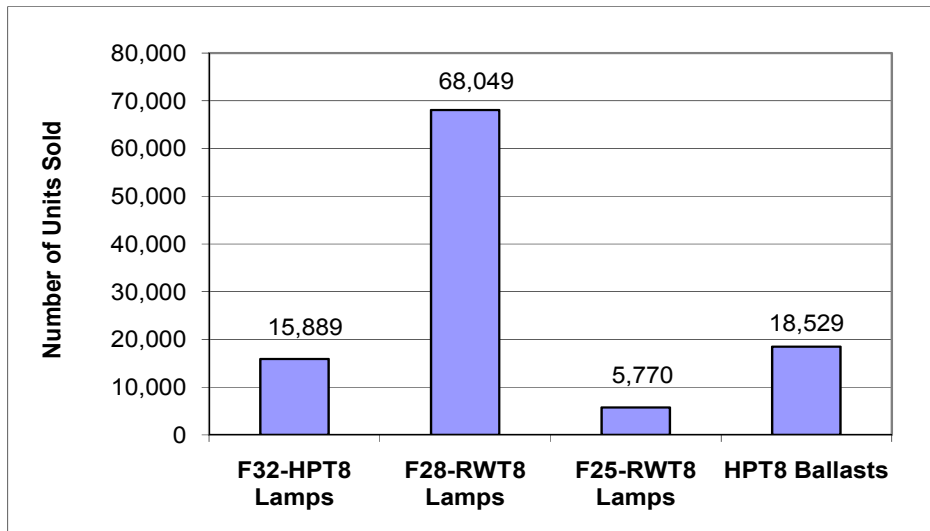
The estimates in **Table 3** are for HPT8 fixtures sold at the time of purchase of new fixtures, in either new construction or to replace existing fixtures. The “medium” penetration rate estimates that, after five years, the initiative would penetrate 22,500 of the 60,000 fixtures sold annually, or 37.5% of the annual market activity.

Table 3. Estimated Number of HPT8 Fixtures to be Sold per Year

| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---------------|--------------|---------------|---------------|---------------|---------------|
| High | 6,000 | 12,500 | 18,000 | 24,000 | 35,000 |
| Medium | 4,000 | 8,400 | 12,400 | 16,700 | 22,500 |
| Low | 2,000 | 4,000 | 6,000 | 8,000 | 10,000 |

The actual total amount of qualifying HPT8 products sold after 12 months is demonstrated by type in **Figure 1**. The total HPT8 lamps sold is 89,708 units; total HPT8 ballast sold is 18,529 units; combining for 108,239 HPT8 units. The product sold is not known whether it belongs to retrofit or new applications. However, the number of ballasts and lamp combinations will produce approximately 20,000 HPT8 fixture replacements and 5,000 new HPT8 fixture installations. This aligns with a Medium penetration rate for Bright Ideas after its first year.

Figure 1. Total HPT8 Product Sales by Type after 12 Months



Measure Savings and Costs

Based upon the analysis performed for the New Brunswick Department of Energy in 2006, an HPT8 system (3-lamp 1-ballast set) provides, on average, approximately 75 kWh annual energy savings over a baseline that combines an assumed current market mix of standard T8 and T12 fixtures. **Table 4** shows the estimated annual energy savings in annual MWh, based on the penetration rates listed.

Table 4. Incremental Annual MWh Savings from Expected HPT8 Installations

| | 2007 | 2008 | 2009 | 2010 | 2011 | 5-year total |
|--------|-------|-------|-------|-------|-------|--------------|
| High | 2,302 | 3,305 | 4,456 | 5,496 | 7,056 | 22,616 |
| Medium | 1,597 | 2,314 | 3,001 | 3,691 | 4,456 | 15,059 |
| Low | 891 | 1,225 | 1,560 | 1,820 | 2,228 | 7,724 |

Assuming at least a 5-year measure life, even for HPT8 lamps (with a 24,000-hour rated lamp life), the cumulative annual energy savings represented by this analysis can range from

approximately 7,700 MWh to 22,600 MWh per year. The upper part of that range accounts for about 3.2% of annual indoor lighting electric energy consumption.

While the energy savings percentage seems acceptable, little information currently exists on penetrations of HPT8 technologies, in which energy efficiency initiatives have targeted the technology, whether by upstream or downstream approaches. In the absence of such information, this estimate, while conservative, seems the most appropriate starting point. Efficiency NB will refine its estimates after conducting a market evaluation of HPT8 sales, which is currently underway.

These energy savings can also be converted into demand savings through two steps:

- Diversified demand: Because not all light fixtures are operated concurrently, the potential analysis discounts the demand savings to account for this diversity in operation.
- Coincident demand: There is also a difference between the time at which these fixtures operate and the electric system peak, which occurs in the winter in New Brunswick. The average “coincidence factor” for interior lighting in the general service sector is 62.5%.

The result of these two steps is shown in **Table 5**. The upper range assumptions for HPT8 technology yields about 2.5 MW of demand reduction within five years for a high penetration rate.

Table 5. Incremental Annual System Winter Peak Savings, in MW

| | 2007 | 2008 | 2009 | 2010 | 2011 | 5-year total |
|---------------|-------------|-------------|-------------|-------------|-------------|--------------|
| High | 0.26 | 0.38 | 0.51 | 0.63 | 0.80 | 2.57 |
| Medium | 0.18 | 0.26 | 0.34 | 0.42 | 0.51 | 1.71 |
| Low | 0.10 | 0.14 | 0.18 | 0.21 | 0.25 | 0.88 |

Incentive payments for Bright Ideas product rebates and transaction fees total \$322,282 after its first 12 months of operation. Additional overhead and marketing costs associated with this program was approximately \$25,000. Thus, year one total program costs were \$347,282 which translate to approximately \$217 per annual MWh saved, assuming the medium penetration rate.

The GHG emissions reduction is calculated as a simple relation to MWh, where in New Brunswick the factor 0.807 tonnes CO₂ per MWh is used. This translates to 1,289 tonnes GHG emissions reduction during the first year of Bright Ideas.

Conclusion

Bright Ideas commercial lighting initiative offers a good example of a program that has achieved success relatively quickly because it applied lessons learned from other lighting programs and carefully examined its own market and related infrastructure to provide program services.

Market research played a critical role in the design and early success of Bright Ideas Initiative. The distributor's level of knowledge of high efficiency lighting technologies and the availability of these products in New Brunswick was first determined and as a result, Efficiency New Brunswick engaged all lighting distribution companies in the province to recruit their participation in an incentive program for high efficiency lighting technologies.

This upstream market approach has proven to be an effective strategy for Efficiency New Brunswick, providing significant benefits to end-users, lighting distributors and Efficiency New Brunswick itself. Providing incentives at the distributor level offers numerous logical advantages.