Introduction

Otter Tail Power Company (Otter Tail, the Company) presents for the South Dakota Public Utilities Commission's (PUC) consideration this 2021-2023 Energy Efficiency Plan (EEP, Plan) to market energy efficiency to South Dakota customers. The Energy Efficiency Plan, as proposed, includes projects for all customer classes and major end uses showing the greatest potential for energy savings. The Plan includes 11 projects intended to achieve approximately 4.6 million kWh in annual energy savings at an approximate cost of $525,000[1]. The majority of these costs – approximately 54 percent, or $281,900, of the proposed budget – are expected to be customer incentives. The energy savings goal represents approximately 1.0 percent of South Dakota's 2019 retail energy sales. The budget represents approximately 1.3 percent of the State's 2019 retail revenue. The Company proposes launching these projects January 1, 2021.

South Dakota Data 2019 Statistical Report	
Customers	11,655
kWh sales	490,278,647
Retail revenue	$41,219,408

Otter Tail is proposing three new residential projects and one new commercial project in this plan: a residential LED lighting project with incentives offered at point of purchase and through rebates; an appliance recycling project encouraging customers to properly dispose of old, energy-wasting refrigerators, freezers, dehumidifiers, and window air conditioning units; a smart thermostat project promoting installation of Tier II and Tier III smart thermostats; and a direct install project focusing on installation of low-cost energy efficiency measures for small to midsize commercial customers. The Company further proposes continuation of residential and commercial projects proven to bring cost effective energy savings to South Dakota customers. All projects are cost-effective. The 2021-2023 portfolio benefit/cost ratios are illustrated in the following table:

Utility Test	**Total Resource Test**	**Ratepayer Impact Test**	**Societal Test**	**Participant Test**
6.42	2.28	0.72	2.98	3.67

This plan will be evaluated on an ongoing basis, and any major modifications will be proposed to the PUC in a timely manner. Major modifications would include new project additions, increases to the overall proposed plan budget by more than 10 percent, or closing projects.

The following sections provide specific details about the 2021-2023 EEP:

- Plan Summary – The Plan Summary includes an overview of the proposed plan, a list of the individual projects, and 2019 Company statistics as background information. A summary of the overall annual kWh savings goals, budgets, and proposed participation is also provided.

[1] $525,000 does not include a large industrial project approved by the Commission on December 11, 2018. 2021 is the final year of expenses and energy savings from the large industrial project.

- Project Descriptions – This section presents the individual project descriptions and justifications, as well as kWh[2], kW[3], budget, and participation goals.
- Cost Recovery and Financial Incentive – Cost recovery methodology, carrying costs, tracker balances, and other accounting matters are addressed in this section. A discussion of the Company financial incentive for providing energy efficiency projects in South Dakota is also included.
- Evaluation – This section shows the cost effectiveness test results for the Plan and assumptions associated with the cost effectiveness evaluations.
- Summary – A brief conclusion and contact information is provided.

[2] Cost per kWh reflects first year energy savings and first year costs. Lifetime costs per kWh saved will be substantially less spread over the lifetime of the technology. For example, if lighting cost per kWh is $0.07 for first year savings, the lifetime cost would be less than $0.01 per kWh, with the lighting fixture operating over nine years.

[3] DSMore modeling software provides coincident peak-load reduction information, which is reported for all projects. Coincident peak savings continues to be based on the summer season.

Plan Summary

In 2021-2023, Otter Tail is proposing to continue, with modifications, its portfolio of cost-effective energy efficiency projects in South Dakota. The portfolio includes the projects listed below, which are described in greater detail in following sections of this filing.

Residential

- Air conditioning control (promotes managing peak-demand and energy of cooling systems).
- Appliance Recycling (promotes recycling less efficient but working home appliances and replacing with high efficiency models).
- Home Lighting (promotes efficient lighting).
- Residential heat pumps (promotes efficient heating and cooling).
- Smart thermostats (promotes managing efficient operation of heating and cooling systems).

Commercial/Industrial

- DrivePower (promotes high efficiency motors and adjustable speed drives).
- Custom Efficiency Projects (promotes efficient energy use such as heat recovery, building envelope, and process improvements).
- Commercial Direct Install (promotes installation of lower cost energy efficiency measures in small to midsize businesses).
- Commercial Heat Pumps (promotes efficient heating and cooling).
- Commercial Lighting (promotes efficient lighting).

All sectors

- Advertising and Education.
- Development.

2021 South Dakota Energy Efficiency Plan				
Customer Class	**Budget**	**Annual kWh Savings**	**Annual kW Savings**	**Annual Participants**
Residential	$183,000	834,311	225.5	7,942
Commercial/Industrial	$542,000	10,778,884	2,100.0	1,463
Indirect impact (all sectors)	$50,000	N/A	N/A	525
Totals	**$775,000**	**11,613,194**	**2,325.5**	**9,930**

2022 South Dakota Energy Efficiency Plan				
Customer Class	**Budget**	**Annual kWh Savings**	**Annual kW Savings**	**Annual Participants**
Residential	$183,000	834,621	230.7	7,967
Commercial/Industrial	$292,000	3,835,429	514.8	1,171
Indirect impact (all sectors)	$50,000	N/A	N/A	525
Totals	**$525,000**	**4,670,050**	**745.5**	**9,663**

2023 South Dakota Energy Efficiency Plan				
Customer Class	**Budget**	**Annual kWh Savings**	**Annual kW Savings**	**Annual Participants**
Residential	$183,000	834,932	235.9	7,992
Commercial/Industrial	$292,000	3,835,429	514.8	1,171
Indirect impact (all sectors)	$50,000	N/A	N/A	525
Totals	**$525,000**	**4,670,361**	**750.6**	**9,688**

AIR CONDITIONING CONTROL
(Existing, Residential)

A. PROJECT DESCRIPTION

The Air Conditioning Control project will continue to include systems cycled on and off every 15 minutes during peak-demand periods through the Company's air conditioning control rider (**Cool***Savings*). The project also includes heat pump systems served through Otter Tail's dual fuel and deferred load rates that are part of Otter Tail's portfolio of demand response programs. Customers who enroll in the Air Conditioning Control project receive a $8.25 bill credit for each of the summer season months – June, July, August, and September – in exchange for allowing Otter Tail to cycle the air conditioner during system peak events. Units reached through other off-peak rates receive a discounted price for energy.

Residential customers with a central air conditioner or air-source heat pump that are not currently on a controlled electric service can enroll in the **Cool***Savings* option. Otter Tail relies on services from electrical contractors to install load control devices that enable cycling through a radio signal sent from the Company's load management system. Cooling system control is permitted by the CoolSavings rider for up to 300 hours during the summer season.

The general benefits of the CoolSavings project are regularly marketed to customers in the South Dakota service territory through bill inserts, bill messages, website promotions, and limited media campaigns. Yet, new enrollments have been below goal for the project in recent years. To help ensure the success of this project Otter Tail is proposing to offer a one-time direct incentive for eligible new project participants. The total cost of this incentive is lower than the cost for most other types of project advertising and provides a direct benefit to participants. Once enrolled in the project participants stay with the project for many years with a minimal number of opt-outs occurring.

B. PROJECT JUSTIFICATION

The U.S. Energy Information Administration (EIA) reports that in 2019 electricity use for cooling the interior of buildings by the U.S. residential and commercial sectors was about 380 billion kWh, equivalent to about 10 percent of total U.S. electricity consumption in 2019.

Though energy consumption for space cooling are significant, the design of typical home air conditioning system provides excellent demand response opportunities for electric utilities and consumers alike. By cycling home air-conditioning units in 15-minute intervals through project s such as Otter Tail's **Cool***Savings* project, the vast majority of residential customers can contribute to delaying or eliminating the need for utilities to add peak generation resources while reducing utility expenses with minimal, if any, adverse impacts to home comfort.

The existing Air Conditioning Control project adds to Otter Tail's extensive portfolio of demand and price response projects. About one-third of the Company's residential and small commercial customers are participating in one of the Company's demand response projects.

Through these projects, the Company maintains system reliability, reduces the need to purchase high-priced spot market electricity, and meets our regulated resource adequacy requirements. Although historically winter peaking, the Company is a member of the summer peaking Midcontinent Independent System Operator (MISO) region. Projects and rates that reduce summer energy and capacity needs are particularly valuable.

C. LONG TERM DEMAND SIDE MANAGEMENT GOALS

Air Conditioning Control			
	2021	**2022**	**2023**
kWh – at the generator	9,143	9,453	9,764
Cost / kWh	$1.31	$1.27	$1.23
kW – at the generator	152.2	157.7	162.9
Cost / kW	$79	$76	$74

D. PROJECT BUDGET & PARTICIPATION

Air Conditioning Control			
	2021	**2022**	**2023**
Project Delivery & Administration	$10,600	$10,600	$10,600
Incentives	$1,400	$1,400	$1,400
Total	$12,000	$12,000	$12,000
Participation	736	761	786

The majority of Project Delivery and Administration costs are for local electrical contractors hired to install equipment outside the home to control the customers cooling system.

Participation numbers reflect cumulative participants, including customers on short-duration controlled rates and participants enrolled in previous years. Actual proposed, incremental participation is 25 participants annually.

APPLIANCE RECYCLING
(New, Residential)

A. PROJECT DESCRIPTION

The Company's proposed Appliance Recycling project offers participating customers an incentive to recycle inefficient, but still operating refrigerators, freezers, dehumidifiers, and window air conditioners. The project will offer residential and small commercial customers the following incentives for recycling and thereby discontinuing the use of inefficient, but operating, home appliances:

Refrigerators	$50
Freezers	$50
Window air conditioners	$25
Dehumidifiers	$10

In the interest of project cost effectiveness, Otter Tail will require customers to recycle an operating refrigerator or freezer in order to qualify for incentives to recycle less energy-intensive window air conditioners and dehumidifiers.

Otter Tail plans to contract with a third-party industry specialist in implementing the Home Appliance project. For appliance recycling services, Appliance Recycling Centers of America (ARCA) provides a toll-free number dedicated to Otter Tail customers. ARCA verifies applicant eligibility, schedules collection appointments, answers questions about the project, places a reminder telephone call the day before the scheduled pickup, and processes and mails customer incentive checks. Interactive web pages provide an alternative to allow customers with inefficient refrigerators and freezers to schedule their own collection dates and print the associated materials. During pick-up, ARCA handles the safe removal of the appliance, secures the customer's signature to record transfer of ownership, disables the unit before leaving the site to prevent re-use, and transports the units to ARCA's fully licensed processing and recycling center.

B. PROJECT JUSTIFICATION

Although space heating, water heating, and air conditioning account for the majority of residential electricity use, consumption from other home appliances is significant and quickly adds up. EIA reports that in 2015 electricity consumption from refrigerators, freezers, clothes washers and dryers, and dishwashers accounted for just over 14 percent of average household's annual electricity use of about 11,000 kWh with dehumidifiers accounting for 1.2 percent of residential electric use.

Energystar.gov reports that an estimated 190 million refrigerators and refrigerator-freezers are currently in operation across the U.S. and that more than 68 million refrigerators are over ten years old, costing consumers $5.5 billion a year in energy costs. In markets closer to South Dakota, the State of Minnesota Department of Commerce supports these findings, reporting that in most homes a refrigerator is the second largest user of electricity behind

only air conditioners. Otter Tail's 2015 Residential End-Use Survey indicates that more than 38 percent of respondents have two or more refrigerators and that 27 percent of refrigerators were greater than 10 years old. The survey indicates that 89 percent of customers have one or more freezers, with 32 percent greater than 10 years old. Nine percent of customers with freezers did not know the age of their appliance. This research indicates significant energy savings potential exists for customers retiring aged and inefficient refrigeration equipment.

C. LONG TERM DEMAND SIDE MANAGEMENT GOALS

Appliance Recycling			
	2021	**2022**	**2023**
kWh – at the generator	97,307	97,307	97,307
Cost / kWh	$0.29	$0.29	$0.29
kW – at the generator	15.1	15.1	15.1
Cost / kW	$1,857	$1,857	$1,857

D. PROJECT BUDGET AND PARTICIPATION

Appliance Recycling			
	2021	**2022**	**2023**
Project Delivery & Administration	$23,000	$23,000	$23,000
Incentives	$5,000	$5,000	$5,000
Total	$28,000	$28,000	$28,000
Participation	100	100	100

HOME LIGHTING
(New, Residential)

A. PROJECT DESCRIPTION

The Company's proposed Home Lighting project promotes qualified ENERGY STAR LED lighting sold by participating retailers located in South Dakota communities receiving retail electric service from Otter Tail Power Company. The project also provides cash rebate incentives to residential customers for hard-wired retrofits of inefficient lighting technologies to LED lighting systems. Finally, the project proposes incentives for installation of hard-wired LED lighting in new construction applications.

The project's objective is to achieve energy savings through increased adoption of LED lighting in the residential market. The Company proposes an up-stream approach to incentivize purchase of LED lighting products by recruiting local retailers to stock and promote qualified, Energy Star LED lighting products. Participating retail stores will generally promote and sell the LED products year-round with price discounts provided at the point of purchase, significantly reducing costs for participating customers. In hard-wired retrofits and new construction applications, the Company will continue providing incentives

through a cash rebate requiring participating customers to provide documentation, including invoices, receipts, and product specifications.

Otter Tail proposes to contract for services with a firm specializing in recruiting and training retailers on LED lighting products to assure success in its Home Lighting project. Specific strategies in this effort will include:

1. Building a network of participating hardware retailers in smaller, rural South Dakota communities.
2. Encouraging other types of businesses outside of hardware stores as participating retailers (e.g. grocery stores).
3. Encouraging retailers to stock a variety of LED lamps and wattages, including floods, dimmable lamps, and globes.
4. Raising awareness among customers of the benefits of energy efficient lighting and the opportunity available through the project.

B. PROJECT JUSTIFICATION

The U.S. EIA estimates in 2019, the U.S. residential and commercial sectors combined used about 216 billion kWh of electricity for lighting. This was about eight percent of total electricity consumption by these sectors and about five percent of total U.S. electricity consumption. Residential sector electricity consumption for lighting was about 75 billion kWh or about five percent of total residential sector electricity consumption in 2019.

Otter Tail's Residential End Use survey indicates that while 47 percent of South Dakota homes had 11 or more light bulbs 73 percent of homes had no LEDs installed. An LED saves 85 percent of energy use over incandescent and lasts up to 25 times longer. LEDs generate much less heat than incandescent bulbs and are less of a fire hazard.

MARKETING

Otter Tail's marketing plan for Home Lighting includes the following proposed strategies:

- Retailer training, development, and network expansion regarding ENERGY STAR qualified LEDs.
- Targeted advertising to residential customers through bill inserts.
- Educational and promotional information on the Company's website.
- Live on-site radio remotes during the campaign.
- Point of sale promotional materials.
- Instant, time of sale, rebates on ENERGY STAR qualified LEDs.
- Promotions through non-profit organizations.

C. LONG TERM DEMAND SIDE MANAGEMENT GOALS

Home Lighting			
	2021	**2022**	**2023**
kWh – at the generator	295,269	295,269	295,269
Cost / kWh	$0.12	$0.12	$0.12
kW – at the generator	30.8	30.8	30.8
Cost / kW	$1,137	$1,137	$1,137

D. PROJECT BUDGET & PARTICIPATION

Home Lighting			
	2021	**2022**	**2023**
Project Delivery & Administration	$18,000	$18,000	$18,000
Incentives	$17,000	$17,000	$17,000
Total	$35,000	$35,000	$35,000
Participation	7,055	7,055	7,055

SMART THERMOSTAT
(New, Residential)

A. PROJECT DESCRIPTION

The Company's smart thermostat project is a new offering for the residential sector. Smart thermostats provide energy savings by changing the temperature set points during unoccupied, occupied, and nighttime preferences. These changes in temperature set points reduces the operating time of the heating and cooling system.

Tier II and Tier III capable smart thermostats are the primary target of this project. Tier II are communicating thermostats that give users access to set points and schedule from anywhere using a smart device including a mobile phone, tablet, or computer. Tier III are analytics capable thermostats that offer additional energy savings features, including coaching, HVAC diagnostics, comparative information, and geofencing, which is the use of global positioning or other tools to define boundaries. Both Tier II and Tier III have demand response capabilities and customer engagement features including customer-specific data and recommendations.

At this time, Otter Tail is not proposing any company-initiated control projects tied to smart thermostat technology but sees future potential as more advanced thermostats are deployed in the Company's service territory. By supporting the adoption of new thermostat technologies, the Company will prepare a foundation capable of supporting additional project services.

B. PROJECT JUSTIFICATION

The EIA 2015 Residential Energy Consumption Survey found only 3 percent of households reported having a smart thermostat.[4] Additionally, the EIA 2015 survey found that more than two-thirds of residents with Tier I programmable thermostats did not operate their systems using the programmable features. This is most likely due to the ease of access and use of the thermostat, requiring customers to physically stand at the thermostat to set schedules. The internet connectivity abilities of Tier II and Tier III thermostats provide a solution to resolve this ease of use barrier. Smart thermostats provide the ability to engage customers in their HVAC systems energy usage and places the information in the palms of their hands. Tier III smart thermostats, also known as learning thermostats, can observe the customers behaviors and preferences to create a temperature setting profile without the need for customer intervention. The ease of use and learning abilities of smart thermostats provide a benefit that results in energy savings over manual and Tier I programmable thermostats.

C. LONG TERM DEMAND SIDE MANAGEMENT GOALS

Smart Thermostat			
	2021	**2022**	**2023**
kWh – at the generator	48,020	48,020	48,020
Cost / kWh	$0.35	$0.35	$0.35
kW – at the generator	1.5	1.5	1.5
Cost / kW	$11,134	$11,134	$11,134

D. PROJECT BUDGET & PARTICIPATION

Smart Thermostat			
	2021	**2022**	**2023**
Project Delivery & Administration	$12,900	$12,900	$12,900
Incentives	$4,100	$4,100	$4,100
Total	$17,000	$17,000	$17,000
Participation	31	31	31

[4] https://www.eia.gov/todayinenergy/detail.php?id=32112

HEAT PUMPS
(Existing, Residential, Commercial and Industrial)

A. PROJECT DESCRIPTION

The Heat Pump project targets residential and commercial customers currently using or considering the installation of standard efficiency resistance heating and cooling systems. The project offers rebates to customers for replacing standard efficiency electric systems with qualifying higher efficiency heat pump systems or for purchasing higher efficiency systems for new installations. Qualifications for project rebates will be based on Energy Star standards.

The definition of a heat pump is a device that extracts energy from one substance and transfers it to another at a higher temperature. A heat pump takes low-temperature heat from an outdoor source (such as the air, ground, groundwater, or surface water) and mechanically concentrates it to produce high-temperature heat. Since most of the heat is simply moved (pumped) from the outdoor source to the indoors, the amount of electricity required to deliver it is typically less than would be required if using electric heat directly.

Otter Tail has structured the Heat Pumps project with separate energy, demand, and cost effectiveness goals for the following market segments:

- Residential air source heat pumps.
- Commercial air source heat pumps.
- Residential cold-climate heat pumps.
- Commercial cold-climate heat pumps.
- Residential geothermal heat pumps.
- Commercial geothermal heat pumps.

B. PROJECT JUSTIFICATION

Space heating accounts for approximately 15 percent of total energy use in the U.S. and represents significant potential for improved efficiency.[5] In the residential sector, energy use for space heating accounts for nearly half of household energy consumption. Based on Otter Tail's REUS, 28 percent of South Dakota residential customers rely on electricity as their primary energy source for heating their homes. Approximately 75 percent of these residences use electric resistance heat as their primary heating system.

Over 90 percent of Otter Tail's South Dakota customers have air-conditioning in their home. According to the 2015 REUS, approximately 68 percent of homes have cooling systems that are electric central air-conditioners or window/wall air-conditioners.

[5] https://www.eia.gov/tools/faqs/faq.cfm?id=96&t=3

Space heating in the commercial and industrial sectors also offers an opportunity for energy savings. In any typical year, the total amount of energy used for commercial space heating nearly triples that used for cooling, accounting for heating 25 percent of all commercial floor space.[6]

Otter Tail's heat pump project provides both residential and commercial customers with a much more energy efficient heating and cooling option than traditional resistance heating and central air-conditioning units. According to the United States Environmental Protection Agency (EPA), geothermal heat pumps are among the most efficient and comfortable heating and cooling technologies currently available, because they use the earth's natural heat to provide heating, cooling, and often, water heating.[7] They use the constant temperature of the earth which allows the system to reach fairly high efficiencies (300 percent to 600 percent) on the coldest winter nights.[8] The illustration below is an example of the energy efficiency capabilities of geothermal heat pumps. The geothermal heat pump delivers more than four units of heat for each unit of energy used. As a result, it can reduce annual heating and cooling costs by 70 percent.

[9]

An air-source heat pump operates at more than 200 percent efficiency. Even when operated with supplemental electric heating that assists during the coldest weather, the system can reduce total heating costs by 30 to 50 percent. Cold climate heat pumps (CCHP) can reduce customer heating cost even further by operating at temperatures of 0°F and below. A report conducted by the Center for Energy and Environment found space heating energy savings of 39 to 65 percent.[10]

While Otter Tail has seen success in growing our heat pump project in South Dakota, we also realize challenges ahead. Our service territory is very rural and depends on a strong agricultural economy to drive economic activity. Up-front capital investment in heat pumps can be large for many customers, especially for geothermal heating and cooling. However, with recent compressor technology advancements and Otter Tail's offering of optimized loop field design, heat pumps offer greater energy savings opportunities at a lower cost than traditional heat pump systems.

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[6] https://www.eia.gov/consumption/commercial/reports/2012/energyusage/
[7] https://www.energystar.gov/products/heating_cooling/heat_pumps_geothermal
[8] http://energy.gov/energysaver/geothermal-heat-pumps
[9] Figure courtesy of Waterfurnace™
[10] https://www.aceee.org/files/proceedings/2016/data/papers/1_700.pdf

The reduction and eventual elimination of the federal tax credit for geothermal heating systems provides another challenge for the heat pump project. This tax credit has been influential in steering customers to learn and to buy into a complex technology. While there is some hope the credit will not be eliminated completely, it is currently set to expire at the end of 2021. In response Otter Tail plans to maximize customer incentives and customer education to maintain the relevance of this sound energy savings technology. While the heat pump project will experience some challenges ahead, our proposed project is still cost-effective.

C. LONG TERM DEMAND SIDE MANAGEMENT GOALS

Residential Heat Pumps			
	2021	**2022**	**2023**
kWh – at the generator	384,572	384,572	384,572
Cost / kWh	$0.24	$0.24	$0.24
kW – at the generator	25.6	25.6	25.6
Cost / kW	$3,551	$3,551	$3,551

Commercial Heat Pumps			
	2021	**2022**	**2023**
kWh – at the generator	223,355	223,355	223,355
Cost / kWh	$0.20	$0.20	$0.20
kW – at the generator	17.7	17.7	17.7
Cost / kW	$2,538	$2,538	$2,538

D. PROJECT BUDGET & PARTICIPATION

Residential Heat Pumps			
	2021	**2022**	**2023**
Project Delivery & Administration	$54,600	$54,600	$54,600
Incentives	$36,400	$36,400	$36,400
Total	$91,000	$91,000	$91,000
Participation	20	20	20

Commercial Heat Pumps			
	2021	**2022**	**2023**
Project Delivery & Administration	$10,000	$10,000	$10,000
Incentives	$35,000	$35,000	$35,000
Total	$45,000	$45,000	$45,000
Participation	13	13	13

DRIVEPOWER
(Commercial and Industrial)

A. PROJECT DESCRIPTION

The DrivePower project offers incentives for efficient motor and variable frequency drive (VFD) installations. For 2021-2023, Otter Tail proposes to continue offering a prescriptive rebate for VFDs and motors as part of a combined DrivePower project. In other states, Otter Tail has experienced success in achieving market penetration with a similar strategy, and customers express appreciation for a simplified, more expedient process for VFD incentives.

The goal of the DrivePower project is to educate dealers and customers on the benefits of installing VFD motor controls as well as new and replacement electric motors that meet or exceed the National Electrical Manufacturers Association (NEMA) Premium® efficiency requirements. Rather than simply isolating opportunities for electric motor efficiency upgrades, the DrivePower project offers incentives to make the entire motor systems more energy efficient by encouraging the installation of VFDs that control motor loads more efficiently.

For the 2021-2023 DrivePower project, Otter Tail proposes changes in the structure for energy efficient motor incentives, specifically a simple, identical rebate for all totally enclosed fan-cooled (TEFC), open drip-proof (ODP), and explosion-proof motor installations with the amount dependent on motor horsepower for motors rated from one to 500 horsepower. The policy will result in more clear and concise communications of project efficiency requirements and rebate levels, making participation simpler for customers, contractors, and dealers.

B. PROJECT JUSTIFICATION

Induction motors are the workhorses of industry, used widely in virtually every manufacturing plant and office building across the country. The Institute for Industrial Productivity's Industrial Energy Efficiency Technology Database indicates that over 300 million motors are used in industry, in large buildings and in infrastructure globally, and 30 million new electric motors are sold each year for industrial purposes alone. Electric motor systems in industry are estimated to be responsible for approximately 29 percent of overall global energy consumption and 69 percent of industrial electricity consumption.

Electric motors convert electrical power into mechanical power within a motor-driven system. The vast majority of the electricity used in an electric motor-driven system is consumed by the electric motor itself. In electric motor-driven systems, some energy losses occur within the actual motor, but energy losses are greater in the rest of the mechanical system to which the motor is coupled. In a typical electric motor-driven system, the three major routes to achieving energy savings include:

1. Use of properly sized, energy-efficient motors—Motor Decisions Matter.org reports that 96 percent of the cost-of-ownership of an electric motor is the cost of electricity.

2. Use of adjustable speed drives to match motor speed and torque to the system mechanical load requirements. A VFD reduces motor speed to match a driven load by controlling the electrical frequency supplied to the motor. In pump and fan applications with centrifugal load, reducing motor speed by half to match a reduced load in turn reduces energy consumption by a factor of eight. E Source reports that the single most potent source of energy savings in induction motor systems lies not in the motor but, rather, in the controls that govern the motor's operation. VFDs can provide significant benefits in matching a motor's performance to the requirements of the process load.

3. Optimization of the complete system, including correctly sized motor, pipes and ducts, efficient gears and transmissions, and efficient end-use equipment.

C. LONG TERM DEMAND SIDE MANAGEMENT GOALS

Drive Power			
	2021	**2022**	**2023**
kWh – at the generator	8,547,821	1,604,366	1,604,366
Cost / kWh	$0.04	$0.04	$0.04
kW – at the generator	1,783.0	197.7	197.7
Cost / kW	$179	$349	$349

D. PROJECT BUDGET & PARTICIPATION

Drive Power			
	2021	**2022**	**2023**
Project Delivery & Administration	$12,000	$12,000	$12,000
Incentives	$307,000*	$57,000	$57,000
Total	$319,000*	$69,000	$69,000
Participation	364*	72	72

*Includes final year of large customer project approved by Commission on December 11, 2018.

CUSTOM ENERGY EFFICIENCY PROJECT
(Existing, Commercial and Industrial)

A. PROJECT DESCRIPTION AND JUSTIFICATION

The Custom Energy Efficiency project incentivizes commercial and industrial customers for energy-saving equipment installations and process changes that improve energy efficiency. The Custom Energy Efficiency project is a comprehensive project that is designed to cover energy-saving applications that are not served by the Company's other prescriptive rebate projects.

Impact savings estimates from Custom Energy Efficiency projects are provided to Otter Tail by the customer in a project proposal. The proposal presents detailed demand and energy savings for each proposed measure that are reviewed and verified by Otter Tail engineering staff. If necessary, modifications are made to the proposal and an iterative process takes place with the customer to ensure accuracy of savings calculations and appropriate documentation of proposed improvements. Otter Tail offers assistance to commercial and industrial customers to help them determine the energy and demand savings necessary in developing a custom efficiency project proposal.

In addition, the customer often works with internal or third-party engineers to determine and verify savings. End-use metering may also be used for verifying impact savings.

B. LONG TERM DEMAND SIDE MANAGEMENT GOALS

Custom Energy Efficiency			
	2021	**2022**	**2023**
kWh – at the generator	604,106	604,106	604,106
Cost / kWh	$0.07	$0.07	$0.07
kW – at the generator	123.1	123.1	123.1
Cost / kW	$341	$341	$341

C. PROJECT BUDGET & PARTICIPATION

Custom Energy Efficiency			
	2021	**2022**	**2023**
Project Delivery & Administration	$12,000	$12,000	$12,000
Incentives	$30,000	$30,000	$30,000
Total	$42,000	$42,000	$42,000
Participation	12	12	12

COMMERCIAL DIRECT INSTALL
(New, Commercial)

A. PROJECT DESCRIPTION

Otter Tail's proposed Commercial Direct Install (CDI) project will provide free installation of low-cost energy efficiency measures for participating small to midsized commercial customers. The project further capitalizes on personal interactions to ensure customers in this market segment have opportunity to engage on:

- Benefits of energy efficiency and conservation.
- Energy efficiency opportunities available in the customer's business operations.
- Quick, easy, and affordable measures that have a direct, immediate impact on reducing energy bills.

The CDI project will retrofit participating businesses with easily installed, lower-cost energy efficiency measures that will immediately demonstrate benefits through reduced energy expenses.

B. PROJECT JUSTIFICATION

E Source reports that the small to midsize (SMB) sector generally makes up around 80 percent of a utility's commercial customer base, yet many business types in this segment are far less likely to participate in energy efficiency projects. Common barriers often contributing to low participation rates include customers' shortage of capital or labor, low awareness and understanding of efficiency project, cultural or language differences, and split incentives between building tenants and owners.

Otter Tail's CDI project provides free installation of low-cost energy efficiency measures for participating small to midsized commercial customers. The project further capitalizes on personal interactions to ensure customers in this market segment have opportunity to engage on:

- Benefits of energy efficiency and conservation.
- Energy efficiency opportunities available in the customer's business operations.
- Quick, easy, and affordable measures that have a direct, immediate impact on reducing energy bills.

The CDI project will retrofit participating businesses with easily installed, lower-cost energy efficiency measures that will immediately demonstrate benefits through reduced energy expenses.

Otter Tail will leverage the synergy between the commercial Advertising & Education and the CDI projects to focus on energy efficiency among the small to midsize business segment. Benefits of the project will include:

- On-site energy assessments.
  Participating customers will receive a free energy assessment and a follow-up

documentation through the Advertising and Education project. The simple two-page report summarizes the most cost effective three or four opportunities for improving energy efficiency unique to each participant's business. Reports will provide detailed information on estimated savings, costs, and paybacks for recommended efficiency measures.

- Direct-installation efficiency measures.
  The CDI project will provide free installation of the following measures:
  - Cold-beverage vending machine controllers.
  - Faucet Aerators, pre-rinse spray valves, domestic water heater pipe insulation, and reduced water heater temperature set-points in businesses with electric water heating.
  - LED spot lamps, A-lamps, T8 lamp replacements, and exit sign retrofit kits.

MARKETING

Otter Tail will rely on the Company's commercial energy management representatives located in South Dakota for initial introductions of the project concept to community administrators and government officials. After confirming interest from the community, the Company will rely on commercial energy management representatives and customer services representatives to implement a grass roots, door-to-door campaign educating small- to mid-size businesses about the project benefits, including free assessments and installations of energy efficiency measures available. Similar campaigns in Minnesota have increased customer participation from only two percent with a stand-alone direct mail campaign to as much as 28 percent with the supplemental, personal interactions.

Following the grass roots promotional campaigns, Otter Tail will contract with an experienced third-party implementation consultant who will schedule visits with customers so auditors can complete all assessments expediently and efficiently to maximize project cost effectiveness. Actual assessment will focus on direct installation of end-use efficiency measures and identification of other opportunities for improving efficiency. Otter Tail's field representatives will receive copies of all completed assessments, enabling them to follow on the best customer leads for participation in the Company's other prescriptive efficiency project s, including Commercial Lighting, DrivePower and other applicable projects.

C. LONG TERM DEMAND SIDE MANAGEMENT GOALS

Commercial Direct Install			
	2021	**2022**	**2023**
kWh – at the generator	243,985	243,985	243,985
Cost / kWh	$0.11	$0.11	$0.11
kW – at the generator	17.4	17.4	17.4
Cost / kW	$1,497	$1,497	$1,497

D. PROJECT BUDGET & PARTICIPATION

Commercial Direct Install			
	2021	**2022**	**2023**
Project Delivery & Administration	$17,000	$17,000	$17,000
Incentives	$9,000	$9,000	$9,000
Total	$26,000	$26,000	$26,000
Participation	578	578	578

COMMERCIAL LIGHTING
(Modified, Commercial and Industrial)

A. PROJECT DESCRIPTION

The Company's Commercial Lighting project consists of the previously approved, existing commercial and industrial Lighting Retrofit project and the proposed Lighting New Construction projects. Because both relate to energy efficient lighting measures, the Company proposes this consolidated project to make project management more efficient.

The Commercial Lighting project provides incentives to commercial and industrial customers installing qualifying energy-efficient lighting technologies in new construction applications and for retrofitting to energy-efficient lighting technologies such LED lamps and fixtures and lighting controls.

B. PROJECT JUSTIFICATION

The U.S. EIA estimates that in 2019 the residential and commercial sectors consumed about 216 billion kWh of electricity for lighting, representing about eight percent of total electricity consumption for these two sectors combined and about five percent of total U.S. electricity consumption. The U.S. DOE's *Energy Star Building Manual* reports that lighting consumes close to 35 percent of the electricity used in commercial buildings in the U.S. and affects other building systems through its electrical requirements and the waste heat that it produces. Large buildings that are dominated with internal heat-generating processes and often use far more air conditioning than heating. As a result, these are excellent candidates for lighting efficiency upgrades as they can experience an HVAC energy-savings bonus of 40 percent or more in addition to efficiency gains from the actual lighting efficiency improvements.

LED lighting is a technology that has experienced very recent increases in market share across the U.S. as well as Otter Tail's South Dakota Service area. The U.S. Department of Energy reports that by 2035 energy savings from LED lighting will top 569 terawatt-hours annually, equal to the output of more than 92- 1,000-megawatt power plants. DOE further reports that most of the projected energy savings in 2035 will be driven by increased use of LED lighting in commercial and industrial buildings and outdoor lighting applications.

PROJECT MODIFICATIONS

For 2021-2023, Otter Tail proposes to modify the Commercial Lighting project by adding incentives for customers to install efficient LED lighting in new construction applications. The Company currently provides incentives for these installations through the Custom Efficiency project, using both baseline and energy efficient LED technology assumptions as provided in the most recent version of the Minnesota Technical Resource Manual. Providing the incentive through a prescriptive rebate is a more efficient process for project participants and Otter Tail alike.

C. LONG TERM DEMAND SIDE MANAGEMENT GOALS

Commercial Lighting			
	2021	**2022**	**2023**
kWh – at the generator	1,159,616	1,159,616	1,159,616
Cost / kWh	$0.09	$0.09	$0.09
kW – at the generator	158.8	158.8	158.8
Cost / kW	$693	$693	$693

D. PROJECT BUDGET & PARTICIPATION

Commercial Lighting			
	2021	**2022**	**2023**
Project Delivery & Administration	$23,000	$23,000	$23,000
Incentives	$87,000	$87,000	$87,000
Total	$110,000	$110,000	$110,000
Participation	69	69	69

ADVERTISING AND EDUCATION
(Modified, Residential, Commercial and Industrial)

A. PROJECT DESCRIPTION AND JUSTIFICATION

The goal of advertising and education efforts is to inform, persuade, remind, and add value. Advertising and education make individuals aware of product options, energy efficiency choices, informs them about those options, and assists the individual in making decisions about a course of action or purchase. Effective advertising and education prepares an individual to respond when a need or opportunity arises. This likely does not occur simultaneously with the message being received, but has an effect, none-the-less, on decisions made.

The range and complexity of energy related decisions consumers make continue to multiply. This is due to the variety of energy-powered technologies used in modern life; the variety of construction materials available; the number of construction techniques represented in today's building stock; and the number of options available for heating, cooling, and ventilation systems.

The primary purpose of this project is educational outreach targeting residential customers, commercial customers, and school-age children across economic groups from within the Otter Tail customer base. The project objective is to promote consumer awareness of energy-saving practices and to educate both today's consumers and future consumers to help prepare them to make lifestyle and business choices and buying decisions that maximize energy efficiency and savings.

Components of the Advertising and Education project include presenting educational assemblies to students and their teachers, providing educational materials such as newsletter articles, bill inserts, and other literature, and providing web-based educational information about energy use and energy conservation options. A key addition for 2021—2023 includes energy assessments for small to midsize businesses. These will be provided as an educational resource alongside the Company's proposed Commercial Direct Install project.

- **Educational assemblies for students and teachers.**
  The Energy Connection program is a production and tour offered by the Minnesota Science Museum. We plan to continue offering an energy tour as a free service to selected schools in South Dakota in the spring of 2021, 2022, and 2023. The goal will be to provide the assembly program to at least four schools each year, targeting students in fourth through sixth grades. The assembly includes interactive displays and activities to develop an understanding of energy, alternative fuels and energy resources used to generate electricity, and energy conservation methods to use at home and at school. The program is supplemented with materials for teachers to assist them in meeting their energy education requirements for fourth through sixth grades. Schools are invited to sign up for the assembly on a first come, first served basis with a three-year rotation among eligible schools to ensure all students in fourth- through sixth-grade have the opportunity to see the assembly.

- **General information literature.**
  Appropriate materials will be developed and produced as companion pieces to support the projects and technologies offered in this portfolio and the general energy efficiency education effort. Pieces will include bill inserts, and educational materials made available online.

- **Internet based resources**
  Materials developed through this project will direct customers to www.otpco.com where they will find a variety of conservation tips and resources. The most significant tool available to customers on the web is an energy feedback tool that provides an online energy audit and bill analysis tool. Called Home Energy Analyzer, this tool helps residential customers understand their individual energy consumption patterns, identify causes for changes in consumption, compare their use to other similar households, and to be guided to actions to reduce their personal energy use. Studies show that energy feedback projects are successful in driving household energy savings of two percent or more through behavior and prescriptive changes. This tool is available for web self-service and through contact with customer service center representatives.

- **On-site energy assessments for small commercial customers**
  Participating customers will receive a free energy assessment and a follow-up documentation. The simple two-page report summarizes the most cost effective three or four opportunities for improving energy efficiency unique to each participant's business. Reports will provide detailed information on estimated savings, costs, and paybacks for recommended efficiency measures.

The annual objective of the Advertising and Education project is to educate approximately 400 students on energy use, its impact on the environment, and how behavior and technology interact; to drive approximately 75 customers to participate in the Home Energy Analyzer project; and to distribute energy efficient literature to customers, and to reach 50 small and midsize customers with onsite energy assessments. The project will also support other advertising efforts in specific projects.

B. LONG TERM DEMAND SIDE MANAGEMENT GOALS

This project is not a direct impact project; therefore, no estimates have been made to determine any effects on peak demand or energy consumption.

C. PROJECT BUDGET & PARTICIPATION

Advertising and Education			
	2021	**2022**	**2023**
Project Delivery & Administration	$35,000	$35,000	$35,000
Total	$35,000	$35,000	$35,000
Participation	525	525	525

EEP DEVELOPMENT AND PLANNING
(Existing)

A. PROJECT DESCRIPTION

Research and development are critical steps in ensuring that Otter Tail's Energy Efficient Plan in South Dakota remains relevant and effective to South Dakota Customers over the long term. The Development and Planning project is designed to allow for both long-term and near-term management and development of the EEP at Otter Tail.

The project will encompass analyzing new trends and technologies, conducting EEP-related strategic planning (economic and impact), and EEP-related regulatory coordination and compliance. Analysis activities will focus on national, state, and other utility trends; demand side management potential, load research, legislative and regulatory activity; and private sector development of new technologies and project aligned with energy efficiency efforts.

B. LONG TERM DEMAND SIDE MANAGEMENT GOALS

This project is not a direct impact project; therefore, no estimates have been made to determine any effects on peak demand or energy consumption.

C. PROJECT BUDGET & PARTICIPATION

Development and Planning			
	2021	**2022**	**2023**
Development and Planning	$15,000	$15,000	$15,000

Cost Recovery and Financial Incentive

Otter Tail has established a balancing account to track South Dakota conservation costs, including a carrying charge for the time value of the money invested in energy efficiency projects incurred by the Company. The tracker also accounts for amounts collected from customers through the conservation cost recovery charge. The conservation cost recovery charge is collected monthly based on the applicable adjustment factor multiplied by the Customer's monthly energy (kWh) usage. For billing purposes, the cost recovery charge is combined with other charges as part of the energy adjustment that appears on customers' electric service bills.

We are not currently recovering any of these costs in base rates. The conservation cost recovery mechanism is an appropriate means to recover costs associated with developing and implementing the South Dakota Energy Efficiency Partnership.

On May 1 of each year the Company plans to file a Status Report detailing the previous year's EEP results, including energy savings and expenses. In addition, the Company will request approval of a financial incentive, an update to the amount of the conservation cost recovery charge, and approval to continue the adjustment charge on customers' bills, effective July 1, of that year.

Otter Tail requests a financial incentive for the 2021-2023 EEP consistent with the incentive proposal filed on May 1. The following table shows the proposed incentive for 2021, 2022, and 2023 capped at 30 percent of budgeted annual EEP expenses. The financial incentive realized by the Company would be based on the lesser of the budget or actual expenses and filed annually in the May 1 Status Report.

SD Energy Efficiency Financial Incentive	**2021**	**2022**	**2023**
Proposed EEP Budget	$775,000	$525,000	$525,000
Percent of Budget	30%	30%	30%
Financial Incentive (cap)	**$232,500**	**$157,500**	**$157,500**

Evaluation

Otter Tail uses DSMore™ software to analyze projects and to calculate benefit-cost test results for each direct-impact project and for the aggregate EEP portfolio including indirect impact project costs. A summary of the cost effectiveness of the portfolio is presented in the following table for each year of the 2021-2023 EEP and for both years combined.

2021 Energy Efficiency Plan - Benefit / Cost Results				
Participant Test	Ratepayer Impact Test	Total Resource Test	Societal Test	Utility Test
3.81	0.74	2.55	3.31	8.71
2022 Energy Efficiency Plan - Benefit / Cost Results				
Participant Test	Ratepayer Impact Test	Total Resource Test	Societal Test	Utility Test
3.68	0.67	1.97	2.57	4.64
2023 Energy Efficiency Plan - Benefit / Cost Results				
Participant Test	Ratepayer Impact Test	Total Resource Test	Societal Test	Utility Test
3.34	0.75	2.03	2.66	4.80
2021 - 2023 Energy Efficiency Plan - Benefit / Cost Results				
Participant Test	Ratepayer Impact Test	Total Resource Test	Societal Test	Utility Test
3.67	0.72	2.28	2.98	6.42

Externality values are typically included in the Societal Test. For this analysis, the Company excluded externality values in the Societal and Total Resource Test.

DSMore™ incorporates data from the Company's Integrated Resource Plan, transmission cost models, and financial parameters to model our customer load profiles, system peaks, line losses, customer rates, marginal energy costs, avoided capacity costs, and avoided transmission and distribution costs. Results for the individual projects are provided in Appendix A along with benefit/cost test results for each project.

Otter Tail used the following discount rates as inputs to DSMore™ for the 2021-2023 analysis. The Societal Test discount rate and the Residential Participant Test discount rate are calculated using the United States Department of the Treasury's (Treasury) 20-year Constant Maturity (CMT) Rate, which averaged 3.02 percent between January 2, 2018 through December 31, 2018.

Participant Test Residential	**Participant Test Commercial**	**Ratepayer Impact Test**	**Total Resource Test**	**Societal Test**	**Utility Test**
3.02%	7.09%	7.09%	7.09%	3.02%	7.09%

Summary

Otter Tail's 2021-2023 Plan presents projects for all customer classes and major end uses. The Plan includes projects intended to achieve approximately 4.6 million kWh in annual energy savings at an approximate total cost of $525,000. DSMore™ results demonstrate that the Plan passes all required cost effectiveness tests.

Otter Tail proposes launching these projects January 1, 2021. Following the Plan's implementation and evaluation, the Company will provide reviews to the Commission of the Company's performance compared to the budgets every year by May 1. The Company aims to achieve a financial incentive for providing energy savings and net benefits to South Dakota customers. This incentive is proposed as 30 percent of actual EEP expenses, capped at 30 percent of proposed budget.

We respectfully request the Commission approve the 2021-2023 Energy Efficiency Portfolio and incentive plan.