Exhibit No.: _____
Issue: Liberty-Empire's Missouri Transportation Electrification Program
Witness: Ambika Coletti
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Sponsoring Party: The Empire District Electric Company
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Before the Public Service Commission

of the State of Missouri

Direct Testimony

of

AMBIKA COLETTI

on behalf of

The Empire District Electric Company

November 29, 2020

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I. INTRODUCTION

Q. Please state your name and business address.

A. My name is Ambika Coletti. My business address is 1200 Sixth Avenue, Suite 1800, Seattle, Washington, 98101.

Q. By whom are you employed and in what capacity?

A. I am employed by ICF Resources, LLC ("ICF"), as a Beneficial Electrification Manager. ICF and its role in this matter are described in the Direct Testimony of Company witness Robin McAlester.

Q. On whose behalf are you testifying in this proceeding?

A. I am submitting this testimony on behalf of The Empire District Electric Company ("Liberty-Empire" or the "Company").

Q. Please describe your educational and professional background.

A. I am a 2012 graduate of Tulane University with a Bachelor of Science Degree in Environmental Science and a minor in Business. I have six years of experience in the assessment, planning, and implementation, of utility beneficial electrification programs. I have been employed by ICF for approximately eight years, and currently serve as a Beneficial Electrification Manager in the Commercial Energy Practice. I have conducted opportunity assessments for 15 utility beneficial electrification programs across 22 states and supported start-up and implementation of 8 utility programs. I have supported the development of utility beneficial electrification programs, including: program design, establishment of incentives, forecasting of participation, cost-effectiveness testing, and creation of marketing strategies. I also currently manage the Clean Air Technology Program on behalf of CenterPoint Energy

where I previously served as the local Account Manager providing direct customer and trade ally outreach and education.

Q. Have you previously testified before the Missouri Public Service Commission or any other regulatory agency?

A. No, I have not previously provided testimony before the Missouri Public Service Commission ("Commission") or any other regulatory agency.

Q. What is the purpose of your testimony in this proceeding?

A. My Direct Testimony addresses non-road transportation electrification, specifically Liberty-Empire's proposed Non-Road Electrification Pilot Program.

Q. Are you sponsoring any schedules with your testimony?

A. Yes, attached to my Direct Testimony is Schedule AC-1 – Liberty-Empire Non-Road Electrification Technology Assessment.

II. NON-ROAD ELECTRIFICATION PILOT PROGRAM OVERVIEW

Q. Please provide a summary of the Company's proposed Non-Road Electrification Pilot Program.

A. The Non-Road Electrification Pilot Program will provide marketing, technical support, and incentives to encourage adoption of qualifying electric technologies that would alternatively be powered by gasoline, diesel, or propane fuel. The technologies include electric forklifts, electric stand-by truck refrigeration units ("E/S TRUs"), truck stop electrification ("TSE"), electric agricultural irrigation well pumps, and qualified custom equipment.

Q. What are the equipment measures within the Company's proposed Non-Road Pilot Program?

A. The equipment measures within the company's proposed pilot include the following technologies: electric forklifts, E/S TRUs, TSE, agricultural well pumps, and custom equipment.

Forklifts are common pieces of material handling equipment that are primarily used for lifting and moving heavy loads around facilities. They are used across diverse commercial and industrial customers including but not limited to: warehouses, manufacturers, shipping depots, airports, ports, mines, hospitals, universities, and railyards. Diesel and propane forklifts are the most common internal combustion forklift fuel types.

Truck Refrigeration Units ("TRUs") are used by food distribution and cold storage companies to maintain temperatures in trailers. On-road power typically comes from onboard auxiliary diesel engines. E/S TRUs can directly plug in to the power grid to maintain temperatures overnight, or prior to and during loading and (as opposed to idling the diesel engine during those times).

Truck stop electrification provides opportunities for truck drivers to power necessary systems directly from the grid without idling diesel engines. Truck drivers are required to take a ten-hour rest after every eleven hours of driving. They often use truck engines to power cab amenities during the rest periods, including heating, air conditioning, and small appliances.

Agricultural well pumps are used to irrigate water from nearby sources or wells to cropland, greenhouses, and pastures. Diesel well pumps are the most common alternative to electric well pumps and are the targets of this program.

Q. What are the benefits of non-road electrification?

A. Overall, the equipment measures in the proposed pilot program will provide a host of benefits to Liberty-Empire's commercial and industrial customers. These benefits include reduced ownership, maintenance, and fuel costs, healthier, cleaner, quieter, and more efficient work environments, and a better environmental profile.

Liberty-Empire will also benefit from downward pressure on rates, increased system utilization and an improved load factor. Additionally, electrification programs can increase customer satisfaction and allow for more utility to customer touchpoints.[1]

Q. Why are these equipment measures important and what are barriers to adoption of these measures?

A. **Forklifts** are a common piece of equipment for Liberty's commercial and industrial customers. Despite significant advancements in battery technology and charging technologies over the past 20 years, electric forklift sales have consistently represented only 40-50% of the U.S. forklift market.[2] According to county level Industrial Truck Association data provided by a Missouri forklift dealer, only 30% of the forklifts sold within Liberty Missouri's service Territory in 2018 were electric (41% including class III lifts). The most significant barriers to adoption of electric forklifts over conventional internal combustion forklifts are their higher initial capital cost, lack of customer awareness of the technological advances and potential long-term savings of modern electric forklifts, and skepticism among business owners that electric forklifts can perform the work as their propane and diesel units. Because so many diverse types of commercial and industrial customers have forklifts, this equipment measure also serves

[1]JEA and GDS PLMA Presentation, Beneficial Electrification, published November 6, 2019, available at: https://www.peakload.org/assets/40thConf/C.2-Duckwall%20&%20Tilden-PLMA%20CONF%20NOV%202019%20ELECTRIFICATION%20-%20v5.pdf.

[2] Industrial Truck Association, History of U.S. Shipments, published 2019, available at: https://www.indtrk.org/wp-content/uploads/2019/02/United-States-Factory-Shipments-Table-2018.pdf.

as a critical lead in opportunity to discuss electrification of additional, sector specific measures.

E/S TRUs and **TSEs** are important measures to help reduce local pollutants as they allow drivers to plug into the grid to power their refrigeration units while at warehouse bays or provide driver comforts while parked overnight instead of idling auxiliary engines. Adoption of E/S TRUs and TSEs has been limited primarily by the cost of infrastructure to support the units and customers' awareness of the equipment's long- term benefits. Including these equipment measures in non-road program will help offset the initial capital cost and educate customers about the financial, driver, and environmental benefits of using E/S TRUs and TSEs.

While many of the non-road electrification measures are focused on the manufacturing sector, there is also substantial opportunity for electrification in the agricultural sector within Liberty-Empire's service territory. While 58% of **agricultural irrigation wells** in Missouri are electrified, this is behind national adoption of 74%.[3] The primary barrier for electric powered irrigation wells is access to sufficient electric infrastructure in rural areas. Funding, customer education, and technical assistance provided through the non-road program can assist customers in navigating this transition and close the gap.

Finally, the **custom equipment** measure allows the non-road program to provide funding and technical assistance for beneficial equipment measures that are not captured under the prescriptive equipment measures. Custom measures will be assessed

[3] U.S. Department of Agriculture, Census of Agriculture Irrigation Pumping Survey Report, published 2018, available at: https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/Farm_and_Ranch_Irrigation_Survey/index.php.

on a case by case basis to meet requirements of improving local air quality and providing participant, customer, and total resource benefits. Custom measures will be able to accommodate unique projects that may have more variable operational and load profiles than can be captured in a prescriptive measure. A custom measure will also allow Liberty-Empire the flexibility to provide funding for new, innovative technologies and address changing market needs.

Q. Are there available alternative funding sources for these equipment measures?

A. While there is alternative funding available for non-road electrification in a broad sense, limited funding mechanisms have awarded funds to the equipment proposed in this program. State level Diesel Emissions Reduction Act ("DERA") funding has been almost exclusively awarded to school bus conversions since the program's inception.[4] The state Beneficiary Mitigation Plan for disbursement of Volkswagen Mitigation Funding indicates that funding will not be applicable to the proposed program technologies and will focus instead on school buses, government owned vehicles, and transit and shuttle buses. The Company's pilot program will close this funding gap and allow for broader non-road electrification.

Q. Are there similar utility programs elsewhere that are useful for comparison? If so, please describe similarities and differences with reference to the Company's proposed Non-Road Pilot Program.

A. Yes, a growing number of utilities are pursuing non-road electrification in various ways. These utilities include CenterPoint Energy, Entergy, Southern Company, Tennessee Valley Authority, JEA, Alliant Energy, Pacific Gas & Electric, Ameren

[4] Missouri Department of Natural Resources, Past State-Allocated Clean Diesel Grants, published 2019, available at: https://dnr.mo.gov/env/apcp/dera.htm.

Missouri, Sacramento Municipal Utility District, and Salt River Project. These programs include a variety of technologies such as forklifts, TRUs, TSE, pipeline compression, port electrification, irrigation pumps, mining equipment, cooking equipment, airport ground support equipment, cranes, and custom industrial process equipment such as metal treating and manufacturing.

While these programs focus on a range of technologies, most electrification programs share key components with Liberty-Empire's proposed program, including financial incentives, educational marketing, and technical assistance. Nine of the 10 utilities listed above offer financial incentives as a core element of their electrification programs and have amounts similar to Liberty-Empire's proposed incentives.

III. PROGRAM DESIGN

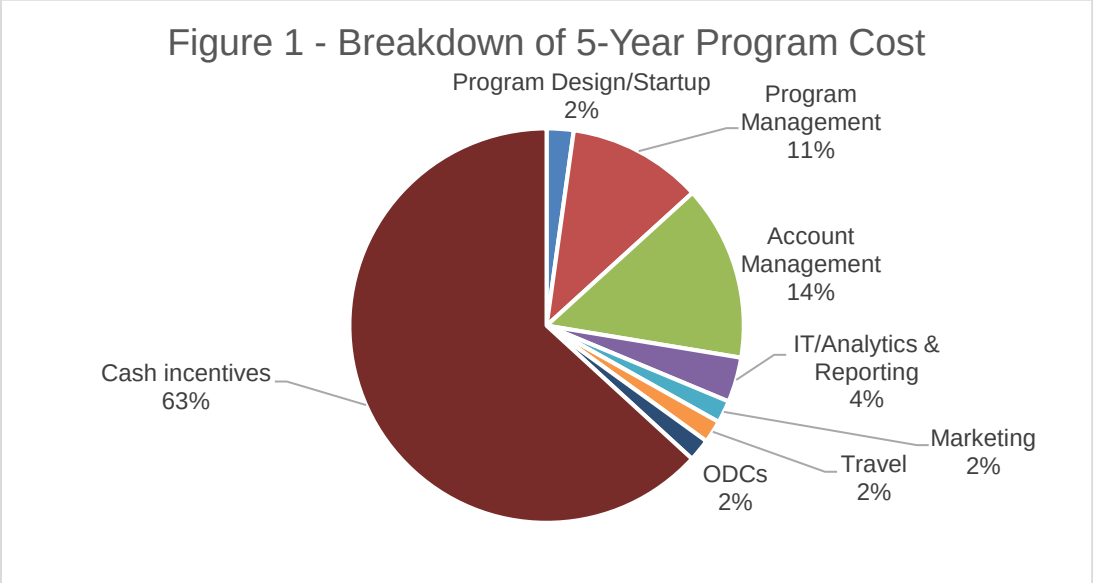
Q. Please describe the important design elements of the Non-Road Pilot Program.

A. The pilot program includes prescriptive and custom cash incentives for customers, forklift dealer special performance incentive funds ("SPIF"), non-cash incentives in the form of educational information, technical assistance, and financial modeling. There will be a marketing awareness campaign that includes physical and digital program materials to help customers understand the benefits of the proposed technologies. Additional program services include local account managers to provide technical and application support to customers, dealers, and other stakeholders as well as data tracking, reporting and equipment verification.

Q. What is the proposed segmented budget for the Non-Road Pilot Program?

A. The budgets outlined for the five-year non-road pilot program are $3,077,000 for cash incentives and $2,015,865 for program delivery. The $2,015,865 program delivery costs include administrative (program management, IT/analytics and reporting, travel,

other direct costs, start-up), marketing (program collateral design and creation), and electrification consultation (account management, customer site assessments, financial payback analyses, trade ally trainings and outreach) costs for a five-year pilot program. The components of program cost are summarized in Figure 1 below. It is my experience that this is a reasonable distribution of costs for a program of this age, scope, and overall size – especially given that this pilot program requires a significant amount of account management time with dealers and customers providing customer education, sales training, technical support, incentive processing support, and documentation.



Q. What are the proposed incentive amounts for each non-road measure?

A. The maximum proposed incentive amount for **forklifts** $2,500 per unit that is displacing a class IV, or V propane or diesel forklift (does not include compressed natural gas forklifts). Electric forklifts that are expanding an existing fleet or new equipment for the customer will be eligible for a reduced incentive of $700 (electric forklifts replacing older electric units will not be eligible). Up to $100 of the total forklift incentive will be eligible for an optional dealer SPIF to help strengthen the utility relationship with the local trade ally network and help escalate initial program

participation. The dealer may defer their SPIF amount to the customer should they not wish to accept.

The proposed incentive for **electric-standby truck refrigeration units** is $900 for infrastructure to support 230V box truck units or $4,200 for infrastructure to support larger trailer units at 480V. The proposed incentive for **truck stop electrification** infrastructure is up to $2,300 per pedestal.

Custom equipment and accompanying rebate amounts will be evaluated by the program on a case-by-case basis. Custom projects will be assessed for potential load impacts, cost effectiveness, and net emission reductions. Custom incentives will be based on $0.10 per annual kilowatt-hour ("kWh") added by the measure, with a cap of 75% of the total project cost. Customers may request application pre-approval prior to equipment purchase to reserve funding for custom projects.

Agricultural customers converting **agricultural irrigation well pumps** to electric will be eligible for a $5,000 incentive towards the cost of the pump or excess line extension (infrastructure not covered by Liberty-Empire's existing line existing policy), not to exceed 75% of total project cost. Liberty-Empire's current line extension policy for non-residential customers will provide overhead or underground distribution facilities to serve an individual non-residential customer at no cost to the customer provided the estimated revenue from three years of electric service equals or exceeds the estimated direct and indirect costs of construction.

The cost benefit analysis ICF conducted assumed the highest incentive amount for each measure to estimate a conservative Ratepayer Impact Measure test. Customers will be limited to a rebate cap of $60,000 per program year. The 5-year program incentive budget will be $ $3,077,000 with about 8% anticipated to be rewarded in year

1, 16% in year 2, and 27% in each of the following 3 years as the pilot program ramps up. Additional information related to this analysis can be found in Schedule AC-1.

Q. Please describe how the customer incentives were determined.

A. The incentives were calculated as a percentage of the incremental capital cost of the electric technology over the fossil fuel technology for prescriptive measures and a dollar per kWh value for custom measures. ICF used a commercial customer payback acceptance curve to estimate the impacts on participation of different incentive levels and the associated customer benefits. The scenario with the highest net benefit and benefit cost ratio for the customer was the medium scenario, which had prescriptive incentives based on 35% of the incremental capital costs and custom incentives of $0.10/kWh. This is the scenario the Company is proposing.

Q. How will the program reduce free ridership by customers that would have adopted the electric technology regardless of an electrification program?

A. Reducing free ridership is important for electrification programs. One goal with all programs is to reduce paying for actions that will happen anyway in the absence of a program. Additionally, for program participants and trade allies, a goal is to reduce the real and perceived burden of participating in a program due to onerous requirements. This can stifle program participation and trade ally willingness to participate resulting in eligible customers not receiving program benefits. The proposed pilot program includes measure specific control criteria meant to reduce free-ridership, and project level data collection meant to inform the level of free-ridership. The following eligibility criteria will help reduce free ridership for forklift measures: Equipment should replace an existing fossil fuel powered unit, OR be an expansion of a customer's existing equipment, OR be a first-time equipment purchase. This excludes incentives

for direct electric to electric equipment replacements. It is important to incentivize both first time purchases and fleet expansions since this is a key time that customers are evaluating their future equipment choices. Additionally, each completed project will be categorized based on the flowchart shown in Schedule AC-1 to help inform the level of free-ridership and customer benefit attributable to the program. This information will be reported to the Commission in the same agile fashion as other portfolio data points and discussed for potential iterations. Because it is important for the program to gain awareness and momentum in the market with customers and trade allies, I believe the eligibility criteria and free-ridership evaluation per project is sufficient to minimize free ridership to a level that the program remains very cost effective. Our analyses show that the non-road program will remain cost-effective as low as a 34% net-to-gross ratio. Where appropriate, similar project level free ridership logic charts and customer and trade ally surveys should be used to inform project level free ridership and the real and perceived burden placed on program stakeholders.

IV. MARKET ASSESSMENT

Q. Please describe the analysis conducted to determine the market potential for the non-road equipment measures and summarize the results of the market assessment.

A. ICF assessed the total convertible market for each technology by combining customer NAICS business data specific to Liberty-Empire's service territory with database research (past studies, reports, trade association data, federal data, state data, and local census data), technology assumptions, market experience and stakeholder insights.

Across the material handling, custom, and agricultural sector measures there is an estimated 3,082 measures available for conversion from internal combustion

technologies to electric which would result in a total of 86,482 annual megawatt-hours ("MWh").

To inform the **forklift** analysis, ICF analyzed county level Industrial Truck Association ("ITA") data and state level QY Research ("QYR") data from the 2018 Global Fork Truck Market Survey Report. Sales data was prorated based on areas served by Liberty-Empire. Less than half of local forklifts have been electrified and the overall population has substantial potential for conversions as electric sales have remained relatively stagnant over time. There are an estimated 1,020 internal combustion forklifts in the service territory available for conversion to electric which would equate to 27,296 additional annual MWh.

For **TRUs**, FleetSeek company fleet data was used for companies located within Liberty-Empire's service territory. Only about 30% of TRUs have been electrified, half of which lack sufficient infrastructure to effectively use the electric-standby option at warehouses. There are over 80 trucking companies with TRUs in their fleet within the service area with over 1,164 total trailers; 880 of which ICF estimates to be refrigeration units which would equate to an additional 10,688 MWhs each year.[5]

Truck stop search websites were used to obtain a list of truck stops within Liberty-Empire's service territory and a count of overnight parking spots. This list was cross referenced with Google maps satellite images to verify locations and truck parking spot quantities. Within Liberty-Empire's service territory there is currently no **TSE** equipment to support heavy-duty trucks while idling overnight and an estimated 24 fueling stations in Liberty territory with 1,476 overnight truck parking spots. ICF

[5] FleetSeek data, purchased 2019.

estimates a maximum of 35% of parking spots will be electrified at stations with TSE, which results in a potential of 517 parking spots available for conversion which would result in 3,588 MWh per year.

ICF used the U.S. Department Agriculture 2018 Irrigation and Water Management Survey and Missouri Department of Natural Resources well registration to estimate the **agricultural well pump** population and fuel distribution. ICF estimates 1,669 agricultural well pumps exist within Liberty-Empire's service territory with 58% already being electric. The 704 well pumps available for conversion would result in an additional 35,200 MWh per year.

As custom equipment will vary depending on the opportunity and size of the equipment, ICF used two archetype measures to estimate the potential impacts of a custom program: cranes and drayage trucks. Employment data from the Bureau of Labor Statistics for applicable sub sectors and areas were used to estimate crane and drayage truck populations. The estimated 8 cranes and 127 drayage trucks available for conversion would result in an additional 9,710 MWh per year.

V. COST BENEFIT ANALYSIS

Q. How was the suitability of each equipment measure determined?

A. The first consideration was cost-effectiveness of the technology, which can be evaluated using different perspectives or tests. For this analysis, the Ratepayer Impact Measure ("RIM"), the Participant Cost Test ("PCT"), and the Modified Total Resource Cost ("mTRC") tests were used to characterize the cost-effectiveness of each technology. These tests are summarized below in Figure 2.

Figure 2 – Beneficial Electrification Cost Benefit Analysis Tests

Test	Question	Benefits	Costs
Ratepayer Impact Measure (RIM)	Will utility rates decrease?	Incremental Revenue	Program Incentives Program Operations Costs Incremental Electricity Supply Costs
Participant (PCT)	Will a participant benefit over the measure life?	Incentives Fuel Savings O&M Savings	Incremental Equipment Cost Electricity Bills
Modified Total Resource Cost (mTRC)	Will the total cost of supplying the service across all fuels decrease?	O&M Savings Value of Saved Fuels	Net Participants Elec. Supply Costs Net Participants Incr. Capital Cost Program Operations Cost Program Incentives Paid to "Free Riders"

Necessary to the calculation of these tests are impacts on load (peak demand and annual energy), customer bills, and Liberty-Empire's supply costs.

Q. How were the expected load impacts of each technology determined?

A. The impact on customer billing demand was priced out using typical technology load shapes and Liberty-Empire's commercial (GP) and Industrial (LP) tariffs. The demand and energy impact of each technology was developed from a variety of sources including equipment metering studies, technology specification sheets, equipment manufacturer and dealer interviews, external studies and technical reports, and data collected during ICF program implementation (usage and model data from project applications). Usage numbers are industry averages and are intended to account for the range and diversity of equipment usage and capacities in the market.

Q. How was the impact of the Company's peak demand determined?

A. The average hourly load of each technology was calculated during the hours of Liberty-Empire's system peak. For this analysis, the hours of Liberty-Empire's system peak were defined as any time that the load exceeds 85% of the annual system peak hour load. In general the Liberty-Empire system peak period is most likely to occur between 3 p.m. and 7 p.m. in July through September.

Q. What is the justification for a five-year pilot program duration?

A. ICF recommends a five-year program for three main reasons. First, a new program promoting electrification will be unfamiliar to many customers and trade allies, and it will take time to build awareness, motivation, and participation from those stakeholders. Second, the purchase cycle for some of the equipment in the program can be measured in years across consideration, budgeting, purchase, installation, and commissioning. Third, ICF estimates that similar programs begin to reach their full potential after 2-3 years which allows the program benefits to be significantly greater than a shorter program.

Q. What are the forecasted participation levels for the Non-Road Pilot Program?

A. The Company anticipates participants will adopt around 1,000 electric measures through the program with a goal of adding 30,480 MWh of gross annual load by the end of year five with 70% of the added load being from prescriptive measures, 10% custom measures, and 20% agricultural measures.

Q. Please describe the analysis conducted by the Company to determine forecasted participation levels for the non-road equipment measures.

A. The market assessment ICF conducted for each technology helped inform the forecasted participation levels by providing the convertible and baseline electric technology populations. A commercial customer payback acceptance curve was applied to estimate the impacts on participation of different incentive levels and the associated customer benefits. ICF also utilized experience from participation in similar utility programs to develop the estimates and account for initial program ramp up impacts.

Q. What are the expected load impacts from the non-road equipment measures?

A. The gross estimated load impacts from the non-road equipment measures are 10 MW coincident on-peak demand, 17 MW combined non-coincident demand, 30,480 MWh at the end of year 5 or 356,163 MWh over 25 years (accounts for equipment lifespans and retirements). The grid impact was determined based on previous metering studies, impact studies, manufacturer information, and engineering calculations. The kW impact on system peak demand and customer billing demand is described in Schedule AC-1.

Q. How were the incremental costs of electricity supply determined?

A. Liberty-Empire provided capacity and energy cost values including transmission, distribution, capacity and energy costs. In addition, capacity reserve margins and line losses were accounted for.

Q. What is the overall impact and cost effectiveness of the proposed Non-Road Pilot Program?

A. It is projected that the program will increase total sales by 356,163 MWh over 25 years, peak demand by 10 MW, and annual revenue by $1.5 Million. The program level RIM is 1.4, PCT is 2.0, and the mTRC is 1.2.

VI. CONCLUSION

Q. Does this conclude your Direct Testimony?

A. Yes.

VERIFICATION

On this 29th day of November, 2020, I, Ambika Coletti, under penalty of perjury, declare that the foregoing is true and correct to the best of my knowledge and belief.

___/s/ Ambika Coletti_____