

## **Proposal Title: K-State Engineering Extension Emission Reduction Projects**

### **SECTION 1. OVERALL PROJECT SUMMARY AND APPROACH (45 points)**

Kansas State University (K-State) Engineering Extension (EEX), together with K-State's Division of Facilities (Facilities), propose three projects to reduce targeted greenhouse gases (GHGs) from Kansas industries, institutions and communities. Leveraging existing technical assistance programs and partnerships, the EEX projects include industry GHG training and community engagement, GHG-focused technical assistance and financial assistance. EEX is a College of Engineering program at K-State, and the CPRG proposal team includes the Pollution Prevention Institute (PPI) and the Kansas Energy Program (KEP) under EEX. The EEX team is leading this proposal work and has several decades of experience providing industry, small businesses and institutions with energy- and source-reduction assistance. EEX will leverage its existing services and partners, proposing "shovel-ready" projects that can be amplified within industries, state institutions or campuses across Kansas and the U.S. These EEX programs also have experience working with all 105 Kansas counties and although disadvantaged communities will be prioritized, all entities in Kansas will be eligible for the services and assistance offered under this proposal. The K-State Division of Facilities team, with extensive experience in creating signature facilities that promote collaborative learning and working environments, will utilize CPRG funds to accelerate and enhance their new build project. This project aims to further facilitate multidisciplinary work and integrated interaction among students, faculty, researchers, staff, and administrators.

*"Action on climate change and clean energy remains more urgent than ever."*

-President Biden

An outline of this proposal was previously submitted to and approved by the Kansas Department of Health and Environment (KDHE). As a result, it is now included as part of the [Kansas Emission Reduction and Mitigation Plan \(PCAP\)](#). As documented in Section 6 of this proposal, the EEX CPRG team has a successful track record of successfully implementing various compliance and emission-reduction projects. As such, two EEX environmental specialists will act as the Principal Investigators (PIs) for the proposed projects and will be assisted by other experienced and trained EEX staff. If funded, EEX will hire and mentor the new staff to assist with technical assistance, project management, data collection and tracking.

#### **1a. Description of GHG Reduction Measures (20 points)**

Understanding the sources and trends of key GHGs – carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O) – and identifying opportunities and methods to reduce them, is essential for creating effective climate mitigation strategies. EEX has been assisting business and industry with these efforts since 1980 through pollution prevention, energy-use reduction and other environmental metrics. K-State EEX, in coordination with Facilities, proposes providing training, technical assistance and financial assistance to Kansas businesses, organizations and governmental entities, including state universities.

By utilizing existing and available data, implementing technology and fostering collaboration, EEX projects will reduce GHG emissions and promote a more sustainable future. The proposed projects target high GHG-emitting sectors and other industries with significant emission footprints. The primary goal of Projects 1 and 2, as described below, will be to empower businesses to implement effective GHG-reduction measures by providing necessary training, technical expertise, and financial assistance while building partnerships through collaborations with environmental justice (EJ) communities to ensure equitable access and impact. Project 3 will accelerate energy efficiency and renewable energy

projects within the new Global Center for Grain and Food Innovation (GCGFI) at K-State's main campus in Manhattan, Kansas. All three projects will be shared to promote replication and transferability.

Underlying assumptions used to estimate GHG emission reductions and associated cost effectiveness are described in Sections 1 and 2 below and in the included Technical Appendix. EEX identified risks that could lead to the delay or interruption of a GHG reduction measure or impact the measure's effectiveness. Because Projects 2A, 2B, and 3 have already been identified and analyzed, the primary risk is a delay in implementation. To mitigate this risk, EEX assumed project start dates will provide sufficient time for implementation and any delays will still allow the proposed measures to be implemented within the period of performance. Projects 2C and 2D are designed to be adaptable to reduce risks. For example, EEX developed a scoring criterion (**Table 1**) to ensure measures with greater effectiveness and with sufficient funding are prioritized. Because EEX works with a wide range of industries and businesses throughout Kansas, any delays or issues implementing a measure at one facility can be resolved by pivoting to another.

EEX and Facilities' three GHG-reduction projects are detailed as follows:

### ***Project 1: Industry Training and Community Engagement***

Project 1 will provide technical training for industry and public engagement opportunities for both industry and the communities. The industry-focused training will be offered at least twice annually and include GHG emission inventory and reduction training. In part, these trainings will utilize EPA national-recognized inventory tools that are a valuable resource for conducting GHG emission inventories. The trainings will also demonstrate various GHG-emission auditing equipment for verifying the accuracy and completeness of GHG emission data and feature Kansas industry case summaries to amplify GHG reduction opportunities. Additional training opportunities will highlight opportunities to improve building and operational energy efficiency and to incorporate renewable energy.

Project 1 will serve as a crucial step in identifying, educating and training businesses and industries to implement and track GHG reduction measures. EEX will provide up to 10 training sessions over the period of performance. As part of the training, EEX will conduct evaluations and follow up with attendees to provide technical assistance and evaluate changes in behavior throughout the grant period. Details of output and metrics to be collected are presented in Section 3. GHG-reducing projects implemented due to the training will be tracked and documented as part of Project 2 below.

In addition to the industry technical training detailed above, EEX will also host up to 10 community-engagement events throughout the grant period. These events will promote communication between industry and their respective communities, promoting a better understanding of the emission impacting a community and the industry's sustainability plan. Participants will make the public, human and environmental health connection between the various industry sectors and the associated public health concerns. Events will be prioritized for EJ communities and light refreshments will be served as an incentive to participate. Industry partner, Birla, already plans to participate in their community event.

### ***Project 2: Industry Emission Reduction Assistance: Assessment and Implementation***

Project 2 will utilize industry-specific collaboration to provide tailored technical and financial assistance to accelerate industry partner GHG-reduction goals throughout the project period. Through Project 2C, EEX has already identified nearly 44 industries and plans to work with approximately 25 small business partners with shovel-ready projects. The projects will be targeted initially, but as the program expands

its messaging and influence, new industry and institutional partners are expected to join Project 2. Project 2D will be used to provide technical assistance to 80 businesses with an estimated 60 receiving financial assistance to implement the proposed energy-focused measures. Experienced and trained staff will provide technical assistance through EEX's existing environmental hotline, on-site assessments, and virtual and in-person meetings. EEX is trained in pollution prevention (P2), energy efficiency, and sustainable materials management (SMM). In addition, all program staff have experience calculating the environmental and economic impacts related to GHG reduction measures and resources to track potential job creation. There will be four main sub-projects under Project 2, identified as 2A-2D.

EEX has secured committed Kansas partner, Birla Carbon U.S.A., Inc. in Ulysses, Kansas (Hickok plant), a major emitter ([reported 120,391.15 MTCO<sub>2</sub>e in 2022](#)) of GHGs. Birla Carbon being one of the high GHG-emitting industries in Kansas and the world's largest producer and supplier of carbon black, focuses on optimizing processes for converting carbon to carbon black and prioritizes energy efficiencies throughout its operations. Additionally, Birla Carbon is in Ulysses (Grant County) a disadvantaged community as identified for EPA IRA Programs (EJ Screen March 2024) shown in [Figure 2a and 2b](#) (Pages 19 & 20). Working with EEX, Birla Carbon has identified two GHG reduction opportunities that could be accelerated with funding. After significant technical data review, if funded, EEX proposes to cost share two new projects (Project 2A and 2B) in partnership with Birla. These projects will achieve quantifiable reductions in GHGs equating to nearly 29,000 MTCO<sub>2</sub>e annually. Birla Carbon prioritizes GHG reduction, and a formal partnership agreement "Birla Carbon\_LOC\_K-State Engineering Extension (EEX)" is attached.

To evaluate which measures are funded under Projects 2C and 2D, EEX will use the example scoring criteria shown below in Table 1 (to be finalized upon notification of project funding). This scoring criteria follows a [scoring rubric](#) similar to the USDA Rural Energy for America Program (REAP) described below under Project 2D. However, it prioritizes businesses located in low-income and disadvantaged communities as defined for EPA IRA programs and businesses in urban areas not otherwise eligible for similar funding. Regular application submission deadlines throughout the grant performance period will allow EEX to evaluate and compare the scores of multiple small business requests.

**Table 1: Example Scoring Criteria for Financial Assistance for EEI or RES Projects**

Criteria	Points	Description
Disadvantaged community	15	Additional points awarded if located in an EPA IRA-identified low-income and disadvantaged community
Urban area	10	Located in urban area with population of 50,000 or more
Size of business	10	Smaller businesses score more points
Size of request	10	Smaller projects score more points
Energy saved or generated	15	Based on Btu energy saved/generated per request dollar (higher BTU/request dollar score more points)
Payback period	15	Shorter payback periods result in more points
Commitment of matching funds	10	Businesses with documented sufficient funds to cover their portion of the project score more points
Other EPA Strategic Plan BENEFITS	10	Projects that improve one or more of the following goals of <a href="#">EPA's Strategic Plan</a> will score additional points: Goal 1 (Climate); Goal 2 (env. justice and

		civil rights); Goal 4 (clean and healthy air); Goal 5 (clean and safe water); Goal 6 (safeguard and revitalize communities); Goal 7 (safety of chemicals)
EEX points	5	Businesses using local contractors providing high-quality jobs; business owners with veteran or socially- or economically disadvantaged status; type of technology used; geographic diversity; businesses providing timely and accurate information during technical assistance; etc.

### ***Project 2A: Installation of a Heat Exchanger (Hex) System to Recover and Recycle Wasted Heat to Preheat Process Air***

Carbon black is manufactured through a high temperature flame synthesis process. A hydrocarbon (usually a high density “heavy” oil) is first injected into a refractory-lined reactor with air and then partially combusted. While some of the hydrocarbon feedstock is fully consumed as fuel, the incomplete combustion of the remaining hydrocarbon feedstock generates carbon black and various tail gases. This high temperature “smoke” stream, which is approximately 1,200-1,400 degrees centigrade, is quenched to a temperature of 250 degrees centigrade as it exits the reactor by directly spraying it with water. The cooled carbon black material is then separated from the tail gas through baghouse filtration.

*“Every country on the planet has to do two things – reduce emissions and prepare for the unavoidable impacts of climate change. American innovation and industry can be at the forefront of both.”*  
- Secretary of State Antony Blinken

It is common in the industry to utilize a heat exchanger to recover some of the heat from the material stream as it exits the reactor to preheat the air stream being mixed with the hydrocarbon feedstock. This recovery of energy increases the yield of the process, meaning that less of the oil is burned, leaving more to pyrolyze into carbon black. Since less oil is ultimately burned, the process generates less CO<sub>2</sub> emissions, and the production cost is reduced. One of the processing units at Birla Carbon U.S.A., Inc’s Hickok plant, Unit 3, was installed years ago, perhaps as early as the 1940s, without a heat exchanger. Therefore, Unit 3 offers an opportunity to lower GHG emissions and material consumption rates.

If funded, this project is expected to be implemented by June 2027. This project would utilize an industry standard shell and tube, counter-current heat exchanger (HEX). The HEX would have 90 tubes (3.5-inch OD) each being 40 feet in length. The hot air would be piped to the reactor using a combination of refractory-lined piping and stainless-steel piping. The process air would be preheated to 700-800 degrees centigrade, resulting in a yield increase of approximately 16-18% and a reduction in CO<sub>2</sub> emissions of approximately 15,500 MTCO<sub>2</sub> annually. The capital expenditure for the project is estimated to be \$5,100,000 of which an investment share of 50% will be each covered by Birla Carbon and CPRG funding assistance. Accounting for an additional cost of \$0.12 million leads to a quantified GHG reduction of approximately **7,900 MTCO<sub>2</sub> per year** as presented in Technical Appendix **Table 1b**; the GHG emission calculation spreadsheet can be viewed for details.

### ***Project 2B: Capture of Wasted Heat to Make Electricity at Carbon Black Plant***

During the production of carbon black, a by-product “tail gas” is produced. This tail gas (a low BTU syn gas) is combusted. Combustion of the tail gas is required by regulation to control many hazardous air pollutants, but this combustion process generates GHGs. With capital investment, the energy from the tail gas combustion can be captured and converted to a useful form. A practical way to utilize the tail gas energy at Birla Carbon’s Hickok, KS plant is to make high pressure steam. The steam can then be used to make electricity and put the excess electricity on the grid, making it available to other consumers and

lessening stress on the energy grid. This type of “co-generation” is practiced at many carbon black manufacturing plants.

All the “tail gas” produced at the Hickok plant is currently combusted (as required by environmental regulation), but the heat generated by burning of the tail gas is currently wasted (goes up the stack). If this energy was converted to electricity, the direct CO<sub>2</sub> emissions of the Hickok carbon black plant would not change, but emissions from utility power plants may be avoided – i.e. the indirect CO<sub>2</sub> emissions of the Hickok plant can be materially reduced.

If funded, this project is expected to be completed by July 2029. The heat currently wasted in the manufacturing process will be used to generate high-pressure steam. The high-pressure steam will then be used to drive a steam turbine, which will power an electrical generator. The wasted heat from the Hickok plant could produce approximately 8-9 MW of electrical power, which would supply the 2.5 MW of internal consumption, and send the remaining 5-6 MW to the utility grid. The net total electricity production is estimated to be ~69,000 MWh/yr, and the avoided CO<sub>2</sub> emissions per year would be ~31,100 MTCO<sub>2</sub>e (using a factor of 992 lb CO<sub>2</sub>/MWh). The total capital expenditure for implementing the project is estimated to be \$25,000,000 and a support of 68% of the total cost is requested as CPRG assistance. Birla Carbon will be covering 32% of the cost to implement this project. The GHG emission calculation spreadsheet has detailed calculations, and Technical Appendix **Table 1b** presents the quantified GHG reduction of **21,200 MTCO<sub>2</sub>e per year** after accounting for an additional cost of \$0.18 million.

### *Project 2C: Emission Reduction Assistance: Bridging the Gap for Disadvantaged Industries*

Through its P2 intern program, EEX’s Pollution Prevention Institute (PPI) has evaluated more than 200 emission-reduction projects at facilities and [published more than 100 case summaries](#) complete with economic and environmental metrics. All documented projects include GHG emissions reductions, but some also include air toxics, hazardous materials and natural resource reductions. While some facilities implemented these recommendations for cost savings and environmental benefits, others faced financial barriers. Examples of unimplemented projects include upgrading compressors or lighting, adding solar, and adopting new painting and coating methods that minimize volatile organic compounds (VOCs) and toxic chemicals. As shown in Technical Appendix **Table 4**, EEX has a list of 44 sustainability projects preidentified for assistance spanning 25 facilities, 40% of which are in CEJST-defined disadvantaged tracts (addresses not provided to maintain client confidentiality) and 88% of which are in counties with CEJST-defined disadvantaged tracts; see [Figure 1: CEJST Map](#). These 44 projects were assessed by PPI interns within the past five years under various EPA P2 and SMM grant programs. The estimated project metrics were gathered via EPA-approved QAPPs and reported using EPA reporting spreadsheets.

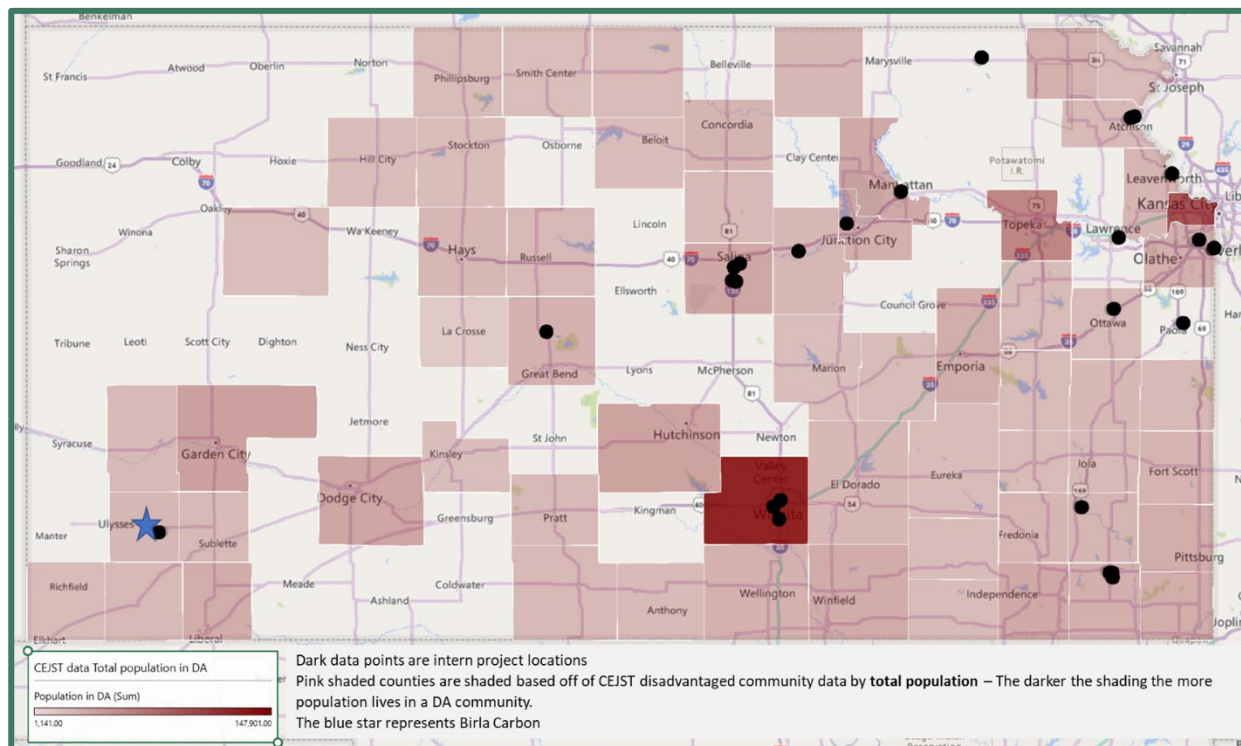
Working with existing partners that have shovel-ready projects, EEX proposes to provide cost-share financial and technical assistance to up to 50 facilities, which could be comprised of up to 25 previous partner facilities (44 preidentified projects) and 25 unidentified facilities (25 projects). To ensure up to 50 facilities are assisted and to maximize GHG reductions, EEX may attempt to recruit more than 50 businesses for assistance. EEX plans to identify potential small businesses through training and outreach completed under Project 1. With the support of its university-trained fiscal and legal management team, EEX would develop an application, evaluation (like [Table 1](#)) and reporting process to provide reimbursement for implementation of verified GHG-reduction projects. Funds would be provided through a subaward. Businesses located in 241 census tracts across 62 counties in Kansas are considered



disadvantaged communities based on EPA screening tools (CEJST, March 2024 – see Appendix Areas\_K-State Engineering Extension (EEX).

Based on economic calculations of project implementation costs documented in Technical Appendix **Table 4**, EEX requests \$7.84 million for the financial assistance portion of Project 2C, which includes \$1.84 million for additional costs. Specifically, EEX proposes a 25% cost share from both existing and new partners (CPRG funding covers 75% of total cost), which allocates \$3.4 million to the 44 preidentified projects and \$2.6 million for 25 new projects. Cost estimates for the new projects were based on implementation costs for similar known projects at existing facilities and may vary due to inflation or implementation of different GHG-reduction measures. To be clear, using grant funding, EEX will support a 75% cost-share which will equate to an estimated quantified GHG emissions reduction of 22,400 MTCO<sub>2</sub>e annually as shown in Technical Appendix **Table 1b** and in the GHG emission calculation spreadsheet.

Businesses will be recruited through new and prior relationships, at training and community events, and referral from our state and federal partners. Financial assistance will be prioritized for those businesses located in EJ communities and for those that have substantial GHG reduction opportunities. At least five **success stories** will be documented and published in a two-page format that makes sharing the story easy to read, promoting transferability.



**Figure 1: CEJST Map**

### **Project 2D: Energy Efficiency and Renewable Energy Technical and Financial Assistance**

EEX's Kansas Energy Program was formed in 2016 in partnership with the State Energy Office, housed within the Kansas Corporation Commission. One of the initial and ongoing goals of this work is to support rural small businesses and agricultural producers in applying for the [USDA REAP grant](#), which

currently reimburses grant awardees up to 50% of eligible project costs for energy efficiency improvement (EEI) and Renewable Energy System (RES) projects. Under this partnership, EEX provides no-cost energy assessments and technical assistance to rural small businesses and agricultural producers and helps these entities complete and submit all REAP grant application documents to the USDA.

EEX proposes using CPRG funding to implement a technical and financial assistance program similar to REAP, but which prioritizes urban small businesses located in disadvantaged areas. Because the REAP grant only supports [small businesses](#) located in rural areas (population less than 50,000), urban small businesses do not have a similar funding opportunity. While larger industries have projects that can result in greater GHG emission reductions on a per-measure basis, EEX anticipates the total from multiple small business projects can result in GHG emission reductions equivalent to one or more larger industry measures. EEX intends to use CPRG funding to target small urban businesses located in disadvantaged areas that do not otherwise have the resources to implement an EEI or RES project. EEX plans to identify potential small businesses through training and outreach completed under Project 1.

EEX will provide no-cost energy assessments and technical reports to assist the businesses in evaluating proposed GHG-reduction measures. The technical report will include projected energy savings, associated GHG emission reductions, and the measure's simple payback. If the business chooses to implement the project, it can submit an application for reimbursement to EEX requesting financial assistance for up to 50% of eligible project costs. Applications will be prioritized based on the scoring criteria shown in Table 1 above. If approved, CPRG funding will be used to reimburse the business up to 50% of total project cost based on receipts and verification of implementation. EEX will also request the business provide at least one year of post-implementation utility bills to evaluate the real-world impact.

Examples of EEI projects include replacing lighting, appliances or HVAC systems with more efficient systems; improving building envelope by sealing or installing new doors, windows or insulation; and installing a geothermal or air-source heat pump system. RES project examples include installing solar photovoltaic systems or wind turbines.

EEX will not design proposed systems but will encourage small businesses to work with local contractors meeting the job quality criteria highlighted in Section 5 below to foster local economic growth. Businesses can request a minimum reimbursement of \$1,000 and maximum of \$100,000. For energy efficiency projects, funding is not intended to expand a business, but rather replace existing equipment.

Based on EEX's REAP grant assistance since 2016, it proposes to provide technical assistance to 80 small businesses over the period of performance. 75% of businesses are anticipated to request reimbursement for implemented projects with an average reimbursement request of approximately \$35,000. This technical and financial assistance results in a total project cost of \$6.8 million (CPRG funding of \$4.7 million of which \$2.1 million will be financial assistance; businesses anticipated to provide \$2.1 million). Details about associated GHG emission reductions and calculation details are shown in Section 2 and in the Technical Appendix.

### ***Project 3: Global Center for Grain and Food Innovation (GCGFI)***

As the nation's first land-grant university, K-State has been helping to feed the world for more than 150 years, and is committed to research, teaching and learning in support of both addressing food insecurity and nutritional needs at home in the United States and abroad. This includes initiatives for agricultural innovation and global food systems. K-State Facilities is dedicated to achieving environmentally responsible and sustainable development of its commercial buildings.

Project 3 is an example of this commitment as evident in the upcoming design and construction of the College of Agriculture's GCGFI building. The GCGFI leverages the university's expertise in grain and animal sciences, offering state-of-the-art facilities such as laboratory and pilot plants to drive innovation in food product development, safety and security. CRPG funding will be used to incorporate strategic measures into the GCGFI building to actively reduce air pollution and greenhouse gas emissions, aligning with the university's overarching sustainability goals:

- The first strategy focuses on the addition of a heat-pump chiller at the chiller plant, piping heating water to the GCGFI, Weber Hall and Call Hall to provide simultaneous heating/cooling opportunities and adding a well-field between GCGFI and the plant to serve as a heat sink/source for a new heat pump chiller.
- The second strategy is to incorporate solar technology on the roof and a freestanding canopy structure to offset energy needs in the new spaces.
- The third strategy involves designing the building envelope with more efficient windows and wall insulation to improve overall performance and reduce energy loss.

In addition to its academic and research initiatives, K-State is dedicated to actively engaging with low-income and disadvantaged communities. Programs like the K-State Land Grant Promise offer financial support to students, fostering inclusivity in agriculture-related fields. The College of Agriculture's commitment to diversity is further exemplified through initiatives like the Summer Research Fellowship, which benefits from the cutting-edge research opportunities provided by the GCGFI.

#### 1b. Demonstration of Funding Need (10 points)

Many industries, small businesses and communities lack the resources to identify and implement effective GHG reduction measures. This knowledge, funding and technical expertise is a barrier to emission reductions and cost savings.

- **Need:** EEX's PPI and KEP are 100% grant funded and CRPG funding will accelerate their current work to identify and educate industries and institutions about GHG reductions. Leveraging existing EPA, state and USDA funds and the related benefits of having existing industry partners with shovel-ready projects will allow EEX to secure partners soon, amplifying CRPG funds and ensuring the funds are used for worthy GHG-reduction projects. In addition, the EEX plan to prioritize funding in environmental justice (EJ) communities provides a synergistic effect, advancing EPA Strategic Goal 1, to "Tackle the Climate Crisis" as well as the Administration's EO 14096 to advance EJ.
- **Other funding:** PPI and KEP have other funding sources as mentioned above, but these funding sources are not necessarily climate-focused, and most do not provide any cost-share resources for implementation. CRPG funding allows EEX to leverage these existing program elements, like the intern program, to create a much stronger program with better implementation rates and dedicated climate reduction results.
- **Funding sources:** In part or by association, EEX secured funds that may have GHG-reduction measures include the EPA P2 grant, EPA P2 EJ for Communities, and if funded, the EPA Source Reduction grant.

Through CPRG funding, EEX will partner with industries and businesses to provide:

- **Training:** Provide up to two annual technical assistance workshops, assisting participants with the skills and knowledge to implement effective GHG reduction strategies. Light refreshments for the participants will be provided.
- **Funding and Resources:** Allocate CPRG funds to support GHG reduction projects by offering technical and financial assistance and access to equipment and supplies. For example, through EEX's



existing energy-focused work with rural small businesses, it has identified a funding need for small businesses located in urban areas (greater than 50,000) that do not have access to funding for the implementation of EEI and RES projects. Project 2D will prioritize small businesses located in the urban communities of Kansas (Kansas City, Lawrence, Manhattan, Topeka, and Wichita), with the highest priority given to those located within areas of these cities identified as disadvantaged.

- Community Engagement: Partner with communities in the two largest cities in Kansas to host events that bring industry and community members together. These events, funded by CPRG, will raise awareness about environmental justice and climate change impacts. Light refreshments for the participants will be provided.

The funding needs for Project 3 are categorized into minimum code-compliant and enhanced sustainable measures. The minimum code-compliant baseline includes \$11 million for HVAC systems and \$4 million for building envelope items. Enhanced sustainable measures (ECM) includes a small heat recovery pump chiller for simultaneous heating and cooling at a first cost of \$1.3 million. A secondary ECM includes a larger heat recovery pump chiller and geothermal at a first cost of \$5.875 million. The second ECM includes a photovoltaic system with a first cost of \$1.365 million. The third ECM includes enhanced wall insulation and fenestration with a first cost of \$550,000. The total funding requested is \$15.27 million.

CPRG funding will allow EEX to "hit the ground running" with new projects by leveraging industry partnerships and experienced staff. All three project areas directly support the EJ goals outlined in the NOFO. The total requested CPRG funding is approximately \$48.2 million. CPRG funding is essential to deliver these crucial services and empower stakeholders to achieve significant GHG reductions.

### 1c. Transformative Impact (15 points)

The proposed Projects 1 and 2 focus on empowering businesses to implement GHG reduction measures through training, technical assistance, financial assistance and EJ community collaboration. This work, which will be amplified through training events, community engagement and published success stories, will result in transformative impact in terms of sustainability, economic opportunity and social justice.

Trained EEX staff will work with businesses and then transfer that assistance through presentations, conferences, case summaries/study, webinars and on-site activities to provide source-reduction technical assistance and training that can be replicated across a broad spectrum of business. EEX will employ a standardized approach to assist businesses. The process will begin with outreach, followed by a site visit planned within 30 days, if necessary. EEX will then provide technical assistance and deliver a comprehensive report within two months of initial contact. The site visit and report schedule will vary based on a business's need and its responsiveness in providing necessary data. Finally, EEX plans to conduct a follow-up assessment in 1-2 years or to analyze utility bill data to quantify greenhouse gas reductions achieved. Small businesses typically do not have the resources necessary to implement GHG reduction measures, making them an often-overlooked, but hard-to-abate group of industries.

*"We know that tackling the climate crisis demands a sense of urgency to protect people and the planet."*

- EPA Administrator  
Michael S. Regan

Published success stories will document industry-specific GHG-reduction processes, successes and barriers in addition to detailed environmental and economic outcomes. EEX will leverage its existing services and partners, proposing "shovel-ready" projects that can be amplified at industries and state institutions or campuses across Kansas and the U.S. EEX will also be documenting GHG reduction **success**

**stories** to amplify source-reduction projects. A [study](#) published in the Journal of Economic Geography found that when one residence installs a solar photovoltaic (PV) system, other neighbors are more likely to also install a solar PV system. Similarly, EEX anticipates the technical and financial assistance to business and industry funded through CPRG will have a similar effect for nearby facilities.

Implementing measures described in Project 3 will have a transformative impact on the university campus and future buildings. It will set new benchmarking and building performance standards, ensuring that future constructions are energy efficient. The project also aims to adopt and implement the most up-to-date building energy codes or stretch codes for new commercial buildings. Additionally, programs will be developed to promote the recovery and destruction of high-global warming potential hydrofluorocarbons (HFCs) used in existing appliances, air conditioning systems and commercial chillers.

## SECTION 2. IMPACT OF GHG REDUCTION MEASURES (60 points)

This section quantifies the significant greenhouse gas (GHG) emission reductions achievable through EEX's proposed measures: both near-term (2025-2030) and long-term (2025-2050) cumulative reductions, alongside a detailed cost-effectiveness analysis. EEX will follow a standardized approach to maximize the impact of services provided through Project 1. This includes:

- Outreach to potential clients.
- Site visits
- Delivering a comprehensive technical assistance report
- Follow-up assessments (1-2 years) or utility bill analysis to quantify achieved GHG reductions.

By empowering businesses, fostering knowledge sharing, and measuring success, Projects 1 and 2 will create a lasting impact on sustainability, economic opportunity, and social justice. Project 2 will focus on assisting industries in achieving measurable reductions in GHG emissions and other air pollutants. In collaboration with Birla Carbon, EEX will work on Projects 2A and 2B, specifically designed to achieve quantifiable results. EEX will work closely with Birla Carbon to monitor progress. This includes:

- Quarterly reporting: Birla Carbon will provide regular updates on emission reduction efforts.
- Site visits: EEX staff will conduct periodic site visits to assess progress.

Birla Carbon utilizes a well-defined methodology for tracking GHG emissions aligned with international standards:

- Scope 1 and 2 Emissions: Emissions are categorized based on their source (Scope 1: direct emissions, Scope 2: indirect emissions from purchased energy).
- Monthly Tracking: Both categories are monitored monthly by Birla Carbon's sustainability team.
- Calculation Methods: Established protocols guide the calculation of emissions.

Under Project 2C, EEX proposes to provide cost-share financial and technical assistance to up to 50 facilities, which could be comprised of up to 25 previous partner facilities (44 preidentified projects) and 25 unidentified facilities (25 projects). Facilities will be identified through outreach to Kansas business and industry with a focus on those doing business in EJ communities and with significant GHG reduction potential. The 44 preidentified projects are presented in Technical Appendix **Table 4** and reflect PPI intern projects at 25 different industrial facilities from the past five years that had not been implemented but could benefit from financial assistance. As noted in section 7b, EEX will develop a procedure for accepting, reviewing, quality assuring, and funding cost-share applicants. An evaluation rubric, similar to [Table 1](#), will be used, as well as standards for reporting and verifying implementation.

GHG reductions for Project 2D are based on data collected from EEX's existing small business assistance program described in Section 1a above. Between 2016 and 2023, EEX completed 188 EEI and RES technical reports for rural small businesses and agricultural producers. This data was filtered to 102 assessments for which a REAP grant application was submitted with a total project cost of less than \$200,000 (55 EEI and 47 RES). The average annual energy savings per assessment was determined to be 42,593 kWh electricity and 24.2 MMBtu natural gas. Using emission factors found in the EPA P2 GHG Calculator, the estimated annual GHG emissions reduction per assessment was found to be 42.6 MTCO<sub>2</sub>e. More details are in the Technical Appendix.

Project 3 GHG reduction measures are based on the estimated lab energy consumption data derived from past lab buildings. The baseline emissions for the GCGFI and related buildings are estimated at 5,715 MTCO<sub>2</sub>e per year. The implementation of various energy efficiency measures is expected to significantly reduce GHG emissions. The addition of a smaller heat recovery (HR) chiller (ECM-1A) is projected to save 210 MTCO<sub>2</sub>e per year by providing simultaneous heating and cooling load for the GCGFI/Weber/Call complex. The larger ground-coupled HR chiller (ECM-1B), sized for the expected full heating load of the complex, is estimated to save 1,203 MTCO<sub>2</sub>e per year. Also, installing a photovoltaic system (ECM-2) with a capacity of 455 kW is expected to save 285 MTCO<sub>2</sub>e per year. Improvements to wall insulation and fenestration assembly (ECM-3) are projected to save an additional 39 MTCO<sub>2</sub>e per year. Overall, implementation of these measures is expected to result in significant reductions in GHG emissions, contributing to the university's sustainability goals and setting a new standard for environmentally responsible construction and operation.

#### 2a. Magnitude of GHG Reductions from 2025 through 2030 (20 points)

The combined estimate of quantified GHG reductions across 2025 to 2030 for Projects 2A, 2B, 2C, 2D and Project 3 scenario 2 is: 82,000 MTCO<sub>2</sub>e. Project 1 is not considered a GHG-reduction measure and GHG reductions are not calculated with this individual measure. Combined and individual quantified GHG emissions reduction estimates for the different projects across 2025-2030 are presented below and in **Table 1b** of the attached Technical Appendix. The calculation details are in the attached GHG emission reduction calculations spreadsheet.

**Project 2A:** An estimated magnitude of GHG reduction, for the total project, for five years is 77,500 MTCO<sub>2</sub>e. With 50% of funding assistance from CPRG a quantified GHG reduction of 39,600 MTCO<sub>2</sub>e can be expected for a period of five years. However, the project's completion timeline is expected to be around 2.5 years from project start. Assuming Project 2A is completed at the start of June 2027, the expected quantified GHG emission reduction for this project across 2025-2030 is 20,500 MTCO<sub>2</sub>e.

**Project 2B:** An estimated magnitude of GHG reduction for the total project for five years is 155,500 MTCO<sub>2</sub>e. With 68% of funding assistance from CPRG a quantified GHG reduction of 106,100 MTCO<sub>2</sub>e can be expected for a period of five years. However, the project's completion timeline is expected to be around 3.5-4 years from project start. Assuming Project 2B is completed at the start of July 2029, the expected quantified GHG emission reduction for this project across 2025-2030 is 10,600 MTCO<sub>2</sub>e.

**Project 2C:** An estimated magnitude of GHG reduction, for the total project, for five years is 140,800 MTCO<sub>2</sub>e. With 75% of funding assistance from CPRG, a quantified GHG reduction of 112,200 MTCO<sub>2</sub>e can be expected for a period of five years. However, the project's completion timeline is expected to be around two years from project start. Assuming all subprojects of Project 2C are completed at the start of

January 2027, the expected quantified GHG emission reduction for this project across 2025-2030 is 67,300 MTCO<sub>2</sub>e.

**Project 2D:** An estimated magnitude of GHG reduction for the total project for 2025-2030 is 5,200 MTCO<sub>2</sub>e. With 69.3% of funding assistance from CPRG (based on all Project 2D costs), a quantified GHG reduction of 3,600 MTCO<sub>2</sub>e can be expected. As detailed in the Technical Appendix, these values are based on a staggered implementation date to allow time after the assessment for the business to implement a project. For example, EEX assumes 75% of assessments completed in Year 1 will result in implementation and CPRG funding, but GHG emissions reductions are not estimated to begin until Year 2.

**Project 3:** An estimated GHG reduction for this project under scenario 2 across five years is equal to 7,600 MTCO<sub>2</sub>e. With 100% of funding assistance from CPRG, a quantified GHG reduction of 7,600 MTCO<sub>2</sub>e can be expected for a period of five years. This project aims to implement several energy conservation measures (ECMs) to reduce GHG emissions. These ECMs include a smaller HR chiller for simultaneous load, a ground-coupled heat recovery chiller, a photovoltaic system, and enhancements to the building's envelope and fenestration assembly. Scenario 2 uses ECM 1B, 2 and 3. Details of these calculations and ECMs are found in the GHG emission reduction calculations spreadsheet. Assuming scenario 2 is completed at the start of August 2026, expected quantified GHG emission reduction for this project across 2025-2030 is 5,200 MTCO<sub>2</sub>e.

## 2b. Magnitude of GHG Reductions from 2025 through 2050 (10 points)

The combined estimate of quantified GHG reductions across 2025 to 2050 for Projects 2A, 2B, 2C, 2D and Project 3 scenario 2 is: 919,600 MTCO<sub>2</sub>e. Project 1 is not considered a GHG-reduction measure and GHG reductions are not calculated with this individual measure. Combined and individual quantified GHG emissions reduction estimates for the projects across 2025-2050 are presented below and in **Table 1b** of the attached Technical Appendix. The calculation details are in the attached GHG emission reduction calculations spreadsheet.

**Project 2A:** An estimated magnitude of GHG reduction for the total project for 25 years is 387,500 MTCO<sub>2</sub>e. With 50% of funding assistance from CPRG, a quantified GHG reduction of 198,000 MTCO<sub>2</sub>e can be expected for a period of 25 years. However, the project's completion timeline is expected to be around 2.5 years from project start. Assuming Project 2A is completed at the start of June 2027, the expected quantified GHG emission reduction for this project across 2025-2050 is 178,900 MTCO<sub>2</sub>e.

**Project 2B:** An estimated magnitude of GHG reduction, for the total project, for 25 years is 777,500 MTCO<sub>2</sub>e. With 68% of funding assistance from CPRG, a quantified GHG reduction of 530,400 MTCO<sub>2</sub>e can be expected for a period of 25 years. However, the project's completion timeline is expected to be around 3.5-4 years from project start. Assuming Project 2B is completed at the start of July 2029, the expected quantified GHG emission reduction for this project across 2025-2050 is 435,000 MTCO<sub>2</sub>e.

**Project 2C:** An estimated magnitude of GHG reduction, for the total project, for 25 years is 703,900 MTCO<sub>2</sub>e. With 75% of funding assistance from CPRG, a quantified GHG reduction of 560,900 MTCO<sub>2</sub>e can be expected for a period of 25 years. However, the project's completion timeline is expected to be around two years from project start. Assuming all subprojects of Project 2C are completed at the start of January 2027, the expected quantified GHG emission reduction for this project across 2025-2050 is 516,000 MTCO<sub>2</sub>e.

**Project 2D:** An estimated magnitude of GHG reduction for the total project for 2025-2050 is 52,600 MTCO<sub>2</sub>e. With 69.3% of funding assistance from CPRG (based on all Project 2D costs), a quantified GHG reduction of 36,500 MTCO<sub>2</sub>e can be expected for 2025-2050. As detailed in the Technical Appendix, these values are based on a staggered implementation date based on time of assessment. EEX analyzed historical projects to estimate a weighted life expectancy for installed EEI and RES equipment of 20.7 years to determine the longer-term GHG emission reductions.

**Project 3:** An estimate of GHG reduction for this project under scenario 2 for 25 years is 38,200 MTCO<sub>2</sub>e. Scenario 2 involves ECM 1B, 2 and 3. With 100% funding assistance from CPRG, a quantified GHG reduction of 38,200 MTCO<sub>2</sub>e can be expected for a period of 25 years. Assuming scenario 2 is completed at the start of August 2026, the expected quantified GHG emission reduction for this project across 2025-2050 is 35,800 MTCO<sub>2</sub>e, showcasing the long-term sustainability impact of the project.

## 2c. Cost Effectiveness of GHG Reductions (15 points)

The combined cost effectiveness of quantified 2025-2030 GHG reductions from CPRG funding for Projects 2A, 2B, 2C, 2D and Project 3 scenario 2 is: \$444.88 per MTCO<sub>2</sub>e. Combined and individual cost effectiveness of quantified GHG emissions reduction estimates for the different projects across 2025-2030 are presented below and in **Table 1a** of the attached Technical Appendix. The calculation details are in the attached GHG emission reduction calculations spreadsheet.

**Project 2A:** Installing a heat exchanger on Unit 3 will improve the process's yield and greatly decrease the GHG emissions. While it is common to include a HEX installation in any newly built unit, it is quite costly to “retrofit” a HEX into an existing old unit. Despite its benefit and Birla Carbon’s support of the initiative, the company has not implemented the HEX system due to cash constraints and alternative business demands. Additional funds for reducing GHGs would reduce initial capital expenditure, making the project economically viable. **The cost effectiveness of quantified 2025-2030 GHG reductions from CPRG funding for Project 2A is \$130.24 per MTCO<sub>2</sub>e.** Attached GHG emission reduction calculations spreadsheet presents the details of cost calculations for project 2A.

**Project 2B:** The capital investment required for producing electricity is quite high and is not always economically feasible. Additional funds to reduce indirect GHGs could improve the economic viability of such a project. Without investment assistance, the simple payback of this project is approximately 12.5 years. Birla Carbon typically demands a maximum simple payback of 4 years – therefore, the grant would need to cover 68% of the investment to make this project viable. **The cost effectiveness of quantified 2025-2030 GHG reductions from CPRG funding for Project 2B is \$1,618.99 per MTCO<sub>2</sub>e.** This high dollar value is due to the relatively long time to implement. Attached GHG emission reduction calculations spreadsheet presents the details of cost calculations for project 2B.

**Project 2C:** The estimated financial investment required for implementing the 44 preidentified projects are presented in the Technical Appendix; the investment required for the 25 projects to be identified are assumed to be equal to the average cost for the identified projects. Due to the focus on businesses with smaller operations than the business assisted under the previous two Projects, EEX plans to support project implementations through reimbursement of 75% of project costs, which are estimated to total \$8 million (\$6 million being CPRG funds; neither value includes an additional cost of \$1.84 million). In general, these projects carry additional benefits beyond strictly GHG emissions reductions, such as energy and water conservation and cost savings. **Ultimately, the cost effectiveness of quantified 2025-2030 GHG reductions from CPRG funding for Project 2C is \$116.54 per MTCO<sub>2</sub>e.** Attached GHG emission reduction calculations spreadsheet presents the details of cost calculations for project 2C.



**Project 2D:** The estimated financial investment required to implement the proposed 60 EEI and RES projects is detailed in the Technical Appendix. Using historical data from small businesses EEX has assisted in the past (as described in Section 1a above), the total anticipated project cost is \$6.83 million (\$4.73 million being CPRG funds including \$2.1 million for financial assistance; the other \$2.1 million being contributed by businesses). **The cost effectiveness of quantified 2025-2030 GHG reductions from CPRG funding for Project 2D is \$1,315.86 per MTCO<sub>2</sub>e due, in part, to the proposed staggered starting dates of the projects.** Attached GHG emission reduction calculations spreadsheet presents the details of cost calculations for project 2D.

**Project 3:** With a total CPRG funding request of \$15.27 million for scenario 2, a 100% CPRG cost share and an expected GHG reduction of 5,200 MTCO<sub>2</sub>e over 2025-2030, **the cost effectiveness for this project is calculated as \$2,926.77 per MTCO<sub>2</sub>e reduced.**

These calculations demonstrate that Project 3 is a highly cost-effective initiative for reducing greenhouse gas emissions, offering significant environmental benefits per unit of investment. These values are based on detailed calculations presented in the GHG emission reduction calculations spreadsheet for Project 3.

## 2d. Documentation of GHG Reduction Assumptions (15 points)

This section outlines the key assumptions used to estimate the GHG-reduction potential of various projects, which are crucial for accurately evaluating the impact of proposed initiatives.

### Start date assumptions:

- Project 2A: Jun. 1, 2027
- Project 2B: Jul. 1, 2029
- Project 2C: Jan. 1, 2027 (including all preidentified subprojects)
- Project 2D: Jan. 1, 2026 (Year 1 projects); Jan. 1, 2027 (Year 2 projects); Jan. 1, 2028 (Year 3 projects); Jan. 1, 2029 (Year 4 projects); Jan. 1, 2030 (Year 5 projects)
- Project 3 scenarios 1 and 2: Aug. 1, 2026

### Project 1 and 2 assumptions:

- Additional details are provided in the Technical Appendix and GHG emission reduction calculations spreadsheet.
- Reference scenarios are assumed to be business as usual.
- All GHG reductions are assumed to be for CO<sub>2</sub> gases.
- On Project 2C, there will be one project per facility for the 25 unidentified projects, leading to up to a total of up to 50 facilities assisted – 25 identified, 25 unidentified. Outreach may cover more than 50 facilities.
- Once completed, Projects 2A, 2B, 2C, and 2D are assumed to achieve "steady-state" outcomes:
  - Impacts from project ramp-up or ramp-down periods are considered negligible.
  - No significant impact from changes in maintenance activities due to project implementation (including equipment repair/replacement).
  - Project outcomes are not affected by market fluctuations, geopolitical events, natural disasters or other external factors. This ensures consistency in the usability of estimated outcomes across all evaluation years (e.g., a 2019 emissions reduction estimate remains relevant for 2049).

### Project 3 Assumptions:

- KSU Global Center photovoltaic system(s) description and analysis

- Proposed renewable energy production system for three separate PV arrays: 380 kW-DC for GCGFI rooftop, 30 kW-DC for Weber Link rooftop, and 45 kW-DC for Dairy Bar patio canopy array, utilizing a 'central inverter' solution due to larger arrays and higher voltages.
- Estimated system calculations generated using PVWatts® calculator tool for data analysis, including component derating, tilt, azimuth, meteorology data, and system losses. Provides a report for expected power generation, performance ratios and economic evaluation. The assumptions considered for rooftop arrays and the canopy array are discussed in the Technical Appendix (Project 3).

### SECTION 3. ENVIRONMENTAL RESULTS – OUTPUTS, OUTCOMES, & PERFORMANCE MEASURES (60 points)

This section presents the environmental benefits arising from EEX's proposed GHG-reduction measures. All anticipated environmental results will help to address EPA's Strategic Goal #1 (Tackle the Climate Crisis), while specific measures will also support Strategic Goal #2 (Environmental Justice), Strategic Goal #4 (Ensure Clean and Healthy Air for All Communities), Goal #6 (Safeguard and Revitalize Communities), and Goal #7 (Ensure Safety of Chemicals for People and the Environment). A framework for tracking progress and measuring success toward achieving these goals is explained below.

#### 3a. Expected Outputs and Outcomes (10 points)

This proposal delivers significant environmental and economic benefits. Here are the key highlights:

##### **Outputs:**

- Improved knowledge and skills: Deliver up to 10 technical assistance training sessions, providing participants with the expertise to implement effective GHG-reduction strategies.
- Community engagement: Host up to 10 community engagement workshops, encouraging collaboration between industry and community members on environmental justice and climate change issues.
- Technical resources: Develop and distribute comprehensive technical assistance materials to support ongoing GHG-reduction efforts.
- Widespread awareness: Create and disseminate outreach materials, such as case studies, social media posts and newsletters, to raise public awareness about the program's impact and best practices in GHG reduction.

##### **Outcomes:**

- Reduced energy and water consumption: Project 2A is expected to lower energy burdens and water use. Project 2C and 2D promote energy and water conservation practices, leading to long-term resource sustainability. Project 3 is expected to reduce energy consumption.
- Energy security and cost savings: Improved energy efficiency across projects (2A, 2B, 2D, and 3) reduces reliance on the grid, strengthens community resilience, and generates financial savings for participating facilities.
- Reduced greenhouse gas emissions: Projects 2 and 3 contribute to combating climate change by lowering overall GHG emissions. Some of the projects in 2C also reduce overall carbon footprint by targeting reduced methane, VOC and HAP releases.
- Clean air and water: All the projects promote cleaner air and water across projects, benefiting both the environment and disadvantaged communities. Project 2C directly addresses environmental concerns within these communities.

- Improved indoor environmental quality: Project 3 specifically focuses on improving the health and well-being of building occupants through better indoor air quality.
- Change of behavior: All the projects proposed encourage industries and communities to adopt sustainable practices and inspire others to follow.

### 3b. Performance Measures and Plan (10 points)

**Project 2A and 2B:** Two sets (Scope 1 and Scope 2) of GHG emissions are tracked monthly by the sustainability team at Birla Carbon. Scope 1 GHGs are comprised of process emissions and fuel combustion emissions. Scope 2 GHG emissions include emissions from electricity and steam that are purchased. Birla Carbon follows the Greenhouse Gas Protocol and IPCC Guidelines for National Greenhouse Gas Inventories for Scope 1 and 2 GHG emission calculations. Scope 1 process emissions are calculated using a mass balance methodology (Page 67, Equation 3.17, IPCC Guidelines). Scope 1 fuel combustion emissions are calculated by multiplying the amount of fuel consumed for heating by their corresponding emission factors. Fuel emission factors are sourced from the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Default Emission Factors for Stationary Combustion in Manufacturing Industries and Construction. Scope 2 emissions are calculated by multiplying the amount of electricity consumed by the EPA eGRID emission factor (or total output emission rate) for the corresponding subregion.

Scope 1 and 2 for Project 2A, and Project 2A and 2B combined will be tracked monthly for the Hickok site to determine project contribution to reductions in GHG emissions. The table presented in the worksheet “Emissions Scope 1 and 2” and the charts presented in worksheets (Chart 2A and Chart 2B) show the present and estimated GHG reporting measures.

**Project 2C and 2D:** As part of the financial reimbursement process, EEX will require assisted facilities to report on implementation status and results of recommended sustainability projects quarterly. This process will be assisted by EEX staff.

**Project 3:** To measure the performance of the environmental initiatives, the following key performance indicators (KPIs) will be tracked:

GHG emissions reduction: Annual monitoring of GHG emissions will be conducted to assess the impact of the implemented measures. In its original application to KDHE, K-State Facilities utilized the DOE/EPA EnergyStar Target Finder (ENERGY STAR Portfolio Manager Target Finder) online tool to estimate the GHG emissions for EEX Project 3. Once the new GCGFI building is in operation, EEX plans to use the EPA’s eGrid to convert electricity consumption to GHG emissions (Emissions and Generation Resource Integrated Database (eGRID) | US EPA).

### 3c. Authorities, Implementation Timeline, and Milestones (10 points)

**Project 1:** Work under Project 1 will occur throughout the period of performance with up to two technical trainings and two community engagement events held per year. After events and throughout period of performance, EEX will provide follow-up and ongoing assistance to attendees and interested parties. Additionally, as GHG reduction measures are implemented and results verified, EEX intends to publish documented success stories which will be publicly available and used at future events. EEX staff will also report on the community engagement, especially in disadvantaged communities, and their strategy for mitigating environmental risks, and progress on job quality.

**Project 2A and 2B:** EEX will closely work with Birla Carbon to monitor the implementation and progress of projects 2A and 2B. Birla Carbon Hickok Plant and Birla Carbon Engineering - Scope project, design

and engineer will be responsible for project, bid letting, construction of projects and commission for project 2A and 2B. Birla Carbon would require working with the Kansas Department of Health and Environment to modify Class I Title V Air Operating Permit to include the facility changes - 12 months for both projects. The expected timeline for both projects is as follows.

- Project 2A:

- Scope project - 3 months
- Design and engineering work - 8 months
- Bid letting - 2 months
- Construct project - 14 months
- Commission project - 1 month

*Total time on project to completion - 28 months (about 2.5 years)*

- Project 2B:

- Scope on project - 6 months
- Design and engineering - 12 months
- Bid letting - 2 months
- Construct project - 20 months
- Commission project - 3 months

*Total time on project to completion - 43 months (about 3.5 years)*

EEX staff (Principal Investigators) will be responsible for the semiannual and final progress reports

**Project 2C and 2D:** EEX staff (Principal investigators) will provide technical assistance throughout the period of performance as described in Section 1a above. EEX will be responsible for semiannual and final progress reports, which will include the following:

- Summary of technical assistance provided
- Quantified results including GHG reduction
- CPRG funding provided to industry
- Community engagement, especially in disadvantaged communities
- Environmental risk mitigation and pollution prevention
- Progress on job quality

**Project 3:** KSU Facilities and external consultants will closely work together to monitor the implementation and progress of project 3. The expected timeline is as follows.

- Scope on project - 3 months
- Design and engineering work - 6 months
- Construct project - 12 months
- Commission project - 1 month

Total time on project to completion - 22 months (about 2 years)

#### **SECTION 4. LOW-INCOME AND DISADVANTAGED COMMUNITIES (35 points)**

The proposed GHG reduction measures will be prioritized to deliver benefits and engage with low-income and disadvantaged communities as defined for EPA IRA programs, see Appendix Areas\_K-State Engineering Extension (EEX), which includes 241 census tracts across 62 counties in Kansas based on the CEJST disadvantaged designation as presented in [Figure 2](#).

#### 4a. Community Benefits (25 points)

Project 1 is mainly accomplished by providing training and technical assistance. Participants will learn how implementing GHG reduction strategies can help replace toxic chemicals, reduce employee exposure and environmental emissions, and lower operating expenses. The technical assistance and training target industries and small businesses, particularly those within environmental justice (EJ) communities. These businesses may have processes that involve volatile and hazardous organic air toxics. These pollutants can be released into the air during operations, but also pose a threat by entering the soil and water through stormwater runoff or improper pre-treatment before discharge into public wastewater systems. Exposure to these pollutants carries significant health risks for both workers and surrounding communities and can even contribute to ground-level ozone formation, a known respiratory health concern in many Kansas communities.

Project 2A and 2B will be implemented in the city of Ulysses (Grant County, Kansas) as shown in [Figure 2a and 2b](#) below. Energy efficiency and water conservation help reduce carbon emissions and combat global warming and are crucial in strengthening community resilience by enhancing energy security and reducing operational costs. Cleaner air means fewer pollutants that can redeposit onto land and water bodies, resulting in improved water quality and lower concentrations of GHGs that trap heat and reduce climate stability. Cleaner water and air thus attributes to better quality of life.

Project 2 (including Projects 2C and 2D) also builds upon the work completed in Project 1 to provide targeted and comprehensive technical and financial assistance for businesses in EJ communities. This assistance will lead industries located in low-income and disadvantaged communities to implement energy efficiency, pollution prevention and sustainable materials management projects. Please see the county map in [Figure 2](#), which highlights low-income and disadvantaged areas in Kansas alongside previous work completed by EEX.

Project 3 will be implemented in the city of Manhattan (Riley County, Kansas) as shown in [Figure 2c](#) below, which is in a low-income and disadvantaged community as defined for EPA IRA programs.

- Energy Efficiency: Building retrofits: Upgrade lighting, insulation and HVAC systems for significant energy savings.
- Pollution Prevention: Process optimization: Identify and implement strategies to minimize waste and emissions from operations; cleaner production technologies. Invest in equipment and practices that reduce pollution at the source.
- Sustainable Materials Management: Recycling and waste reduction programs: Develop and implement systems for waste reduction, recycling and composting.
- Improved Economy: New job opportunities for communities with implementation of new projects.

*"The climate crisis impacts everybody, but it does not impact all communities equally."*

- Vice President  
Kamala Harris

#### 4b. Community Engagement (10 points)

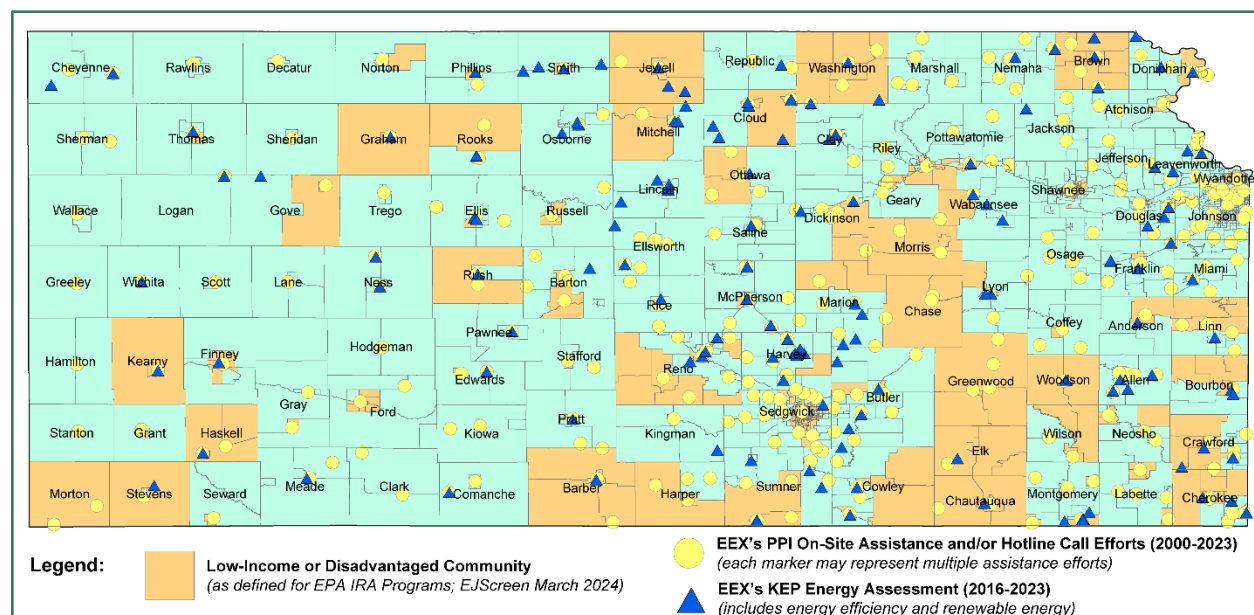
Community conversations and opportunities to express concerns and learn about local and regional environmental impacts in EJ communities leads to greater resilience. Industries in communities need to share their environmental impacts and plans for sustainability to their community members, many of which are their valued employees. Partnering with industries already involved with the GHG-reduction efforts under project 2, EEX will work with the industry and local public health authorities in the region



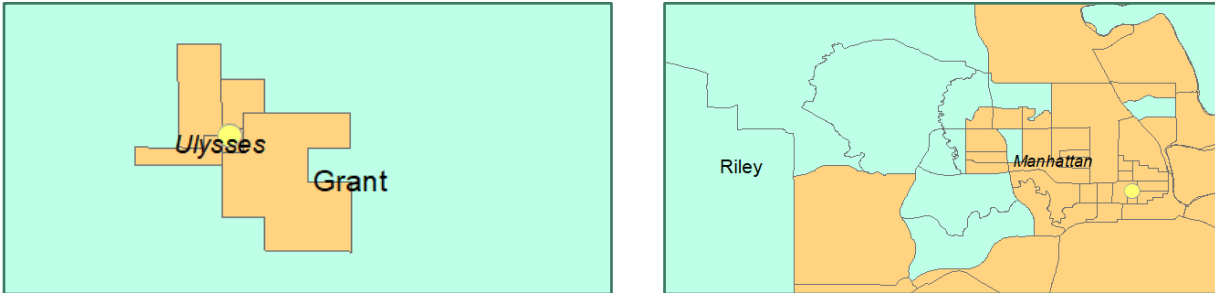
to host community engagement events. Community action groups identified by local partners will also be invited. To help the community understand environmental impacts, event content will involve basic public and environmental health information, definition of an EJ community and concerns that may need to be identified and discussed, as well as industry partner emission data and GHG-reduction projects. The events will be a time for engagement and listening to local leaders, industry and communities. EEX already partners with the [Heartland EJ Center](#) and will involve this group as well as the Brownfields group if appropriate. EEX will facilitate the meetings, taking notes and creating general action steps and identifying resources that local industry, health and community leaders will be asked to follow up. It will be a first step with EJ communities to open dialogue and potentially identify and understand environmental challenges faced by their communities regarding air quality, pollution prevention and sustainable material management. EEX plans to host up to two community engagement events annually and light refreshments will be offered as an incentive to participate. In some communities, it may be necessary to host community meetings two-three consecutive years to create meaningful engagement.

EEX has a documented history of providing assistance in disadvantaged communities as highlighted in [Figure 2](#) below. Through EEX's PPI and KEP programs, technical assistance has been provided to business and industry within every county in Kansas.

Project 3 is dedicated to actively engaging with low-income and disadvantaged communities. Through the GCGFI, K-State aims to foster innovation that is not only relevant locally but also can make a global impact. Initiatives such as the K-State Land-Grant Promise, which offers financial support to students enrolled at the university, are instrumental in providing opportunities for individuals from disadvantaged backgrounds to access higher education.



**Figure 2a: Past EEX Assistance in Low-Income and Disadvantaged Communities**



**Figure 2b and 2c: Subsets of Figure 2. Showing Location of Projects 1A and 1B (Ulysses in Grant County) and Project 3 (Manhattan in Riley County)**

Through these initiatives, K-State is not only providing financial support and educational opportunities to low-income and disadvantaged communities but also fostering a diverse and inclusive environment that benefits students, the university and the broader community.

#### **SECTION 5. JOB QUALITY (5 points)**

If funded, EEX will expand its team by hiring new employees who meet the qualifications outlined in Criteria 5. These employees will receive comprehensive training and mentorship to ensure their success. Commitment to workforce development extends beyond EEX, as it also offers training programs to the industry and community, aiming to enhance overall skill levels. Through its work under Project 1 and 2, EEX will encourage small businesses to work with local contractors providing high-quality jobs in alignment with [Executive Order 14082](#). For Projects 2C and 2D, the proposed scoring criteria in Table 1 will provide an incentive for businesses to use local contractors providing high-quality jobs. Once implemented, Project 2B has the probability of creating five new job opportunities. Project 3 will also lead to economic development and job growth. According to a [study](#) by TEconomy Partners (May 2020), for every \$1 invested in agriculture research at K-State, there is a return of \$17 to the Kansas economy, underscoring the importance of agriculture as a key driver of economic prosperity in Kansas and highlighting the quality and impact of jobs created in this sector.

#### **SECTION 6. PROGRAMMATIC CAPABILITY AND PAST PERFORMANCE (30 points)**

For more than 40 years, EEX has successfully managed and implemented various public and environmental health EPA grant-funded projects. Within its three program areas (PPI, KEP, and the Radon Program), the department manages about 10 grants at a time. Due to this success, the department programs have grown from 10 to 20 professional and support staff since 2006, all dedicated to the mission of improving the environment and quality of life for Kansas citizens. As a 100% grant- and contract-funded department, EEX has established a proven structure for accomplishing project goals, tasks and activities that results in implemented projects and on-time reporting to the EPA. This structure requires project leads to develop and follow annual work plans, providing accountability to team members and funders regularly. As a result of its success and leadership regionally and nationally, EEX's PPI has received numerous accolades from the EPA for its work under various grants, including a 2022 National Karen Brown Leadership award, 2019 and 2009 SBEAP of the year award, a 2018 EPA Administrator's Award, state and national P2 awards, as well as champion awards.

#### 6a. Past Performance (10 points)

**FFY23-24 EPA Pollution Prevention Environmental Justice for Communities Grants** Titled: Environmental Justice in Communities; funding number: EPA-I-OCSP-OPPT-FY2023-001 for \$574,771; Using nationally recognized tools, PPI will identify EJ communities, industries and institutions in EJ areas and provide P2 technical assistance under three different proposed projects. EPA contact: Chen Wen

**FFY22-23, EPA Source-Reduction Assistance Grant** Titled: Identifying and implementing greenhouse gas reduction opportunities at small- to medium-sized hospitals in Kansas; Assistance number: X9 97799201 for \$130,000, to provide source reduction technical assistance to identify, quantify and reduce greenhouse gasses at healthcare facilities. EPA contact: Kate Larberg.

**SFY23 Kansas Corporation Commission State Energy Program Grant** for \$426,682 to conduct energy assessments for rural small businesses and agricultural producers; to provide general and K-12 energy education through presentations, equipment loans, and other support; to develop curriculum and resources to assist K-12 schools in benchmarking their energy use; and to host a number of KidWind Challenge events (a national STEM competition) for the state of Kansas. KCC contact: Lynn Retz.

**FY20-FY25, EPA Support and management of Nationalsbeap.org Website and 507 Program** Titled: support 507 programs through communication, collaboration and web resources; Assistance number: 84004701 for \$550,000. Develop, enhance and maintain nine listservs, a resource website and assist with annual conference. EPA contact: Paula Hoag

**FFY22-23 EPA Pollution Prevention Grant** Titled: Kansas Pollution Prevention Program; Assistance number: 97798901 for \$318,821 to provide pollution prevention technical assistance to NEA 1 and 2 industries. EPA contact: Kate Larberg.

KEP Results	
Small business assessment results 2016 to June 2022	
Energy Savings Identified 11,244,939 kWh	Assessments Completed 148
Annual Dollars Saved \$1,100,617	REAP Projects Awarded 71
PPI Implemented Results	
Savings realized by entities who have participated in PPI programs and have implemented projects as a result.	
Solid Waste Reduced 24,209,108 lb.	Hazardous Materials Reduced 964,688 lb.
Water Reduced 289,516,594 gal.	Air Emissions Reduced 58,208,800 lb.
Money Saved \$23,121,531	MTCO2e Reduced 34,955

#### 6b. Reporting Requirements (10 points)

As described above, EEX has developed a structure to ensure proposal work plans are broken into milestones resulting in implemented project goals. A review of the **five EPA grant agreements listed above as well as past closed EPA grants, reveals that all required reporting was provided to the EPA either before or on the due date.** When the EPA seeks clarification, EEX specialists are prompt to answer questions and provide any requested materials. Specific reporting history is as follows -

**FFY23-24 EPA Pollution Prevention Environmental Justice for Communities Grants** - Awarded Feb. 1, 2024 semiannual reports using EPA's templates will be due Aug. 30, 2024 and Feb. 28, 2025. PPI is currently working with its grant officer to develop its QAPP for EPA's approval.

**FFY22-23, EPA Source-Reduction Assistance Grant** - 24-month grant requires semiannual reports. All reports have been submitted on or before the due date with the most recent report submitted Jan. 30, 2024.

**SFY23 Kansas Corporation Commission State Energy Program Grant** - KEP submitted acceptable and timely monthly reports and a final report submitted on 7/20/23.

**FY20-FY25, EPA Support and management of Nationalsbeap.org Website and 507 Program** - Five-year grant requires quarterly reports using an EPA template. All reports have been submitted on or before the due date with the most recent report submitted Feb. 29, 2024.

**FFY22-23, EPA Pollution Prevention Grant** - 30-month grant requires semiannual reports. All reports have been submitted on or before the due date with the most recent report submitted Nov. 30, 2023.

#### 6c. Staff Expertise (10 points)

PPI specialist Leena Divakar and KEP specialist, Ryan Hamel, will act as PIs for the project, which will be led by the EEX team members listed below. If funded, EEX will hire or promote existing staff to work on Project 1 and 2. Current specialists will lead projects and mentor the new staff. With a combined 70 years of experience, EEX can quickly mentor new staff. Key staff resumes are attached.

**Leena Divakar**, PPI specialist, is one of two principal investigators and key contacts for the project. Divakar has more than 15 years working in the environmental field and has been with PPI for five years working with various industries, and institutional partners. As one of two principal investigators, Divakar will supervise project management and reporting and ultimately be responsible for timely and complete reports. She serves as one of the two representatives of R7 SBEAP for [nationalsbeap.org](https://nationalsbeap.org) and sits on various national subcommittees. Divakar also has experience mentoring new specialists and P2 interns.

**Ryan Hamel**, energy specialist, is one of two principal investigators and key contacts for the project. He will provide technical assistance, supervise project management and reporting, and be responsible for timely and complete reports. Hamel is a Certified Energy Manager (certificate #15745) and Certified Measurement and Verification Professional (certificate #4913) through the Association of Energy Engineers and a licensed Professional Engineer (State of Kansas, #24799). Hamel received his degree in Biological and Agricultural Engineering in 2007 and has conducted energy audits since 2008.

**Jacob Larson**, P2 specialist, has a chemical engineering degree and will assist with the project by providing GHG technical assistance and training detailed in Project 1 and 2. Larson led PPI's sustainable material management grant and leads PPI's hazardous waste technical assistance program. He began his P2 career as a 2017 P2 intern, then worked with aerospace before joining PPI in early 2022. He has experience mentoring interns, as well as working with industry and community partners.

**Rajavel Krishnamoorthy**, PPI specialist will work with Project 2, will assist different businesses for potential implementation challenges for GHG mitigation projects plans. Krishnamoorthy has expertise in identifying EJ's areas and specific industry P2 best practices. Prior to joining PPI in late 2023, he spent more than five years developing sensor technology for quantification of carcinogen VOCs.

**New specialists**, if funded, EEX will hire up to three new professional staff members to assist with the technical assistance tasks as detailed in Project 1 and 2. The specialists will be well supported by experienced PIs and other EEX team members. PPI specialists must have a B.S. in engineering or science and at least two years of experience working with industry.

**New technical and support staff**, if funded, EEX will hire two new technical and administrative support staff to assist with recruitment, training and the processes of funding reimbursements.

**Kurt Foley**, energy specialist, will conduct fieldwork under Project 2. Foley is a Certified Energy Manager (certificate #28396), Certified Measurement and Verification Professional (certificate #1006), and a Certified Demand Side Manager (certificate #2339) through the Association of Energy Engineers. He has conducted energy audits since 2019.

**Mary Park**, project manager for the K-State Division of Facilities (Facilities), will act as the key contact for Project 3. Mary is a P.E. with more than 10 years' experience with project management and will be the contact responsible for reporting progress and metrics to the two primary EEX PI's.

## SECTION 7. BUDGET AND TIMELY EXPENDITURE OF GRANTS FUNDS (45 points)

### 7a. Budget Detail (20 points)

Using EPA's Excel template, EEX has provided a detailed budget spreadsheet as part of the allowable 10-page budget narrative attachment. The budget narrative breaks down expenses by each of the proposed six GHG-reduction activities or projects and provides details related to personnel salary and allocation, travel budget breakdowns, supplies, subawards and consulting fees.

In summary, a total of \$48,180,934 is proposed over a five-year period. A description of the various categories and percent budget by category follows. The budget narrative attached breaks down costs in detail by project. Please note that EEX estimates about 20% of personnel time will be dedicated to collecting metrics and reporting.

**Primary Personnel:** 5% of the direct costs are allocated for primary personnel. L. Divakar will co-lead Project 1 and lead Project 2a-c. and with assistance from J. Larson, R. Krishnamoorthy. All three will mentor the new specialist, technician, and administrative assistant. R. Hamel will co-lead Project 1 and lead Project 2d. with assistance from K. Foley. The two will mentor the additional two new specialists. M. Park will lead Project 3, which involves oversight of a construction contractor project. These costs are reasonable, and the salary is below or consistent with the market rates for university professionals in STEM fields.

**Other Personnel:** less than 1% of the direct costs will be allocated for other personnel. Funds are requested to provide compensation for two departmental technical leads, D. Carter and A. Fink. Funding one staff-level administrative support, D. Lutt at 10% time to support and mentor administrative processes and program needs related cost-share reimbursements. These costs are reasonable, and the salary is below or consistent with the market rates for university staff-level employees.

**Fringe Benefits:** 2% of the direct costs are for fringe benefits. KSU's fringe benefit rate is 32.8% for personnel included in this proposal. Fringe benefits cover insurance, social security, and retirement.

**Travel:** Less than 1% of funds are requested for travel for trips to partner industries and communities including to disadvantaged communities. Travel costs are detailed in the budget narrative by project and include on-site assessments, trainings and for professional conferences used to amplify GHG-reduction success stories. Travel locations are to be determined and include day trips and overnight trips, primarily by car.

**Supplies:** less than 1% of funds are requested for supplies to support various costs at less than \$5,000 per unit for laptops, emission assessment tools and training needs as detailed in the budget narrative.

**Contractual:** 27% of funds are requested for Project 3 design and build costs, as well as for consultant services to support primary staff with Project 2c. and 2d. Work.

**Other:**



*Subawards:* 65% of funds will support subawards to named and unnamed industry partners that apply and are awarded cost-share funds to implement GHG-reduction projects. The details of projects are explained in the budget narrative.

*Other:* less than 1% of funds are requested for other categories and IT, editing support, fees for trainings space and light refreshments costs associated with trainings, primarily related to the community engagement event to promote attendance. If desired, a light refreshment descriptive table can be provided.

**Indirect:** 35% is allocated for facilities and administrative costs, except for subawards which only charge indirect costs on the first \$25,000. This is the KSU federally negotiated rate included as an attachment for reference.

#### 7b. Expenditure of Awarded Funds (15 points)

EEX has more than 30 years' experience implementing an **approach, procedures and controls** that ensure the EPA funds awarded are expended in a timely and efficient manner. From a fiscal standpoint, as part of K-State, EEX has the fiscal and administrative support and experience that a university can provide, including grant-trained specialists who help EEX process required contracts, forms, budgets and fiscal reporting, and a fiscal accountant who provides detailed reports on expenses incurred by budget category and funds remaining. EEX programs have an internal protocol (**approach and process**) for ensuring timely and efficient expenditures of awarded grant funds. Proposed expenditures are compared to actual expenses and tracked separately on an Excel spreadsheet. Differentials greater than 10% in any budget category are flagged for closer analysis. If a new expenditure is required or a budget category deviates by more than 10% of the total budget, PI's will notify the grant administrator.

From a workplan and staffing standpoint, EEX has established a proven structure for accomplishing project goals, tasks and activities that results in implemented projects and on-time reporting to the EPA. This structure requires project leads to develop and follow annual work plans, providing accountability to team members and funders on a regular basis. In addition to annual workplans reviewed with the PIs, specialists send out weekly activities lists that track past progress and planned activities, document internal project meeting agendas and action items, as well as report on their project progress quarterly during staff meetings. If concerns are identified at any point, the project team collaborates to find solutions. Progress and concerns are also discussed with EPA project managers during scheduled semiannual Zoom meetings. As a result of this structure and leadership, EEX has never submitted a late report to the EPA, and always cooperates with EPA requests for additional information. EEX's history of successful management of grant projects resulting in significant outcomes and outputs has allowed it to thrive and grow over the past 30 years.

#### 7c. Reasonableness of Cost (10 points)

EEX has trained, experienced technical staff that utilize internal time tracking tools to identify the labor needs for various compliance and P2 projects. These time tracking tools provide data and a process that supports **reasonable cost controls** and estimates for personnel costs. EEX uses past experience working with technical assistance projects when adding staff time based on their roles, travel costs are based on past expenses for state-wide assistance, training and conference travel. All specialists maintain checks and balances to ensure strict adherence to the contracts and fiscal procedures, including quarterly check-ins to review workplan goals, objectives and tasks, and budget.

Supply costs are estimated based on real-time research of the product. Proposed costs related to providing industry with grant-funded GHG-reduction equipment were professionally estimated using vendors, information from past similar projects and in the case of Project 2b and 2c, the costs came directly from the engineering team at the industry.

Based on previous experiences collecting outcomes, EEX estimates about 20% of the personnel time spread throughout the six projects will be dedicated to evaluating and reporting **measurable environmental outcomes**. The cost effectiveness of all proposed GHG-reduction measures (Projects 2A, 2B, 2C, 2D and Project 3 scenario 2) is estimated to be \$444.88 of CPRG funding per MTCO<sub>2</sub>e.

#### **Project Narrative Attachments**

- **Cover Page** [Filename: Cover\_K\_State\_EEX.pdf]
- **Workplan** [Filename: Workplan\_K\_State\_EEX.pdf]
- **Budget** [Filename: Budget\_K\_State\_EEX.xlsx]
- **Technical Appendix** [Filename: Techappx\_K\_State\_EEX.pdf]
- **GHG emission reduction calculations** [Filename: GHGcalcs\_K\_State\_EEX.xlsx]

#### **Other Attachments**

- **Applicable PCAP** [Filename: KDHE\_K\_State\_EEX.pdf]
- **CEJST Census Tract IDs** [Filename: Areas\_K\_State\_EEX.xlsx]
- **Team Biographies** [Filename (multiple): LastName\_bio\_K\_State\_EEX.pdf]
- **Letters of Commitment** [Filename: Birla\_LOC\_K\_State\_EEX.pdf]
- **Indirect Cost Rate Agreement** [Filename: IndirectCostsFY20\_FY23\_K\_State\_EEX.pdf]