

# **Appendix C:**

# **IMPACT OF GHG REDUCTION MEASURES**

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in St. John the Baptist Parish:**

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## **IMPACT OF GHG REDUCTION MEASURES**

### **Measure 1: Maurepas Swamp Hardwood Reforestation**

#### **Magnitude of GHG Reductions from 2025 through 2030**

The Maurepas Swamp Hardwood Reforestation project is poised to make significant strides in GHG reduction in the short term. From 2025 through 2030, the cumulative CO<sub>2</sub>e captured by the newly planted hardwood trees is projected to scale up as the forest matures. Considering the initial annual increase in trees planted and the subsequent stabilization of tree growth and carbon capture rates, we can calculate the total CO<sub>2</sub>e captured by this project during this period. With an average CO<sub>2</sub>e capture of 0.013 metric tons per tree per year, the focus on rapidly increasing the tree population within the initial years maximizes carbon sequestration during these crucial early stages.

#### **Magnitude of GHG Reductions from 2025 through 2050**

Extending our projection to 2025 through 2050, the long-term impact of the Maurepas Swamp Hardwood Reforestation on GHG reductions becomes even more pronounced. As these trees mature and reach their peak carbon-capturing capabilities, the total CO<sub>2</sub>e captured exponentially increases. This period represents a critical phase in the project's lifecycle, transitioning from growth to sustained carbon sequestration, illustrating the project's enduring contribution to combating climate change.

#### **Cost Effectiveness of GHG Reductions**

Analyzing the cost-effectiveness of the GHG reductions achieved through this project involves examining the total direct funding requested (\$1,574,375) against the projected carbon sequestration outcomes. The substantial budget allocated for tree plantings and related supplies underscores the project's commitment to maximizing carbon capture through reforestation. The investments in solar-powered trailers and management of plantings are crucial for enhancing the project's sustainability and effectiveness. By calculating the cost per metric ton of CO<sub>2</sub>e captured, we can illustrate the economic efficiency of this reforestation effort in terms of both immediate and long-term GHG reduction impacts. To derive the cost effectiveness of GHG reductions, the following quantities were calculated.

1. The cumulative CO<sub>2</sub>e captured from 2025 through 2030 and 2025 through 2050, using the given annual sequestration rates and tree counts.
2. The cost per metric ton of CO<sub>2</sub>e captured by considering the total budget and the total CO<sub>2</sub>e captured over these periods to assess the cost-effectiveness.

Then, the team calculated the total CO<sub>2</sub>e captured by the project during the periods 2025-2030 and 2025-2050.

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The calculations for the Maurepas Swamp Hardwood Reforestation project provide insightful data on the GHG reduction impact:

- *Magnitude of GHG Reductions from 2025 through 2030:* The project is expected to capture approximately 1,381.25 metric tons of CO<sub>2</sub>e within this six-year period. This showcases the project's significant immediate impact on GHG reduction as the newly planted trees begin to mature.

- *Magnitude of GHG Reductions from 2025 through 2050:* Looking at a longer time frame, the project is projected to capture a substantial total of 105,300 metric tons of CO<sub>2</sub>e by 2050. This highlights the enduring legacy of the reforestation efforts, emphasizing the crucial role of long-term planning in environmental conservation and climate change mitigation.

The cost-effectiveness analysis of the GHG reductions achieved by the Maurepas Swamp Hardwood Reforestation project yields the following insights:

- *Cost per Metric Ton of CO<sub>2</sub>e Captured by 2030:* The cost is approximately \$1,139.82 per metric ton of CO<sub>2</sub>e. This figure represents the investment required in the short term (up to 2030) to kickstart the reforestation and begin the process of carbon sequestration.

- *Cost per Metric Ton of CO<sub>2</sub>e Captured by 2050:* For the longer term, extending to 2050, the cost effectiveness significantly improves, with the cost per metric ton of CO<sub>2</sub>e reduced to approximately \$14.95. This dramatic decrease underscores the project's long-term value, showing how initial investments mature into more cost-effective GHG reduction over time.

These findings demonstrate the Maurepas Swamp Hardwood Reforestation project's potential to provide substantial and cost-effective GHG emissions reductions, aligning with both immediate and extended climate goals. The upfront costs are mitigated by the long-term benefits, emphasizing the project's contribution to sustainable environmental stewardship and resilience against climate change.

## Measure 2: Electrifying Transportation in St. John the Baptist Parish

### Magnitude of GHG Reductions from 2025 through 2030

The electrification of the transportation sector in St. John the Baptist Parish is set to significantly reduce GHG emissions by replacing gasoline-powered vehicles with EVs and by harnessing solar energy to offset energy demands from EV charging stations. From 2025 through 2030, the cumulative GHG emissions reduction are calculated based on the yearly increase in EV fleet size, the substitution of gasoline vehicles with EVs, and the additional household EVs adopted over the years, along with the GHG mitigation contributed by the solar array.

### Magnitude of GHG Reductions from 2025 through 2050

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Extending the analysis to the period from 2025 through 2050 provides a broader perspective on the long-term environmental benefits of this measure. This encompasses the continued yearly increase in the EV fleet, broader adoption of EVs by households, and sustained GHG emissions mitigation from the solar array installation. The projections highlight the enduring impact of these initiatives on reducing the carbon footprint of the parish's transportation sector.

#### Cost Effectiveness of GHG Reductions

The budget for this comprehensive electrification and solar power project totals \$10,832,360. Evaluating the cost-effectiveness involves comparing this investment against the GHG emissions reductions achieved over the two time periods. This demonstrates the economic efficiency of transitioning to electric vehicles and leveraging solar energy as sustainable practices within the parish.

The team began by calculating the cumulative GHG emissions reductions for the two time periods and assessed the cost-effectiveness of these reductions. This required summing up the CO<sub>2</sub>e mitigated by transitioning to EVs (both the parish fleet and additional household EVs) and the CO<sub>2</sub>e offset by the solar array from 2025 through 2030 and then from 2025 through 2050.

The analysis for Measure 2: Electrifying Transportation in St. John the Baptist Parish, reveals the following projections for GHG emission reductions:

- *Magnitude of GHG Reductions from 2025 through 2030:* The collective efforts of transitioning the parish fleet and household vehicles to EVs, along with the GHG emissions offset by the solar array, are expected to mitigate approximately 3,945.71 metric tons of CO<sub>2</sub>e in this six-year period. This indicates a significant step towards reducing the parish's carbon footprint through electrification and renewable energy adoption in the near term.

- *Magnitude of GHG Reductions from 2025 through 2050:* Extending the timeframe to include the period from 2025 through 2050, the initiatives are projected to mitigate a total of approximately 33,832.15 metric tons of CO<sub>2</sub>e. This substantial reduction underscores the long-term environmental benefits of transitioning to a more sustainable, electric-powered transportation system and leveraging solar energy.

To complete the cost vs. GHG mitigation analysis, one must assess the cost-effectiveness of these GHG reductions by comparing the total project budget to the amount of CO<sub>2</sub>e mitigated over both periods.

- *Cost per Metric Ton of CO<sub>2</sub>e Mitigated by 2030:* The investment for the electrification and solar power projects translates to approximately \$2,745.35 per metric ton of CO<sub>2</sub>e mitigated within the initial six years. This figure reflects the upfront costs associated with transitioning to electric vehicles and setting up the solar array to support the EV charging infrastructure.

- *Cost per Metric Ton of CO<sub>2</sub>e Mitigated by 2050:* Looking at the longer term, the cost effectiveness significantly improves, with the investment amounting to around \$320.18 per metric ton of CO<sub>2</sub>e mitigated over the 25-year period. This highlights the project's long-term economic and environmental benefits, demonstrating the value of investing in sustainable transportation and renewable energy solutions.

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These findings illustrate the strategic importance of the parish's initiative towards electrification and solar energy utilization, emphasizing both immediate and sustained impacts on GHG emission reductions. While initial costs are higher, the long-term benefits in terms of reduced carbon footprint and cost per ton of GHG mitigated clearly support the project's viability and contribution to combating climate change.

### Measure 3: Transitioning to Sustainable Waste Management

#### Magnitude of GHG Reductions from 2025 through 2030

The project's initial phase, spanning from 2025 to 2030, promises a consistent annual GHG emission reduction by avoiding the incineration of waste. With the average metric tons of waste currently incinerated per year in SJPB and the CO<sub>2</sub>e per metric ton of waste incinerated, the total CO<sub>2</sub>e mitigated annually remains constant. This period is critical for establishing the shredder's efficacy in reducing emissions associated with waste processing.

#### Magnitude of GHG Reductions from 2025 through 2050

Extending the analysis to 2050, the long-term GHG reduction potential of transitioning to a shredder-based waste management system becomes even more evident. The consistent annual reduction in CO<sub>2</sub>e highlights the enduring impact of this transition on the parish's carbon footprint, showcasing the project's contribution to sustainable waste management over 25 years.

#### Cost Effectiveness of GHG Reductions

To assess the cost-effectiveness of these GHG reductions, it's essential to consider the budget required for implementing the shredder-based system. The project's alignment with the EPA's Climate Pollution Reduction Grants program underscores its potential for securing necessary funding. By comparing the total GHG reductions achieved to the project's costs, we can evaluate the economic efficiency of this transition in terms of GHG mitigation.

Given the provided data on annual waste incineration and the associated CO<sub>2</sub>e mitigation, let's calculate the total GHG emissions reduced from 2025 through 2030 and 2025 through 2050, followed by an assessment of the cost-effectiveness based on the project's budget and anticipated environmental benefits.

*- Magnitude of GHG Reductions from 2025 through 2030:* The transition from an incinerator to an industrial shredder is expected to mitigate approximately 2,026.65 metric tons of CO<sub>2</sub>e over this six-year period. This reflects the immediate and significant impact of adopting a more sustainable waste management approach on reducing GHG emissions.

*- Magnitude of GHG Reductions from 2025 through 2050:* Over the longer term, from 2025 to 2050, the total GHG emissions reduction is projected to be approximately 8,444.38 metric tons of CO<sub>2</sub>e. This underscores the lasting benefits of the shredder-based system in contributing to climate change mitigation by consistently reducing emissions from waste management practices.

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Incorporating the total project funding requirement of \$508,275, the team calculated the cost per metric ton of CO<sub>2</sub>e mitigated for both the initial six-year period and the 25-year project lifespan. This analysis will provide insights into the economic efficiency of the project in terms of its contribution to GHG emissions reduction relative to the investment made. Let's proceed with these calculations.

*Cost per Metric Ton of CO<sub>2</sub>e Mitigated by 2030:* The investment towards transitioning to an industrial shredder translates to approximately \$250.80 per metric ton of CO<sub>2</sub>e mitigated within the first six years. This figure highlights the efficiency of the project in reducing GHG emissions through the initial phase of implementation and operation.

*Cost per Metric Ton of CO<sub>2</sub>e Mitigated by 2050:* Over the 25-year lifespan of the project, the cost per metric ton of CO<sub>2</sub>e mitigated improves significantly, to around \$60.19. This long-term analysis underscores the project's sustainability and its contribution to ongoing GHG emission reductions, demonstrating excellent cost-effectiveness over time.

These findings illustrate the project's economic and environmental value, showcasing a strategic investment in sustainable waste management that aligns with the objectives of the EPA's Climate Pollution Reduction Grants program. By moving away from incineration to a shredder-based system, St. John the Baptist Parish not only reduces its carbon footprint but also sets a precedent for innovative and environmentally friendly waste management practices, ensuring healthier community living conditions and a substantial contribution to combating climate change.

## **Measure 4: Belle Terre Streetscape & Stormwater Improvements**

### **Magnitude of GHG Reductions from 2025 through 2030**

This project will improve traffic flow and reduce vehicle miles traveled (VMT) by enhancing roadways and integrating bioswales and pedestrian-friendly designs. The assumptions provided indicate an initial yearly CO<sub>2</sub>e reduction due to improved traffic flow and additional reductions from reduced VMT thanks to the project's enhancements. Over the period from 2025 through 2030, we've calculated the cumulative GHG emission reductions resulting from these interventions.

### **Magnitude of GHG Reductions from 2025 through 2050**

Extending our analysis to 2025 through 2050, we've examined the long-term GHG reduction potential of the Belle Terre Streetscape & Stormwater Improvements. This includes sustained improvements in traffic flow, the enduring impact of bioswales in managing stormwater and reducing runoff, and the promotion of active transportation methods such as walking and biking.

### **Cost-Effectiveness of GHG Reductions**

With a total project budget of \$2,018,280, we've assessed the cost-effectiveness of the GHG emission reductions over the short and long term. This involved comparing the project's total

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investment against the calculated CO<sub>2</sub>e reductions for both the initial six-year period and the 25-year project lifespan.

The team calculated the cumulative GHG emission reductions from 2025 through 2030 and 2025 through 2050 based on the improvements in traffic flow and the reduction in vehicle miles traveled. Then, we evaluated the cost per metric ton of CO<sub>2</sub>e mitigated over these periods.

*- Magnitude of GHG Reductions from 2025 through 2030:* The project is expected to mitigate approximately 1,213.42 metric tons of CO<sub>2</sub>e over the initial six years. This demonstrates the immediate impact of the streetscape and stormwater improvements on reducing GHG emissions through improved traffic flow and the implementation of green infrastructure.

*- Magnitude of GHG Reductions from 2025 through 2050:* Looking at the longer term, from 2025 to 2050, the project is projected to achieve a total GHG emissions reduction of approximately 8,514.22 metric tons of CO<sub>2</sub>e. This highlights the substantial and sustained contribution of the Belle Terre improvements to GHG mitigation over a 25-year period.

### **Cost-Effectiveness of GHG Reductions**

*- Cost per Metric Ton of CO<sub>2</sub>e Mitigated by 2030:* The investment in the project translates to approximately \$1,663.30 per metric ton of CO<sub>2</sub>e mitigated within the first six years. This figure provides insight into the initial cost-effectiveness of the project, reflecting the significant upfront investments in green infrastructure and streetscape enhancements.

*- Cost per Metric Ton of CO<sub>2</sub>e Mitigated by 2050:* Over the 25-year lifespan of the project, the cost per metric ton of CO<sub>2</sub>e mitigated improves to around \$237.05. This improvement underscores the long-term economic and environmental benefits of the Belle Terre Streetscape & Stormwater Improvements, demonstrating the project's effectiveness in contributing to GHG emission reductions at a decreasing cost per ton over time.

These findings illustrate the Belle Terre project's significant potential for reducing GHG emissions through sustainable urban development and green infrastructure, offering a cost-effective solution to environmental challenges while enhancing community resilience and quality of life.