CLIENT: ARCHER DANIELS MIDLAND

REPORT NUMBER: R001

CARBON REDUCTION FEASIBILITY STUDY

MARCH 30, 2020

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1 INTRODUCTION

Archer Daniels Midland (ADM) has retained WSP USA to assist with their greenhouse gas (GHG) emissions reduction planning. ADM has identified and quantified numerous emission reduction projects at its facilities. WSP has reviewed the assumptions and results of ADM's analysis, and has identified several additional projects that ADM may utilize to continue its journey to reduce greenhouse gas emissions globally in keeping with its commitment to mitigate the effects of climate change.

This report summarizes the work of ADM and WSP and provides the underpinning for the greenhouse gas reduction goal that ADM will pursue over the next 15 years. The report also discusses technologies that, while not available or feasible at this time, may become more feasible for ADM to implement in the future.

1.1 ABOUT ADM

For more than a century, the people of Archer Daniels Midland Company (NYSE: ADM) have transformed crops into products that serve the vital needs of a growing world. Today ADM is one of the world's largest agricultural processors and food ingredient providers, with approximately 40,000 employees serving customers in nearly 200 countries. With a global value chain that includes approximately 450 crop procurement locations, more than 330 food and feed ingredient manufacturing facilities, 62 innovation centers and the world's premier crop transportation network, ADM connects the harvest to the home, making products for food, animal feed, industrial and energy uses.

To enhance the efficiency of transporting large quantities of raw materials and finished products between the company's procurement facilities and processing plants, and also the final delivery of products to its customers around the world, the company owns approximately 1,800 barges, 12,000 rail cars, 360 trucks, 1,200 trailers, 100 boats, and 10 oceangoing vessels; and leases, under operating leases, approximately 610 barges, 16,400 rail cars, 240 trucks, 190 trailers, 4 boats, and 12 oceangoing vessels.

1.2 ABOUT WSP

WSP Global is one of the world's leading engineering professional services consulting firms. WSP is dedicated to local communities and propelled by international brainpower. WSP employs technical experts and strategic advisors including engineers, technicians, scientists, architects, planners, surveyors and environmental specialists, as well as other design, program and construction management professionals. The company designs lasting solutions in the Property & Buildings, Transportation & Infrastructure, Environment, Industry, Resources (including Mining and Oil & Gas) and Power & Energy sectors as well as project delivery and strategic consulting services. With 48,000 talented people in more than 430 offices across 40 countries, WSP develops projects that will help societies grow for lifetimes to come.

WSP USA is the U.S. operating company of WSP Global, with more than 9,500 people in 100 offices across the U.S.

Within WSP USA, multidisciplinary sustainability, energy and climate change teams bring a balance of technical and strategic experience, collaborating with our clients to unlock opportunities to reduce cost, create brand value and mitigate risk across the value chain, ultimately building more resilient organizations that can thrive in a changing market. WSP supports clients across sectors by providing strategy and planning, as well as operational and technical expertise. WSP's employees are passionate about contributing to their clients' successes through depth of expertise, collaborative approaches and unique perspectives on the market.

2 GENERAL FINDINGS

2.1 CURRENT STATUS

As a global enterprise, climate change is an issue that has implications for all ADM employees, stakeholders, the communities in which it operates, and all aspects of its business. ADM has a global industrial footprint, and responsibility to lower emissions related to its operations and business activities. What's more, the agricultural supply chain – with which ADM is closely associated – contains a variety of emissions sources, as well as potential emission sequestration capabilities.

Many ADM processing facilities have significant electrical and thermal energy needs. They generally burn fuel onsite to generate electricity and thermal energy, and purchase electricity from the grid to cover additional electricity needs. As with most industrial companies, ADM has focused on improving process efficiency and other projects to reduce energy use, and there will continue to be opportunities to further reduce. However, the facilities will continue to require significant thermal and electrical energy.

2.1.1 – CLIMATE CHANGE RISK

ADM has identified operational and financial risks associated with climate change in the ADM SEC 10k and Proxy statement. In addition, as climate change and global carbon emissions continue to be a focus around the globe, the company has seen an increase in inquiries from customers, investors, NGOs, and private citizens.

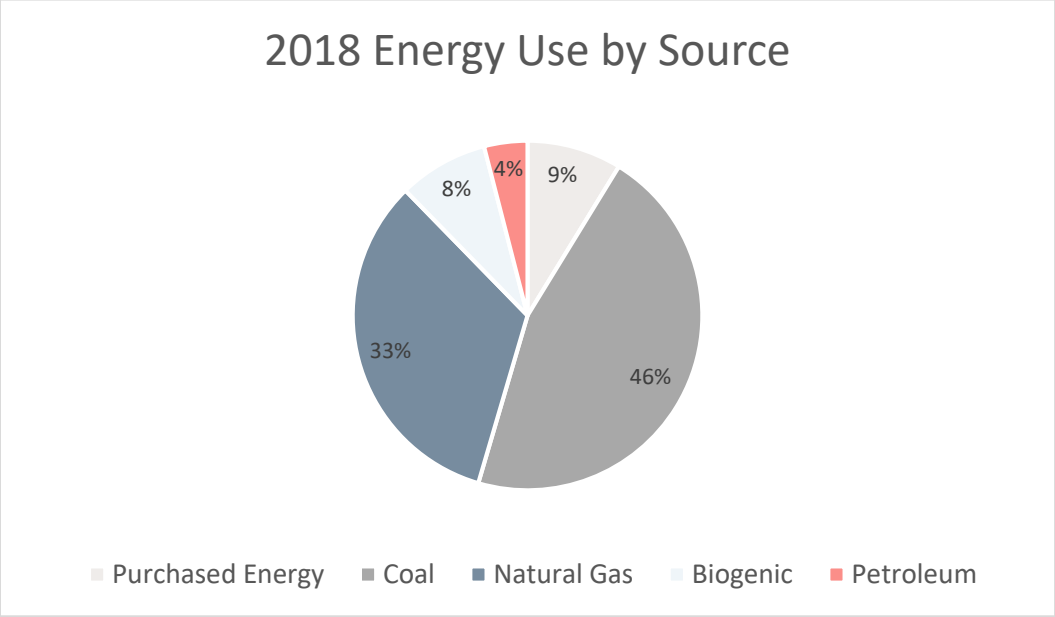
To mitigate these operational, financial and reputational risks, ADM worked to address climate change through three key areas of focus:

- Renewable product and process innovations, such as the carbon sequestration project in Decatur, Illinois;
- Supply chain commitments, such as ADM's No-Deforestation policy; and
- A strategic approach to operational excellence, which emphasizes enhancing the efficiency of production plants throughout global operations, including oversight by a centralized energy management team that enables ADM to identify and share successful programs across business or geographic regions.

2.1.2 FUEL USAGE

ADM operations rely on heat and electricity. Through the use of onsite co-generation, both energy types are generated and used increasing efficiency. Throughout its global operations, ADM uses many types of fuel in addition to purchasing electricity from the grid. Fuel types used in ADM operations are divided into five categories: purchased energy which includes electricity and steam generated offsite (5,060,000 MWh); coal including bituminous and subbituminous (28,600,000 MWh); natural gas (20,700,000 MWh); biogenic sources such as biodiesel, ethanol, biogas, and

biomass including agricultural products and wood (5,170,000 MWh); and petroleum products including diesel fuel, lubricants, kerosene, and jet fuel (2,510,000 MWh).

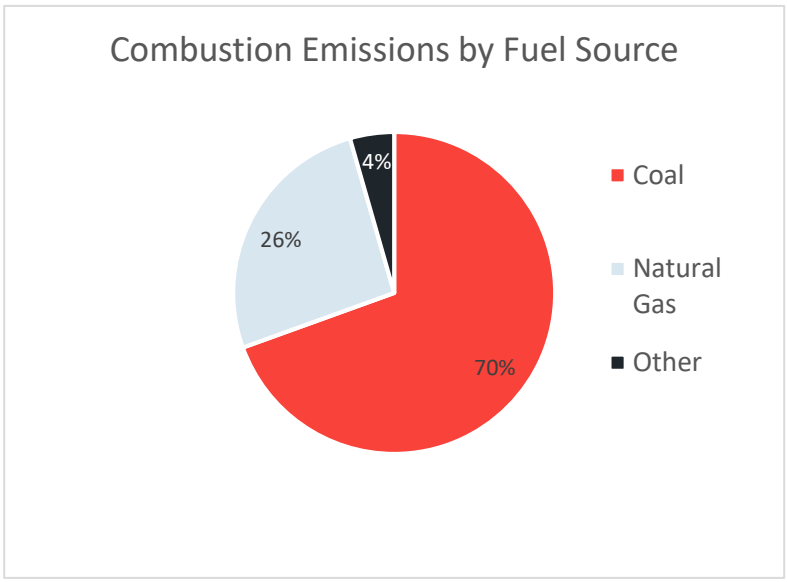


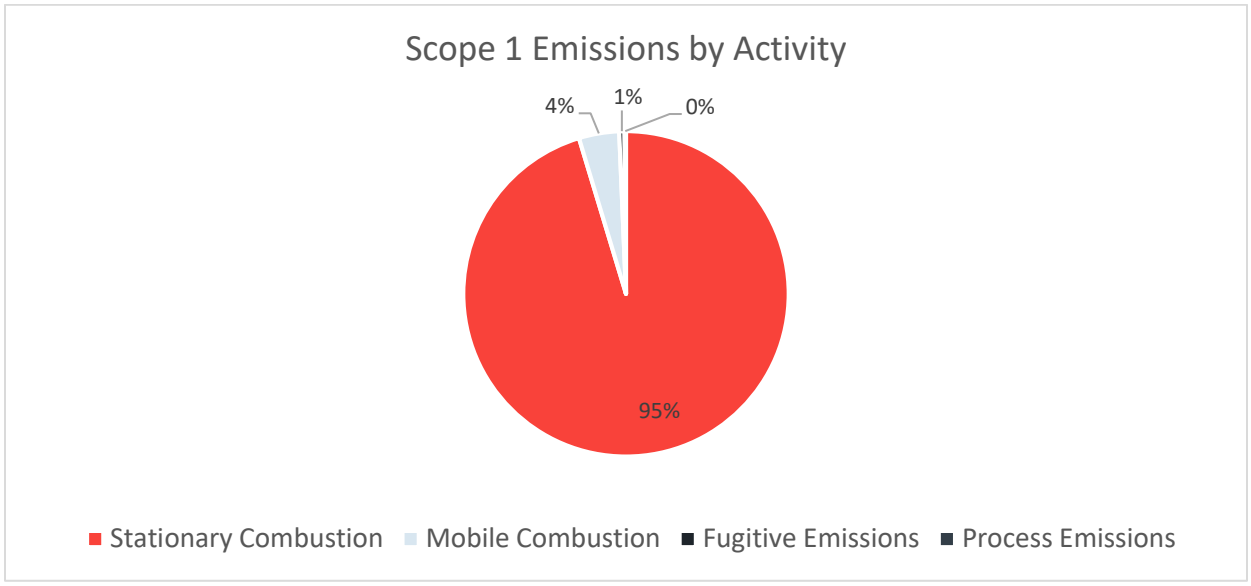
The fossil fuels ADM currently uses have reasonable cost, a well-defined supply chain, and a reliable and plentiful supply, but they also have an environmental impact. All these issues were considered in this feasibility study.

2.1.3 CARBON FOOTPRINT

Each year, ADM calculates its global GHG emissions. The footprint is defined by ADM operational control and includes emissions from stationary and mobile combustion, processing, and leakage (fugitive emissions). ADM's largest facilities have continuous emissions monitoring systems to measure actual CO_2 emitted to the atmosphere. Emissions from other facilities and sources are calculated using emission factors from IEA, US EPA, and The Climate Registry. ADM tracks and calculates emissions of all 6 Kyoto Protocol gases – CO_2, CH_4, N_2O, SF_6, HFC, and PFC in addition to certain other refrigerants. Emissions are broken down by scope – Scope 1 is comprised of direct, onsite emissions including mobile and stationary combustion, processing, and leakage (fugitive emissions); Scope 2 includes emissions from energy generated offsite but used onsite such as electricity and steam purchased from utility providers; and Biogenic emissions which come from the combustion or fermentation of biological materials. Scope 3 emissions from ADM's supply chain are calculated and reported through CDP but not discussed in this document.

	MT CO_2e
Scope 1	14,523,000
Scope 2	2,840,000
Sequestration	-525,000
ADM Footprint	16,838,000
Biogenic	5,537,000



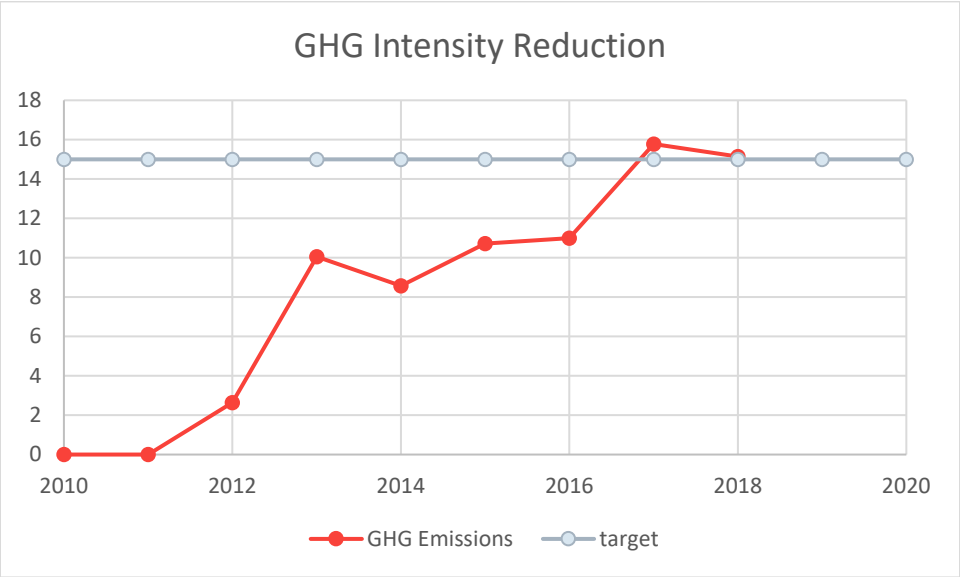


2.2 GHG REDUCTION EFFORTS TO DATE

In 2011, ADM set reduction goals for energy, emissions, water and waste. The goal was to reduce emissions intensity by 15% over the 2010 baseline by 2020. Intensity was calculated using metric tons of raw material processed.

Emissions from ADM operations are primarily a function of energy use and the type of fuel used by the Company to power its operations. Reduction efforts have been primarily focused on improving energy efficiency. ADM utilizes a centralized energy management team that enables the Company to identify and share successful programs and practices from projects at one site across business or geographic regions. Through energy "treasure hunts" and efficiency projects, ADM identified and implemented hundreds of energy-saving projects at its facilities. These projects – ranging from pump and fan operations to exhaust heat recovery, process controls optimization and improved data-management –

have resulted in reduced electricity purchases and onsite fuel usage. ADM achieved its 15% greenhouse gas reduction target in 2018 and has continuously improved.



2.3 ANALYSIS METHODOLOGY

With the 2020 deadline for the ADM environmental goals approaching and targets already met, the ADM sustainability and operations teams began work on assessing further reduction opportunities and targets. A carbon reduction task force was established to begin identifying projects that could lower the company's global greenhouse gas footprint. To ensure efforts are aligned with best practices and to further identify reduction opportunities, ADM hired WSP to review internal efforts, assess further reduction opportunities, and formally document the results.

WSP used ADM's carbon reduction task force project list as the basis for the study. Additional projects and reduction opportunities were added to the list by WSP. WSP reviewed the details and estimated CAPEX, OPEX and carbon reductions associated with each project. For the major projects and those that WSP felt warranted additional attention, WSP requested supporting documentation to conduct a high-level review of the values presented. Projects that were small, unreasonable to review in detail, or appeared to be within reason from a high level were not examined in detail.

The projects examined by WSP had their carbon reduction rationale checked, and final values were independently checked for reasonableness. CAPEX values were checked at a high level using nominal capacity and factored costs. OPEX values were checked with the assumption that labor costs would be similar between options, and only fuel cost was considered in most cases.

WSP's evaluations were based on current prices. A detailed evaluation of future market prices was beyond the scope of this study. A uniform 10-year depreciation was used for analyzing projects.

The analysis incorporated a carbon price per MT of CO_2e reduction. The price of carbon represents the perceived direct and indirect financial benefit to ADM of reducing GHG emissions. Simple payback calculations in this study used the OPEX including carbon value, reflecting this financial benefit.

Once WSP had reviewed and confirmed all the projects' key information as technically reasonable, the projects were tabulated and organized into a number of implementation plans for comparison.

2.4 MOST IMPACTFUL REDUCTION OPTIONS

The following are the most impactful reduction options identified by ADM and WSP:

- Transition from coal to natural gas for onsite fuel use
- Purchased renewable electricity
- Co-fire solid biomass
- Alternative vehicle fuels
- Efficiency improvements in facilities and vehicles
- Clean gas – biogas, renewable natural gas, hydrogen
- Onsite carbon sequestration

2.5 ADM PATH FORWARD

2.5.1 ADM REDUCTION GOAL

In 2010, the world's governments agreed to work towards holding the average global temperature rise to below 2°C, a level deemed likely to prevent the worst effects of climate change. This threshold implies a 'carbon budget' – a total volume of greenhouse gases that can be emitted while still providing a degree of confidence that the 2°C target can be met. According to figures from the Intergovernmental Panel on Climate Change (IPCC), this requires a 41- 72% reduction of global emissions by 2050.

Based upon its analysis of the feasibility study summarized above, ADM has set an ambitious goal to reduce its absolute Scope 1 and 2 greenhouse gas emissions by 25% from its 2019 baseline by 2035. This represents an annual reduction of 1.67% for 15 years. This is more aggressive than the absolute emissions contraction approach that takes into account the global carbon budget, which requires an annual reduction of 1.23% to limit global warming to two degrees Celsius.

2.5.2 FEASIBLE EMISSIONS REDUCTION OPPORTUNITIES

WSP and ADM have developed a plan with sufficient reductions to reach a GHG reduction target of 25% over 15 years. The projects selected to achieve the reductions include purchasing renewable electricity, increasing use of biomass fuels, transportation fleet changes, and in some locations, equipment changes.

- **Renewable energy and biofuels** – Through the purchase of renewable electricity, ADM can significantly reduce its Scope 2 emissions. Increasing the amount of biofuels burned onsite will reduce Scope 1 emissions. ADM is moving forward with several projects to use biodiesel in its fleet of boats and trucks.
- **Fuel switching** – In both stationary and mobile equipment, ADM has opportunities to switch to less carbon-intense fuels. Some facilities can feasibly switch to natural gas or co-fire biomass in the boilers. ADM is also assessing the use of liquefied natural gas for its boat fleet and compressed natural gas for its truck fleet in certain geographies.
- **Energy treasure hunts** – ADM has had success over the past few years conducting energy treasure hunts which identify energy efficiency and reduction opportunities across its facilities globally.

Although sufficient reduction projects have been identified to achieve the 25% reduction target, as ADM implements these projects over the next 15 years, new technologies may become available that offer greater or less costly reduction opportunities.

2.6 FUTURE TECHNOLOGY

Near-term (0-10 years) emission reduction projects were the primary focus of this study, given the 15-year timeframe of the 25% target. WSP identified some projects that are not feasible for ADM in the near-term but may be longer-term clean energy opportunities for ADM facilities. As technology and resource availability develops, these opportunities may allow ADM to reduce emissions faster than currently expected. They will also allow ADM to reduce emissions beyond the 15-year timeframe of the 25% goal, to make continued progress toward a future net zero emissions scenario.

2.6.1 ONSITE ELECTRICITY GENERATION

Installing onsite generation is one of the highest-impact ways to contribute to new clean energy capacity, though for ADM the gross contribution is likely to be small. Options include solar, wind, nuclear and battery storage. Meeting the demand of one of ADM's larger processing facilities would require about 6 square miles of PV panels or over 200 utility-scale wind turbines.

2.6.2 ONSITE FUEL OR THERMAL PRODUCTION

ADM currently generates thermal energy onsite primarily by burning purchased fuels. There are a few options to produce fuels onsite that will reduce GHG emissions such as biogas, solid biomass waste and geothermal. These are not likely options due to resource availability and capital cost.

2.6.3 SHIFTING FUEL USE TO PURCHASED ELECTRICITY

ADM could consider ending onsite electricity generation with fossil fuels and purchasing renewable electricity instead. ADM could also consider using purchased electricity to generate thermal process energy using electric resistance boilers, rather than burning fossil fuels. Currently, purchased fuel is a much less expensive means to generate thermal energy (and electricity in many cases), so this shift would result in significantly higher OPEX based on current prices. It would also involve the CAPEX cost of boiler replacement. As such, using purchased power for process heat is not a realistic option for ADM in the near term.

2.6.4 PURCHASED FUELS

- Biomass: this feasibility study includes options to purchase and co-fire biomass with coal onsite. As part of this feasibility study, the firm Ecostrat conducted a biomass supply assessment for ADM facilities. Currently, there are limited supplier options available to aggregate biomass fuel and deliver it on a just-in-time or as-needed basis. The current boilers are permitted for only a certain percentage that varies on a boiler to boiler basis. Where biomass purchase was evaluated, WSP assumed that an average mix of 80 to 90% coal and 10 to 20% biomass could be fired at each facility because higher biomass firing would likely result in operational issues such as ash handling, ash build-up and more downtime, derating and other issues. There may be CAPEX requirements to adjust the boiler feed systems for co-firing, and it may take a year or two for these modifications to be planned, budgeted and installed before co-firing can begin. To utilize 100% biomass, entirely new boilers would be required, and biomass fuel yards would be required as there is not sufficient storage space at boiler facilities. In addition, if relying on 100% biomass, ADM could be receiving more than 500 trucks per day of biomass fuel.
- Biogas: landfills, livestock facilities, and wastewater treatment plants are among the common sources of biogas. Eventually, if there are biogas sources located near to ADM facilities (typically ten miles or less), a pipeline could be built and biogas delivered for use as a fuel by ADM.
- Biofuels: this feasibility study includes options to mix biodiesel with fossil fuels in ADM's vehicle fleets. In the future, it may be feasible to use 100% biodiesel in these vehicles, further reducing GHG emissions.
- Renewable natural gas (RNG): pipeline-quality natural gas that comes from renewable sources is called RNG. The typical sources are processed biogas or hydrogen generated by renewable electricity and then converted to methane. RNG can be purchased from natural gas suppliers and delivered to ADM contractually (though not physically) through the natural gas grid, displacing traditional natural gas.

- Hydrogen: a potential future scenario is a hydrogen distribution infrastructure, potentially using current natural gas infrastructure. This could deliver hydrogen to ADM facilities for use as a fuel. Hydrogen is an energy carrier that must be generated from some other fuel source. There are two classifications of hydrogen in which the generation process results in minimal or no GHG emissions, thereby providing a low-GHG fuel options for ADM. Blue hydrogen is generated through fossil fuel reforming, where the resulting CO_2 emissions are captured and sequestered. Green hydrogen is generated using renewable sources, typically through hydrolysis using renewable electricity.

2.6.5 CARBON SEQUESTRATION

In addition to, or prior to, the clean energy options discussed in the preceding sections, permanent carbon capture and sequestration can be a way to reduce direct GHG emissions, and can be employed while still burning fossil fuels. The ADM Decatur facility has underground carbon capture and sequestration capability, and this could potentially be viable at other ADM facilities. The ability to capture stack emissions and sequester them is likely 10 years out, due to the technology and energy needed to separate and process the stack gas sufficiently to inject the CO_2 in the sequestration well.