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Rendering: A Global Model of Sustainability

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According to the U.S. Environmental Protection Agency (EPA), sustainability creates and maintains the conditions under which humans and nature can exist in productive harmony and allows the social, economic and other requirements of present and future generations to be fulfilled. Indeed, Sustainability is frequently depicted as consisting of three distinct, but overlapping components: Social, Environmental and Economic. The relationship among these components is shown in Figure 1. The region in the center of the figure where all three components intersect is commonly used to depict sustainable practices.

The rendering industry in the U.S. annually processes more than 59 billion pounds of food materials from the meat, restaurant and bakery industries that, despite being wholesome, are not typically consumed by humans in the USA. To recycle these food materials, which may contain 60% or more water, the rendering industry must first evaporate or remove the moisture. The dried materials are then further processed to produce useful products that have value as concentrated sources of energy and rich sources of nutrients, such as protein, amino acids, minerals and fatty-acids. Though not well publicized, the recycling services provided by rendering companies such as Darling International Inc. and Griffin Industries LLC (“Darling/Griffin”) under our shared DAR PRO Solutions brand, are essential to protecting the environment and in addressing many social and economic issues. To say it simply, rendering is the essence of sustainability. (Figure 2).



Figure 1. Illustration of the components of sustainability

Economic issues: The rendering industry brings value to the food industry by processing food materials that would otherwise be discarded, such as meat products, parts of the animal not consumed as meat, cooking oils and bakery products. Renderers process such materials to produce stable products that can be recycled and safely used as: ingredients in animal feed, pet food and organic fertilizers; chemical components used to make consumer goods; and as renewable fuels. Darling/Griffin is committed to ensuring finished product safety and can demonstrate strict adherence to written procedures that reduce food safety risks and provide for traceability and biosecurity through participation in approved risk management programs. For example, every

Darling/Griffin production facility is certified through the American Feed Industry Association's (AFIA) Safe Feed/Safe Food program and the Animal Protein Producers Industry's (APPI) Code of Practice program, which are both founded on Hazard Analysis Critical Control Point (HACCP) principles. To receive such certifications, facilities must be compliant to all applicable federal regulations and demonstrate to an independent third-party auditor that written procedures developed to address potential physical, biological and chemical hazards are followed.

The rendering industry is a collection of small and large companies which operate facilities in cities, towns and rural communities. These facilities compete with other local industries to attract good employees to work in management, operations, trucking and sales and to provide technical services to operations. Rendering companies are aggressive in offering competitive compensation and benefit packages, including health insurance and retirement savings plans. Indeed, the rendering industry has a history of attracting and retaining quality employees. In addition to maintaining a full-time staff, rendering facilities also rely on local electricians, plumbers, masons, carpenters, welders, contractors and others for specialized services. Having such a source of financial stability within a community can benefit the local economy, especially during periods of economic downturn.

The rendering industry is also proactive in addressing other economic issues, such as the cost of energy and transportation. The industry has worked to replace its use of heavy petroleum oils and coal as fuels to operate its boilers with lower greenhouse gas emitting fuels, such as natural gas and renewable biofuels made from processed animal and vegetable fats. Many in the industry have replaced aging boilers with modern boilers and/or optimized their boilers to make more efficient use of boiler fuels. Some rendering companies produce low carbon fuels, such as biodiesel and renewable diesel, from recycled animal fats and used cooking oils. The industry operates modern fleets of trucks used to collect raw materials that are frequently equipped with GPS-based equipment for more efficient routing.

Social Issues: Public perception, industry image, plant locations and food chain concerns are all issues the rendering industry must face. For decades, the rendering industry tried to remain out of public view. As society moved away from its agrarian roots and the public lost sight of the valuable services the rendering industry provided, its perception of the rendering industry deteriorated. Rendering's public image was further tarnished as urbanization and revitalization projects led to development of neighborhoods and/or shopping and entertainment districts near, and sometimes adjacent to, rendering plants. To address these concerns, the rendering industry has taken a more visible role in local, state and federal issues. Efforts to educate regulators, politicians and the general public about the essential services rendering provides have been initiated and will continue to be developed. One practical example involves industry collaboration with municipal authorities to encourage the collection of used cooking oils to prevent frying oils from accumulating in and clogging city sewer

DAR PRO Solutions is Sustainability



Figure 2. Rendering is a global model of sustainability in action.

systems, thereby protecting these strategically important infrastructures. At the local level, rendering companies are diligently working to be good neighbors. For example, Darling/Griffin alone annually invest millions of dollars in environmental controls and equipment to minimize odors and pollutants. Rendering companies make significant financial and resource donations to their local communities and to charities, children's homes, youth programs such as Junior Achievement, revitalization projects, disaster relief, and other important causes. Many rendering companies are also active in numerous environmental programs such as the Audubon Cooperative Sanctuary Program.

Environmental Issues: The rendering industry is well-equipped and committed to addressing environmental issues such as air and water emissions, water usage and solid waste disposal. In addition to the enhanced environmental controls and energy efficiency improvements already mentioned, the industry continues to make significant investments to improve many other areas that affect the environment, including, but not limited to, storm water control; waste heat recovery; wastewater processing and management; using biomass combustion technology to reduce dependence on petroleum based fuels; recovering methane from anaerobic lagoons to replace fossil fuels in boilers or turbines; and, land applying nutrients recovered from wastewater streams to replace fertilizers made from mined or manufactured components for forage crop production.

Rendering companies are conducting water balance studies that compare water inputs, such as water purchased from municipalities, water from wells and condensate (evaporated water collected when raw food streams are processed) with water outputs, such as treated or processed waste water. In some cases, waste water can be further processed so it is suitable for re-use when cleaning certain areas of a rendering plant and/or to irrigate crops and pastures. The rendering industry continues to consider other technologies that can be used to further improve its water balance.

If not rendered, food materials would decompose rapidly to produce greenhouse gases (GHG) such as carbon dioxide, methane and nitrous oxide. The National Renderers Association (NRA) and the Fats and Proteins Research Foundation (FPRF) commissioned Dr. Charles Gooding, Professor of Chemical Engineering at Clemson University, location of the Animal Co-Products Research and Education Center, to study the rendering industry's carbon footprint and develop a model NRA and FPRF members can use to determine the carbon footprint for their facilities. Dr. Gooding's results indicate rendering to have a very positive carbon footprint when Scope 1 and Scope 2 emissions are considered. Scope 1 emissions are direct emissions, such as burning natural gas on-site to produce steam; Scope 2, or indirect emissions, are attributed to purchased energy, such as electricity, that is generated by a third party. Thus, after offsetting the GHG emitted to collect, transport and process food materials, including fuel burned to generate steam, transportation fuel, waste water treatment and electricity, *a typical rendering plant would recycle seven (7) out of every 10 carbons processed.*

The rendering industry annually captures and recycles a net of about 3.4 million metric tons of carbon (after offsetting Scope 1 and Scope 2 emissions for a typical rendering plant) and 0.5 million metric tons of nitrogen, which prevents the release of at least 12.2 million metric tons of carbon dioxide equivalents. This example of the net GHG emissions averted by rendering assumes that only carbon dioxide would be produced as food materials decompose. Canadian research (Xu and others) suggests that carbon may be released as carbon dioxide (96%) and methane (4%) and that nitrogen (7%) may be released as nitrous oxide when composting (controlled decomposition) animal remains. Methane and nitrous oxide are more significant GHG. Compared to carbon dioxide, the global warming potential for methane is 23 times greater and nitrous oxide is as much as 310 times greater. Allowing that some methane and nitrous oxide may be produced when food materials decompose suggests that recycling food materials through rendering provides a net benefit (after GHG emissions associated with the rendering process are taken out) of *avoiding the release of about 32.5 million metric tons of carbon dioxide equivalents each year, which is equivalent to the emissions from 6.4 million passenger cars.*

Without rendering, new sources of proteins, fats and other products would have to be produced as replacements for the recycled fats, proteins and bakery products the rendering industry produces each year. Such

new production would require additional natural resources, such as land, water, and fertilizer, and contribute to, rather than avoid, the production of GHG. Thus, the rendering industry is an important environmental protection tool as a net carbon capture/GHG avoidance technology.

In response to concerns over dwindling landfill capacity, global warming, and more efficient use of the earth's finite resources, many communities have aggressively adopted programs to divert recyclable materials away from landfills. Rendering is consistent with such recycling initiatives. Indeed, food streams that are not sent to rendering are often times disposed of in landfills. It can therefore be concluded that when food streams are sent to a rendering plant for recycling, such materials are diverted from landfills. Rendering is also more efficient at capturing and recycling energy (as calories or as BTUs) from food materials than other technologies, such as anaerobically digesting food materials to produce methane.

The California Legislature publicly recognized the benefits the rendering industry provides to society in the preamble to a 2009 state assembly bill: "The rendering industry is a critical health and safety infrastructure for California. Rendering is an effective tool to eliminate many human and animal disease pathogens, protects our groundwater and air resources, and greatly reduces greenhouse gas emissions compared to other alternative disposal options."

Rendering is a classic example of Sustainability and is a global model of environmental stewardship excellence.

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EPA Greenhouse Gas Equivalencies Calculator:

<http://www.epa.gov/cleanenergy/energy-resources/calculator.html#results>

California Assembly Bill No. 1249, Chapter 280, signed into law October 11, 2009.

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