

How to Create a Sustainable Operation

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Sustainability (as defined in the NRMCA Sustainability Initiatives document) is the ability to provide for the needs of the present without compromising the **ability of future generations to meet their own needs**. As expected with the limitless boundaries of this definition, there are many different facets of sustainability. A business focusing on becoming sustainable can develop programs to retain trained employees to carry on the business goals; develop and maintain health and safety programs to protect employees from illnesses and injuries so they can return to work the next day; secure an available quality supply of natural and man-made resources that are essential to production and minimize the use of and protect those resources to ensure future availability, etc. The 2005 World Summit Outcome document refers to sustainable development as encompassing economic development, social development and environmental protection as mutually reinforcing and interdependent relationships. This article will focus on just the environmental protection component and provide you with some specific actions your company can take to implement a more sustainable operation.

The NRMCA Sustainability Initiatives document lays out objectives for the **ready mixed concrete industry to move forward in becoming a key player in sustainable development** as well as becoming sustainable as a manufacturing operation. The objectives are: minimize energy use, reduce emissions, conserve water, minimize waste and increase recycled content. The goals are to reduce environmental impact during the concrete lifecycle: material acquisition, production, construction, use and recycling.



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Sustainability goes far beyond complying with applicable regulations. Environmental compliance is commonly accepted as the least that a company must do. It is a start toward ensuring a positive company reputation. Environmental regulations have been established to minimize the impact of various operations on the environment. Compliance with environmental regulations and protection measures ultimately ensures that the impact of an action on the environment is negligible or at the very

least, reversible. Of course, the timeline for that impact to be reversed must be taken into consideration. This is where sustainability comes into play. To be sustainable from an environmental protection perspective, natural resources must not be consumed at a greater rate than they can be replenished. Also, the act of consuming one resource cannot create an adverse impact to another resource. Consuming resources at a greater rate than they can be replenished results in environmental degradation.

Why is Sustainability Getting Attention?

In general, sustainability has been talked about for a long time, but recently, it has become more of a priority due to the following pressures:

- **Availability of resources required for operating your facility may be limited in the future**, such as supply of natural gas, clean water and electricity, and the future cost of these resources could become a significant challenge.
- Local communities may put pressure on companies to become more protective of the environment, publish sustainability goals and report on progress in meeting those goals.
- Customers / consumers may select a product from the most "sustainable" or "green" supplier.
- Shareholders may consider investing in companies that have sustainability programs.
- Lastly, as employees become more educated about sustainability, they may choose to work for companies who are seriously committed to sustainability.

Preparing for any or all the above requires that businesses develop a sustainability action plan. A serious commitment from top / corporate management is a key first step in this process. Next, consideration needs to be given to identifying the requirements needed to sustain the company (resource supply and availability, people, location, transportation, regulations, etc.). Measuring these requirements and determining their environmental impact is not trivial.

How Does Sustainability Relate to Climate Change?

Sustainability initiatives seek to reduce or stop climate change, as there is suspicion that it will affect the ability of future generations to meet their needs. The President has made climate change a high priority and has pledged to invest \$150 billion over 10 years to accelerate the commercialization of plug-in hybrid vehicles, promote development of commercial-scale renewable energy, encourage energy efficiency, and invest in fuel infrastructure. The President's goal is to reduce greenhouse gas (GHG) emissions 80% by 2050. The EPA administrator has issued a memo highlighting her top priorities for the agency and one of those is reducing GHG emissions. Although some

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states already have GHG reporting requirements, federal regulations are being drafted which also will require reporting of GHG and may ultimately require reductions.

Climate Change and GHG Emissions

As mentioned above, there is a lot of focus on GHG emissions. What are they, where do they come from, how do GHG emissions relate to 'carbon footprint', and do they really cause climate change? Climate change is thought to be one form of environmental degradation. GHG emissions are the focus of an effort to understand and eventually stop climate change and the reduction of those emissions is a current and future priority. Reducing the impact on climate change (degradation) is one component of environmental protection. The first step toward reduction of GHG emissions is understanding what is being emitted. **Combustion sources are the primary GHG emitters.** Collecting data on fuel usage can be used to estimate emissions of the most common GHGs, namely carbon dioxide (CO₂), nitrous oxide (N₂O), nitrogen oxides (NO_x), and meth-

ane. Facilities without combustion sources also have an impact on emissions of GHGs due to the energy they are using. Any facility that uses / purchases electricity is creating GHG emissions unless the supplying utility uses 100% renewable energy sources such as wind or solar power. Assessing the impact of the use of electricity can be performed by converting that use into a carbon footprint. **The total amount of GHG emissions produced is usually expressed in equivalent tons of CO₂, which has been termed a 'carbon footprint'.**

What is Your GHG Carbon Footprint?

A carbon footprint is the measurement of all GHG emissions caused directly or indirectly by an entity (operation, building, facility, etc.). Converting GHG emissions into a carbon footprint offers a method to compare numbers year to year, and facility to facility. Different carbon calculators are available, and although they produce different results, the important first step is to collect data and establish a baseline. One of the initiatives outlined in the NRMCA Sustainability Initiative doc-

ument is to develop Sustainable Concrete Plant Guidelines. Included as part of the guidelines will be a carbon calculator that will allow concrete producers to measure and track their carbon footprint on a plant-by-plant basis. Use of a carbon calculator provides a consistent protocol so that a baseline can be established and compared to future results in order to measure improvements.

Collecting the data to input into the calculator is the challenge. If an organization sets a goal of 10% reduction of GHG emissions in its sustainability action plan, it will need to identify what the baseline is, and over what period of time the 10% reduction will occur. Without these two pieces of information, the 10% commitment is meaningless. Some organizations are committing to reducing GHG emissions to eventually reach 1990 levels. This was initiated by the Kyoto Protocol, an international agreement that set binding targets for 37 industrialized countries and the European Union for reduction of GHG emissions. As a company, it is difficult and may be impossible to find the data necessary to calculate GHG emissions in

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1990. Consider the changes that your company has undergone since 1990. The importance of determining a baseline year cannot be underestimated.

Once your management team has committed to calculating the carbon footprint for your facility, plans for reducing the footprint can be identified. What are your next steps? Identifying your GHG emission sources and collecting the data needed for the carbon calculator comes first. Direct emissions are those from onsite combustion sources and fleet vehicles owned and operated by the organi-

zation. Don't forget indirect emissions, as every entity has them. Indirect emissions can include items such as purchased utilities, commuting, and production and transportation of goods and services. The NRMCA carbon calculator will help minimize the complexity of this process.

How to Normalize Carbon Footprint Results?

In order to establish a baseline and enable you to evaluate the data you collect for subsequent years, you need to determine the

factors that define or describe your facility. This is a production index or factor. It might be square feet of office or production space, yards of concrete produced, number of employees, etc. Whatever units are needed to represent your business, it should account for year-to-year growth, loss and change in business strategy. As an example, let's use a company that has a fully supported and implemented waste minimization program. It has set up innovative processes to reduce the quantity and toxicity of waste generated and has been quite successful. But now, its production volume has doubled over the past two years and it has also introduced new products. Consequently, the waste generated has increased along with the generation of new types of waste. To enable a proper comparison of waste volumes year to year, a production index must be used, so you can determine if the pounds of waste per pound of product (e.g., concrete) produced has changed. This same accounting method must be used for raw materials. If you are using 3 gallons of water to make a block and you double your production rate and start using 5 gallons of water per block, this indicates that something is wrong with the production process and your raw material usage per unit production has increased significantly. The NRMCA Sustainable Concrete Plant Guidelines, currently under development, will help concrete producers track, control and improve performance in all areas of environmental impact.

What GHG Data Is Needed?

After the baseline year has been selected and there is evidence that sufficient data exists for that year, the next step is to identify the actual data that is needed and set up an organized method for collecting that data. Each source of data must be identified, so that data collection in future years can be repeated and accomplished seamlessly. This process lends itself quite readily to having a cross-functional team involved. A brainstorming session with a knowledgeable team of individuals is useful to identify all significant sources of GHG emissions. The team can include representatives from purchasing, facilities, environmental and accounting as well as others who understand the business components. The purchasing department is the first place to go to determine if records exist for utilities purchased. Facilities may have the necessary information on square

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Setting Goals to Reduce Carbon Footprint / Improve Sustainability

Once you have collected data, you are ready to start identifying what you can do to create a sustainable operation. The goals you set, and the projects undertaken to meet those goals, will comprise your **sustainability action plan**. Here are some example projects as well as actual projects that are being implemented by companies, including those in the concrete industry.

- **Recycle Water** – Collect process wastewater in settling pits and store for reuse, when specifications do not prohibit this reuse. When necessary, utilize separate collection systems for 'dirty' and 'clean' process water. The dirty wastewater is sent for treatment and discharge while the 'clean' process wastewater is treated onsite with ion exchange and reused in processes with lower design criteria.
- **Reduce Water** – Use of spray nozzles on hoses improves efficiency, minimizes use, and shuts off the water supply when not in use. A simple component, such as a solenoid interlocked with the start up of a process, can eliminate thousands of gallons of water wasted when the process is not running.
- **Conserve Energy** – Turn off equipment, lights, etc. when not in use. Work with a local university to support a student project where the students conduct an energy audit. As a result of one such audit, interlocks were installed on belt drives to shut off motors when a process was not running. In office space, adjust thermostats properly to keep the occupants from freezing in the summer and overheating in the winter. Most importantly, use programmable controls to minimize the use of the HVAC when the space is not occupied.
- **Minimize Waste** – Understand what waste is generated in order to determine if waste-like materials can be reused, recycled or replaced with materials that can be reused, or recycled. Waste associated with ready mixed concrete operations includes left-over concrete and rejected concrete. One company is using steel block forms to make concrete blocks with the leftover concrete and rejected concrete when specifications allow, and these are then sold. Concrete removed from demolition sites

can be crushed and purchased as aggregate by concrete companies.

- **Utilize Resources** – Online resources such as the Green Building Initiative (GBI) Green Building Incentives Database located at <http://www.dsireusa.org/gbi/> can be used to locate incentives for energy efficiency projects.
- **Educate** – Launch an education program for your employees, contractors and suppliers to bring everyone on board with your sustainability objectives and goals. A sustainability action plan must involve everyone in a company in order to realize measurable results.
- **Energy Efficient New Construction** – Utilize the design standards of the Leadership in Energy and Environmental Design (LEED) for new construction. These standards are for building design and support the concept of a 'green' building.

NRMCA encourages concrete producers to use the NRMCA Sustainability Initiatives document as a template for developing their own sustainability plans. The document can be downloaded at www.nrmca.org/sustainability. Developing a sustainability plan along with implementing strategies to reduce environmental footprint using tools such as the NRMCA Sustainable Concrete Plant Guidelines and carbon calculator will result in positive environmental, social and economic impacts.

In summary, we have covered sustainability and how it relates to environmental protection. We've identified GHG emissions, explained the current focus and how to prepare for eventual reporting requirements, and identified the steps to start a sustainability action plan. The more we can educate ourselves, our employees, contractors, suppliers and our communities, the more likely we are to encourage creative approaches to sustainability and environmental protection. It will take all of us working together to make a positive impact. Regardless of whether we agree with the climate change theory, we can agree that current fuel choices have a finite life span, the availability of secure, long term waste storage will decline and natural resources such as clean water are not limitless. Conservation is the essential first step toward sustainability we must all take. It should not be an option! ■

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