

CLIMATEVISION WORK PLAN FOR NATIONAL LIME ASSOCIATION

Summary

The National Lime Association's Climate VISION greenhouse gas emission intensity reduction goal is to reduce GHG from fuel combustion per ton of product by 8% between 2002 and 2012.

The National Lime Association (NLA) has developed this work plan, with the support of DOE, outlining its proposed implementation actions to reduce greenhouse gas emission intensity by 2012. NLA members, with the assistance of DOE, will implement the actions. The work plan includes the following four major components:

➤ **Element 1: Emission measurement and reporting protocols**

In the fall of 2003, NLA developed a protocol for quantifying greenhouse gas emissions and emission reductions from lime manufacturing plants, and began collecting data for 2002. Collection and analysis of both the 2002 and 2003 data were completed in 2004. In July of 2004, NLA submitted a report to DOE on aggregate industry trends in greenhouse gas intensity (emissions per unit of production). 2004 and 2005 data have been collected, and the second report is currently in preparation.

Development of the Protocol

In developing the protocol, NLA used as a starting point the protocol developed under the international GHG Protocol Initiative. (See http://www.ghgprotocol.org/standard/Current_Tools/lime_guidancev1.0.doc.) That protocol (also sometimes referred to as the World Resources Institute or "WRI" protocol) reflects a general understanding of the production of CO₂ from lime manufacturing. , NLA has developed a protocol that, while consistent with the WRI protocol, incorporates a more refined approach to estimating CO₂ emissions from lime plants. NLA's approach was adopted in large measure by the Department of Energy in the recent revisions to the 1605(b) program.

Among other refinements of the WRI protocol, NLA's protocol includes CO₂ generated from the production of calcined byproducts/wastes (such as lime kiln dust). Byproduct generation quantities are typically 15% of quicklime (CaO) production, with the oxide content of byproducts being about half that of quicklime. Also, NLA's protocol uses a more precise calculation of calcination emissions because it requires calculations based on the actual amounts of CaO and MgO in a company's lime products. NLA's approach generates an emission factor (factor multiplied by tons of lime product to generate tons of CO₂ emissions) that is based on measured values. NLA's protocol also includes detailed instructions on how to calculate CaO content in lime using measured %

total CaO, or by using measured % available CaO with a correction factor. (Note: Although the lime industry's commitment relates only to energy-related emissions of carbon dioxide, it is necessary for the protocol to calculate all emissions in order to allocate emissions reductions from on-site sequestration.)

Since the initial development of the protocol, NLA has made a number of corrections and revisions based upon experience in collecting and analyzing the data submitted.

Administration of the Protocol

NLA has learned that substantial effort is required for the administration of the protocol on an annual basis. The data submitted by member companies must be subjected to quality assurance/quality control (QA/QC) review, and frequently NLA staff must work with member companies to clarify, correct, or complete submissions. Because half of NLA's members are small companies who may not have comprehensive in-house technical expertise, substantial support must be provided to members in collecting data, completing protocol forms, and in reviewing and correcting submitted data.

Protocol Timeline

NLA will continue to collect protocol data on an annual basis, and to report results to DOE every two years. The protocol data will be used by NLA to evaluate efforts to achieve the ClimateVISION goal, and to identify possible measures to increase energy efficiency and reduce emissions intensity. The protocol will continue to be evaluated, corrected, and modified as needed.

➤ **Element 2: Identify / implement near-term *cost-effective opportunities***

NLA's members will identify and implement near-term cost-effective measures to enable them, in the aggregate, to achieve the reduction of greenhouse gas emissions from fuel combustion per ton of product by 8% between 2002 and 2012. Companies will pursue a variety of strategies to achieve this goal, including (but not limited to) physical modifications to kilns to improve energy efficiency, operational changes, increased reuse of byproducts, use of alternative fuels, use of green power, carbon sinks and sequestration, transferable credits if available, and offsets. Because this is an aggregate goal, not all lime companies will have the same intensity goal, depending on what efficiency improvements have already been achieved before 2002, and what kind of equipment the company operates.

To assist its members in these efforts, NLA will take the following steps:

1. Provide opportunities for training and information sharing on energy efficiency and emissions intensity reductions. NLA has already begun to provide these opportunities through its regular Operating Meetings and through its committee structure, and will continue to do so on an ongoing basis.
2. Develop and distribute relevant information, tools and resources. NLA has already begun these efforts through its website and its regular publications and through direct communication with its members. NLA has and will continue to use its communications tools to promote DOE's research and development solicitations.
3. Provide support to members in responding to the NLA greenhouse gas protocol. NLA provides this support on an ongoing basis each year.
4. NLA will monitor the efforts of members to identify and implement measures to increase efficiency and reduce emissions intensity. NLA collects this information in conjunction with the protocol, and in additional meetings and conversations throughout the year.

Timeline

NLA will evaluate efforts to achieve cost-effective measures at its regular meetings, including Board Meetings and Operating meetings, and will report on progress in its biennial reports to DOE.

In many cases, intensity reductions can only be achieved by means of physical changes to lime plants, including replacement or modification of kilns and other equipment. Most such changes involve several years from concept to completion. Companies must identify energy efficiency opportunities, and this involves benchmarking similar plants and kiln equipment against each other. Because lime companies did not have the benefit of industry CO₂ intensity data until after the first commitment year, this benchmarking could not be performed until 2004.

Once a project has been identified, funds must be allocated (and often borrowed) to carry it out. Next, it must be planned and engineered, a process that often takes months. At this point, the company must apply for permits to perform the project. In addition to construction permits, most projects will require permits under environmental regulations, often from federal, state, and local authorities. Some permit applications require complex air dispersion modeling, and multiple interactions with permitting agencies to select appropriate modeling parameters. In many cases, prolonged environmental reviews have delayed projects—sometimes by years—that would improve energy efficiency in the lime industry. Once permits are issued, construction often takes more than a year to complete.

As a result of these factors, NLA expects that it will take several years for many intensity reductions to appear.

➤ **Element 3: Develop *cross-sector projects* for reducing greenhouse gas emission intensity**

The Climate VISION initiative encourages cross-sector projects that reduce greenhouse gas emission intensity. NLA and DOE will explore innovative opportunities between the lime industry and the steel sector to improve energy efficiency and greenhouse gas emission intensity. Steelmakers normally use low-sulfur lime, which is generally produced in inefficient straight rotary kilns. Modifications to these kilns could be undertaken that would improve significantly their energy efficiency but raise slightly the sulfur content in the lime they produce. NLA and its members are seeking to work with steel companies and with the American Iron and Steel Institute to determine whether steelmakers can tolerate increased sulfur levels.

The lime industry will explore other opportunities to work with customers (and suppliers) to improve efficiency and reduce intensity.

Timeline

NLA and DOE are seeking to schedule talks with steel industry representatives to discuss potential cross-sector efforts. Physical modifications to the lime kilns in question can be made only after this issue is resolved.

➤ **Element 4: Accelerate investment in R&D and commercialization of advanced technology**

NLA is interested in developing with DOE a collaborative R&D program focused on technologies that can reduce the lime industry's greenhouse gas emission intensity by 2012. NLA will identify research projects that could lead to further improvements in energy efficiency and other means of reducing greenhouse gas intensity, such as sequestration, and will seek to cooperatively fund such projects.

Timeline

NLA is currently seeking appropriate projects.

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