

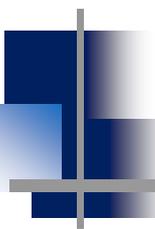
Sustainability Committee Update

April 22, 2024

Mathieu Bouchard

NLA Sustainability Committee Chair

NLA Staff

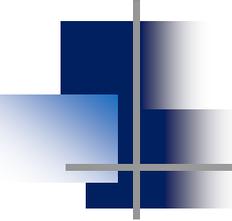


Lime Product Carbonation Potential Update

Trinity Lime Carbonation Review



- Conducted a literature review to assess
 - CO₂ reabsorption estimates
 - Data Confidence & Data Gaps
- Determine CO₂ uptake by U.S. market share
- Deliverables – Summary memo and spreadsheet analyses
- Recommended follow-on work

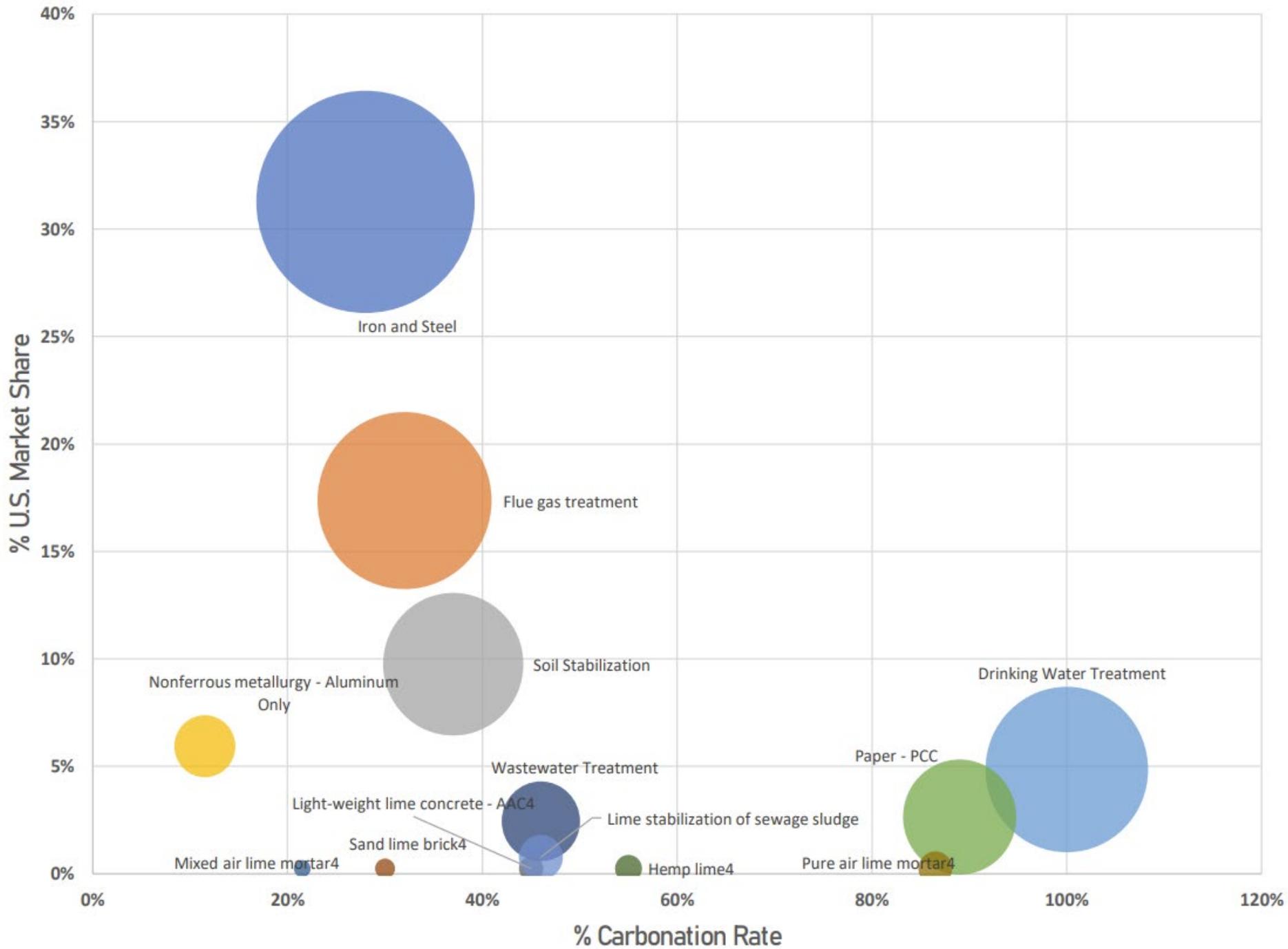


Determination of CO₂ Uptake Summary

- Applications with conclusive carbonation data have an average carbonation rate of 23% and account for a 63% share of the US lime market
- The applications with less conclusive carbonation data have an average carbonation rate of 5% and account for a 14% share of the US lime market

U.S. Average Lime Carbonation Rates Summary

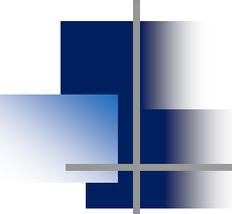
Application	Market Share (%)	Average % Natural Carbonation ³	Amount of CO2 captured ^{1,2} (MT CO ₂ e)	Carbonation Timeframe (years)
Iron and Steel	31.27%	28%	1,324,191	1
Flue gas treatment	17.37%	32%	840,596	<1
Soil Stabilization	9.75%	37%	545,884	34
Nonferrous metallurgy - Aluminum Only	5.94%	12%	103,248	NA
Drinking Water Treatment	4.85%	100%	734,082	<1
Paper - PCC	2.64%	89%	355,490	<1
Wastewater Treatment	2.44%	46%	170,080	NA
Sand lime brick ⁴	0.24%	30%	10,975	NA
Light-weight lime concrete - AAC ⁴	0.24%	45%	16,463	0 to 30
Pure air lime mortar ⁴	0.24%	87%	31,645	100
Mixed air lime mortar ⁴	0.24%	22%	7,866	100
Hemp lime ⁴	0.24%	55%	20,121	<1
Lime stabilization of sewage sludge	0.77%	46%	53,797	NA
US Average Carbonation Rate			28%	



Lime Applications with Unverified/Estimated Carbonation Data

Application	Market Share (%)	Carbonation % (Est.)
"Other" chemical & industrial	8%	5%
Nonferrous metallurgy other than Aluminum	3%	16%
Pulp & Paper (lime used in kraft pulping)	5%	14%
Sugar refining	3%	10%
Asphalt	1%	5%

Revised US Average Carbonation Rate including data from unpublished studies
= 29 percent

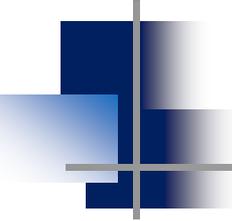


Potential Future Work

- Close data gaps, especially for applications that account for larger portions of the US market that currently have less conclusive data, or no data at all.
- E.g., soil stabilization applications account for almost 10% of US market, however the data is less conclusive due to regional variations in soil and climate.
 - Additional data collection & further research needed



NLA GHG Protocol Findings, 2022



NLA GHG Protocol Responses

	2011	2019	2020	2021	2022
No. of Companies	16	12	12	12	11
No. of Plants	48	45	43	43	43

NLA Member Kilns in Operation

	2019	2020	2021	2022
Straight Rotary	49	48	47	45
Rotary Preheater	61	57	56	58
Vertical/Twin-shaft Vertical	10	10	12	12

Lime Produced and Byproducts Recycled

Million (MM) Metric Tons					
	2011	2019	2020	2021	2022
Quicklime	17	15.6	13.9	15.1	15.2
Byproducts Recycled	1.0	1.4	1.0	1.1	1.1

Production Breakdown

Lime Product	% Total Production				
	2011	2019	2020	2021	2022
Hi-Cal	78	79	79	78	79
Dolo	21*	19	18	20	17
Other (Mag lime, dead-burned, brick grain)		2	3	2	4

* Dolo plus "Other"

Byproduct Recycling

<u>WASTE TYPE</u>	Recycling Rate (%)			
	2019	2020	2021	2022
BLENDED/UNSPECIFIED LKD	58.5%	49.4%	99.6%	96.3%
DOLO LKD	72.8%	66.4%	58.7%	62.1%
DOLO OFF-SPEC LIME	0%	0%	0%	0%
DOLO SCRUBBER SLUDGE	0%	0%	0%	0%
HICAL LKD	70.3%	73.1%	79.7%	82.1%
HICAL OFF-SPEC LIME	34.8%	27.9%	26.2%	23.6%
HICAL SCRUBBER SLUDGE	0%	0%	0%	0%
MAG LIME LKD	0%	0%	7.1%	17.8%
MAG LIME OFF-SPEC LIME	0%	0%	0%	0%
MAG LIME SCRUBBER SLUDGE	0%	0%	0%	0%
OTHER CALCINED WASTE	7.5%	10.1%	8.4%	0.6%

Byproduct/Waste Statistics

	2011	2019	2020	2021	2022
Overall Recycling Rate (LKD sold/total BPW produced)	42%	51.0%	46.9%	49.3%	51.2%
All Byproducts and Waste Generation Rate (All BPW/total lime produced)		16.2%	14.7%	13.7%	13.0%
LKD Only Generation Rate (LKD produced/total lime produced)		10.7%	9.8%	9.3%	8.6%

Oxide Content of Lime

	HICAL LIME		
	CaO	MgO	TOTAL
2019	94.3	1.7	96.0
2020	94.2	1.6	95.8
2021	93.8	1.4	95.1
2022	94.5	1.6	96.0
	DOLO LIME		
	CaO	MgO	TOTAL
2019	56.9	39.3	96.2
2020	57.1	39.5	96.6
2021	56.7	39.6	96.3
2022	56.4	39.3	95.8

Oxide Content of LKD

	HICAL LKD		
	CaO	MgO	TOTAL
2019	47.0	1.7	48.7
2020	42.0	1.8	43.8
2021	41.6	3.0	44.6
2022	43.9	1.4	45.4
	DOLO LKD		
	CaO	MgO	TOTAL
2019	24.9	18.2	43.1
2020	23.7	16.2	39.9
2021	28.2	16.3	44.5
2022	26.5	16.4	43.2

Lime Industry Kiln Fuel Use (%)

	2011	2019	2020	2021	2022
Coal	76	64	59	61	62
Coke	21	18	20	19	17
Natural Gas	2.6	16	19	18	20
Alternative Fuel	0.1	1.0	1.2	0.6	0.3
Fuel Oil	0.3	<1	<1	1.1	~1

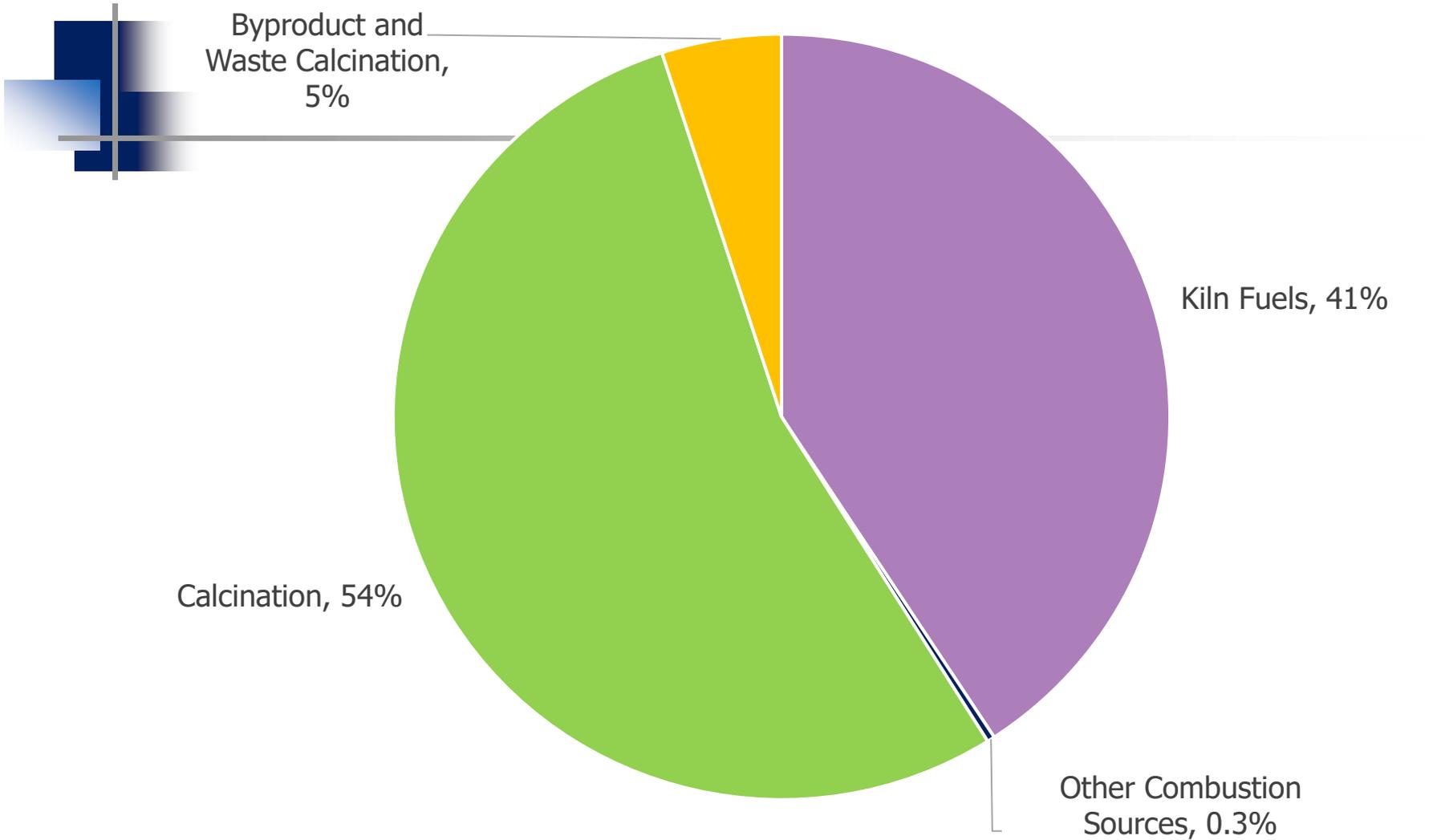
(Expressed as a percentage of total MMBTUs)

NLA CO₂ Emissions (MM Metric Tons) (based on protocol responses received)

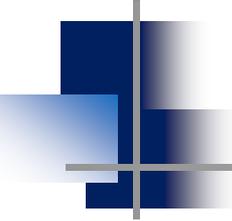
	2019	2020	2021	2022
Kiln Fuels ¹	9.37	8.25	9.0	8.9
Other Combustion Sources	0.07	0.07	0.07	0.06
Calcination	12.2	10.9	11.9	11.9
Byproduct and Waste Calcination	1.4	1.1	1.1	1.1
TOTAL	23.0	20.3	22.0	22.0

1. Total includes CH₄ and N₂O CO₂e

2022 NLA Member CO2e Emissions



Attorney-Client Privilege/Joint
Defense Privilege



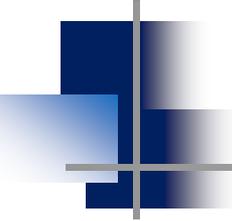
Various Benchmarks

- Energy Intensity Benchmark
 - Sum CO₂ (kiln fuel emissions, other combustion sources, CH₄, N₂O CO₂e)/lime produced
 - Lime only, and lime & LKD
- Calcination Intensity Benchmark
 - Sum CO₂ (lime production, calcined by products & wastes)/lime produced + LKD sold

GHG Benchmarks

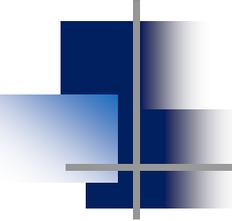
	2011	2019	2020	2021	2022
EPA Calcination Emissions Intensity	0.80	0.80	0.79	0.79	0.80
EPA Energy-Related Intensity					
Lime & LKD	0.60	0.57	0.57	0.57	0.55
Lime only	0.64	0.62	0.62	0.61	0.59

Attorney-Client Privilege/Joint
Defense Privilege



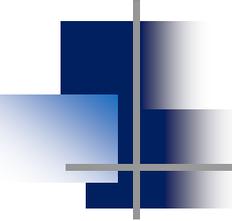
Total EPA GHG Benchmarks

	All Lime			
	2019	2020	2021	2022
Lime Only	1.39	1.38	1.39	1.37
Lime + LKD	1.36	1.36	1.36	1.35



Total EPA GHG Benchmarks

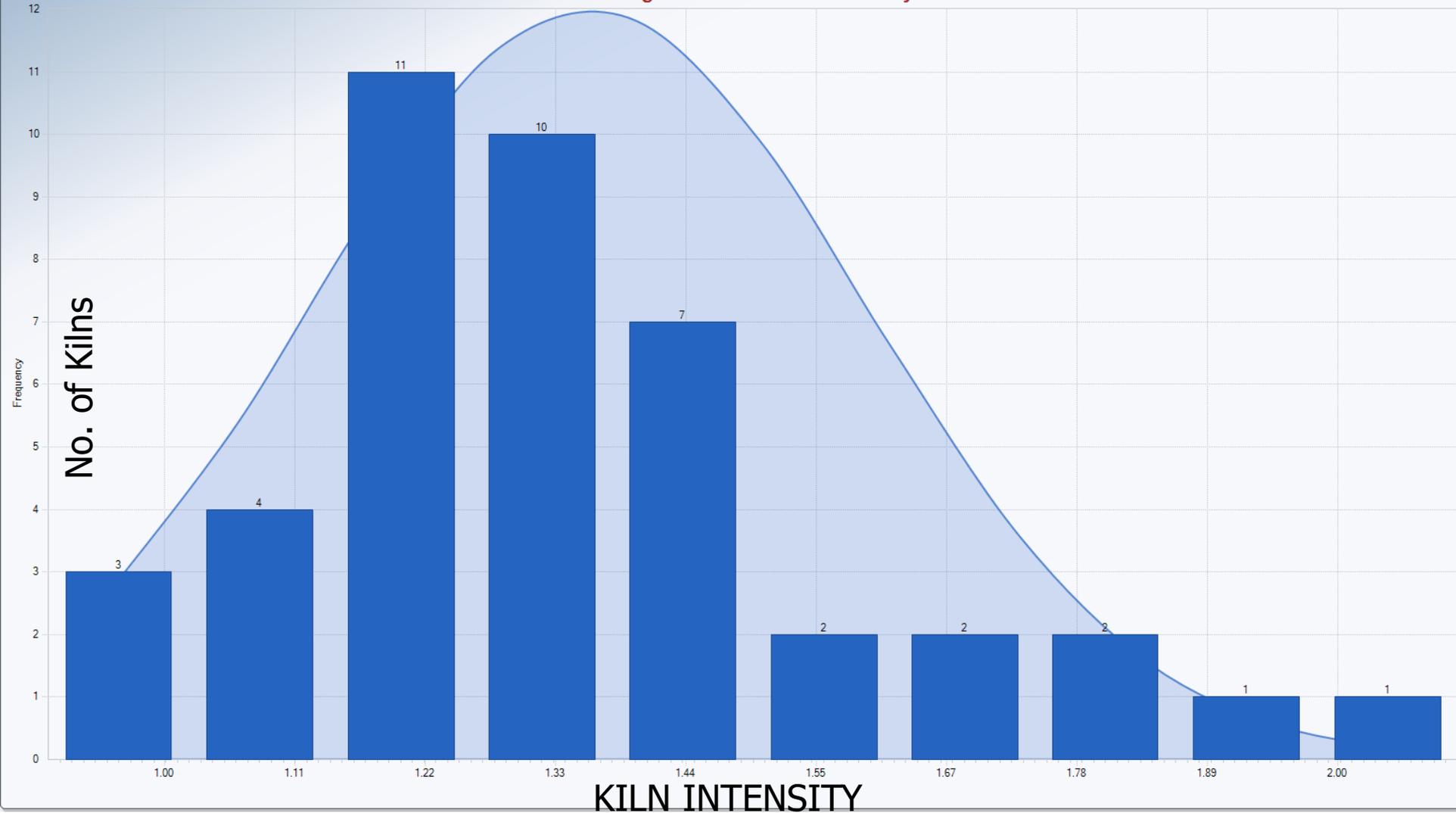
	Hi-Cal			
	2019	2020	2021	2022
Lime Only	1.32	1.31	1.31	1.30
Lime + LKD	1.31	1.30	1.30	1.29



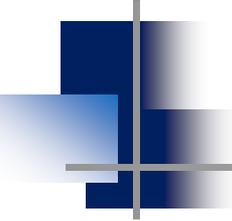
Total EPA GHG Benchmarks

	Dolo			
	2019	2020	2021	2022
Lime Only	1.54	1.54	1.53	1.47
Lime + LKD	1.44	1.43	1.45	1.40

Histogram for Total GHG Intensity

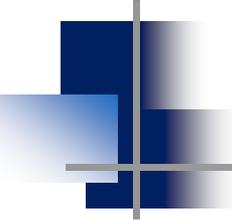


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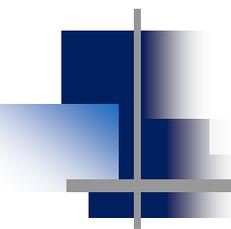
2022 Recap

- Various GHG benchmarks are essentially unchanged from previous years
- Total production unchanged from 2021, however, slight decrease in dolomitic lime production
- Slight increase in natural gas use, decrease in “alternative fuels” and pet coke
- LKD recycling – fluctuates within historical norms



Data Collection for 2023

- Scope 1 emissions, facility-wide only
- Revised protocol spreadsheet will be distributed shortly



Roadmap to Carbon Neutrality Update

A landscape photograph showing large, grey limestone rock formations in the foreground. In the background, there are rolling hills with trees showing autumn foliage in shades of yellow and orange. The sky is blue with some clouds.

A ROADMAP TO CARBON NEUTRALITY FOR THE U.S. LIME INDUSTRY

A composite image showing a limestone quarry and processing site. The top part shows a dark, rocky quarry face. The middle part shows a yellow front loader or truck in a gravel processing area. The bottom part shows a large pile of grey limestone gravel. The background shows a forested hillside under a cloudy sky.

FOREWORD

Lime is a vital product used in all aspects of our society, including purifying the air we breathe and the water we drink, as well as extensive use in manufacturing, construction, environmental protection, agriculture, and many other applications. The lime industry is committed to making the manufacturing and use of lime more sustainable, and to reduce the carbon footprint of the industry.

This document will explain what lime is, how it is made, and how it is important to the public and to the economy, and will set out the industry's plan of action for achieving carbon neutrality by 2050. It sets out the opportunities and challenges ahead for this effort and the need for cooperation of the industry, government entities, and other stakeholders, if the goals are to be achieved.

The National Lime Association is the trade association representing U.S. commercial manufacturers of high calcium quicklime, dolomitic quicklime, and hydrated lime (collectively referred to as "lime"). This document was prepared with the assistance of NLA's Sustainability Committee, with representatives from across the industry.

1 | WHAT'S IN THE ROADMAP?

The energy intensive nature of lime production and the chemical reactions that occur when the raw limestone materials are heated at high temperature produce emissions of carbon dioxide (CO₂) to the atmosphere. The lime industry is committed to reducing these emissions in response to the challenge of climate change. This Carbon Neutrality Roadmap shows the steps that the U.S. lime industry intends to take to achieve significant carbon reductions by 2050.

The roadmap highlights actions and investments to date that have resulted in reduction in CO₂ emissions and describes key approaches that can be used to decarbonize emissions from lime and dolomitic lime production in the U.S., including process optimization for improved energy efficiency, moving to less carbon-intensive fuels (such as natural gas or biofuels), reduction of indirect emissions (such as electricity use and transportation), carbon capture, utilization and storage (CCUS), use of nature-based solutions that will support carbon credits, and the recognition of the role of recarbonization through the use of lime products. Reaching decarbonization goals will require decisive steps by the industry as well as cooperation from government entities and others. These steps and the partnerships required are further explained in this roadmap.

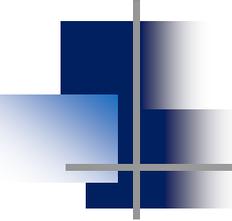


6 | WHAT IS THE LIME INDUSTRY'S COMMITMENT TO CARBON NEUTRALITY?

The lime industry has been working to reduce its carbon footprint for many years, including such early efforts as voluntary participation in the Department of Energy's Climate Vision program more than 20 years ago. These efforts have increased in recent years, with the formation of NLA's Sustainability Committee, and most recently in the summer of 2023, with the decision of NLA's Board of Directors to adopt a Carbon Neutrality Commitment and to develop this Roadmap. The Commitment is:

The members of the lime industry represented by NLA commit to take actions to achieve carbon neutrality across the lime product value chain when technologically and economically feasible. The actions taken (including those listed elsewhere in this document) may vary across the industry, based on size of company, location of operations, product mix, and other factors, but all members pledge to use reasonable efforts to identify measures to reduce their carbon footprint. The industry believes that if the actions identified in this Roadmap are pursued, and if needed actions by federal and state government entities and other economic actors are taken, lime industry carbon neutrality can be achieved by 2050.

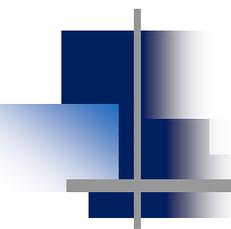




NLA Roadmap

- What's left
 - Member photos

LCA/EPD Development for Lime



Milestones

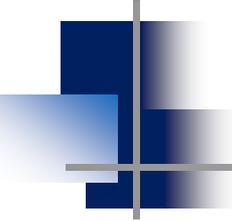
Complete the NLA Roadmap



Call for member volunteers to assist
developing a generic protocol



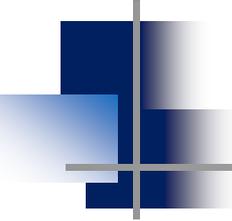
Develop Generic Protocol for LCA & EPD



Questions/Discussion

Attorney-Client Privilege/Joint
Defense Privilege

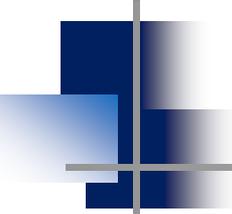
SEC Climate Disclosure Rule Update



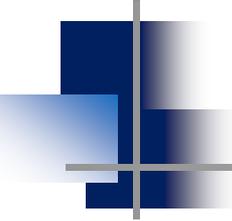
SEC Climate Disclosure Rule

- SEC final rule issued March 6, 2024
- Rule challenged in multiple Circuit Courts (including the 5th Circuit)
- 5th Circuit issues an administrative stay of the rule on March 15, 2024
- All multidistrict litigation transferred to 8th Circuit (3/21/2024)

SEC Climate Disclosure Rule— Cont'd

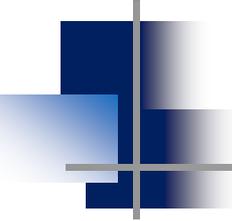


- SEC stayed its own rule under § 25(c)(2) and § 705 of the APA
- SEC is still defending the legality of its rule, but agreed to stay it pending judicial review
- US Chamber of Commerce and many others are challenging the 254-page rule



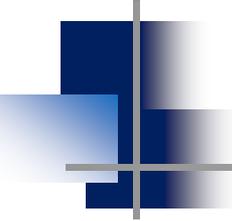
SEC Climate Disclosure Rule— Changes from Proposed Rule

- Scope 1 & 2 emissions covered if “material”
- Scope 3 emissions no longer covered
- However, many other complex requirements remain that generally relate to materiality
- Litigation will likely go on until at least the end of 2024 (and probably beyond)



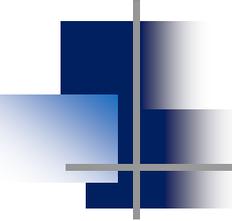
Scope 1 Data Collected

- Calcination Emissions (by kiln)
 - Product type
 - %CaO and %MgO
 - Production, calculated emissions
- Byproducts and Waste Emissions
 - Waste type
 - %CaO and %MgO
 - Amount Sold/Not Sold, calculated CO₂ emissions



Scope 1 Data Collected

- Kiln Fuel Emission
 - Fuel types and amounts (by kiln)
 - Fuel heat values
 - Calculated CO₂, CH₄, N₂O emissions
 - CO₂ CEMS (EPA Tier 4) – 2 companies, 5 plants
- Other Combustion Sources (OCS)
 - As per EPA “Report CO₂, N₂O, and CH₄ emissions from each stationary fuel combustion unit other than lime kilns.”
 - Fuel type, amount, and calculated CO₂ emissions



Data Not Collected

- Purchased electricity (~4-6% total emissions)
- Portable and emergency equipment (<1%)
- Quarry/Mine fuel (<1%)
- Emissions sequestered (0.3%)