
To: National Lime Association
From: Mike Remsberg, PE and Susan Barnes – Trinity Consultants
Date: February 17, 2023
RE: Updated - Economic Implications of Candidate HAP Emissions Controls on Commercial Lime Kilns

Trinity Consultants (Trinity) prepared a preliminary economic impact assessment given the potential costs associated with the impending Lime MACT rule revisions last year (see Docket Item: EPA-HQ-OAR-2017-0015-0091).¹ The proposed Lime MACT Rule amendments were eventually promulgated on January 5, 2023. With a view of the proposed rule now available, Trinity has used our prior cost estimation study (based on an EPA economic analysis) and has updated the cost impacts on the industry in this memo.

Given the short amount of time available to assess the impacts of this rulemaking and time to comment on this proposed rule, it is necessary to leverage our prior work in this analysis. As there is no ready-made economic cost model available for pollution control on lime kilns, Trinity has relied on EPA's prior work for economic impacts from the Portland Cement Manufacturing MACT rule. Although the manufacture of cement and lime have some fundamental differences in what their products are and how they are made, a cement kiln's scale, exhaust gas characteristics, and nature are a better proxy for what a lime manufacturer would experience in terms of technical and economic challenges than other typical combustion sources. Furthermore, in this update we used EPA's information provided in the proposed rule docket to arrive at our results.

Below is a summary of the methodology applied to arrive our results in this assessment:

- ▶ First, we estimated the number of control devices by kiln process type starting with EPA docket item EPA-HQ-OAR-2017-0015-0134, Attachment 1.
- ▶ As NLA has otherwise commented on the rule, the following revisions were made to this docket spreadsheet:
 - Updated EPA's economic analysis spreadsheet for 83% HCl control with DSI and 30% THC removal with ACI.
 - Corrected the Carmeuse, Gary IN kilns to their proper process type SR (not PR).
 - Note, four kilns in EPA's database were not assigned a process type. For the purposes of this analysis, we have assumed they are PR kilns.

Making these revisions, we found the following breakdown of controls needed to comply with rulemaking by process types:

¹ EPA Docket Item: EPA-HQ-OAR-2017-0015-0091. Economic Implications of Candidate HAP Emissions Controls on Commercial Lime Kilns. Mike Remsberg, PE and Susan Barnes, Trinity Consultants, January 13, 2022.

Control Device	Estimated Number of Kilns Requiring Control Using EPA's Model			
	Preheater Rotary Kilns	Vertical Kilns	Straight Rotary Kilns	Kilns with No ICR Data
Wet Packed Tower Gas Absorbers	34	3	0	4
Dry Sorbent Injection	5	1	4	0
Activated Carbon Injection	34	4	35	4
Regenerative Thermal Oxidizer	36	4	3	4

From this point, we used the estimated total capital investment (TCI) and total annualized costs (TAC) from Trinity's original cost estimate study which provides economic impacts by kiln type and control technology.² To arrive at industry wide impacts, we summarized the costs for all 96 kilns identified in EPA's database that are potentially subject to this rule.

Control Device	Estimated Total Capital Investment per Kiln ²			
	Preheater Rotary Kilns	Vertical Kilns	Straight Rotary Kilns	Kilns with No ICR Data ³
Wet Packed Tower Gas Absorbers	\$ 12,526,457	\$ 11,203,000	\$ 13,494,397	\$ 12,526,457
Dry Sorbent Injection	\$ 583,058	\$ 74,283	\$ 589,476	\$ 583,058
Activated Carbon Injection	\$ 583,058	\$ 74,283	\$ 589,476	\$ 583,058
Regenerative Thermal Oxidizer	\$ 7,808,169	\$ 6,983,213	\$ 8,411,519	\$ 7,808,169
<i>All Kilns</i>	<i>\$ 729,732,884</i>	<i>\$ 61,913,267</i>	<i>\$ 48,224,121</i>	<i>\$ 83,670,736</i>

Total Capital Investment for All Kilns Affected by Proposed Rule: **\$ 924M**

Control Device	Estimated Total Annualized Costs per Kiln ²			
	Preheater Rotary Kilns	Vertical Kilns	Straight Rotary Kilns	Kilns with No ICR Data ³
Wet Packed Tower Gas Absorbers	\$ 1,596,758	\$ 1,437,765	\$ 1,745,214	\$ 1,596,758
Dry Sorbent Injection	\$ 677,760	\$ 184,644	\$ 678,571	\$ 677,760
Activated Carbon Injection	\$ 566,977	\$ 410,688	\$ 585,789	\$ 566,977
Regenerative Thermal Oxidizer	\$ 1,393,226	\$ 1,249,138	\$ 1,500,499	\$ 1,393,226
<i>All Kilns</i>	<i>\$ 127,111,926</i>	<i>\$ 11,137,243</i>	<i>\$ 27,718,396</i>	<i>\$ 14,227,844</i>

Total Annualized Costs for All Kilns Affected by Proposed Rule: **\$ 180M**

Our update reiterates our prior findings that the costs to the industry are very high given the design and scope of the proposed rule. We estimate that TCI will be in the order \$924M for existing LMPs to comply with the proposed rule and TAC will be in the range of \$180M per year for existing LMPs to comply with proposed rule. This further supports that EPA's economic impact analysis in this rulemaking far underestimates the impacts the proposed rule will have on major source LMPs.

² See Page 7. EPA Docket Item: EPA-HQ-OAR-2017-0015-0091.

³ Kilns not identified with a process type in EPA's database are all presumed to be PR kilns.