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**TO:** Climate Action Council, Department of Environmental Conservation and New York State Energy Research and Development Authority

**FR:** LEILAC

**RE:** Request for Public Comments – New York Draft Scoping Plan

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LEILAC appreciates the opportunity to respond to the Department of Environmental Conservation (DEC) and New York State Energy Research and Development Authority's (NYSERDA) Draft Scoping Plan.

LEILAC, a subsidiary of Calix Ltd., aims to apply a breakthrough in low-cost carbon capture technology that will enable the cement and lime industries to reduce their emissions dramatically - while retaining their international competitiveness – by capturing those process emissions at low cost. This is a completely new ‘type’ of carbon capture technology: a “process modification” approach, rather than requiring additional chemicals or processes. The LEILAC technology simply stops the unavoidable CO<sub>2</sub> process emissions from being contaminated from these ‘hard to abate’ industrial processes. It uses simple, heated tubes that keep the CO<sub>2</sub> pure. As there is minimal energy use and no chemicals are required, it can do so at very low cost.

The technology is currently being applied to capture 20 percent of a plant's emissions as a retrofit. It can also be applied in a modular form to 100 percent and use any fuel or energy source – providing a ‘future proof’ solution. This technology is a practical and affordable pathway for local industries to thrive in a carbon-constrained future.

LEILAC is supportive of the Draft Scoping Plan's recommendations for strategies to decarbonize industrial processes. LEILAC believes that governments have a key role to play in solving emissions challenges and should coordinate with companies and other stakeholders to implement long-term incentive frameworks and public financing opportunities.

Thank you for the opportunity to respond to this request for comments. We welcome the opportunity to serve as a resource to DEC and NYSERDA to provide further information or answer any questions.

Sincerely,



Daniel Rennie  
Chief Executive Officer

## About the LEILAC Technology

This new type of carbon capture technology is specifically designed for the cement industry, ensuring a clean stream of unavoidable process CO<sub>2</sub> is captured, and operating with almost no energy cost and minimal capital cost.

### *Fast Facts*

- It is an extremely simple technology, based on using heated tubes to contain the process CO<sub>2</sub> released from the minerals and stop it being contaminated by fuel or air. Its unique process of ‘indirect calcination’ ensures that the relatively pure, unavoidable, CO<sub>2</sub> released from the limestone is available for direct capture.
- It can be retrofitted or integrated into a new plant and applied in a modular approach.
- The technical risks are very low, with a demonstration plant due to start construction in 2022 that will capture approximately 20% of a cement plant’s emissions (100ktpa).
- The design is future proof and heat source agnostic, enabling the potential use of any fuel – including renewable electricity and hydrogen.
- Quite uniquely for a capture technology in this space, the system requires very little (and often no) additional energy or chemicals, keeping the capital and operating costs very low.
- It offers high CO<sub>2</sub> abatement potential, as it does not need additional fuel to be used to power the capture process and is highly efficient.

The LEILAC system has been developed over the course of 15 years and is approaching the point of large-scale application. The core system is proven; the critical next step is for proven large-scale integration with a host plant, on a variety of energy sources – which is currently underway.

LEILAC 1, a pilot project funded by the EU’s Horizon 2020, was successfully constructed on time and in budget in 2019. The project has been supported by a consortium of key cement and lime industry partners, with Heidelberg Cement hosting the pilot-scale project at a cement plant in Belgium. The pilot separated 18,000 metric tons of CO<sub>2</sub> per year. The project has successfully demonstrated that both limestone and raw meal can be processed; that the CO<sub>2</sub> is successfully separated; and that (disaggregated from the entire system) the energy penalty for indirect calcination (LEILAC) should not be higher than direct (conventional) calcination.

LEILAC 2 commenced in April 2020 and plans to demonstrate the technology at a larger scale – 20% of plant emissions. This demonstration project will be hosted at the Heidelberg Cement plant in Hannover, Germany, and aims to separate 100,000 metric tons per year of CO<sub>2</sub> in a scalable module. The LEILAC2 project passed its financial investment decision (FID) in March 2022 and is set to become operational in 2023-2024. It is being designed in a module that can scale to 100% of a plant’s total emissions, for possible operation in 2025.

There are minimal technical risks associated with the LEILAC technology given its stage of development. The primary risk is associated with application at full-scale in the most efficient way possible, while ensuring that the design can be quickly and cheaply applied to all cement plants.

A demonstration plant and full-scale application in the US would significantly enable the remaining technological risks to be addressed, ultimately enabling rapid decarbonization of the cement industry at large.

With our experience and ambition to decarbonize the cement and lime industries, LEILAC appreciates the opportunity to provide the following comments in response to New York’s Draft Scoping Plan.

## **Chapter 2. The Time is Now to Decarbonize Our Economy**

The cement and lime industries play a vital role in our society. Cement is used in our roads, buildings, homes, offices and almost all infrastructure. Lime is used in a variety of applications, including the iron and steel, chemical, paper, pharmaceutical, drinking water, food, and farming industries. However, the cement sector is responsible for 8% of global CO<sub>2</sub> emissions, most of which are CO<sub>2</sub> emissions released directly and unavoidably from the processing of the raw materials. According to researchers at the Massachusetts Institute of Technology, the United States will build the equivalent of New York City 20 times over between 2017 and 2050.<sup>1</sup>

Until very recently, there were not the technologies nor policy mechanisms available to support wholesale decarbonization efforts globally – but that has changed. Today the global cement and lime industries are both committed, and are developing the tools, to take dramatic steps in achieving net zero production.<sup>2</sup> The LEILAC Group supports the draft scoping plan’s notion that technology advancement will be vital to improving climate change mitigation and adaptation success and encourages DEC and NYSERDA to support new and emerging technologies toward large-scale deployment. Specifically, we encourage DEC and NYSERDA to consider policies that incentivize both carbon abatement and carbon capture to establish a market for technologies that reduce overall emissions created. While many existing policies in North America reward projects that capture high volumes of CO<sub>2</sub>, and those programs have positive impacts, technologies and solutions that prevent emissions at the source should be incentivized as well.

Additionally, LEILAC understands the critical importance of strengthening environmental justice initiatives outlined in the draft scoping plan. LEILAC projects are designed for enabling local industries to continue operating at low-cost, providing a just transition for industry and society to a low-carbon future. Currently, communities local to cement plants experience disproportionate emissions and public health challenges. Disadvantaged communities can benefit from the emissions reductions enabled by the LEILAC technology. By decarbonizing the cement and lime industries, New York can continue to retain industry, grow its economy, and reenforce critical infrastructure without health or environmental trade-offs.

## **Chapter 5. Overarching Purpose and Objectives of the Scoping Plan**

The Draft Scoping Plan points to electrification and the strategic use of carbon capture technologies for certain industrial applications to decarbonize the economy. Cement production and the processing of lime are two industrial sectors with limited near-term

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<sup>1</sup> Vahidi, et. al., Regional variation of greenhouse gas mitigation strategies for the United States building sector. *Applied Energy* (302). 2021.

<sup>2</sup> <https://www.project-leilac.eu/leilac-news/leilac-technology-roadmap-to-2050>

electrification opportunities. Currently, cement production has two sources of carbon emissions: naturally occurring carbon released from limestone and carbon emissions from the energy and heat required to operate the cement production facility. The carbon from the limestone must be captured in order to decarbonize cement production, as these emissions are naturally occurring and unavoidable. The energy and heat source can come from renewable or zero-carbon fuels (i.e., clean hydrogen) when using LEILAC’s technology, which is heat source agnostic.

## **Chapter 8. Public Health**

### *8.3 Sector-Specific Health Co-Benefits of Climate Policies*

The draft scoping plan comments that “carbon capture and sequestration may also reduce emissions of some other pollutants, but in many cases does not ... while carbon capture technology requires energy ... can lead to additional power sector emissions”. One of the critical benefits of LEILAC technology is that it is heat source agnostic, enabling the potential use of any fuel, including renewable electricity and hydrogen, in operations. Additionally, because the stream of CO<sub>2</sub> is relatively pure, an amine system is not required and very few, and often no, other additional energy or chemicals are required. Therefore, there is no increase in criteria pollutant emissions and significant reductions in greenhouse gas emissions.

Strong local engagement with key governmental and non-governmental stakeholders is critical. All LEILAC projects place community engagement as a central pillar of the project’s management and organization. It would be the intent, in any project, to have local community engagement from the outset, including site tours, a visitor center, and say in the development process. In addition to sustaining jobs and providing a competitive, low-carbon product, a LEILAC retrofit should result in no additional air emissions or energy requirements. LEILAC aims to enable local, small-scale cement producers to thrive in a low-carbon economy with an efficient means of capturing their unavoidable CO<sub>2</sub>.

## **Chapter 14. Industry**

According to the scoping plan, industrial emissions made up 9% of statewide emissions in 2019.<sup>3</sup> LEILAC believes that governments have a key role to play in solving this challenge and should coordinate with companies and other stakeholders to (1) promote the environmental and economic benefits of low-carbon solutions; and (2) to facilitate deployment through permitting, financial support, and public procurement rules. Appropriate long-term incentive frameworks and public financing for early movers are critical to reaching net-zero targets.

### *Financial and Technical Assistance*

LEILAC encourages the State to pursue the financial and technical assistance mechanisms outlined in the draft scoping plan (efficiency and decarbonization programs and low-cost power programs) and believes such tools will put the State on the correct track toward effectively deploying decarbonization solutions.

### *Low-Carbon Procurement*

LEILAC agrees that public procurement policies for low-carbon building materials is an effective strategy for reducing sectoral emissions. Directing federal and state governments’

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<sup>3</sup> New York State Climate Action Council Draft Scoping Plan. December 2021.

purchasing power toward less emission-intensive goods can have significant impacts. LEILAC would welcome the opportunity to serve as a resource for determining the exact method and details of a public procurement policy for low-carbon concrete in the State.

#### *Economic Incentives*

LEILAC is highly supportive and encouraging of the draft scoping plan's recommendation that the State should offer economic incentives such as "loans, grants, tax credits, technical assistance programs, or even venture capital investments".

The main risk for LEILAC is associated with validating full-scale, commercial operations. Full scale commercial operations, particularly at a fully integrated retrofit, carries some technical and production risks, and without incentives like the federal Section 45(q) tax credit or financing support through to a final investment decision (FID), it is difficult to build a business case.

Tax credits can provide the long-term guarantees needed to ensure a project's success. Funding to support development costs through to FID, through grants and other cost-sharing arrangements, would greatly reduce project risks for industrial decarbonization projects, as sectors like cement and lime production are typically low-margin, conservative markets. These initiatives would improve market demand in the State for low-carbon projects, attract green developers, and foster clean energy jobs.

#### **Conclusion**

Again, thank you for the opportunity to respond to this request for comments. LEILAC is excited about the support for decarbonizing industrial processes outlined in this Plan and look forward to seeing these recommendations take shape. We welcome the opportunity to serve as a resource to DEC and NYSERDA to provide further information or answer any questions.