



PRESS RELEASE

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ZICCUM takes lead on new pilot study of vaccine plant producing cost-effective thermostable vaccines at volume with KeyPlants as engineering partner

Ziccum has produced a pilot study, including blueprints and costings, exploring the technical and financial viability of a Fill and Finish plant producing thermostable air-dried vaccines at volume. The plan, produced in collaboration with leading modular plant construction specialist KeyPlants AB, indicates significant financial benefits from formulating and packaging vaccines based on Ziccum's LaminarPace ambient dry-formulation technology. Ziccum will now move forward and seek strategic partnerships for establishing a pilot plant for vaccine manufacturing.

One of Ziccum's key strategic goals has always been the integration of its dry-formulation technology LaminarPace into large-scale vaccine manufacturing – as demonstrated by recent patent applications on key technical aspects of its technology.

Ziccum CEO Göran Conradson: "We have long stated our commitment to integrating LaminarPace into an industrial GMP environment. The detailed project planning we have carried out with KeyPlants has clarified for us the enormous scale of the savings our technology offers over today's standard lyophilization processes, and how achievable the concept is as well. With KeyPlants we have a partner with high expertise not only in pharmaceutical facility design and engineering, but also in vaccine production and aseptic processing solutions. The core and modular technology for these new facilities is already available, and the limitations of our present vaccine supply chain are clear. This is a historic opportunity."

Ziccum AB's air-drying technology transforms liquid vaccine solutions into thermostable dry powders. Unlike currently available commercial vaccines and vaccines in development, these dry powder vaccines can be stored and transported at ambient temperatures for extended periods. They require no Cold Chain and meet WHO CTC (Controlled Temperature Chain) requirements.

Ziccum has identified 'Fill and Finish' (F/F), the third and final stage of vaccine production, where medical vials are filled with vaccine solutions and packaged for

distribution, as a key target area of vaccine production that would profit from Ziccum capabilities. The vast majority of today's F/F plants formulate, store and pack vaccines as liquid or lyophilized (freeze-dried) solutions – both are complex, costly, energy-intensive processes compared to ambient air drying.

Together with KeyPlants AB, a global leader in agile modular solutions who have carried out more than 50 projects globally, including F/F vaccine facilities, Ziccum has now drawn up detailed blueprints for a 36 m x 27 m two-floor F/F plant that would be able to produce up to 30 million doses of dry-formulated vaccine a year at an estimated 65% lower OPEX cost and 50% lower CAPEX cost than today's standard lyophilization F/F plants. The pilot study report is attracting interest from some leading vaccine industry peers.

David Lindholm, head of Sales at KeyPlants: "We currently see a strong demand for new vaccine facilities and we're currently working on several vaccine projects for customers worldwide. At KeyPlants we're proud to be a key partner to Ziccum and we see great benefits with their LAPA-technology. This technology will not only significantly reduce facility CAPEX- and OPEX-costs, but also increase vaccine access and safety through the removal of the cold chain distribution."

Ziccum CEO Göran Conradson: "We have made great progress with our other two key strategy areas – growing our IP portfolio of dry-formulated vaccines for license, and increasing our collaborations with vaccine research and stakeholder groups - we absolutely intend to keep developing those. Now, with the scale of potential savings revealed by our pilot study, we are focusing on building new collaborations and strategic partnerships to unlock funding and investment and move ahead towards capturing this extraordinary opportunity.

"Our roots are in dry-powder aerosol technology, bringing the benefits of dry-formulation to vaccines could benefit millions around the world. We all consume essential food and pharma products in dry form as standard every day – knowing it means they can be stored and transported to more people, more cost-effectively. So why can't we do the same with vaccines? The fact is we can. Now is the time for realistic new solutions for vaccine distribution. As an industry, we need to look again at what's possible."

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About Ziccum

Ziccum AB (publ) develops new patented formulations of biological drugs where sensitivity to temperature differences, especially during transportation, currently limits medical and so commercial potential. The company's patented technology, LaminarPace, develops dry powder formulations of drugs and vaccines that currently only exist in liquid form. By doing so Ziccum can increase the availability of drugs and vaccines in existing markets—and open up new ones.

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About KeyPlants

KeyPlants provides fast track process and facility solutions for the Life Science and Advanced Technology Industries. KeyPlants is a global leader in modular facility solutions, having executed more than 50 modular projects globally. Pharmaceutical manufacturers around the world benefit from their modular off-site construction. Headquartered in Stockholm, Sweden, KeyPlants also provide engineering solutions and execute conventional pharmaceutical facility projects in the Nordic countries. Capabilities include full in-house design and construction as well as Subject Matter Expertise in Biomanufacturing, Aseptic Filling, Containment and Manufacturing of APIs and Oral Solids.

This press release has jointly been submitted for publication by the company's CEO's on 15 October 2020.