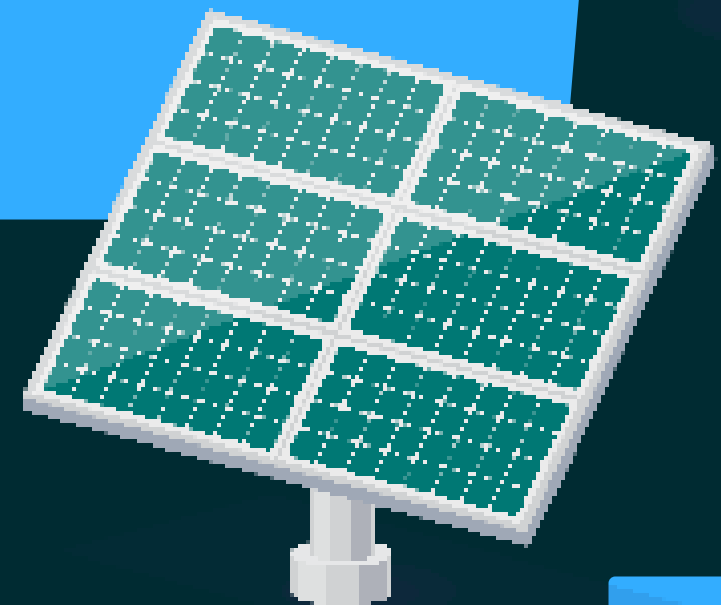




# The Magic (Red) Wand That Turns Any Lithium to Battery Grade

WITH JIM RIEKE

VP of Process Engineering  
at Veolia Water Technologies

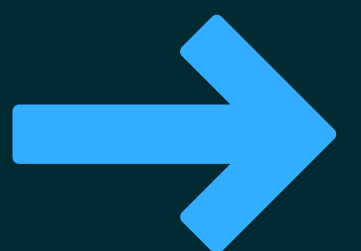


# Let's recall something we learned from Tony Strobbe in Episode 2 of this Deep Dive:

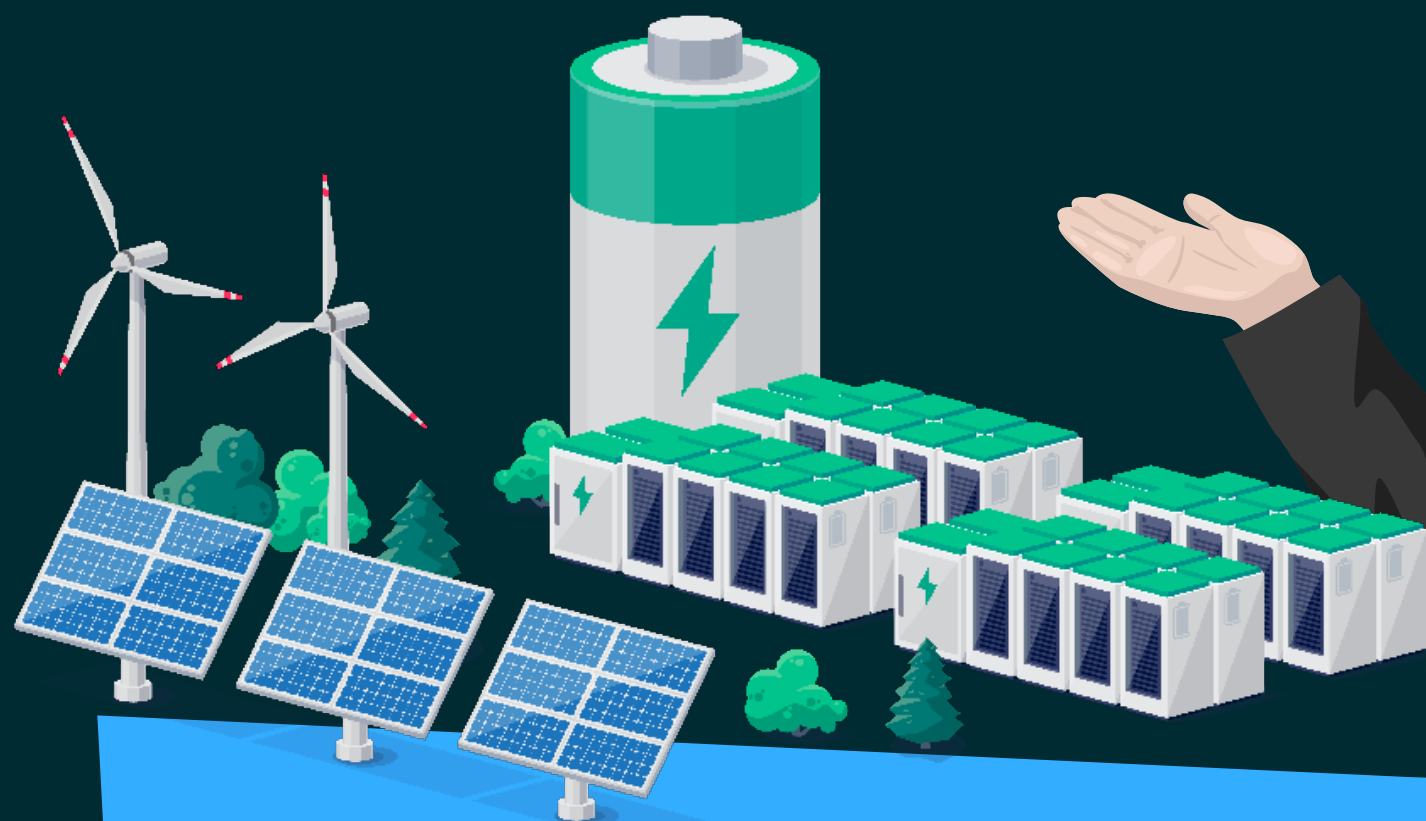


**Battery-Grade Lithium has a shelf life!**

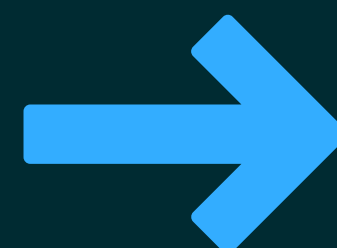
How do you hence feed all the newly built battery gigafactories with “White Oil” around the World if lithium’s production is heavily localized in Western Australia and the South American Lithium Triangle?




**One solution is to refine lithium to battery grade much closer to the battery plants:**

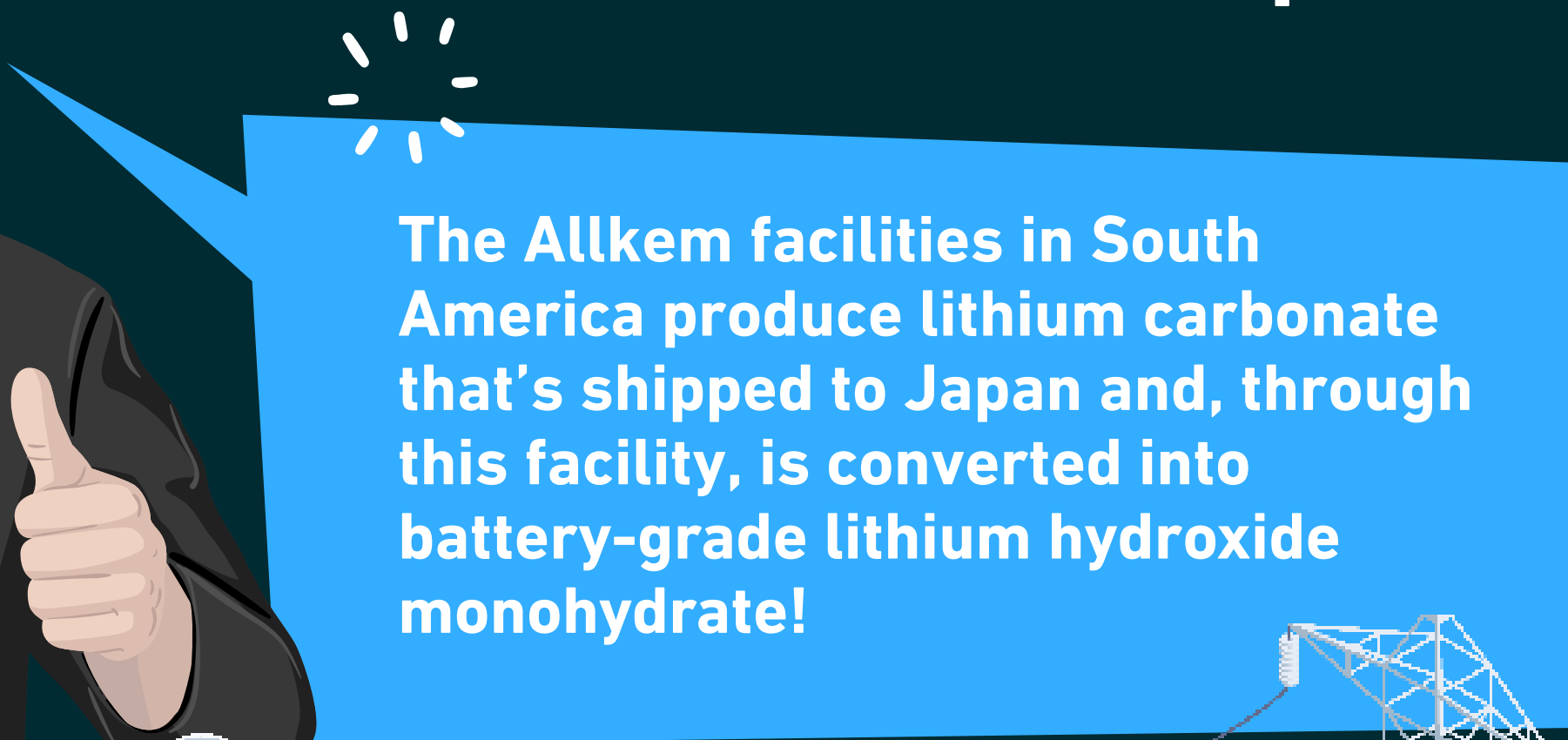


**We began working with Allkem (then called Orocobre) 5-6 years ago now. We demonstrated a conversion flow scheme through our testing facility.**





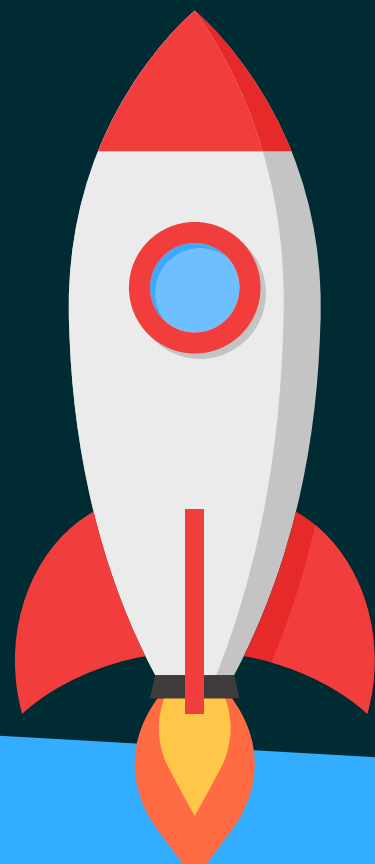
**Having validated this in the lab, HPD - the expert group within the Veolia galaxy - went forward with Allkem to bring the process to a commercial scale in Naraha, Japan.**



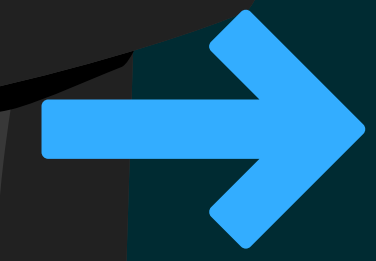
**The Allkem facilities in South America produce lithium carbonate that's shipped to Japan and, through this facility, is converted into battery-grade lithium hydroxide monohydrate!**




# But is that still rocket science in 2023?

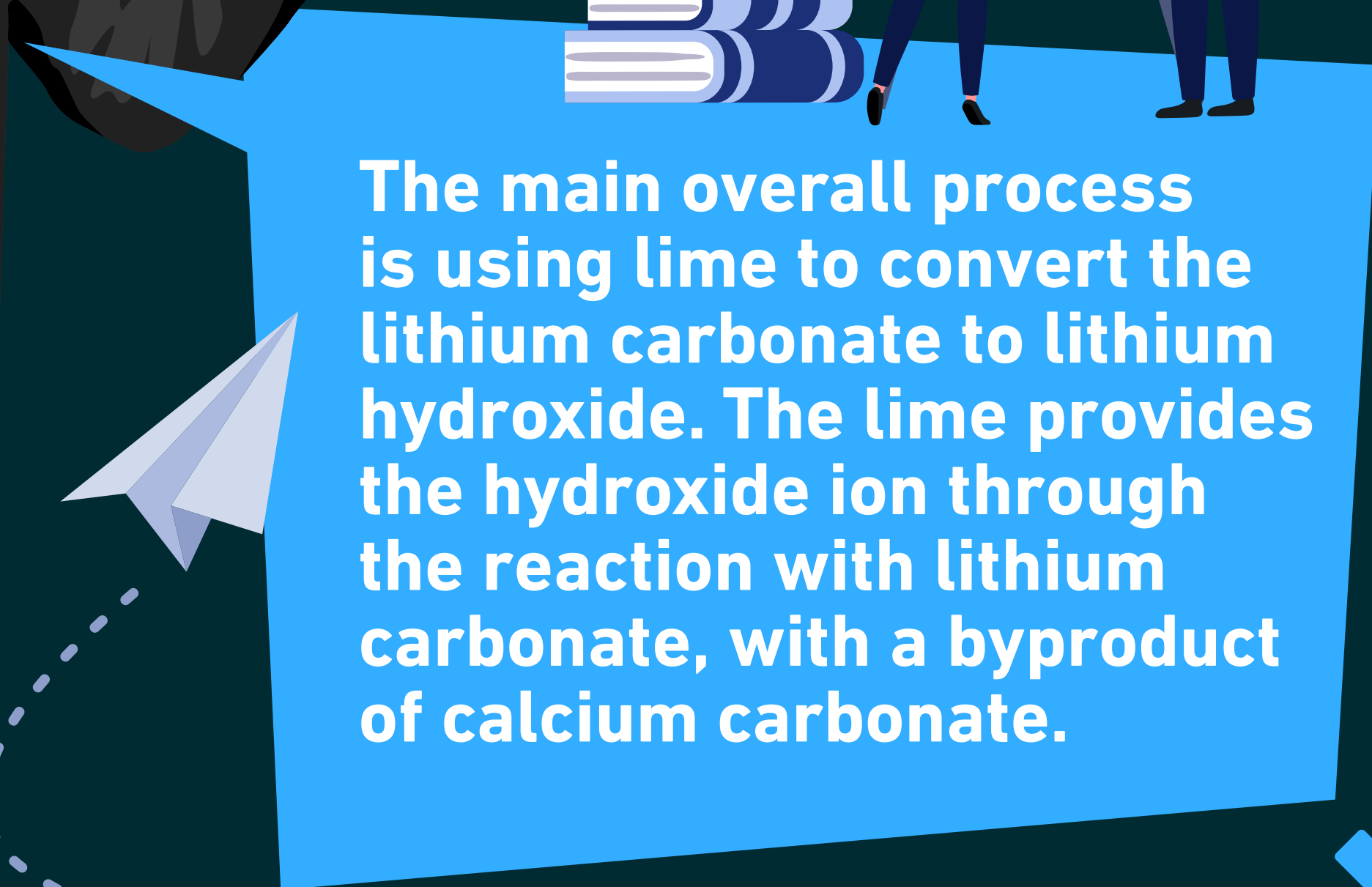
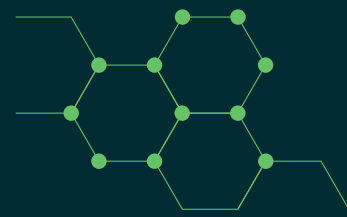


Much of the unit operations that we use are fairly well known. The thing that is always unique is the actual chemistry of the lithium carbonate that Allkem produces.

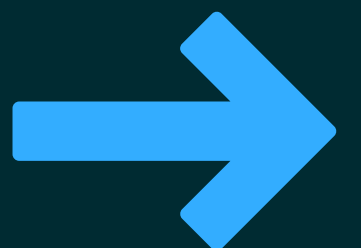


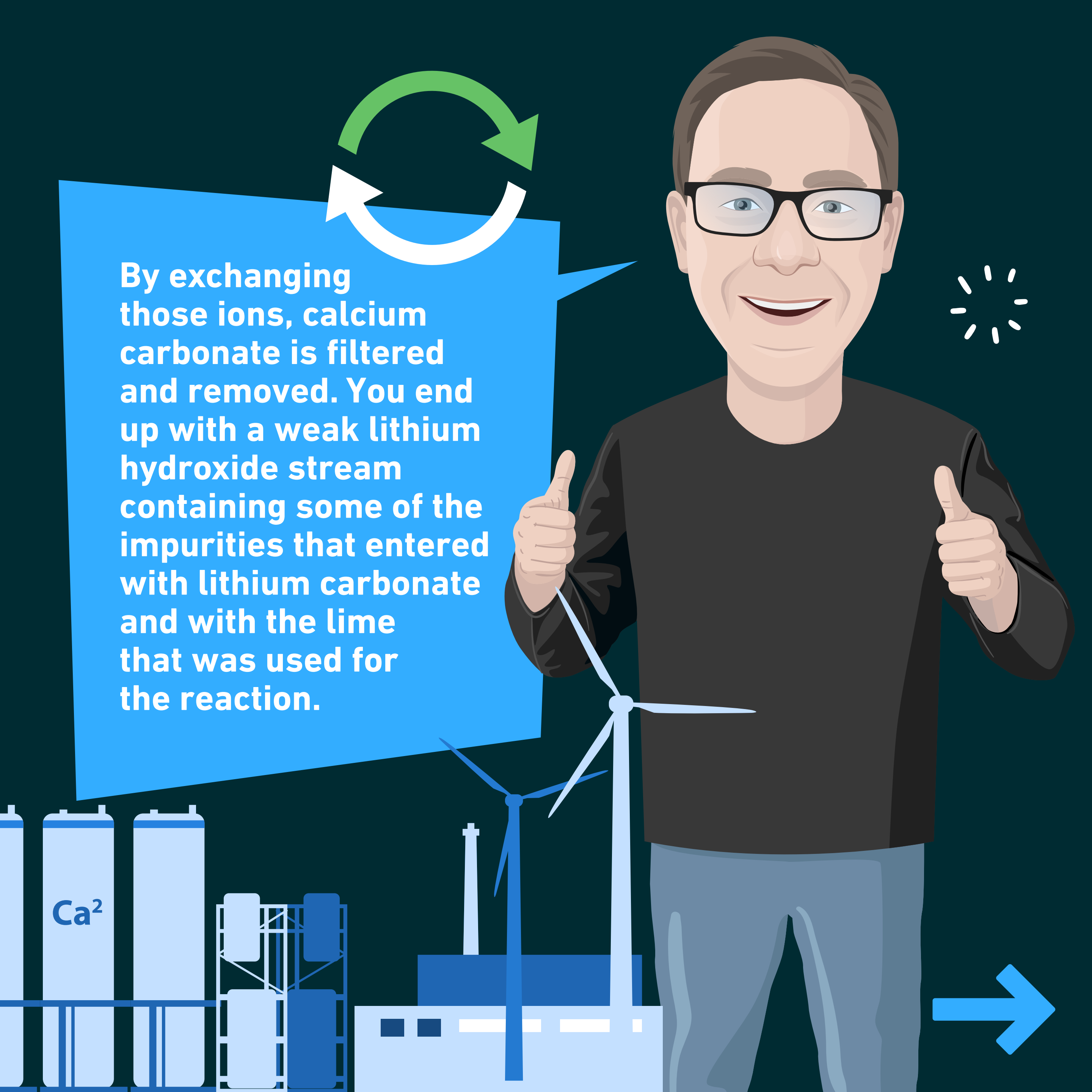


# If the final flow sheet needs finetuning, it still follows a blueprint:



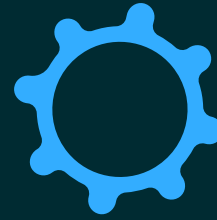
The main overall process is using lime to convert the lithium carbonate to lithium hydroxide. The lime provides the hydroxide ion through the reaction with lithium carbonate, with a byproduct of calcium carbonate.





By exchanging those ions, calcium carbonate is filtered and removed. You end up with a weak lithium hydroxide stream containing some of the impurities that entered with lithium carbonate and with the lime that was used for the reaction.

$\text{Ca}^{2+}$




**That stream is further purified through ion exchange, and then through an evaporative process, it's concentrated, and through a series of crystallizations of lithium hydroxide, the impurities are removed.**


**Lithium hydroxide is then dewatered, dried, and bagged as a final battery-grade product.**





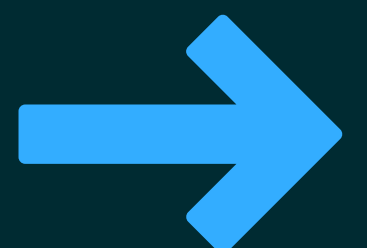


**Now, the Naraha plant isn't only cool on ONE side:**



**One of the unique things about that plant that could be applied elsewhere and fully fits into Veolia's corporate mission is that we're recovering and recycling byproducts.**

**For instance, the calcium carbonate is recalcined through a lime kiln and converted back into active lime that can then be used at the front of the process!**





**Wanna get more of this plant's secrets?**

**More stories from the fascinating lithium projects Veolia is powering up?**

**More insights, nuggets, opportunities, and best practices?**



**Embark on a deep dive with Jim Rieke, this week on the**

(DON'T!)  
**WASTE WATER**

**Podcast!**