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CleanTech Lithium PLC
14 January 2025

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CleanTech Lithium PLC ("CTL", CleanTech Lithium" or the "Company")
Pilot Plant Downstream Process Produces Lithium Carbonate with 99.78% Purity

CleanTech Lithium PLC (AIM: CTL, Frankfurt: T2N), an exploration and development companyadvancing sustainable lithium projects in Chile, further to "Pilot-Scale Lithium Carbonate Production" RNS on 21 November 2024,announces the production of a high purity lithium carbonate sample from the Company´s pilot plant downstream process.

The Company has also made the decision to voluntarily delist from the OTCQX market in the U.S. The Board did not see the value from low trading volumes and the associated administration costs. The Company's Ordinary Shares continue to trade on the London AIM Market, the Frankfurt Stock Exchange and the U.S. OTC Pink Market.

Highlights:

- The Company is processing concentrated eluate from its DLE pilot plant in Copiapó, Chile at the facilities of Conductive Energy ("Conductive") in Chicago, USA with the aim of producing battery grade lithium carbonate.
- The downstream process design aims to minimise process steps and demonstrate a process that is scalable and can consistently produce a battery-grade lithium carbonate product. Key stages are:
  - §Eluate concentration using Forward Osmosis ("iFO") to produce a highly concentrated pre-carbonation solution with low energy input
  - §Treatment of the pre-carbonation solution to remove contaminants
  - §Carbonation to technical-grade lithium carbonate
  - §Post-carbonation polishing to achieve battery-grade lithium carbonate
- A substantial volume of pre-carbonation solution and lithium carbonate was produced as reported to the market on 21 November 2024.
- Due to the onset of freezing weather in Chicago from late November, steps were taken to mitigate damage to sensitive iFO processing equipment and iFO concentration was paused.
- Further downstream processing continued using the already produced pre-carbonation solution to refine and analyse the downstream process and lithium carbonate product.
- A test run volume of pre-carbonation solution was processed in December into an 8kg sample of high grade lithium carbonate which a laboratory at the University of Calgary has recently confirmed achieved 99.78% purity.

- This exceeds the 99.6% purity standard (Chinese GB/T 23853-2022 (Type 1) for battery grade lithium carbonate from brine. However, certain individual impurity concentrations were higher than the standard.

- The treatment process was shown to be effective at removing contaminants, resulting in high-quality feed to the carbonation stage.

- The most problematic contaminants in the pre-carbonation solution, Calcium, Magnesium and Boron, were reduced by 98.5%, 99.9% and to non-detection (>99.99%) respectively.

- Conductive Energy is is currently assessing best options to restart iFO operations that are paused due to winter conditions.

- Conductive is utilising the current pause to upgrade the system based on initial data as well as add an nanofiltration step to remove divalent ions (Calcium, Magnesium) before the ion exchange steps which will improve purification efficiency further whilst improvements in automation and process control will be made.

Steve Kesler,Executive Chairman, CleanTech Lithium said: *"We are pleased to report the production of high grade lithium carbonate with a purity of 99.78% from an initial batch of concentrated eluate from our Laguna Verde project. This phase of work has focused on fine-tuning the process and preparing to scale up pilot plant output. Our collaborative efforts with Conductive Energy and Forward Water on the downstream process are advancing our aim to produce signifigant quantities of battery grade product to introduce to potential strategic partners and off-takers."*

Images 1-2: High purity lithium carbonate falling from filter plate and final product. Low adhesion and moisture content is an indicator of high product purity & exceptional crystal structure





Further Details:

In 2H 2024, a total of 88m^3 of concentrated eluate produced at the Company´s DLE pilot plant located in Copiapó, Chile, was shipped to the facilities of Conductive Energy in Chicago, USA, for conversion into lithium carbonate. Processing commenced in November 2024 and a total of 27.5m^3 of concentrated eluate was processed through the iFO stage which reduced the volume to 5.3m^3 of pre-carbonation solution with lithium concentrations up to 14,400mg/l. The iFO unit is a mobile demonstration scale unit with a feed flow rate of 800 - 1,000L per hour and is an outdoor installation and therefore susceptible to weather conditions. A portion of the solution was processed into approximately 50kg of lithium carbonate as announced to the market on 21 November2024.



Image 3: The iFO unit installed at the Conductive Energy site in Chicago, USA

Despite challenging weather conditions in late November, with temperatures in Chicago dropping below zero degrees Celsius, process evaluation continued with the aim of achieving iterative improvements in yield at lower energy and reagent inputs, which helps assess scalability and operating costs.

Adverse weather did pose risks to sensitive process equipment, such as the membrane modules of the iFO unit and further iFO concentration was paused. Under commercial-scale operations, such systems would be housed within temperature-controlled facilities to mitigate these challenges.

Production of High Purity Product

Downstream processing continued using iFO concentrate already produced to run the final purification, carbonation and polishing stages and produce a test quantity of high grade lithium carbonate. The solution produced by the iFO unit was 14,350mg/l Li, a 6.5X increase in concentration of the concentrated eluate. This was achieved without optimisation and in sub-optimal weather conditions. Optimization is expected to achieve a minimum 10X increase in concentration at this stage. Further stages of contaminant removal, carbonation and polishing achieved a high grade lithium carbonate product with a purity of 99.78% Li2CO3

	DLE Pilot Plant		Downstream Process	
	Feed Brine	Concentrated Eluate	Post iFO Solution	Lithium Carbonate
Grade (mg/L Li)	180	2,210	14,350	99.78%

Table 1: Lithium grade in key stages from feed brine to final product

Treatment to Remove Impurities

The purification stage consists of 3 process units - microfiltration, divalent ion exchange and boron ion exchange. These were shown to greatly reduce the concentrated contaminants in the pre-carbonation solution resulting in a high-quality feed to the carbonation process. The most problematic contaminants in the pre-carbonation solution, Calcium, Magnesium and Boron were reduced by 98.5%, 99.9% and to non-detection (>99.99%), respectively. Table 2 shows the major ions in each process stage. Upgrades to the system, including the addition of a nanofiltration step is being implemented to more efficiently remove divalent ions which were at a higher concentration in the concentrated eluate received (although within Lanshen design specification) than the Conductive pilot plant was set up for.

Element (mg/L)	Concentrated Eluate (mg/L)	iFO (mg/L)	Microfiltration (mg/L)	Ion Exchange (mg/L)	Boron Ion Exchange (mg/L)
B	506	1,655	1,480	1,230	ND
Ca	48.2	346	319	5	5
K	21.8	129	132	114	70
Mg	49.7	357	318	1.7	0.4
Na	428	2,685	4,140	7,870	5,115
S	19.3	136	132	117	78

Table 2: Major impurities following each stage of pre-treatment

Carbonation Stage

Carbonation proceeded as designed, with initial technical grade material produced from the feed in under 15 minutes of reactor time. The technical grade product was subsequently polished in a single wash step to produce a high-purity lithium carbonate product. Table 2 presents all the detected elements by ICP, undertaken by a laboratory at the University of Calgary, as a percent weight of the total dry product (100% dry mass). Moisture in the product prior to kiln drying was low at 28% wt. The final product achieved 99.78% lithium carbonate purity on a fully dry basis (Table 3).



Image 4: Filter press used in the conversion process to produce lithium carbonate

A comparison to Chinese standard GB/T 23853-2022 (Type 1) for battery grade lithium carbonate is shown in Table 3. Potassium, sodium and chloride will be reduced through changes in carbonation reactor operation such that post-carbonation washing is more effective. The divalent ions, calcium and magnesium, will be reduced following introduction of the nanofiltration step.

Product	CTL T1 Product[2]	GB/T 23853-2022
Li2CO3	99.78%	99.60%
Na	0.050%	0.030%
K	0.014%	0.002%
Ca	0.022%	0.005%
Mg	0.015%	0.005%
SO4	0.016%	0.01%
Cl	0.044%	0.02%
B	0.001%	0.005%
Fe	nd (0.0005%)	0.001%
Cu	nd (0.0005%)	0.005%
Pb	nd (0.0005%)	
Al	0.001%	

Zn	nd (0.0005%)	
Si	0.006%	0.002%
Mn	0.0003%	0.001%
H2O	0.2%	0.4%
Insoluble	nd (0.01)	0.005%

Table 3: Weight (%) of elements in the final product after drying

Next Steps

Downstream processing is scheduled to resume in February 2025, with the rest of the 88m³ volume of concentrated eluate anticipated to be processed between February and April 2025.

Conductive Energy is utilising the the iFO operations pause to implement several improvements to the system will be implemented primarily in automation and process control and debottlenecking for continuous operation and addition of a nanofiltration stage. The planned schedule is:

- Early January - early February 2025: facility recommissioning and recommence processing
- Mid-February - plan additional tours with third parties for offtake purposes
- Mid-February - early April, completion of CleanTech Lithium's concentrated eluate processing and conversion to battery grade lithium carbonate to produce larger quantities for start of product qualification by potential strategic partners and off-takers.

Competent Persons Statement

The following professional acts as qualified person, as defined in the AIM Note for Mining, Oil and Gas Companies (June 2009) and JORC Code (2012):

The technical information contained within this announcement has been reviewed and approved by Dr Steve Kesler, a Director of the Company. Dr Kesler is a Fellow of the Institute of Materials, Minerals and Mining and a Chartered Engineer with over 40 years' experience in the mining and resource development industry. Dr Kesle holds a degree in Mining Engineering and Ph.D in Mineral Technology both from Imperial College, London Dr Kesler and has sufficient experience, as to qualify as a Competent Personas defined in the 2012 edition of the "Australian Code for Reporting of Mineral Resources and Ore reserves" and for the purposes of the AIM Guidance Note on Mining and Oil & Gas Companies dated June 2009. Dr Kesler consents to the inclusion in this announcement of the matters based on information in the form and context in which it appears. The Company is reporting progress on project development and metallurgical results under the 2012 edition of the Australasian Code for the Reporting of Results, Minerals Resources and Ore reserves (JORC code 2012).

The information communicated within this announcement is deemed to constitute inside information as stipulated under the Market Abuse Regulations (EU) No 596/2014 which is part of UK law by virtue of the European Union (Withdrawal) Act 2018. Upon publication of this announcement, this inside information is now considered to be in the public domain. The person who arranged for the release of this announcement on behalf of the Company was Gordon Stein, Director and CFO.

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Notes

CleanTech Lithium (AIM:CTL, Frankfurt:T2N, OTCQX:CTLHF) is an exploration and development company advancing lithium projects in Chile for the clean energy transition. Committed to net-zero, CleanTech Lithium's mission is to become a new supplier of battery grade lithium using Direct Lithium Extraction technology powered by renewable energy.

CleanTech Lithium has two key lithium projects in Chile, Laguna Verde and Viento Andino, and exploration stage projects in Llamara and Arenas Blancas (Salar de Atacama), located in the lithium triangle, a leading centre for battery grade lithium production. The two most advanced projects: Laguna Verde and Viento Andino are situated within basins controlled by the Company, which affords significant potential development and operational advantages. All four projects have good access to existing infrastructure.

CleanTech Lithium is committed to utilising Direct Lithium Extraction with reinjection of spent brine resulting in no aquifer depletion. Direct Lithium Extraction is a transformative technology which removes lithium from brine with higher recoveries, short development lead times and no extensive evaporation pond construction. www.ctlithium.com

****ENDS****

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