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ASX ANNOUNCEMENT

## EcoGrafi Development Update

**Product evaluation with potential customers supports accelerated ramp-up and engineering studies confirm reduction in construction and operating costs**

### Highlights

- 2018 **EcoGrafi** pilot plant test work program results exceed expectations
  - **EcoGrafi** non-hydrofluoric (“HF”) acid purification process flowsheet optimised on Epanko graphite
  - Successful application to 10 existing sources of natural flake graphite feedstocks from Europe, Africa, Asia and the Americas
  - Manufacture of value-added bi-products via non-HF purification of fines
  - Submission of updated global patent application
- Product test work with potential customers confirms market support for accelerated development
- Engineering studies based on optimised **EcoGrafi** process flowsheet demonstrate reduction in both construction and operating costs
- Discussions with prospective partners over joint development of initial **EcoGrafi** facility in 2019
- Industry aspirations for environmentally sustainable supply chain increases attractiveness of **EcoGrafi** process

**Kibaran Resources Limited (Kibaran or the Company)** (ASX: KNL) is pleased to provide an update on progress with its **EcoGrafi** development plan for 2019.

Due to strong interest for **EcoGrafi** battery graphite from potential customers during the 2018 product test work program, Kibaran is evaluating various ramp-up options for its first manufacturing facility, focussing on supporting the existing markets of South Korea, Japan and China. Recent discussions with potential customers confirm a significant increase in their latest demand requirements to supply the EV market, which Kibaran is incorporating into the design plans for its **EcoGrafi** production plant.

The pilot plant program conducted in Germany over the last 12 months demonstrated the **EcoGrafi** purification process is able to consistently produce graphite to battery anode manufacturer specifications at a cost competitive with existing toxic HF supplies. The **EcoGrafi** process can also be applied to a range of existing natural graphite supplies, enabling the facility to commence operations without reliance on graphite feedstock from the Company’s Epanko project.

The optimised **EcoGrafi** flowsheet developed during the test work program has been incorporated in an updated global patent application and contains refinements to the 2017 process to satisfy the highest physical and chemical specifications required by anode manufacturers.

Kibaran’s **EcoGrafi** development plan involves initially establishing an Asia-Pacific manufacturing plant close to existing markets, commencing with the production of 5,500 tonnes of battery graphite and

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increasing to 20,000 tonnes per year (or more) as required to meet customer demand. By 2025 a second manufacturing plant is planned to be built in Europe to support the massive investment currently announced by Government and industry to establish a new lithium-ion battery supply chain in that region.

Over the last few months GR Engineering Services Limited re-designed the **EcoGrafi** production flowsheet to incorporate the results of the German pilot plant program and also completed an updated estimate of capital and operating costs.

The GR Engineering capital cost estimate for 2019 is based on construction of a new **EcoGrafi** production facility on land to be acquired within in an industrial park in Asia, using existing sea and land transport infrastructure, water and power supplies. Equipment quotations have been obtained from suppliers in Australia, Asia and Europe. The total estimated cost to construct the initial 5,500 tonne facility (including a 7.5% contingency) is US\$19.9m which represents a 23% reduction on the GR Engineering estimate of US\$25.9m in December 2017.

GR Engineering has determined that operating costs for the updated flowsheet are 10% lower than previously estimated in 2017, principally due to reduced power, reagent and labour costs.

The initial results of these engineering studies are encouraging and work is currently underway to assess the optimum expansion schedule to capture economies of scale as **EcoGrafi** production increases from 5,500 tonnes to at least 20,000 tonnes of battery graphite per year. This includes consideration of a faster ramp-up phase to meet the growing demand requirements of battery anode manufacturers, which also enables the Company to increase the capital efficiency of the new **EcoGrafi** development.

Financial modelling in December 2017 indicated that the first 20,000 tonne **EcoGrafi** production facility will generate earnings<sup>1</sup> of US\$30.5m per year. Once the expansion schedule studies are complete further financial modelling will be undertaken to include the revised capital and operating costs, together with the updated pricing forecast to reflect increasing demand.

Kibaran has recently been approached by potential customers in relation to participating in the **EcoGrafi** graphite business and discussions relating to investment, construction and offtake are continuing.

The Company is committed to establishing a sustainable, eco-friendly battery graphite business that meets the requirements of lithium-ion battery manufacturers for responsible supply chains. The continued production of battery graphite with toxic HF is inconsistent with these aspirations.

On 30 January, one of the world's largest lithium-ion battery companies, Contemporary Amperex Technology Co ("CATL") issued a Sustainable Development Commitment, noting *"We consider the sustainable development as an important part of the procurement strategy, value the sustainable development in every stage of supplier certification, performance evaluation and procurement decision-making, and assist the suppliers to develop sustainability through the procurement, so as to reduce the risks in supply chain, and promote all suppliers to operate in a socially and environmentally responsible manner to ensure that products and services meet sustainable development requirements at the source."*

Kibaran's cost competitive **EcoGrafi** battery graphite products are positioned to meet the battery market's increasing focus on sustainability.

Note 1: Earnings before interest, tax and depreciation (refer ASX announcement *Battery Graphite Pilot Plant* 5 December 2017)

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