Level 1, 89 St Georges Terrace
Perth, WA 6000
T: +61 (8) 9481 2277
F: +61 (8) 9481 2355
ABN: 81 119 267 391
www.proteanenergy.com

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Vanadium Processing Optimisation Project Agreement with Korean Institute of Geoscience & Minerals Resources (KIGAM)

- KIGAM has recognised vanadium as critical to the South Korean economy however annual domestic Korean demand of 17 Mlbs is currently 100% imported
- Protean subsidiary, Stonehenge Korea Ltd (SHK) and KIGAM have signed a processing optimisation project agreement focused on maximising vanadium recovery from the Daejon black shale project
- The project agreement provides access to KIGAM's proprietary black shale processing intellectual property (IP)
- IP includes results from KIGAM's 1.2tpd capacity uranium/vanadium pilot plant
- The KIGAM pilot plant comprises crushing, leaching and solvent extraction circuits to create V_2O_5 and yellow cake (U_3O_8) products from black shale mineralisation
- KIGAM has identified the emergence of black shale hosted deposits as a key new source of vanadium & is now focused on economic optimisation of the Daejon Project
- KIGAM has identified that the development of Protean's Daejon vanadium asset will contribute to the sustainable growth of Korea's steel and petrochemical industries
- The project agreement highlights the Company's strong relationship with KIGAM, the national significance of the Daejon Project and its importance to the local supply of vanadium for South Korea

Protean Energy Ltd (**Protean** or the **Company**) is pleased to advise that a significant milestone has been achieved on the Daejon vanadium/uranium project in South Korea (**Daejon Project**). Protean's 50% owned Korean subsidiary, Stonehenge Korea Limited (**SHK**), has reached agreement with the Korean Institute of Geoscience and Mineral Resources (**KIGAM**) to undertake a joint project focused on maximising vanadium recoveries from Protean's Daejon Project mineralisation.

In addition, SHK will acquire rights to the significant body of intellectual property (**IP**) held by KIGAM. KIGAM's IP includes the results of numerous studies on processing of Daejon style Korean Ockcheon belt vanadium bearing black shale mineralisation. These studies were undertaken at both bench and pilot plant scale on mineralisation from tenements immediately to the south along strike from the Daejon Project area. The existing KIGAM pilot plant, which was part of these studies, holds the potential to become a significant asset to the project.

This project agreement is a further endorsement of the strong relationship that has been forged between SHK and KIGAM following the landmark agreement to allow testing of 36,000 metres of Daejon Project drill core held by KIGAM.

Vanadium Processing Optimisation Project

The KIGAM IP and results from studies undertaken by Protean in Australia will be leveraged to help guide the project work program. The project aims to optimise the processing flowsheet for the extraction of vanadium from black shale and its purification into battery grade V_2O_5.

Under the project agreement, KIGAM and the Company have agreed to share all historical metallurgical and processing testing data in an effort to optimise the processing approach for recovery of vanadium and the production of a high purity V_2O_5 end product.

Research undertaken in China has enabled the beneficiation of back shale hosted vanadium to a grade of 2% and this, in turn, has led to this style of deposit emerging as a substantial source of vanadium supply. KIGAM has identified the opportunity to leverage their significant body of existing IP through a systematic study on recovery of vanadium from Ockcheon black shale minerals. KIGAM has significant and diverse research experience plus a suite of technologies for optimising the wet smelting of rare metals, including vanadium. The new project will utilise KIGAM's existing patents, advanced lab equipment and experienced research manpower including a team of 7 senior engineers. In particular, KIGAM's previous work on vanadium, rare earths and uranium smelting and leaching will be invaluable to the project. KIGAM also holds inventory of Daejon style Ockcheon belt black shale mineral samples to supplement material sourced from the Daejon Project area.

Ultimately, the project also aims to review the current KIGAM pilot plant design with a view to updating and optimising it for vanadium extraction. The project comprises the following study work streams:

- oxidizing roasting conditions of black shale minerals
- vanadium pressure leaching technology for oxidizing roasting black shale minerals
- salt roasting conditions for black shale minerals
- vanadium acid/alkali leaching technology for black shale minerals
- vanadium separation & purification solvent extraction technology from acid/alkali leachate
- V_2O_5 manufacturing technology for separation & purification solution
- pilot plant design plan (see below)

Pilot Plant Circuit

The pilot plant (**Figure 1**) is housed within KIGAM's Daejon City facility and was commissioned in 2012 to process vanadium/uranium bearing mineralisation from within the greater Daejon area (Ockcheon) black shale belt. KIGAM conducted a number of tests between 2012 and 2015 and registered three patents for the extraction and production of V_2O_5 and U_3O_8. Work ceased in 2015 due to continued depressed U_3O_8 market pricing.

Pilot plant testing during 2012-2015 focused primarily on yellowcake production and aimed to optimise for U_3O_8 extraction which was achieved through a leaching and solvent extraction processing route (**Figure 2**). The pilot plant can process up to 1.2 tonnes of material per day.

The Company is in discussions with KIGAM to explore another agreement to access the existing pilot plant for future processing optimisation work.

***Figure 1**. Pilot Plant Facility at KIGAM, Daejon City, South Korea (Images above & below)*

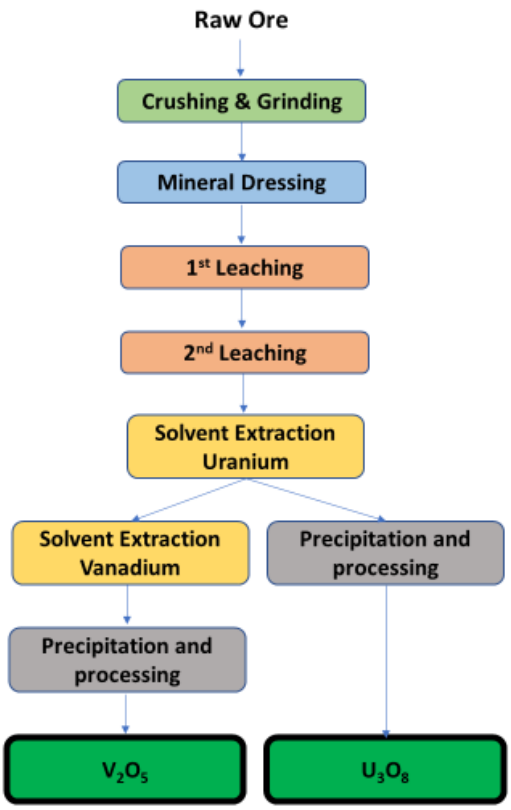

***Figure 2**. Pilot Plant Circuit Diagram*

ABOUT PROTEAN ENERGY LIMITED (ASX: POW)

Protean Energy Limited is an energy company focused on the commercialisation of vanadium battery energy storage systems via its 50% owned Korean subsidiary, KORID Energy Ltd. The Company is also developing a multi-mineral project in South Korea through its 50% holding in Stonehenge Korea Limited (**SHK**). SHK is a Korean JV company with two KOSDAQ-listed industry partners being DST Company Ltd (**DST**) and BHI Co Ltd (**BHI**). SHK owns 100% of the rights to 3 projects in South Korea, including the Company's flagship Daejon Vanadium Project.

For further information, see www.proteanenergy.com or phone: T: + 61 8 9481 2277