



28<sup>th</sup> March 2017

**TomCo Energy plc (AIM: TOM)**

**(“TomCo” or the “Company”)**

**Strategic partnership to develop new oil shale technology**

TomCo Energy plc, the oil shale exploration and development company focused on using innovative technology to unlock unconventional hydrocarbon resources, is pleased to provide an update on its strategic direction and to announce that it has incorporated a new Utah-based subsidiary company named TurboShale Inc. (“TurboShale”). TurboShale will seek to develop and commercialise a new propriety technology for processing oil shale. In addition to the provision of management and administrative services by TomCo, TurboShale’s executive and technology team shall comprise of Ray Kasevich and Jeb Rong of *Massachusetts-based* JR Technologies LLC and Graeme Hossie of *UK-based* Venture Development Partners Ltd. A Letter of Intent outlining the principal commercial terms of this collaboration has been agreed by the parties and it is expected that the final co-operative framework agreement will be executed soon.

**Background**

As previously announced on 14 June 2016, TomCo’s technology partner, Red Leaf Resources, Inc. (“RedLeaf”) completed its Seep Ridge Preliminary Front End Engineering Design (“pre-FEED”) study. While the capsule costs were in line with expectations, the Seep Ridge processing plant costs were higher than originally budgeted resulting in the total costs per barrel coming in at the higher end of expectations. In addition, RedLeaf’s joint venture partner and shareholder, TOTAL E&P USA Oil Shale, LLC (“TOTAL”), announced it was not prepared to move forward with the new-generation Early Production System Capsule (“EPS”).

Since June 2016, RedLeaf has experienced further delays in the EPS at their Seep Ridge site. Furthermore, significant uncertainty remains with regards to the ongoing involvement of its joint venture relationship with TOTAL.

As a result of these factors, TomCo has had to re-evaluate its future strategy for its Holliday Block oil shale project and seek alternative technological solutions which could have the potential to, not only, be effective, scalable and environmentally benign but also be economically viable at today's oil prices.

Since the results of the Seep Ridge Pre-FEED study became known, TomCo has researched various alternative oil shale technologies to retort oil shale in-situ, especially Radio Frequency (RF) heating technology, oxidation heating technology and oil upgrading technology.

### **Radio Frequency (RF) Heating Technology**

The RF in-situ heating method that has been selected by TurboShale, was tested by Texaco, Badger and Raytheon during the early 1980's (in the laboratory for six years, and for three years in the field in Utah on the Mahogany Zone from the Green River Formation, less than 10 miles away from Tomco's Holliday Block project). The results of this programme showed that downhole RF antennae in several continuous pilot studies over a three-year period could successfully heat up and retort oil shale in-situ at less than 200ft from surface, and that high-grade shale oil could be produced and recovered from the antenna itself and nearby wells, using standard oil field gas lift methods. Retort temperatures averaged 350 °C in commercial quantities at the surface, without affecting the water table in a separate geological formation below the Mahogany Zone. This technology was never commercialised, largely due to the oil price slump in the 1980's and 1990's, and the takeover of Texaco by Chevron. A detailed description of this technology can be found in expired patents US4140179, US4301865 and US4457365.

TomCo's management travelled to Boston in December 2016 and met with the original Technical Director of this RF testing programme, Ray Kasevich, and his business & technical partner Dr. Jeb Rong, who between them, have decades of experience in researching and operating RF heating technologies and other high power applications. TomCo commissioned a desktop economic study by JR Technologies that showed RF heating alone could be used to produce oil commercially at current oil prices.

JR Technologies has agreed to join TurboShale and assign its patent US7891421B *Method and Apparatus for In-Situ Radiofrequency Heating* (US Application 62/017/408), and its patent application US2015/035433A1 *Subsurface Multiple Antenna Radiation Technology (SMART)*,

to TurboShale. JR Technologies will supervise all the RF laboratory work, and any subsurface field work for TurboShale.

### **Oxidation Heating Technology**

Heating oil shale by RF uses significant amounts of electricity and TurboShale plans to test new oxidation heating technology that may aid in the heating of oil shale at lower cost. Laboratory studies show that when oil shale is pre-heated to around 250-300°C, then air added at ambient temperature, an oxidation reaction is initiated with a small portion of the kerogen in the oil shale (about 4%), mainly carbon, causing an exothermic reaction that is up to nine times the heat required for oil shale pyrolysis. This could be an extremely cost efficient way of retorting oil shale in-situ, but is unproven in the field so far.

The University of Utah has been selected to carry out laboratory work on the oxidation heating technology, using drill core samples from the Holliday Block and its bench scale retorts. Various heating patterns and techniques will also be studied to improve the quality of the shale oil production.

### **High Voltage (HV) Fracturing**

TurboShale may also look at High Voltage (HV) Fracturing, to improve the permeability of the shale for the oxidation heating technology, so that RF heating is no longer needed once oxidation heating is initiated. RF heating would microfracture the oil shale along the bedding planes, by boiling the intrinsic connate water (water trapped in the sediments during formation), but it is not known whether this will be enough permeability to allow the oxidation heating technology to work effectively. HV Fracturing is a tool to generate strong electric pulses (alternating and impulse current waveforms in succession) that cause localised shock waves which may fracture the rock parallel to, and perpendicular to, the bedding planes in a way that can be highly controlled by electrode placements. The energy requirement for HV Fracturing is low. This technology has been independently tested at a full scale by Chevron USA Inc. and JR Technologies LLC on the Green River Formation in Colorado and is explained in detail in patent application US2015/0167440 A1.

### **Oil Upgrading Technology**

Research by TomCo's management has shown that retorting kerogen into shale oil can have a number of problems that need to be investigated, such as high nitrogen levels (this poisons the catalysts used in refineries so is usually restricted to less than 0.25%), high Total Acid Number (corrodes pipes in refineries and pipelines), high Pour Point (the temperature at which oil will flow easily in a pipeline) and high Olefin content (gums up pipelines). The University of

Utah will test for these properties. It also intends to produce a number of shale oil samples for testing by Ceramatec Inc. based in Utah, which invented a process for denitrogenating shale oil using natural gas produced during the retorting process (rather than relatively expensive imported hydrogen gas), and contacting it with the shale oil under elevated temperatures and pressures, in the presence of molten sodium.

### **Series A Fund Raising**

TurboShale intends to raise up to US\$1.5 million by way of a private placing of equity. The net proceeds of which shall be applied to its laboratory testing programmes, patent applications and to general working capital. In addition, during this initial phase, a scope of works pertaining to the second phase of development shall be conducted and costed in detail. Graeme Hossie of Venture Development Partners Ltd has agreed to join TurboShale's executive board, shall oversee and assist in the raising these funds. Earlier in his career, Graeme was part of the original London Mining Plc team, and was instrumental in their funding activities.

Assuming full subscription, TomCo anticipates that its holdings in TurboShale will be diluted to 40%, with JR Technologies owning 20%, new investors 20%, Venture Development Partners 10%, and 10% remaining in treasury.

TomCo shall provide management services to TurboShale, initially at a rate of \$7,500/month. In addition, TomCo shall be paid \$2,500/month for administrative services.

### **Series B Fund Raising**

Once the laboratory test work has been completed in approximately 12 months' time, TurboShale intends to raise a larger tranche of funding in a Series B Fund Raising round, to commence field testing at TomCo's Holliday Block in Uintah County, Utah, and prove commerciality of the TurboShale Technology to other oil shale companies. The intention is that TurboShale generate revenues from both license fees and royalties from oil production.

### **Discussion**

The **CEO of TomCo, Chris Brown, said** *"This is an extremely exciting time for TomCo and our new company TurboShale. We believe we have found a collection of technologies that can be competitive at current oil prices and address the problems of producing shale oil from kerogen. While we continue to monitor the progress at RedLeaf, our new company TurboShale allows TomCo to have greater control of its future development plans. There are estimated to be 3 trillion barrels of oil in the Green River Formation in the USA, and TomCo Energy has 126 million of these barrels in JORC Measured Category at the Holliday Block*

*alone, so the prize for commercialising oil shale production is huge. I am very pleased that Ray Kasevich and Jeb Rong have agreed to join TurboShale and to work on the TurboShale™ Technology. I am also looking forward to working with Graeme Hossie again, who founded London Mining with me.”*

**Enquiries:**

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*The information contained within this announcement is deemed by the Company to constitute inside information as stipulated under the Market Abuse Regulations (EU) No. 596/2014 ("MAR").*

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