Shell And AirFlow Truck Company Debut Starship - Hyper-Efficient Truck

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Collaborative Process Seeks Energy Efficiency Improvements Applicable Globally

SONOMA, Calif., April 19, 2018 /CNW/ -- Shell Lubricants and AirFlow Truck Company have unveiled a new hyper fuel-efficient truck. This next-generation vehicle, named Starship, was designed and built by the companies with the aim of demonstrating what is possible in reducing energy demand in freight transportation. It uses currently available technologies to minimise the amount of energy it takes to transport a load of cargo from one point to another. The truck is currently on public display at the free Shell Make the Future California event at Sonoma Raceway. (www.shell.us/makethefuturecalifornia)

"We seek projects such as the Starship initiative to keep Shell at the leading edge of technology development and energy efficiency. Working with AirFlow Truck Company and other suppliers gives Shell Lubricants the opportunity to align with innovative companies to explore what is really possible in fuel efficiency" says Robert Mainwaring, Technology Manager for Innovation, Shell Lubricants. "Transport accounts for more than one quarter of the world's total energy use and one-fifth of global energy-related carbon dioxide emissions: 72 % of which is attributable to road transportation of which trucks make up a significant part. Increasing efficiency and fuel economy in the commercial transport sector could therefore make considerable progress to help reduce emissions."

With new fuel economy regulations on the horizon across the globe and the need for continuing advances in fuel economy, Shell Lubricants recognises that a holistic approach to making advances is important. However, obtaining significant fuel economy improvements in heavy duty trucks is a challenging process given the size and construction of a tractor and trailer and it is an area which has not had much focus in recent decades.

"Shell firmly believes that collaborative, co-engineering, relationships are essential to the effective reduction in emissions and enhancements in efficiency and have developed such co-engineering relationships with several world leading OEMs," said Mainwaring. "The relationship with the AirFlow Truck Company and other suppliers to build the Starship Project is part of a collaborative process led by Shell that encourages co-engineering, and has resulted in a truck that will be used to challenge how trucking efficiency is defined. In recent years, we developed a concept car which explored the role that light weighting, streamlining and lubrication played in personal transport. Starship is the Shell Concept Car's equivalent for freight transport."

Shell provided technical consultation on engine and drivetrain components, as well as recommendations for lubricant needs for use in the Starship Project truck. The truck is using Shell's next generation, low viscosity, fully synthetic heavy duty engine oil. The use of fully synthetic base oils, plus advanced additive technology provides protection against wear, deposits and oil breakdown. The lower viscosity delivers superior fuel economy compared to a conventional SAE 15W-40. The lubrication technology shares the same viscosity as Shell Rimula Ultra E+ and is being tested by OEMs around the world.

"As the leader in heavy duty lubricants we have a responsibility to the industry beyond simply our products. That's why I'm so proud of this collaboration with AirFlow Trucking – which provides a unique opportunity to explore ways to improve fuel economy in transport application. Moving forward, we need creative solutions to the world's energy challenge such as Starship that will benefit our customers, drivers and the wider world for years to come" says Chris Guerrero, Global Brand Manager, Heavy Duty Lubricants.

Ahead of its first public display at the Shell Make the Future event in Sonoma, the companies have continued to fine tune the truck. In May 2018, Shell and AirFlow Truck Company will demonstrate the performance of the Starship on a US coast-to-coast drive: beginning in California and ending in Florida. The truck will carry the maximum viable amount of freight within the allowed gross vehicle weight of 80,000lbs/36,287kgs.

The freight tonne efficiency and fuel economy will be measured along the way and the result will be shared publicly. Freight tonne efficiency is the primary indicator that will be measured on the Starship truck. Shell and Airflow believe this is the most meaningful measurement of efficiency of freight transportation. It is defined as the energy required to move freight from point A to point B. Maximising the amount of load the truck is carrying will decrease the fuel economy, however it will improve freight tonne efficiency and reduce weight specific carbon emissions.

The lessons learned from the Starship Project are globally relevant. The trucking sector worldwide is united

in the challenge to "go further with less"; to reduce fuel consumption while maximising load; both in pursuit of lower costs and to meet fuel economy regulations. The truck operates with modern Class 8[1] engine technology, the demands of which are replicated worldwide; higher temperatures, mechanical and corrosive wear, minimising deposit build-up and the need for extended oil-drain intervals and engine life. A large selection of innovative technologies to aid (fuel) efficiency are commercially available in many markets around the world, we have used a range of these in Starship. These are therefore solutions that truck owners around the globe can readily implement to realise benefits in their own vehicles. The Starship project is one step in the journey to target the world's global energy challenge; a journey that will benefit the trucking sector directly and the wider environment. To stay up-to-date on the latest Airflow Starship activities, visit www.shell.com/starship.

NOTES TO EDITORS
Starship Truck technology

- Starship is known as a Class 8 Truck in the US: this US specific-classification is determined based on the vehicle's gross vehicle weight rating (GVWR). The classes range from 1–8 and are classified by the Department of Transportation's Federal Highway Administration (FHWA).
- The body of the Starship Project tractor is a bespoke 100% aerodynamic design made of carbon fibre. This includes the side skirts, hood, and front end.
- The Starship Project truck is powered by a 6-cylinder engine with 400 horsepower and 1850-foot pounds of torque/2,508 newton metres. The standard engine has been calibrated with the transmission to run at very low speeds and down to 800 rpm.
- Active grille shutters (active based on temperature to maximize aerodynamics and maximise efficiency) open to enable airflow through the radiator and into the engine compartment allowing cooling. When cooling is not needed the shutters are automatically closed, leaving the air to reroute around the vehicle. The result is less aerodynamic drag and reduced fuel consumption. Furthermore, closed shutters in cold-weather reduce warm up time of the engine.
- The truck will, in the future, feature a hybrid electric axle system with an electric motor and axle replacing the rear tractor non-driven axle. This will provide a power boost while climbing grades, where most of the fuel is consumed, the axle transfers the energy out of the truck and feeds it into the battery for acceleration/braking. A downspeed axle configuration using advanced engine controls and automated manual transmission also provides improved efficiency as well as good pulling power
- A 5,000-watt solar array on the trailer roof charges and stores power in a 48- volt battery bank , and is sufficient to power the normal truck loads such as lights, wipers, blower motors, gauges, air conditioning and heating, microwaves, and other electrical components.

Shell's collaborations

- Recognising the need for sustainable, cleaner and more energy efficient transportation solutions, Shell is collaborating and co-engineering a number of projects. In 2016, Shell work with Gordon Murray Design and Geo Technology to co-engineer the Shell Concept Car – an ultra-efficient city vehicle that, compared to a typical city car, uses 34% less primary energy over its entire lifetime.

ABOUT AirFlow Truck Company
AirFlow Truck Company has built two previous aerodynamic and fuel-efficient Class 8 tractor trailers, the first in 1983 and the most recent in 2012. The most recent rig, dubbed the Bullet Truck, ran coast-to-coast hauling freight at 65,000 pounds (almost 30,000kgs) gross vehicle weight and averaged a record 13.4 mpg or 5.7 km/l.

ABOUT Shell Lubricants
Shell Lubricants produces and sells a wide range of lubricants catered to a wide range of customers in 150 countries – from consumers to business customers. We produce lubricants used in sectors such as consumer motoring, heavy duty transport, mining, power generation, general manufacturing, etc. Our brands include Pennzoil, Quaker State, Shell Helix, Shell Advance, Shell Rotella and Shell Rimula, Shell Tellus and Shell Gadus. Our robust supply chain allows us to bring our products to customers globally. This includes five base oil plants, 40 lubricants blending (and packaging) plants and 10 grease production plant across the globe, in 32 countries around the world.

Shell's strong heritage in technology for lubricants traces back to more than 70 years. We have over 200 scientists and engineers that work in specialised technical centres for lubricants in China, Japan, Germany and the US. We hold over 150 patents for base oils, lubricants and greases and carry out millions of trials every year. Our close relationships with OEMs help us to continue to work on producing high quality

lubricants. We also work with top motorsports teams like Scuderia Ferrari, BMW Motorsport, Hyundai Motorsport and Ducati Corse to use racing as a test bed to bring race quality lubricants to customers on the road. We also offer a wide range of technical services to our customers, namely Shell LubeMatch, Shell LubeAdvisor and Shell LubeChat. For more information, logon to www.shell.com.
*Kline & Company, "Global Lubricants Industry November 2016: Market Analysis and Assessment.

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The companies in which Royal Dutch Shell plc directly and indirectly owns investments are separate legal entities. In this press release "Shell", "Shell group" and "Royal Dutch Shell" are sometimes used for convenience where references are made to Royal Dutch Shell plc and its subsidiaries in general. Likewise, the words "we", "us" and "our" are also used to refer to Royal Dutch Shell plc and subsidiaries in general or to those who work for them. These terms are also used where no useful purpose is served by identifying the particular entity or entities. "Subsidiaries", "Shell subsidiaries" and "Shell companies" as used in this press release refer to entities over which Royal Dutch Shell plc either directly or indirectly has control. Entities and unincorporated arrangements over which Shell has joint control are generally referred to as "joint ventures" and "joint operations", respectively. Entities over which Shell has significant influence but neither control nor joint control are referred to as "associates". The term "Shell interest" is used for convenience to indicate the direct and/or indirect ownership interest held by Shell in an entity or unincorporated joint arrangement, after exclusion of all third-party interest.

This press release contains forward-looking statements (within the meaning of the U.S. Private Securities Litigation Reform Act of 1995) concerning the financial condition, results of operations and businesses of Royal Dutch Shell. All statements other than statements of historical fact are, or may be deemed to be, forward-looking statements. Forward-looking statements are statements of future expectations that are based on management's current expectations and assumptions and involve known and unknown risks and uncertainties that could cause actual results, performance or events to differ materially from those expressed or implied in these statements. Forward-looking statements include, among other things, statements concerning the potential exposure of Royal Dutch Shell to market risks and statements expressing management's expectations, beliefs, estimates, forecasts, projections and assumptions. These forward-looking statements are identified by their use of terms and phrases such as "aim", "ambition', "anticipate", "believe", "could", "estimate", "expect", "goals", "intend", "may", "objectives", "outlook", "plan", "probably", "project", "risks", "schedule", "seek", "should", "target", "will" and similar terms and phrases. There are a number of factors that could affect the future operations of Royal Dutch Shell and could cause those results to differ materially from those expressed in the forward-looking statements included in this press release, including (without limitation): (a) price fluctuations in crude oil and natural gas; (b) changes in demand for Shell's products; (c) currency fluctuations; (d) drilling and production results; (e) reserves estimates; (f) loss of market share and industry competition; (g) environmental and physical risks; (h) risks associated with the identification of suitable potential acquisition properties and targets, and successful negotiation and completion of such transactions; (i) the risk of doing business in developing countries and countries subject to international sanctions; (j) legislative, fiscal and regulatory developments including regulatory measures addressing climate change; (k) economic and financial market conditions in various countries and regions; (l) political risks, including the risks of expropriation and renegotiation of the terms of contracts with governmental entities, delays or advancements in the approval of projects and delays in the reimbursement for shared costs; and (m) changes in trading conditions. No assurance is provided that future dividend payments will match or exceed previous dividend payments. All forward-looking statements contained in this press release are expressly qualified in their entirety by the cautionary statements contained or referred to in this section. Readers should not place undue reliance on forward-looking statements. Additional risk factors that may affect future results are contained in Royal Dutch Shell's 20-F for the year ended December 31, 2017 (available at www.shell.com/investor and www.sec.gov). These risk factors also expressly qualify all forward looking statements contained in this press release and should be considered by the reader. Each forward-looking statement speaks only as of the date of this press release,19 April 2018. Neither Royal Dutch Shell plc nor any of its subsidiaries undertake any obligation to publicly update or revise any forward-looking statement as a result of new information, future events or other information. In light of these risks, results could differ materially from those stated, implied or inferred from the forward-looking statements contained in this press release.

We may have used certain terms, such as resources, in this press release that United States Securities and Exchange Commission (SEC) strictly prohibits us from including in our filings with the SEC. U.S. Investors are urged to consider closely the disclosure in our Form 20-F, File No 1-32575, available on the SEC website www.sec.gov.

[1] A Class 8 truck is a heavy-duty truck as classified by the US Department of Transportation's Federal Highway Administration.

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