Technology, Markets & Policies:

Bringing Peak Oil Demand Ever Closer
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The world is nearing a paradigm shift in the oil story – where our dependence on oil as a necessity begins an irreversible long-term decline. There is, furthermore, increasing reason to believe that the inevitable peak in demand may be within this decade, driven by increasing concerns about climate change, security of supply and high oil prices, and the policies consequently being adopted to address these issues.

Ricardo Strategic Consulting and Kevin J. Lindemer LLC have drawn on their experience and privileged understanding of both energy and automotive industries to take a fresh and insightful look at how the future of oil demand may unfold.
Over the last few years, a nearly “perfect storm” for peak oil demand has been forming and gathering strength.

The drivers working against oil demand growth are increasing in number and intensity while those drivers supporting future oil demand growth are either stable or declining in influence.

Climate change policy, ever-growing concerns about security of supply, and high and volatile oil prices (with the widely held conviction that significantly higher prices are here to stay) all point to the desirability, even the political imperative, of moving “beyond petroleum.” The world’s consuming nations are therefore increasingly focusing on their need to reduce their dependency on oil. Importantly, evolutionary technology change, as well as the new opportunity to exploit potentially vast shale gas resources, are providing the means to do this, impacting on both the transportation and stationary segments. These new drivers and dynamics apply equally to all the world’s major consuming regions, including, most importantly, China. In fact, there is increasing evidence that China—with security of supply a key preoccupation—is leading the drive to develop the new automotive technology that will prevent the increase in its vehicle fleet, from translating directly into an increasing dependency on imported oil.

The signposts pointing to peak oil demand are evident. Combining these factors with demographic changes and concern about the ability to sustain projected economic growth brings into focus key questions about the manner in which oil markets will evolve as they move into decline:

- Which vehicle technologies are most likely to reach commercial scale—electric vehicles, hybrids, plug-in hybrids, fuel cell vehicles, etc—and in what timescale?
- In what timeframe will substitutes to stationary oil make themselves felt?
- How much petroleum will countries and consumers therefore want, and for what purposes?
- What are the corresponding implications for the structure of oil demand, and for the world’s refining business?
- When will the “tipping point” in demand be reached?
KEY FACTORS DRIVING THE SCENARIO

What began as a concern over greenhouse gas emissions in developed countries in the late 1990s—which supported the implementation of emissions and efficiency standards—has picked up strength and new driving forces from around the world. Technology changes, impacting both demand and supply, are increasingly providing the means of implementing the policy imperative to reduce oil dependency and meet environmental targets.

| Price Response: | Individual consumers and consuming countries are responding to current high prices and a widely held belief that higher oil prices are sustainable. Their collective actions work to reduce future oil demand growth in ways not yet fully understood, but will undoubtedly have long lasting effects on the trajectory of demand growth. |
| Security of Energy Security: | In the last few years oil price volatility and the related concern for energy security have intensified the focus of the major consuming countries on policies and measures targeting a longer-term reduction of oil demand. Today, the degree of geopolitical concern continues to intensify, with political unrest in major oil producing countries and surrounding nations, adding to doubts about the security of oil supply and triggering anxiety about a new price shock. |

Technology changes affecting demand:
Incremental technology change, in the shape of ever-improving fuel efficiency, is already making itself felt, but more radical technology change, in the shape of the development of alternatives to the internal combustion engine (hybrids, electric vehicles, fuel cells etc), is likely to prove of greater significance in terms of its medium to longer term impact on the sector which accounts for over half of global oil demand - transportation.

Technology changes affecting supply (1):
Improvements in exploration and production technology have, almost "overnight", generated a doubling of global technically recoverable reserves of natural gas, according to a recent report from the US Department of Energy, and many sources estimate the increase to be even greater. Several of the major oil-consuming growth markets, in particular China, are thought to have enormous shale gas reserves; since some of these countries use up to 60% and more of their oil consumption in stationary (i.e. non-transportation) uses, this would appear to suggest significant scope exists for oil substitution by domestic gas.

Technology changes affecting supply (2):
Supported by government policy that sees biofuels as an important component of the future supply mix, increasing resources are being targeted on the development of new biofuels technology, particularly second and third generation biofuels, and there seems little doubt that biofuels will have an increasingly important role to play.

Consumption patterns:
Population changes are taking place in the major developed consuming countries that are resulting in -- or will soon result in -- falling per capita oil demand. Moreover, adult population growth is beginning to slow substantially in other nations as well. For example, China's working age population is set to decline after 2016.

It is difficult to imagine any of these factors diminishing in force on the market. In oil, as in other commodities, demand responses to higher prices and to policy initiatives are typically asymmetric. Many of the driving forces that are now beginning to act against future oil demand growth will not reverse, and others will not fully reverse even if oil prices should fall back. We have therefore undertaken an in-depth analysis and quantification of peak oil demand.
In addressing these questions and issues, Ricardo Strategic Consulting, in partnership with Kevin J Lindemer LLC, have drawn on Ricardo plc’s cutting edge knowledge and understanding of technology change in the automotive sector to provide a key input to our analysis of the evolution of oil demand over the next 10-20 years. In this way, our assessment, based on our expertise in both automotive and energy industries, provides a view independent of those produced by energy agencies and energy companies.

The outcomes of this study have wide industry relevance across the energy sector and beyond.

**Exploration and Production operators**
A consensus that a peak in oil demand was imminent would logically motivate a move by the holders of the world’s low cost oil resources to accelerate the monetisation of their reserves, with significant implications in terms of the future structure of oil supply and of oil prices and price differentials.

**Biofuels producers**
The study considers the potential impact and positioning of biofuels within the energy sector and their potential impact on the longer term oil price outlook.

**Refineries and downstream marketers**
The study outcomes provides insights regarding future refinery capacities and configurations, as well as providing a framework for competitive refinery market positioning and highlighting considerations for retail marketing strategy.

**Petrochemicals**
The study highlights changes in the stationary oil sector, and their potential feedstock implications as a result of oil displacement, with resultant production cost impacts.

**Gas wholesalers and traders**
Displacement of oil from the stationary segments, such as industrial, commercial and residential applications, could provide a boost to gas demand, with a consequent impact on the outlook for natural gas prices.

**Power companies**
Increased penetration of electric vehicles will bring with it a greater need for power generating capacity and grid/charging infrastructure, and will among other things require new thinking about power pricing mechanisms.

**Automotive**
The study provides a comprehensive assessment of the impact that vehicle technology changes has on oil’s position in the energy sector and on other energy segments.

**Energy contracting and construction sector**
Changes in oil demand will impact on activity throughout the oil value chain, and potentially shift construction focus towards other parts of the energy sector, for example, toward power generation and grid infrastructures.

**Investment community**
An understanding of the outlook for oil demand, the relative importance of fuels within the energy sector, and consequent impacts on the different service sectors will provide alternative market growth considerations, and a framework against which to evaluate potential investment opportunities.

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1. Oil price projections have not themselves been generated by the study.
The study

WHAT THE STUDY INCLUDES:

This study addresses these factors and considers their implications for the primary oil related industries, on both supply and demand sides. Specifically, this includes:

- Quantified analysis of transportation fuels demand for the period until 2035, incorporating in particular Ricardo’s industry leading understanding of vehicle technology developments, presented from its fully independent standpoint.

- Quantified analysis of stationary fuels demand based on our expertise in energy market dynamics.

- Assessment of the implications for the oil product groups and by major geographic area. This will be delivered in a printed, presentation format document.

Study deliverables:

The final study deliverable consists of a quantified scenario of the demand outlook for oil, presented as major refined product groups and by major geographic area. This will be delivered in a printed, presentation format document.

Process:

Ricardo and Kevin Lindemer LLC have undertaken the detailed analysis and modelling, based on our own proprietary knowledge, research and resulting assumptions, such as to ensure a genuine independence in terms of the results and outcomes.

Pricing:

The price for subscription to this study is 25,000 GBP (excluding VAT) per participating organization. This includes the final study documentation and a full day workshop to present the study findings and discuss the strategic implications of the findings for the client in question. This workshop will take place at a location of the client’s choice.

STUDY TEAM

Peter Hughes
Director, Head of Energy Practice, Ricardo Strategic Consulting
Study Co-Director

Peter Hughes has over 30 years experience in the international energy business. He has led strategic consulting assignments for a number of the world’s leading corporations and national oil companies, with a particular focus on the dynamics and drivers of the global oil and gas business. He has held positions as Senior Director and Head of the Pan-Asia Division at Cambridge Energy Research Associates (CERA), Strategy Vice President for BP Gas, Power and Renewables, and Executive Vice President, Group Strategy for BG Group plc, amongst others. He has also authored a number of publications, including “The Beginning of the End for Oil?”, and has been a frequent keynote speaker at high profile industry and academic events.

Kevin Lindemer
Managing Director, Kevin J. Lindemer LLC
Study Co-Director

Kevin Lindemer has over 25 years of experience in the oil and downstream petroleum industries and is an expert on the global oil industry. He led numerous strategic consulting and research projects around the world in the energy, biofuels, oil and downstream oil business, authored numerous articles and papers covering many aspects of the oil and energy industry; and spoken at multiple industry conferences. His background notably includes serving as Executive Managing Director of Global Insights’ Energy Group, Director of Strategy and Business Development at Irving Oil Corporation, and Senior Director in the Global Oil Division at Cambridge Energy Research Associates (CERA), amongst others.

Sarah Crombie
Senior Manager, Energy Practice, Ricardo Strategic Consulting
Study Project Manager

Sarah has ten years experience in the energy sector, gained in the consulting sector and previously as an Engineer with ExxonMobil. Her experience in the upstream business, ranges from onshore and offshore production facilities engineering, well operations performance improvement, field development design to asset valuations and commercial due diligences. She has managed various strategic analytical studies covering upstream oil, E&P technology, the UK gas sector, and the wind sector. Sarah coordinates the execution of the study.

Ian Kershaw
Managing Director, Northern Europe, Ricardo Strategic Consulting

Ian has significant line management experience with OEMs and Tier 1 suppliers in the automotive industry as well as extensive consulting expertise in the automotive sector. His experience includes responsibility for developing a manufacturing strategy for the bespoke car division of Rolls-Royce and Bentley diesel engine design and development, development of powertrain technology roadmaps for passenger car, commercial vehicle and defence equipment manufacturers and their suppliers to 2020 and beyond; development of product and technology growth strategies for major suppliers of oil-based, plastic, electrical and metal components, amongst others. Ian has published papers on market potential of bioethanol, biodiesel and hydrogen as fuels for automotive transportation.

Scott Hare
Associate, Ricardo Strategic Consulting

Scott has over 8 years experience in the sustainable energy and automotive sectors. His background spans engineering design of hydrogen and compressed natural gas (CNG) filling stations, management of large industrial energy efficiency projects and strategic consulting focused on renewable power generation (wind, solar, biomass) and alternative transport fuels (biofuels, electricity and hydrogen). He has led several analytical studies including a future market assessment of six bioenergy industries and forecasting the UK emissions savings and economic potential of 50 low carbon technologies to 2050.

Fabrizio Moncelsi
Associate, Ricardo Strategic Consulting

Fabrizio has 12 years experience in the automotive sector where he worked for multinational corporations such as CNH and Delphi as well as Ricardo. His experience includes various roles in product development, project management and consulting. He’s been involved from a multidisciplinary angle in the development of power train components for the off-road machinery sector, in design to cost exercises, in the architectural design for electronic control software for engine applications and in project management leading to the production of several programmes supplying engine control systems for major OEMs.

Clarice Chung,
Associate, Ricardo Strategic Consulting

Clarice has 2 years experience in the consulting sector. Her work includes a technical and market due diligence study of an automotive battery manufacturer and the market potential of advanced biofuels for transportation. Clarice has also undertaken extensive assessment of fuel demand in the rail, aviation and marine sectors.

Contact:

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Standard study enrolment £25,000 plus VAT where applicable

Payment will be invoiced upon receipt of signed application form

Please scan and return enrollment form to:

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