BITOR EUROPE LIMITED

HM GOVERNMENT
CABINET OFFICE
PERFORMANCE AND INNOVATION UNIT

ENERGY POLICY REVIEW

COMMENTS ON

PROJECT SCOPING NOTE
ENERGY POLICY

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1. Summary

Orimulsion® should be given full and careful consideration within the context of energy policy for Great Britain to 2050. Bitor Europe Ltd believe that the use of Orimulsion® is consistent with existing government policies and longer-term goals of meeting emissions reductions, whilst ensuring future projections for energy demand are met at an affordable price.

The large energy resource, its easy utilisation in all combustion technologies, low CO_2 emissions mean Orimulsion® should be seriously considered as part of the Cabinet Office Performance and Innovation Unit's (PIU) review of energy policy project. This review is a key input to the Government's future policy on security, diversity of energy supply and on climate change including its response to the Royal Commission on Environmental Pollution report on Energy.

It is important the ministries of state, the PIU team and advisory group are fully aware of developments and the status of the fuel to enable a fully inclusive project.

2. Introduction

On the 25 June 2001 the Prime Minister announced he has asked the Performance and Innovation Unit to carry out a review of the strategic issues surrounding energy policy for Great Britain. The review will be met within the context of meeting the challenge of global warming, whilst ensuring secure, diverse and reliable energy supplies at a competitive price.

Bitor Europe Ltd, a wholly owned subsidiary of the Venezuelan national oil company Petróleos de Venezuela are responsible for the marketing and supply of Orimulsion® in Europe. Orimulsion® is now established as one of the four major global fossil fuels with oil, gas and coal and as such Bitor Europe feel they can make a positive contribution to this review. Below we give a summary of the status of the fuel and our view of its potential contribution to the review in the context of the topics raised in the PIU scoping notes. More detailed information and references can be obtained from Bitor Europe Ltd.

3. Orimulsion®

Orimulsion® is the trade name for an established, clean burn conventional fossil fuel. It consists of 70% natural bitumen dispersed in approximately 30% water, using a commercially available surfactant package to stabilise the emulsion. The emulsification of natural bitumen with water enables Orimulsion® to be stored and transported at ambient temperatures using conventionally available plant and equipment.

The development of the fuel is seen as a way of diversifying Venezuela's hydrocarbon production and serving as an alternative to the existing power fuels (not a replacement) whilst complementing the development of renewable sources by reducing the production of carbon dioxide with affordable base load power. It is intended to produce a total of 20 million tonnes/year by the year 2010, which would

account for less than 1.5 % of the world primary energy consumption on present levels. Current production is 6.5 million tonnes per year. It offers the global energy market an opportunity to utilise a large energy resource to:

- Improve the environment

  As well as its established use in conventional plant it can be utilised in all the 'clean coal' technologies such as gasification, having superior environmental performance to the other black fuel plant such as coal and oil in both conventional and new technologies. An example is the environmental impact of conversion of the 640 MW Asnaes plant in Denmark from imported coal to Orimulsion® where CO_2 has been reduced by 15 %, NO_x by 60 %, ash by 99 % and SO_2 and particulate matter (PM) by 92.5 % and 85 % respectively from EU New Plant Standards.

- Diversify and increase security of supply

  More than 1.2 trillion barrels of bitumen exist in the Orinoco Belt in Venezuela where Orimulsion® is manufactured, an amount greater than 50% of the Worlds estimated oil reserves. The recoverable reserves of bitumen are estimated at 267 billion barrels, which on an energy basis is similar to reserves of coal in South Africa.

- Enhance competition, reducing prices

  The price of long term contracts for Orimulsion® is designed to be competitive with alternative fuel and offering the stability to make the plant investment required to significantly improve environmental performance.

4. The Market

Since its introduction into the market over 35 million tonnes of Orimulsion® have been safely delivered and consumed on a commercial basis for over 10 years. It is being utilised in countries including Canada, Japan, Denmark, Italy, and Germany with the highest environmental standards in the World.

The fuel has been used on a commercial basis in Denmark since 1995 in the largest generating plant in Scandinavia as part of the country's policy of using low CO_2 base load plant to complement the development of renewable energy such as wind turbines. This has enabled a learning curve bringing down the price of wind technology, making it more viable in other parts of the World including GB.

Orimulsion® was used in GB in two plants from 1991 until 1997 on a commercial trial basis without Flue Gas Desulphurisation (FGD). Over 7 million tonnes of fuel was supplied and the plants met all the technical and environmental targets set by the Environment Agency. Both contracts ran for their full length (five years each) and their environmental permits still had some years to run.

Commercial contracts were not initiated due to the poor logistics of each plant, making the cost of FGD prohibitive. In 1997 a planning application was withdrawn

by National Power to convert the Pembroke plant due to the potential delay after it was submitted for Public Inquiry in the aftermath of the Sea Empress disaster at Milford Haven. The following year, the Florida Power and Light company withdrew a planning application due to the potential delay of appeal after the State Cabinet had rejected the project on the grounds of public perception against the recommendations of all the State and Federal legislative authorities.

The Pembroke plant has now been demolished with the loss of over 200 permanent jobs (and 1000 construction jobs) in an area of high unemployment, whilst the Florida plant has to operate at a significantly reduced load on heavy fuel oil.

5. Developments

Since 1998 there have been changes to Orimulsion®, the way projects are developed and constructive dialogue with NGOs previously opposing the use of the fuel such as Friends of the Earth. These developments are summarised as follows:

- Replacement of the nonyl-phenol surfactant with an alcohol based surfactant
- Design and commissioning of a metals recovery plant for Orimulsion® ash
- At the request of the US Congress in 1998 a full evaluation of the environmental Performance of Orimulsion® by the US Environmental Protection Agency (USEPA) was carried out.
- Evaluation of the environmental performance of the fuel by the UK Electricity Association.
- Formal company environmental policy to install FGD as a fully integrated package with Orimulsion® at all commercial plants
- Pro-active briefing of all interested parties in detailed plant performance and future Orimulsion® projects.

In 1998 as part of Bitor's programme of continuously developing the performance of the fuel, the nonyl phenol ethoxylate based surfactant was replaced by an alcohol-based chemical, improving both the handling properties of the fuel and its environmental performance. It also had the effect of removing any possibility of oestrogen-mimicking effects on fish that had been associated with the nonyl phenol based chemicals in the unlikely event of a fuel spill.

In a unique development, Bitor Europe have formed a joint venture with Strategic Minerals Corporation of the U.S.A and built a metals processing plant in Harwich to extract and sell metals from the fly ash from the Danish and Italian Plants thus closing the environmental loop. All the by-products from the Danish plant are recycled in what is called Industrial Symbiosis. This system is now being used as a blueprint for industrial areas in GB. The Business Council for Sustainable Development, Conoco, North Lincolnshire Council and the Yorkshire and Humber Regional Development Agency have commissioned a pilot report into the potential for the Humberside region for a by-product synergy programme based on this system. The Danish plant won the *Electric Power* magazine power plant award in 1998 for its industrial symbiosis under the heading "industrial ecology guides life at Asnaes".

In August 2001, the USEPA completed a study of the environmental issues associated with the use of Orimulsion®. The Orimulsion® Technology Assessment Program (OTAP) was conducted by the EPA in response to a request by the United States Congress to "provide better scientific data on the qualities and characteristics of this product and the potential environmental impact of its introduction" into commerce in the United States. After reviewing the issues associated with Orimulsion® use with regard to air pollutant emissions, waste disposal, and spill control, toxicity, and ecological risk, has concluded that there are no gaps that seriously impact the understanding of environmental impacts associated with the use of Orimulsion®. Therefore, the EPA has sufficient data to conclude there is little difference in unabated Orimulsion® emissions in comparison with the other fossil fuels and with the installation of modern conventional abatement equipment, emissions performance of Orimulsion® is better than the other fuels.

The UK Electricity Association carried out a study and an environmental briefing note was published in March 2000. It showed that the Orimulsion® emissions of carbon dioxide are similar to fuel oil but less than coal. Orimulsion® with FGD produces over 80% less SO_2 than unabated coal and about the same as coal with FGD currently used on two GB power stations. Experience to date has shown lower overall NO_x emissions are produced with Orimulsion® than heavy fuel oil or coal. PM emissions can be controlled within required limits by the installation of the appropriate equipment.

6. Present Status

An example of a tangible impact of these developments has been the promotion of Orimulsion® as a fully integrated package with FGD by the Regulator for Electricity and Gas *(Ofreg)* in Northern Ireland to re-power the AES Kilroot plant (from imported coal) as part of his plan to reduce the price of electricity and improve the environment. After detailed briefings by the generator and Bitor Europe, Friends of the Earth, WorldWide Fund for Nature and the Ulster Wildlife Trust, amongst others, have agreed to participate in a local Environment Forum during project development.

In the year 2000, Italy imported 3 million tonnes, Denmark 1.1 million tonnes, Canada and Japan about 800,000 tonnes each with countries such as Germany, Lithuania, Barbados and China, the balance of a total of 6.5 million tonnes.

Negotiations are now taking place for a joint venture between ENEL the Italian state generator and Bitor to build a new production module in 2005 supplying to the Italian generation market for the next 20 years.

In May 2001 Bitor signed a contract to supply Power Seraya of Singapore with 1.5 million tonnes per year for 10 years starting in 2004 when the FGD has been installed.

In July 2001 Bitor reached agreement with Canada's New Brunswick Power Corporation to supply the 1050 MW Coleson Cove plant near St Johns New Brunswick with a minimum of 1.6 million tonnes per year for 20 years starting in 2004. NB Power won *Power* magazine's prestigious Power Plant of the year award in 1995 for the Dalhousie Generating Station conversion to Orimulsion.

In July 2001 the Chinese National Petroleum Corporation signed a 30-year joint venture agreement with Bitor to build a new production module to supply China 6.5 million tonnes Orimulsion® per year for 20 years starting in 2004.

Orimulsion® supply agreements are being negotiated at present in the U.S.A, Korea and Thailand.

7. Orimulsion®'s Contribution to UK Energy Policy

CO_2 reductions are a global challenge and at the same time as meeting future energy demand will require action in GB as in the rest of the World. Orimulsion® can be supplied at a competitive price but has 15 to 20% less CO_2 emissions than coal due to the composition of the fuel. The fuel is very suitable for use in any of the clean coal technologies and is a good source of hydrogen for fuel cell technology. Renewable energy such as wind power requires a stable base load low carbon fuel such as Orimulsion® to complement its inherently interruptible nature.

With the GB's nuclear power stations decommissioned and coal generation likely to have only a limited role, GB energy consumption is likely to be increasingly dependent on oil and in particular gas. The integration of European gas networks means gas supply to GB will in effect be a single source of supply. Both gas and oil prices are very volatile and it is important to have access to an alternative large source of energy at a less volatile price allowing investment in clean fuel technology. Thus access to Orimulsion® makes it easier to reconcile the natural conflict between energy prices and its implications for fuel poverty and industrial competitiveness with environmental performance.

Although the challenges explored by the PIU Project will be largely placed in a GB context, the location of this hydrocarbon enables the strategy to be put in a more global context including utilising carbon conservation projects at source and enabling the utilisation of a resource from a developing country that has strong trading links with GB.