

RUSI Alternative Energy and Sustainability Project

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There is no doubt that Climate Change is one of the top priorities for governments across the world. The effects of a warming planet have been clearly demonstrated by a large body of scientists and there is an increasing awareness of the unsustainable way in which we all use the world's natural resources, particularly fossil fuels. Combined with fluctuating energy costs and the constantly decreasing availability of UK fossil fuel resources, the military is left particularly vulnerable to its dependency on imported fuel. The aim of the RUSI alternative energy programme is to highlight the financial and environmental drivers for alternative energy and sustainability in the military. It will assess the challenges of maintaining operational freedom from the current dependency on fuel and will identify potential advantages in operational capability for the future warfighter.



THE CURRENT SITUATION

The UK Ministry of Defence (MoD) produces approximately five and a half million tonnes of carbon dioxide emissions each year, with almost two million tonnes being from non-operational energy use across its estate. This equates to over two thirds of the total Central Government emissions from buildings. The MoD also uses 24 million cubic metres of water annually and spends an estimated £19 million on waste; experts estimate that up to 15 per cent of MoD's annual expenses can be attributed to energy. This adds up to a significant footprint and one which MoD, and the UK Government as a whole, are treating as a priority.

The MoD Sustainable Development Action Plan, published in 2007, identified seven strategic priorities for 2007 to 2012: Leadership and Accountability; Sustainable Procurement; Driving Performance Measurement; Climate Change; Water; Waste and People. Within these priority areas are a number of strategic actions and targets. This programme will look to identify the processes that will make these strategic actions achievable.

Sir Ian Andrews, the former 2nd Permanent Undersecretary for Defence, gave a presentation entitled 'The Ministry of Defence Sustainable Development Action Plan 2007-2012 – How are we doing?' This presentation highlighted some of the successes of to date:

- 'We expect to offset at least 18,000 tonnes of carbon dioxide from our civilian air travel this year'
- '[We are looking] to improve the design and construction of our new buildings and refurbishments, we use environmental assessment tools'
- 'We currently buy 6% of our electricity in the UK from renewable sources'
- 'We reduced absolute carbon dioxide emissions from our buildings by 6% against baselines'
- 'We reduced water leakage levels in the last quarter of 2006 saving over 3 million cubic metres'
- 'Waste data are improving year on year'
- 'A private finance initiative in South West England will deliver 58 buildings with micro-combined heat and power'

THE RUSI ALTERNATIVE ENERGY AND SUSTAINABILITY PROJECT



The aim of the RUSI Alternative Energy Project will be to assess the challenges of maintaining operational freedom from the current dependency on fuels and identify potential advantages in capability for the future warfighter. The project will consider overall sustainability both within the UK and on operations.

Fuels are currently relied upon for home bases, live training, naval operations and Search and Rescue as well as for supply to current operations. The total military

cost of fuel is continually increasing, incorporating the financial cost of the fuel, the delivery to the front line and the

increased risk to personnel and equipment that such a supply chain mandates. Alternative sources of energy could reduce the need for fuel and could allow forces to remain in forward operating bases for longer. Such alternatives might include solar cells, wind power, heat pumps and combined heat and power (CHP) plants. Military vehicles are also being adapted to accommodate alternative fuels. Hybrid engines, electric drive and engines rated for synthetic fuels, first and second generation bio-fuels and other sources of hydrocarbons are all possible solutions.

The programme will be divided into four main themes: International Programmes; Platforms; Home Bases and Deployed Forces.

International Programmes

RUSI will initially look to raise awareness within the UK of what the military are doing in the alternative energy and sustainability field. It will look at the impact of international legislation on the military, including the Kyoto agreement and, and what other nations are doing in response. Overseas programmes will be investigated to identify any areas of work that might be applicable to UK forces. Key technologies from across the civil sector will also be identified and the environmental and military benefits of such systems will be considered.

Sustainability for Home Bases



The project will also look at how alternative energy solutions can be used on bases in the UK and across the buildings of the MoD estate. The Stewardship Report on the Defence Estate 2007/08 gives detailed background information on UK legislature and MoD initiatives including methods for reducing water consumption (and leakage) and increasing efficiency and energy management. Building on this report, the programme will look at reducing fuel consumption directly, increasing efficiency of systems to reduce fuel usage and using other energy sources to make fuel savings.

Additional areas for discussion will be efficient power generators and machinery, improved insulation of infrastructure, development of low energy components and improved power management. Alternative sources of energy for fixed infrastructure will cover the possibility of combined heat and power systems, ground sourced heat pumps, solar panels, wind turbines and hydrogen power to reduce the consumption of fuel related to UK MoD building. The outcomes will be a thorough review of initiatives and identification of those that will be applicable for UK buildings. This will also take into account the importance of personnel behaviour, the use and disposal of IT systems and the possibility of purchasing carbon offsets.

Platforms



Military platforms are some of the largest consumers of fuel across government. This portion of the project will therefore look at initiatives to reduce fuel requirements, increasing fuel efficiency and the possibilities of using alternative fuels (hybrid, synthetic or bio-fuels) or alternative energy sources (batteries, fuel cells and renewables). The

project will look to showcase innovative technologies and vehicle designs from both the civil and defence sectors. By the conclusion of this branch of the project, there should be a comprehensive view of the technologies that are available to increase platform sustainability. There should also be a detailed account of the options that are available for alternative fuels and alternative energy sources along with an assessment of the military benefits of any such options.

Deployed Bases and Forces



Deployed bases will bring together a number of the research streams from home bases and platforms but will also consider the logistics and security of operational bases. The use of alternative energies by Main and Forward Operating Bases (MOBs and FOBs) would reduce the need for fuel convoys which may be vulnerable to enemy attack and would also free up transport vehicles for other tasks. The project will identify the capability benefits alternative energy sources offer to front line forces, such as reducing the need for heavy batteries and thereby decreasing the load for the soldier to carry.

Finally, this portion of the project will assess the military trade-offs. Although savings may be made in environmental and financial terms by moving away from traditional fuels the operational performance of some vehicles could be affected. This would leave the platform more vulnerable to attack and may reduce its effectiveness.

CONCLUSIONS

The RUSI Alternative Energy Programme will look at new technologies and practices (both civil and military) that will reduce operating costs; reduce environmental impact and develop sustainability in the field.

There are a number of repetitive themes that can be seen throughout the different aspects of the programme. These represent the short, mid and long term techniques to achieve decreased dependency on fuels and therefore increased freedom of action.

- Short term: Reducing the amount of energy required – this includes reducing waste and leakage, increasing efficiency of energy consuming equipment and reducing the actual energy consumption
- Mid term: Using alternative fuels and alternative sources of hydrocarbons to reduce the dependency on imported fossil fuels and reduce impact on the environment without a major upheaval of equipment
- Long term: Using alternative energy sources and therefore changing technology, equipment and practices

The overall programme will look at initiatives in each of these areas and assess how these proposals would affect operational capability. The discussions will highlight whether benefits can be gained from the changes or whether detrimental effects can be tolerated for the gains in non-operational areas. In conclusion, this project will provide a complete view, from government, industry and academia on important developments in this field and how the strategic aims of the Sustainable Development Action Plan might be met.

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All photographs courtesy of the US Department of Defense.