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Pavements: a new source of water and energy?

P. Grabowiecki and M. Scholz

Proceedings of the Institution of Civil Engineers, Civil Engineering, **159**, No. 2, May, 54

Climate change means storm runoff is becoming an increasing problem in urban areas, and yet so is water supply. A novel permeable pavement design that combines water-harvesting with a heat exchange system could help solve everything. Piotr Grabowiecki and Miklas Scholz of The University of Edinburgh report.

Britain finally begins to rise to the energy challenge

R. Freer

Proceedings of the Institution of Civil Engineers, Civil Engineering, **159**, No. 4, November, 158

In July this year the UK Government launched its third publication on national energy policy in just over four years. Robert Freer says there are at last some signs of positive action to solve the main problem, which is keeping Britain's lights on.

Engineering at the Centre for Alternative Technology

K. Brown

Proceedings of the Institution of Civil Engineers, Engineering Sustainability, **159**, No. 2, June, 49–53

From the early days of experimental windmills and inter-seasonal solar heat stores to today's water-balanced cliff railway, wood chip burner and award-winning rammed earth construction, the Centre for Alternative Technology's (CAT) knowledge-sharing ethos has always helped to push sustainable technologies towards the mainstream. This paper covers three decades of engineering innovations at the CAT and looks toward future methods for renewably meeting our energy demands or, rather, making our energy demands meet the renewable solutions.

Sustainable transport policies under scarcity of oil supply

S. P. Shepherd and P. Pfaffenbichler

Proceedings of the Institution of Civil Engineers, Engineering Sustainability, **159**, No. 2, June, 63–70

A strategic land-use–transport interaction model is used to investigate the impacts of policies in technology, infrastructure, pricing and regulation under different assumptions about energy supply. Six scenarios have been defined, analysing three policy strategies in two different contexts of energy supply—A, generally accepted energy supply forecast and B, worst-case energy supply forecast (scarcity of energy). Policies include: business as usual; investment in infrastructure and technology; and a demand regulation based approach involving changes in taxation and tolls. The paper assesses the impact and robustness of each policy against assumptions about future oil supply/demand. Our results demonstrate three key issues. First, scarcity of oil will accelerate the development and take-up of alternative fuel technologies; second, investment in alternative technologies alone will alleviate the impact of local emissions and reduce energy consumption per kilometre travelled but will only reduce yearly carbon dioxide (CO₂) emissions after a time lag of about 15 years; so that, third, some form of regulation of demand will be necessary to reduce total emissions and externalities caused by congestion. Research is required to define the necessary level of regulation in combination with technology investments. However, we suggest that a policy involving improvements in infrastructure coupled with investments in fuel technology and differentiated fuel taxes will be required in the future.

Hydro-electric power without water storage

T. L. Shaw

Proceedings of the Institution of Civil Engineers, Engineering Sustainability, **159**, No. 4, December, 139–143

Although reservoirs benefit the performance of hydropower schemes there is no overriding operational need for them. Wind and solar power projects function well without storage, as will the planned range of marine energy devices. This paper reviews the equivalent features of 'run-of-river' hydro schemes which in essence operate in response to rainfall, that is, according to the variation of river flow resulting from the natural release of water from catchments.

Sustainable energy? A Feasibility study for Eastside, Birmingham, UK

D. V. L. Hunt, I. Jefferson, L. Jankovic and K. Hunot

Proceedings of the Institution of Civil Engineers, Engineering Sustainability, **159**, No. 4, December, 155–168

Eastside, a 130 ha brownfield site located to the eastern side of Birmingham's city centre, is undergoing social, economic and environmental changes, driven mainly through public and private investment estimated to be worth £6 billion. The regeneration programme is well under way and it aims to turn a once deprived inner-city area into the regions first 'sustainability quarter'. Achieving a sustainable quarter, in terms of energy, will require reductions to be made in energy demands compared to typical practice, for example through more thermally efficient buildings and utilisation of low-energy technologies. In addition it will require these demands to be met through renewable technologies rather than fossil fuels. This paper presents estimates for the total energy demands from the various developments planned within Eastside assuming typical and good-practice scenarios. The paper then assesses the feasibility of introducing various renewable energy supply technologies and combined heat and power (CHP) technologies in order to meet these demands. Finally the paper presents a simplified costing scheme for assessing the potential of renewable technologies to secure energy supplies while limiting carbon emissions. The renewable technologies are compared directly, aiming at providing an independent viewpoint for decision makers when considering which technologies to adopt. While the study focuses on Eastside, the lessons learned from this study are vitally important for redevelopment programmes being undertaken elsewhere.

An introduction to the UK marine renewable atlas

W. S. Cooper, C. L. Hinton, N. Ashton, A. Saulter, C. Morgan, R. Proctor, C. Bell and Q. Huggett

Proceedings of the Institution of Civil Engineers, Maritime Engineering, **159**, No. 1, March, 1–7

The UK marine renewable atlas is a new information resource designed to assist government strategic planning for large-scale offshore renewable energy development. The atlas provides a means to identify, quantify and spatially map the potential interest areas for wave, tidal and offshore wind resources at a regional scale across the limits of the UK continental shelf. The assembled database and technical reports generated by the study are publicly available, and have received great interest from potential developers, stakeholders and the general public. The project has been funded by the Department of Trade and Industry's strategic environmental assessment combined programme covering oil and gas and marine renewable agendas.

The marine energy resource, constraints and opportunities

I. G. Bryden

Proceedings of the Institution of Civil Engineers, Maritime Engineering, **159**, No. 2, June, 55–65

The British Isles are blessed with highly energetic coastal waters, which offer opportunities for the exploitation of waves and tides for the generation of electricity. This paper looks at prospects for, and constraints upon, the long-term economic development of the wave and tidal resources. Technology already exists which is capable of the effective harnessing of marine resources. Proponents have estimated that up to 40% of the UK electricity supply could, eventually, come from wave and tidal sources. More conservative estimates suggest that the potential is somewhat lower than this but still substantial. The wave resource is recognised as being the larger but the tides do offer some very real advantages. Specifically, they are predictable, as they are driven by regular astronomic mechanisms. In addition, the energy flux density in many of the most attractive sites is formidable, offering the prospect of large-scale generation with relatively compact technology. Developers of both wave and tidal technology share economic as well as technical challenges and these must be overcome if new industries are to be established. The solutions require effort by scientists, engineers and, crucially, politicians.