The future of our energy

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When it comes to sustainable energy supplies hydroelectric plants are usually the best solution, according to researchers who have reviewed the economic, social and environmental impact of fuel provision.

However, Western Europe has run out of suitable locations to create large plants and micro-hydro power (small-scale generation of energy using falling water) is not sufficient to support the electricity need.

Coal and nuclear could be a good alternative although each type of plant has its strengths and weaknesses. On the contrary, gas-fired plants and in particular oil power plants are usually not a suitable option.

Dr Giorgio Locatelli, from the School of Engineering at the University of Lincoln (UK) which was created in partnership with Siemens, and Mauro Mancini, of Milan Polytechnic (Italy), are leading the research which provides a unique evaluation of all sustainability factors in the power plant industry.

Most recent literature is focused on the issue of power plants based on economic factors, but environmental and social considerations are moving higher up the agenda.

Writing in the *International Journal of Business Innovation and Research*, Dr Locatelli explained that as worldwide demand for electricity grows as well as the replacement of aging power plants, new plants must be created.

Dr Locatelli said: "Energy and electric sector policy makers have to achieve an overall evaluation of different options, covering risks and benefits from an economic, environmental and social point of view. Public acceptance is of major importance when it comes to deciding energy choices for the future and investors must take this into account."

The team considered various factors including risk of severe accidents, security of fuel supply, volatility of fuel price, environmental aspects and public acceptance.

When all these were taken into account, hydroelectric plants came out as the best solution with oil plants being the worst choices.

Dr Locatelli said: "Hydropower provides a negligible amount of pollution, so is not affected by fuel concerns and is typically well accepted. However, there is a shortage of new locations for the construction of large hydroelectric plants in Europe so other options are necessary. The nuclear plant is, however, a good alternative even if it does suffer from social acceptability in many countries. Nuclear energy has an extremely low environmental impact and low impact of risk in the fuel supply."

The research revealed that beside the hydroelectric plant, nuclear is the best choice when looking at the security of the fuel supply.

As expected coal technology has the greatest environmental impact, whereas the impact of hydroelectric and nuclear plants is almost negligible. This result is mainly due to the fact that the inevitable air emission from coal and oil plants represents a much greater risk than a correctly managed nuclear waste. On the other side coal has very good economic benefits.

The nuclear option comes off the worst in terms of public acceptance

due to the confinement of radioactive waste and the proliferation.

In all scenarios oil-fired plants are the worst choice, suffering from fuel concerns as well as high environmental impact. Also gas plants do not receive a high score due to the security of gas supply and the high impact of a cost increment in the gas supply.

Further study will include a better quantification of public acceptability and how it may be possible to increase the social acceptability for new nuclear power plants.

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