

The future is not black

Over the past few years, the world has seen a significant rise in oil prices from \$18 per barrel in December of 2001 to prices approaching \$70 per barrel last summer. The current price levels are unprecedented and there is little indication that this recent trend will change. Various reasons have been brought forward to explain rising market prices, mainly attributed to disruptions to oil production and distribution.

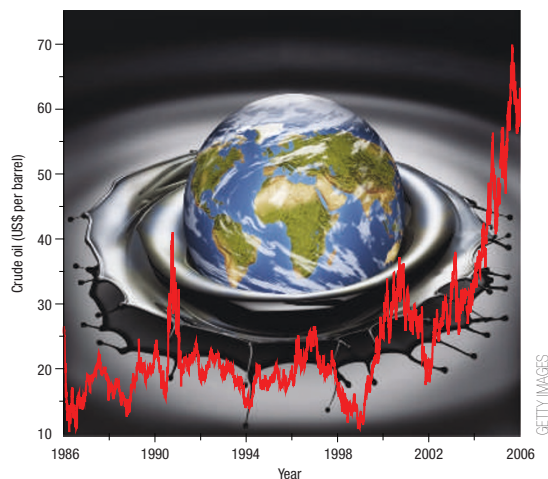
These shortages, however, are merely a symptom of the fact that the demand for crude oil has reached the limits of oil production. Clearly, the days are over when the OPEC Sheiks could avert higher consumer prices by simply opening the oil tap. On the contrary, the fight for oil reserves and open access to oil production is a serious political matter, shown, for example, by the recent dispute about Russia's gas exports to its eastern European neighbours. This political pressure is poised to increase. Despite intensive efforts of oil exploration, production capacity is widely expected to have hit its all-time peak, and most likely oil production will slowly start to fall over the next few years. Oil prices will therefore see an even more dramatic increase in the near future.

For a long time scientists have been fruitlessly warning about the consequences that a dwindling supply of oil has, not only on our quality of life and individual mobility, but also to our society as a whole. Alarmed by the continuing rise in oil prices, it seems, however, that politicians are slowly beginning to face reality and are developing strategies for alternative energy sources. In countries such as Finland and the UK, for example, proposals have been put forward to build new nuclear power plants, often backed by the argumentation that nuclear power provides clean, greenhouse-gas-free energy. Unfortunately, those proposing this revival of nuclear energy are not

able to provide a sufficiently long-term solution for the storage of radioactive waste on the required timescale of a few hundred thousand years. In any case, even the most optimistic nuclear scenario will not be able to provide a full substitution for the diversity of hydrocarbon fuel applications. Furthermore, whether other technologies such as nuclear fusion will become commercially feasible in the near future seems doubtful at present.

In this issue of *Nature Materials*, scientists showcase a cross-section of alternative activities aimed at tackling the looming energy crisis. In their Commentary, Keith Barnham and colleagues argue for a distributed generation of solar energy that is produced where it is consumed, as nuclear energy may not be a very efficient way of coping with the large variations in energy demand that can occur even within a single day¹. On a similar premise, Youngkyoo Kim and co-workers report on improvements to low-cost organic solar cells². Whereas these approaches target the conversion of solar energy into electricity, fuel cells present a clean way of releasing energy stored in hydrogen and oxygen, producing water as the only by-product. To improve the efficiency of existing fuel cells, Reidar Haugsrud and Truls Norby explore novel electrolytes³.

These contributions illustrate the significant progress that has been made in the development of alternative energy sources. As a consequence, in many countries production of clean energy is increasing. At the current pace, however, it remains doubtful whether these efforts will be sufficient to replace our dwindling supply of oil. Either we consequently step up our scientific activities⁴, or face the reality of a looming energy crisis. What is needed now is a large-scale, sustainable, efficient and clean way of energy production that attacks the problem from different fronts⁵. The problem is complex, and its solution will require a variety of technologies. It is therefore important that the academic community takes a lead in this renewed discussion, and argues the case for a concerted scientific effort to all relevant parties — from governments, funding agencies and decision makers, to the relevant industries and consumers. Without doubt, the pressure for technological progress will remain high, and the research we do today determines our way of life tomorrow.



SPOT PRICES OF CRUDE OIL LEAVE NO DOUBT ABOUT THE SEVERITY THIS TREND HAS ON OUR SOCIETY. DATA FROM US DEPARTMENT OF ENERGY.

REFERENCES

1. Barnham, K., Mazzer, M. & Clive, B *Nature Mater.* **5**, 161–164 (2006).
2. Kim, Y. *et al.* *Nature Mater.* **5**, 197–203 (2006).
3. Norby, T. & Haugsrud, R. *Nature Mater.* **5**, 193–196 (2006).
4. Editorial. *Nature Mater.* **2**, 425 (2003).
5. Insight. *Nature* **414**, 331–337 (2001).