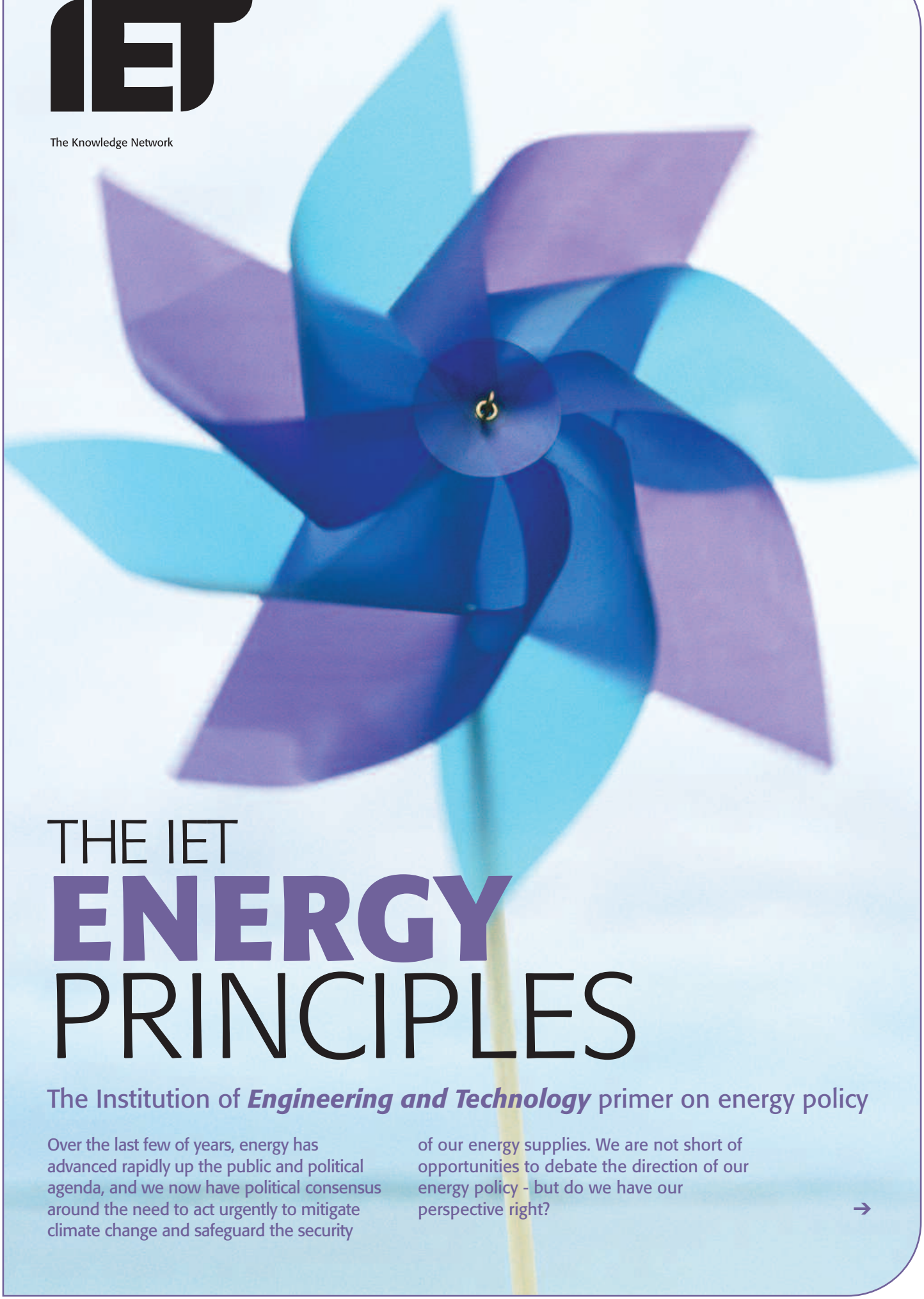


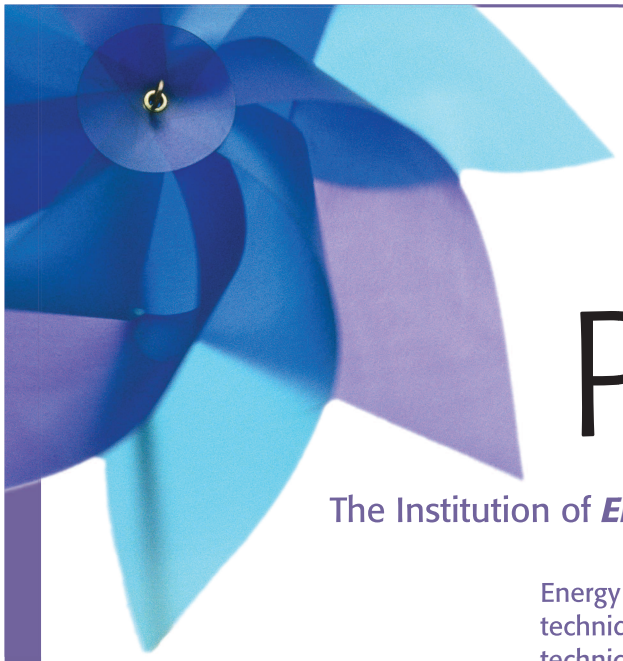
The Knowledge Network

THE IET ENERGY PRINCIPLES

The Institution of ***Engineering and Technology*** primer on energy policy

Over the last few of years, energy has advanced rapidly up the public and political agenda, and we now have political consensus around the need to act urgently to mitigate climate change and safeguard the security of our energy supplies. We are not short of opportunities to debate the direction of our energy policy - but do we have our perspective right?

→



THE IET ENERGY PRINCIPLES

The Institution of ***Engineering and Technology*** primer on energy policy

Energy is often seen as a complex technical issue. Whilst it is true that technical knowledge is fundamental to the development of sound energy policy, it is all too easy to lose sight of the big picture. The energy debate is often polarised by special interests, and technology tends to be demonised or idealised as a bearer of solutions.

At the IET, we believe that there are certain high-level principles derived from engineering that offer policy-makers a comprehensive vantage point from which to review energy policy. Here we do not offer technical solutions, but guidance towards effective policy-making based on sound expert knowledge and experience.

We hope that the IET Principles will prove useful in the course of the ongoing debate on UK energy policy. The IET will continue to act as a resource for authoritative, independent information on energy technology.

We appreciate that solutions will not be easy, but only those based on sound principles will have a hope of succeeding.

1. THINK OF THE BIG PICTURE – THE WHOLE ENERGY SYSTEM

- Energy is not just Electricity. We use more of our tightening natural gas supplies for *Heating* than for power, whilst *Transport* is the fastest growing energy consuming and carbon emitting sector, (Fig. 1).
- The energy system includes consumers as well as suppliers; people as well as technology and resources.
- There can be no workable solutions to the energy challenge so long as these key parts of the energy system remain policy 'blind spots'.
- To reduce waste and environmental impact across the energy system, follow the Energy Hierarchy.

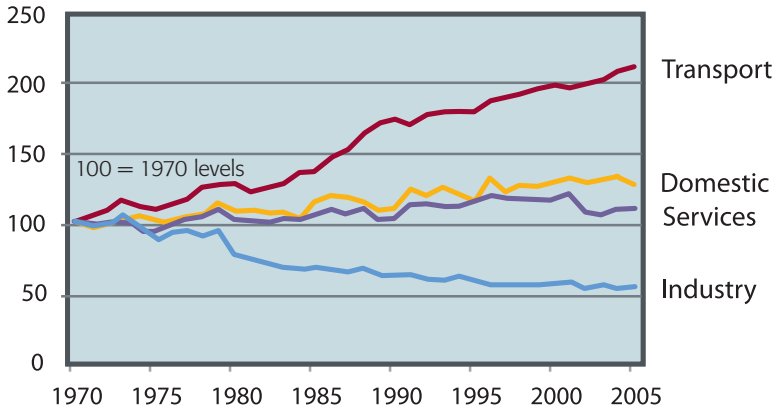


Fig. 1: Transport and domestic energy use are on the rise[1]

The Energy Hierarchy

The Energy Hierarchy is a simple principle for prioritising solutions: a sensible energy policy should make its first priority the reduction of energy use before seeking to meet demand by the cleanest means possible.

Sustainable

- Energy conservation – changing behaviour to reduce demand
- Energy efficiency – using technology to reduce demand
- Renewable, sustainable energy sources – setting a course to replace fossil fuels
- Conventional energy sources – using low/no-carbon technologies
- Exploitation of conventional energy sources as we do now

Unsustainable

2. THERE IS NO SILVER BULLET

- The scale of the challenge is enormous and there will be no single simple solution.
- The only approach capable of meeting the challenge is a mix of 'hard' and 'soft' policies, large scale and small scale, dispersed and centralised.
- Diversity is the watchword. Policy should seek to balance the risks and rewards of all the different options.
- Fossil fuels currently meet 90% of the UK's energy needs, and it is hard to see their contribution falling below 50% over the next 50 years, (Fig. 2).

3. ENERGY POLICY IS FOR THE LONG TERM

- Energy infrastructure is critical and pervasive – it takes a long time to build and stays in service long enough to shape the lives of several generations.
- We are not starting from a clean sheet of paper – our decisions are constrained by the infrastructure of previous generations.
- Decisions today will be part of our system in 2050, way beyond the normal political cycle.
- Second-guessing the future is a dangerous exercise – policy should guard against unintended consequences by combining strategic vision with flexibility.

4. CONSUMERS FIRST

- Decisions made now on energy supply can only deliver results 10-15 years from now.
- Therefore, within the next 10-15 years the only serious rewards can come from far-reaching and effective measures to reduce demand for energy, (Fig. 4).

5. DON'T UNDERESTIMATE THE PEOPLE FACTOR

- Half our energy is used directly by individuals for transportation and in the home, and this proportion is increasing, (Fig. 3).
- Energy use is tied to wealth. No country has been able to reduce its energy demand while growing its economy. Nothing short of a radical culture change can break this connection.
- There is a lot of scope to reduce demand using energy efficient technologies without impacting on our quality of life.
- Technology is often the easy part - persuading people to take it into their lives is the real challenge. In parallel with research into new technologies, we have a major task to understand and tap into people's attitudes to energy use. →

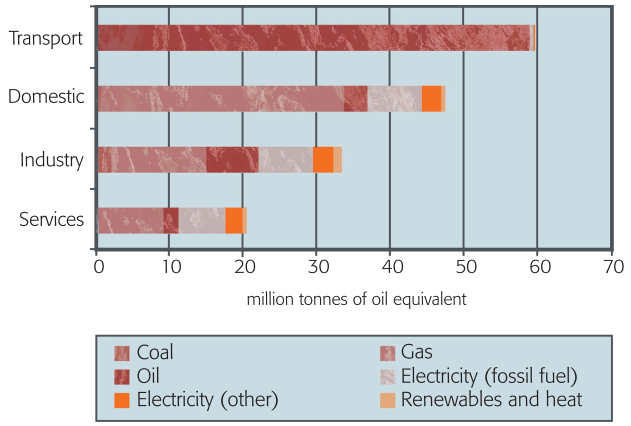


Fig. 2: The scale of the challenge: Over 90% of the UK's energy mix is fossil fuel. Less than 5% of electricity and 3% of primary energy comes from renewable sources[1]

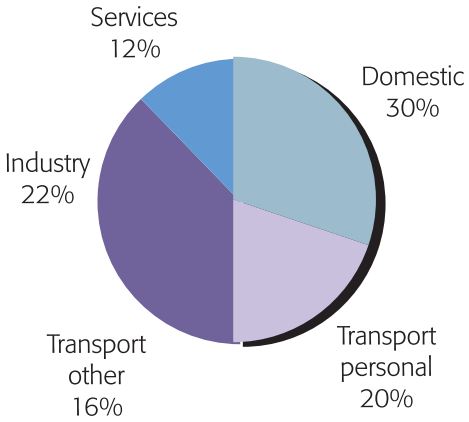


Fig. 3: Personal consumption accounts for half the UK's total energy demand[2]

Low energy technologies

Currently available

- Building insulation, double glazing
- Energy efficient lighting
- Energy efficient appliances
- Correct installation of boilers
- Simple building controls, sensors, systems
- Energy efficient electrical motors

Newly emerging or existing but financially expensive

- Reduced consumption electronic goods; reduced standby consumption
- Smart meters and displays
- LED lighting
- Advanced controls for buildings and appliances
- Breakthroughs in ground / air source heat pump technologies
- New building materials and technologies e.g. low-e glazing, active shading, daylight linking
- High efficiency solar panels
- Active power distribution networks

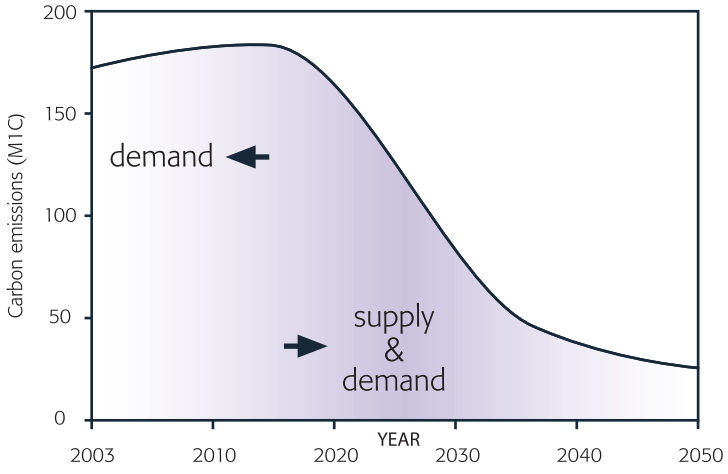


Fig. 4: Demand-side measures are needed to kick-start emissions reductions[3]

6. MAKE THE MARKETS WORK FOR YOU

- Before 'leaving it to the markets', the markets must be fit for their intended purpose - the quality of the regulatory and market environment we put in place will determine our success in meeting government targets.
- Clarity, simplicity and consistency are the best means to encourage an entrepreneurial response - piecemeal solutions and micromanagement have the opposite effect.
- The success of international systems like emissions trading will depend critically on sensitive political handling, long-term planning and effective implementation.
- The market is becoming increasingly global, so the UK will be in competition to attract investment in new energy technologies and systems.

7. MAKE SURE WE HAVE THE PEOPLE FOR THE JOB

- Make sure that the right foundations are there – the education system needs to promote the basic building blocks of science and technology, like maths and physics.
- Show commitment and direction in tackling the energy challenge - young people will chose careers in energy if they see it to be relevant and promising.
- Work more closely with employers in the energy industry to understand their requirements.

8. INNOVATION – IT TAKES MORE THAN BRIGHT IDEAS

- New technologies will have to be developed urgently, but innovation remains a risky, costly and time-consuming business.
- Find ways to help new technologies along the perilous path from the lab to the market - the UK's excellent track record in supporting academic research needs to be matched with incentive structures supportive of high-tech investment.
- Public resources should be prioritised for resolving local challenges and boosting areas of unique advantage – not picking arbitrary winners.

9. THINK AND ACT GLOBALLY

- Encourage productive working relations with rapidly industrialising countries like China and India - the future markets for energy technology will be dominated by them.
- We will have to buy from others, and we should be prepared to learn from them too – our policies must embrace an active approach to collaboration.

10. BE INFORMED

- The IET provides factfiles, policy briefings and position statements offering impartial and accessible information on current technologies and scientific facts.
  http://www.theiet.org/factfiles/

Sources

1 Department of Trade and Industry Energy Statistics, 2006.
2 Brenda Boardman, 2004.
3 Kevin Anderson, 2006. Baseline carbon emissions for 2004 include the UK share of international aviation (9MtC) and shipping (11MtC), in addition to UK domestic emissions (153MtC).

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