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# Engineers: ethics and responsibilities

**Fossil fuels provide 89% of the world's primary energy needs. We consume over 1m tonnes of oil and 250m cm of gas every hour. These fuels are essential to our existence, but are controversial – it is generally accepted that they have a damaging effect on our climate. Phil Hopkins, technical director, Penspen and professorial fellow, University of Newcastle, introduces some of the ethical issues staff face in the oil and gas business**

**E**NGINEERS face ethical dilemmas in many industries. For example, an engineer working for a company that manufactures military missiles may view these products as weapons of mass destruction, or as a means of maintaining political stability and peace in some parts of the world. So oil and gas engineers should not feel alone.

Oil and gas is a big international business: in January, ExxonMobil announced profits of \$36bn – the largest ever by a listed company. Then, in February, Shell announced record profits for a UK company of \$23bn. These earnings are around equal to the GDP of Luxembourg or Guatemala, and higher than the individual GDPs of Syria, Bulgaria and Kenya. Shell's profits are over \$2m an hour; equal to 1% of UK GDP.

Are these profits justified and are they obtained in an ethical manner? Are the financial benefits showered on the oil and gas majors' staff and shareholders, matched by the benefits being received by the people of the countries they obtain the oil and gas from?

## Profits and morality

These huge profits must be contrasted with the many controversies surrounding the fossil fuel industry. Two of these are that:

- Burning fossil fuels is causing climate change. Engineers working in the oil and gas business know that fossil fuels help create global warming; consequently, they must be confident that their profession and companies understand this effect and are contributing to its mitigation; and

- Oil and gas is often obtained from countries with poor human-rights, environmental and socio-economic records. Engineers may work in countries that have major social and political problems; for example, Nigeria is an oil-rich country, but its people are very poor – the population of 130 million has an average salary of \$1 a day.

These controversies raise ethical issues for staff in the oil and gas business. It is not surprising that the world has started to move away from oil and gas. For example, Sweden intends to replace all fossil fuels with renewable-energy sources by 2020. Iceland hopes, by 2050, to power all its cars and boats with hydrogen made from electricity drawn from renewable

resources. Even US President, George Bush, admits his country is “addicted to oil” – he wants to cut dependence on Middle East supplies by 75% by 2025.

Will climate change concerns signal the end of the oil era? Will the increasing oil and gas prices, and the uncertainties and political problems in the Middle East bring this era to an end? It is worth recalling the words of the former Saudi Arabian oil minister, Sheikh Yamani, who said in the 1970s: “The Stone Age ended not for lack of stones. The oil age will end, but not for the lack of oil.”

Should the oil and gas majors be devoting more effort and directing more of their profits towards alternative fuels? Should we, as staff working in the fossil-fuel business, be hastening the end of the climate-damaging, politically unstable oil and gas era, rather than extending it?

## An ethical dilemma

The supermajors' profits do not include all the costs of fossil fuels. We hear about the true cost of nuclear power, and environmental damage and decommissioning costs must be taken into account when assessing its true cost, but what about fossil fuels? Fossil fuels damage the environment and this damage can be quantified: BP is responsible for 1.38bn tonnes a year of greenhouse gases (6% of world total output); according to the UK government, the cost of these emissions is \$50bn; consequently, BP should be recording a \$31bn loss in 2005, not a \$19bn profit.

Is it now time to levy windfall taxes and direct the proceeds to climate protection? Or is it time to levy carbon taxes and direct the proceeds to alternative fuels? Staff working in the oil and gas business must form a view on these issues. But it is not a simple case of confronting the oil and gas majors with a new taxation system. It is far more complex.

Consider this: Is cutting the use of fossil fuels, and money spent on controlling global warming, a good thing? It is estimated that the implementation of the Kyoto agreement is costing \$150bn a year, and its effect will not be seen for centuries. But for half that sum, we could provide clean water, health care and basic education to all of the world's population. Additionally, is the scale of the world population (now 6 bil-



lion, rising to 9 billion by 2040) the problem? Is population management the main issue? Ask the father of an uneducated, starving, ailing family in the developing world how we should spend \$150bn this year, he will not say “save the planet”, but “save my family”.

How can an engineer deal with these ethical issues? First, what is responsibility? Responsibility usually means we are expected to achieve or maintain a result, as we have the required knowledge. We have many responsibilities in our lives. They can be family (eg, care for your children), social (care for your neighbour), professional (care for your clients), spiritual (satisfying our conscience) and political (care for developing countries). Engineers have many responsibilities, but we always think of three of the more obvious:

- **Professional** – the responsibility that arises from a special knowledge;
- **Company** – these are our official or specified duties in our job; and
- **Legal** – those required by society.

We expect an engineer to behave in a professional manner at all times and to behave in a right and proper manner to our company, within the law of the land, to satisfy both our own morals and the employment contract. This standard or duty of care is an important legal obligation on engineers – society expects engineers to provide a professional and competent service, otherwise they may face litigation.

**“Responsibility: A detachable burden easily shifted to the shoulders of God, Fate, Fortune, Luck or one’s neighbour. In the days of astrology it was customary to unload it upon a star” – Ambrose Bierce, *The Devil’s Dictionary*, 1911.**

But engineers now have many responsibilities beyond these simplistic professional ones. When designing a component, conducting a calculation, or giving a view, we are making a decision and we have responsibilities to all stakeholders for those decisions – stakeholders include the engineer, the company they work for, the client they are making the decision for; and any person or environment that may be affected by this decision. Consequently, engineers in the oil and gas business carry a responsibility for any environmental damage caused by the business, and all people and cultures affected by the extraction of the oil and gas, including indigenous people.

Most engineers belong to professional organisations that give clear guidance on their responsibilities. The American Society of Mechanical Engineers says engineers should uphold and advance the integrity, honour and dignity of the engineering profession by:

- Using their knowledge and skill for the enhancement of human welfare;
- Being honest and impartial, and serving with fidelity the public, their employers and clients; and
- Striving to increase the competence and prestige of the engineering profession.

These fundamental responsibilities lead onto a set of fundamental rules (canons):

- Engineers shall hold paramount the safety, health and welfare of the public;
- Engineers shall perform services only in areas of their competence;
- Engineers shall continue their professional development throughout their careers and ... provide opportunities for the ... development of those engineers under their supervision;
- Engineers shall act in professional matters for each employer or client ... and shall avoid conflicts of interest;
- Engineers shall build their professional reputation on the merit of their services and shall not compete unfairly with others;
- Engineers shall associate only with reputable persons or organisations;
- Engineers shall issue public statements only in an objective and truthful manner; and
- Engineers shall consider environmental impact in ... their professional duties.

Clearly, the first rule is safety, but note the other responsibilities, including considering human welfare, dealing with reputable organisations (this would include governments) and impact on the environment.

### Linking responsibilities to ethics

Engineers’ responsibilities can be viewed as professional standards. Professional standards can be defined as morally permissible standards of conduct each member of some particular occupational group wants every other member of the group to follow, even if everyone else’s following them would mean having to follow them too.

Ethics is the conventional term in the US for professional standards; so responsibilities, professional standards and ethics are directly linked. Indeed, the Engineering Council in the UK under its *Roles and Responsibilities of Chartered Engineers* states that an engineer has “a responsibility to society with regard to safety, to their legal and contractual obligations, and for the ethical and environmental impact of their work.” This is important: the prime responsibilities of professional engineers are the safety of society, ethical behaviour and protecting the environment. This leads to a major ethical dilemma: should engineers work in an industry that damages the environment and obtains its products from regions that are unethical in their behaviour to their people and neighbours?

Many companies have ethics policies and statements. Additionally, companies must consider corporate social responsibility: the responsibility modern business organisations have to creating a healthy and prosperous society. Businesses can no longer work in isolation when products, services and activities can affect the lives of people in many ways, ranging from the creation of a safe and clean environment, through clean and careful production, to the creation of jobs and opportunities for all members of the community.

These responsibilities are reflected through ethical practice. It involves doing the right thing rather than the wrong one and is based on operating in a moral way. Ethical principles listed on a website or documented in an employee's handbook are of no use unless they are practised and understood by staff. Our responsibilities are reflected through ethical practice. In some countries, engineers are prohibited by a code of ethics from practising beyond their training and experience. Breaches of the code may be sufficient grounds for suspension, loss of licence, financial penalties, or even a jail sentence should negligence be shown to have played a part in any incident.

### Failing our responsibilities: negligence

Negligence is when an engineer's conduct is below the standard established by the laws of a land, for the protection of others against unreasonable risks of harm; and is also when we have fully considered the possible consequences of our actions, but failed to act reasonably to avoid the risk of harm to others. Any party seeking to recover damages for injury caused by these acts of negligence would need to demonstrate that an engineer or a company: owed a duty of care to that party; failed in this duty (was negligent); and this failure resulted in injury to that party or their property.

Engineers and companies can avoid claims of negligence if they can show that they have made all the preparations that a reasonable person in their position would recognise to prevent unreasonable risk. This due care could be demonstrated before any incident by: adherence to federal and state regulations; conforming with advisory standards; and private knowledge and conduct. A much easier way to avoid negligence claims is not to be negligent.

### The balance

All engineers have responsibilities, but their prime responsibility is to safety. They are bound by the legal system in their country of residence or operation, but must also satisfy the following criteria in all aspects of their work: professional (institutional requirements); legal (standard, or duty of care); and ethical (moral). So how can engineers ensure they are behaving in an ethical manner and for an ethical company?

The first thing is to understand your company's values: does it give good, fair value? Does it try and squeeze the biggest profit and look for gullible customers? Does it have an ethics policy and work to it? Does it apply its ethics policy globally, or selectively? Does it address all ethical issues, including controversial issues that may reflect badly on its own image? Does it appreciate the wide responsibilities it has to its stakeholders and allow open debate about these responsibilities? Does it recognise the consequences of the use of its products and address any damaging effects? and does it pursue solutions to ethical problems (for example, does an oil and gas major contribute to reducing climate change and ensure profits are spread to all stakeholders, however distant?).

The next thing engineers must do is check their own values in the workplace: integrity, honesty, charity. This is difficult, but guidance on responsibility and ethics can help:

- Is safety a prime focus and a clear business goal for the company?
- Does the company recognise its responsibilities to the environment?
- Does the company's human-welfare consideration extend to all other stakeholders?
- Does the company deal with reputable organisations and governments?
- Does line management act in a professional manner, and consider and challenge company policies if they are unfair, short-sighted, or unethical?
- Does management recognise mistakes, both at management and corporate level? and
- Do your bosses and colleagues have admirable human values?

The UK's New Economic Foundation has reviewed the profits recorded by the majors. It says: "The way we view economic success in the UK has become a fossil-fuelled fantasy. No accounting system with a hint of common sense would view profiting from a never-to-be-repeated natural asset as a good thing – even less so when it leads to climate-change chaos."



Engineers should not be against multinational companies making a profit, the expansion of their business, or to globalisation. The question is are these profits being accumulated in an ethical manner?

Other difficult issues facing engineers in the oil and gas business are opaque business practises and human-rights concerns in many of the countries we obtain our fuels from. The majors are addressing this problem; for example, BP has agreed with the government of Azerbaijan that both sides will ensure greater transparency over tax and royalty payments from the Baku-Tbilisi-Ceyhan oil pipeline. BP is also investing in agricultural programmes to help local communities, and helping local firms to bid for pipeline contracts.

An engineer working in the oil and gas business must consider all the above ethical issues and be convinced that – on balance – oil and gas, and the company they work for, contribute to the welfare of the people it affects and serves.

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