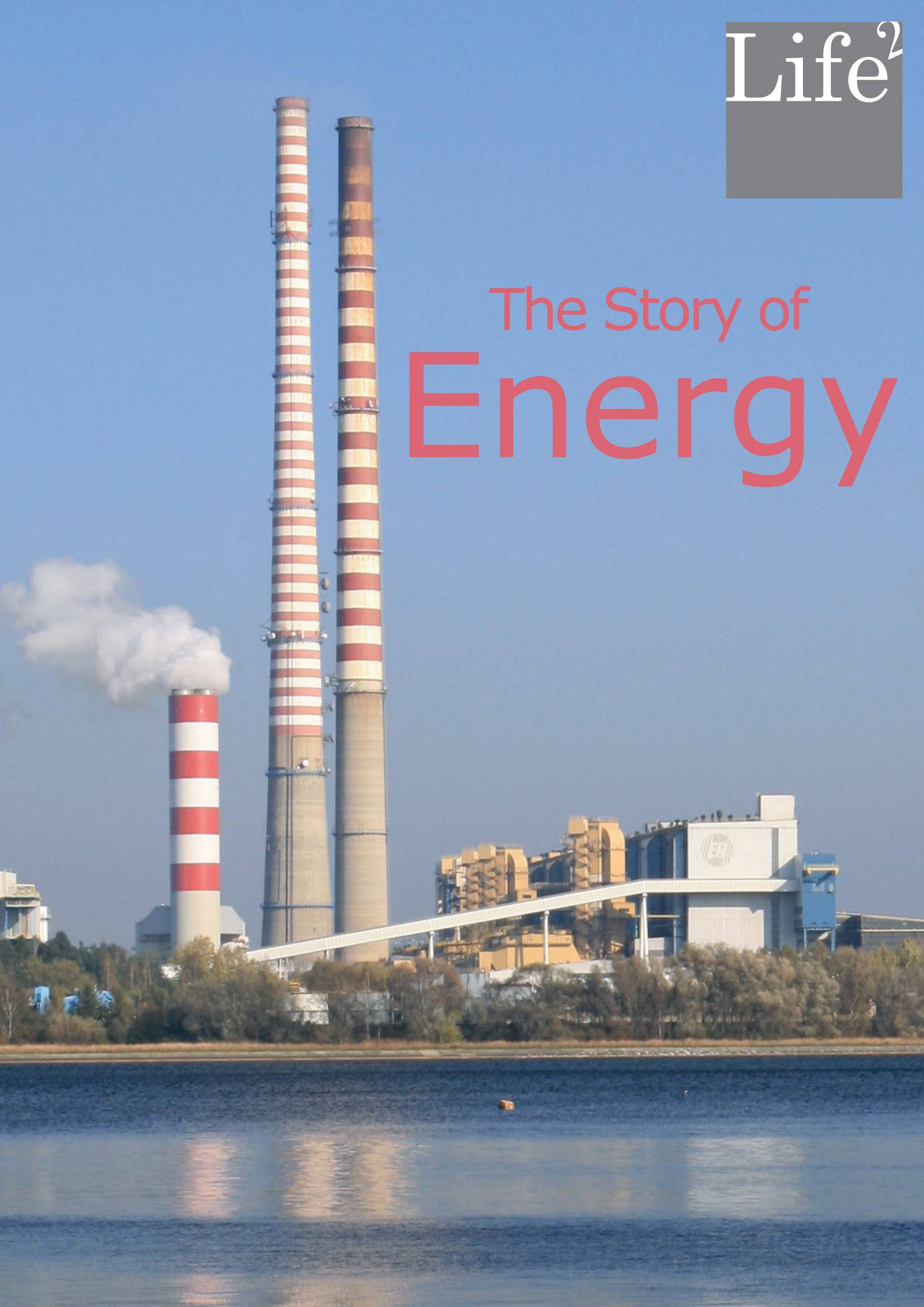
Life²

The Story of Energy



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We offer guides, courses, ideas and advice on a wide range of topics, from 'how to get involved in your community' through to 'how to choose your own pace of life', and from 'the problem with consumerism' through to 'how to be happy'.

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Introduction

This booklet, and the other items that accompany it in the Story of Energy project, arose because we at Life Squared believe that energy use is one of the most important topics facing human beings in the modern world, but it is also a large and complex topic, and most people need some help to understand it better.

Instead of being given this help however, we are bombarded with horror stories about rising energy bills, fuel poverty and peak oil as well as the seemingly insurmountable threats we face from climate change and other energy-related problems. We are then told to 'do our bit' to help address them - but the advice on how to do this often seems to consist of a series of minor actions (such as turning off your lights) that appear unlikely to make a difference in the great scheme of things - especially when politicians and businesses are failing to take enough meaningful action themselves.

In short, we face a range of serious energy problems as a species, and we're not having much success in addressing them - certainly not to the level that we need to in order to avoid serious consequences.

This booklet explores why we are finding it difficult to respond to our energy problems with the speed and level of change that we need and how we might respond to them more effectively. It provides a basic outline of the challenges we face (from global warming to our finite supply of certain sources of energy), the scale of the challenges and their potential consequences for us, but we don't go into technical detail about the problems or about energy use itself, as we want to focus the attention of this booklet on our response as human beings to these challenges. The majority of the booklet will therefore explore why we are having problems dealing with them and how we could deal with them as a society and in our own lives. The booklet aims to be neither optimistic nor pessimistic - just realistic.

The booklet is accompanied by a video, leaflet, wallchart and on-line resources that help you understand the story of energy and play your part in securing a better future for people and the planet.

Part 1 - The problems we face

Seeing the big picture

Over the last 30 years, human beings have experienced growing concern over energy-related issues. Some of the most worrying newspaper headlines in the last couple of decades have been related to energy issues - phrases like climate change, global warming, pollution, acid rain and peak oil have become common currency and have begun to represent issues that many people feel are just too big to solve.

They can also be complex issues, overlapping with both each other and other broader issues such as science, food, human development and military security, and it can be difficult to navigate through this complexity to really understand the bigger picture. This chapter aims to put the bigger picture in perspective, so that we can at least gain a reasonable view of the problems that we face - as we'll need this before we can find the best ways of dealing with them.

Growing energy use on a finite planet

Global energy use has risen nearly 70 percent since 1971 and is poised to continue its steady increase over the coming decades. Energy demand has risen at just over 2 percent per year for the past 25 years and will continue to climb at about this same rate over the next 15 years if current energy use patterns persist, according to the International Energy Agency (IEA).[i]

This wouldn't be a problem if the Earth didn't have limits - but it does. We only have one planet, with a finite range of resources available to us (sometimes called 'sources') and a finite capacity to absorb the waste from them once we've used them ('sinks').

Our growing energy use causes problems both on the supply side (having enough safe energy sources to accommodate our increasing global energy

demands) and on the disposal side (the effects of our energy use on the planet and other people).

So, our central problem is our growing energy use on a planet with finite sources and sinks, and how we can use the resources we have in the fairest way possible.

Problems with where we get our energy from

The key problem facing us in where we get our energy from is the limited availability of the main energy sources we currently rely on to fund our ever-increasing energy use.

As a species, we currently have access to a limited number of energy sources - at least, those that can supply anything like the levels of energy we're using at the moment. Below is a summary of our main energy options[ii]:

Source	% of current global use	Disadvantages	Advantages
Oil	33.5%	Addresses our energy needs	Running out, CO2 emissions
Coal and coke	26.8%	Addresses our energy needs	Running out, CO2 emissions
Gas	20.9%	Addresses our energy needs	Running out, CO2 emissions
Nuclear	5.8%	Low CO2 emissions	Safety concerns, cost and speed of setup
Hydropower	2.2%	Clean	Not enough capacity yet, cost/ speed of setup

As the table shows, we rely on oil, coal and gas (fossil fuels) for over 81% of our global energy needs. These resources took millions of years to form from ancient vegetation and we're using them up at such a rate that they are running out. There are disputes about how many reserves are still available – oil companies are getting better at extracting resources that previously were just too difficult to reach. But even with technological advances we're still using more fossil fuels than the planet can replace.

Our burning of these fossil fuels is also responsible for some of the biggest problems facing the world at present - as we will see in a later section. In summary, we desperately need to reduce our reliance on these particular resources.

The problem is that the alternatives to these main energy sources don't offer an easy solution to this problem. Some are expensive and carry safety concerns (e.g. nuclear energy), others aren't always predictable which can make it difficult to ensure we have a constant supply (e.g. wind energy) or they are simply not sufficiently well developed (e.g. tidal and wave power, hydrogen fuel cells) to replace existing resources very quickly.

It would therefore be difficult to replace oil and gas at the levels we demand and at the necessary speed even if we wanted to replace them (and some powerful people don't - as we will see later). And if we can't continue this uninterrupted supply of energy at the levels we are used to, our economies and our own lives could face a crisis very suddenly indeed - as they both depend on this supply of energy to run normally. You only have to see the panic buying at petrol stations in a truckers' dispute to get a sense of the speed and scale that a severe energy crisis could have.

Of course, one way to reduce the impact of this 'energy crash' scenario is to reduce our demand in the meantime, but the idea of reducing demand (beyond basic efficiency savings) appears to be anathema to most countries and businesses - and will remain so whilst the drive for economic growth remains the central aim of most countries on the planet. So, our energy crisis also challenges some of the basic beliefs on which we base our modern societies. But, for now, we have to assume that any solution to energy supply will have to involve an uninterrupted supply of the energy levels we are used to.

Our search for more energy resources is also leading to number of further problems - including the following:

- This scarcity of resources is leading to unease between countries. Many countries are making military and strategic decisions on the basis of securing an adequate energy supply in the future, and some people have already attributed some recent conflicts (such as the Iraq war) to the need to secure such resources.

- The price of energy increases as it becomes more scarce and this can impact on our own lives in a very basic way (i.e. we pay more for our energy), as well as causing further political tensions.

- Our search for resources is having an impact on the environment - whether it is drilling in the Arctic to find new oil reserves, 'fracking' gas to uncover reserves we previously could not get to, creating vast strip mines to extract petroleum from tar sands or damaging our views of the countryside with wind farms.

Finally, there is the issue of energy justice. Although some countries use massive amounts of energy, others are using very little indeed, and have very poor access to the energy they need. Some of these (such as Nigeria and Angola) are countries that are richest in energy deposits, but are choose to export them to richer countries rather than provide energy to their own populations. Whilst we in the West are profligate with our energy use, many people in poorer countries have very poor access to energy, which in turn leads to failures in economies, health issues and lack of development. To give a very simple example, when a family can't light their home, their children can't do their school work in the evening, which leads to poorer performance in education.[iii]

Problems with the effects of our energy use

We can now turn to the other set of problems in our energy crisis - the effects of our energy use.

The phrases climate change, global warming and the greenhouse effect each carry their own sense of dread, but essentially they refer to the same process - the fact that we're warming up the Earth's atmosphere by altering its chemical makeup, which could have serious consequences for the human population and life on earth.

We will not go into the details of this process in this booklet, as there are plenty of resources elsewhere that give simple summaries of it. At the most basic level though, CO2 (carbon dioxide) is the gas that contributes most to altering this chemical process and causing the atmosphere to warm.

Whilst CO2 emissions come from a variety of natural sources, human-related emissions are responsible for most of the increase that has occurred in the atmosphere since the industrial revolution.[iv] And the increase in recent years has been massive - the average temperature of the Earth's land has risen by 2.5F over the past 250 years, including an increase of 1.5 degrees over the most recent 50 years.[v]

It is the effects of this temperature rise that cause concern about climate change. We are already experiencing the following consequences of a warming planet:

"Glaciers everywhere are melting and disappearing fast—and they are a source of drinking water for hundreds of millions of people. Mosquitoes, who like a warmer world, are spreading into lots of new places, and bringing malaria and dengue fever with them. Drought is becoming much more common, making food harder to grow in many places. Sea levels have begun to rise, and scientists warn that they could go up as much as several meters this century. If that happens, many of the world's cities, island nations, and farmland will be underwater. The oceans are growing more acidic because of the CO2 they are absorbing, which makes it harder for animals like corals and clams to build and maintain their shells and skeletons. Coral reefs could start dissolving at an atmospheric CO2 concentration of 450-500 ppm. Along with increased intensity of extreme weather, such as hurricanes and blizzards, these impacts are combining to exacerbate conflicts and security issues in already resource-strapped regions."[vi]

It sounds like a scene from a disaster movie. But it doesn't take much increase in atmospheric temperature to cause significant changes on the planet - for example, one scientist has described the goal agreed in Copenhagen in 2009 to keep global temperature level rises below even 2 degrees Celsius as 'a prescription for disaster', as it could lead to the melting of a significant portion of the world's ice, *"because feedback mechanisms kick in; melting ice hastens the melting of even more ice, for example, and thawing permafrost emits methane that accelerates warming, prompting permafrost to thaw even more."*[vii]

The effect of climate change is exacerbated by the way we have been treating our planet's plant life. Trees and plants are the 'lungs' of the Earth's atmosphere. They convert CO2 into oxygen, and are therefore an important way of reducing the effects of our increased burning of fossil fuels. But we are cutting away the capacity of these lungs at an alarming

rate through deforestation, industrialisation and agriculture - among other things. For example, we lose an area of forest roughly the size of Costa Rica every year.[viii]

So that's the position on climate change, But our energy problems don't just end there, as CO2 and methane are not the only harmful by-products of our fossil fuel energy use - these also include oil spills, air pollution, waste - the list goes on...

Conclusion - the consequences we face

In summary, we face a number of serious consequences as a species from our energy crisis:

- If we can't replace our finite supplies of oil and gas quickly enough with more plentiful energy sources there could be an 'energy crash' which would cause massive disruption for the economy and major consequences for our lives. Unless we can massively reduce our energy consumption as a planet in the meantime, of course.

- Unless we can reduce our current usage levels of oil and gas by a massive amount and very quickly, we'll face huge environmental consequences, such as rising sea levels, which will change the face of the planet, our lives and human society.

Our challenge is therefore to change the mix of our energy sources to those that are more plentiful and have fewer negative effects on our planet, and to reduce our energy use to make this easier to achieve. We also need to do this within a very short timeframe. This is a difficult task. And as we will see later in Part 4, there are plenty of additional problems hampering our progress on this issue even further.

Part 2 - What needs to change?

Setting targets

Before we consider what steps we need to take to address our energy problems let us set out the targets that we need to reach in order to address these problems (or at least, to avoid some of the worst consequences discussed towards the end of the previous chapter).

Another problem that presents itself at this stage is that there is disagreement on what these targets should be - and if you think about it, this is the first thing that needs to change if we are to get somewhere. You can't successfully seek change without knowing what your targets for success actually are.

Below we set out some simple targets, but to keep things simple and brief we don't discuss the disagreements behind each of them.

- Reduce our CO2 emissions - in the 650,000 years since the end of the last ice age, the concentration of CO2 in the atmosphere has never exceeded 300ppm (parts per million) - until now. Many experts believe that a safe level of CO2 is 350ppm. The current level is around 397ppm - higher than at any time in human history. This is already having a disastrous impact - as we've already seen in the previous chapter

  James Hansen of NASA was one of the first scientists to warn about global warming more than two decades ago – his research indicates that "If humanity wishes to preserve a planet similar to that on which civilization developed and to which life on Earth is adapted, paleoclimate evidence and ongoing climate change suggest that CO2 will need to be reduced from its current 385ppm to at most 350ppm."[x] So, 350ppm is our target.

So how are we doing in meeting this target? In the UK, the Government has said that the UK is committed to reducing its greenhouse gas emissions by at least 80% by 2050, relative to 1990 levels. The last statistics available from the Department for Energy and Climate Change are from 2010 and indicate that we are making steps to that target – emissions are down 23% relative to 1990 levels. Much of this is due to energy efficiencies, better environmental standards on fossil-fuel power stations and closing old and polluting coal-fired stations. But this may not tell the whole story because many of the products we purchase in the UK come from other countries – meaning that, for at least some of our reductions, we've effectively "outsourced" our greenhouse gas emissions.

The government has produced a Carbon Plan to show how it will meet this 80% reduction target by 2050. The plan shows some initial changes we can make but is lacking in detail on how we can make the critical (but more difficult) reductions in later years towards 2050 that will get us to an 80% reduction. If we are to meet this target, it seems inevitable that this will require the public to changing their own behaviour and reduce their consumption levels - but this is something that most modern mainstream governments are unwilling to consider or put into policy.[xi]

- Find alternatives to fossil fuels, to avoid an energy crash - it's very difficult to set a target for a maximum level of fossil fuel usage by a particular date because no-one knows how much is out there.

  The European Union has set target a target of generating 20% of Europe's energy needs from renewable energy sources by 2020, but it is clear that this is nowhere near the proportion of energy we will need to gain from renewable sources if we are to avoid a crash and maintain a CO2 level of below 350ppm. The real target we need to reach for sources of non-fossil fuel energy is a lot higher.

- The UN has recognised that sustainable energy powers opportunity and that without it, it will be impossible to meet the Millennium Development Goals. To this end, the UN's Sustainable Energy for All initiative is striving for universal access to sustainable energy by 2030 – this means bringing modern energy to the world's poorest, improving energy efficiency and increasing renewable energy

production. Sustainable development isn't possible in the absence of sustainable energy – but the task is enormous given 1.3 billion people lack access to electricity.

Quite simply, we're struggling to meet any of these targets at the moment. Our energy use is actually set to increase over the coming decades, with the growth of industrial giants like China and India, and a global population that could reach 9 billion by 2050.

What needs to change?

So, broadly, what do we need to do to meet these targets? Below are some simple principles:

- **Find more sources of clean energy** - we clearly have to find a way of massively reducing our use of fossil fuel energy sources, and replacing these with cleaner sources. At present, it looks like only a vast programme of building nuclear power stations (supported by sustainable sources such as solar, wave and wind) could achieve this - and this would not happen quickly, as it takes up to 5 years to construct a nuclear power plant, in addition to the years of development and planning that needs to happen beforehand. Recently, two of the world's leading economies – Germany and Japan – have rejected any new nuclear power plants and in the UK, government subsidies may be needed to make the building of new nuclear power plants economically viable.

- **Reduce the effects of our energy use** - we need to minimise the negative effects of any energy source on other people and the rest of the planet. This is one area in which innovation and technology have the potential to help us.

- **Use less energy**. Some people argue that we will be able to solve our energy problems simply through technological advances in the future, but it is clear that this is wishful thinking. Even if we found a miracle energy source that could fulfil our unlimited energy needs, we would still face planetary limits to the other materials and things we consume and the waste we generate - so there's no escaping it - we have to reduce our footprint by using less. Here are some of the ways we can use less:

- **Reduce wastage** - we can reduce the amount we waste, both as individuals and in society generally.
- **Increase efficiency** - there is room for improvement in how we generate and supply our energy - for example, in the transportation of energy. If energy is generated closer to the point of use, there is less wasted in transporting it via power lines. Also, using waste heat from power stations for heating and cooling systems (in combined heat and power stations) can vastly increase the efficiencies of electricity generation – but this means siting power generation close to locations that can use the heat produced.
- **Reduce our population** - world population has multiplied by 7 times in the last 200 years, and is set to increase to 9 billion by 2050, and an increasing population puts even greater strain on the Earth's resources. One solution to the energy problem is therefore to maintain an optimum population, but many people see it as a human right to have our own choice about procreation so any suggestions about keeping an optimum population have always been controversial, ever since Thomas Malthus first discussed the topic in 1798. But the issue of population growth is primarily an economic one - if a nation has a stronger economy and education system then population growth becomes more stable. So, a fairer distribution of resources can help to stabilise population.
- **Simply reduce our use** - there's no escaping this point - much as we may try to avoid it in a world where the ability to consume and do as much as we like is seen as one of our key freedoms! This is the part of the process that is going to need real changes to the way we run our societies and institutions, as well as how we live our lives.

- **Have a fairer distribution of energy resources** - we need to ensure that there is fair access to the world's energy resources - primarily for moral reasons but also because it helps to deliver some of the other important points mentioned above.

- **Think differently** - overall we need to change the way we think about energy. We need to see it as one of the parameters we need to live within, and start acknowledging that there are actually

parameters we need to live within as a species if we are to sustain life in the way that we've got used to.

So, in conclusion, we will have to not only radically increase the proportion of cleaner energy sources but also clean up the energy we do use and use less energy in the first place. This last point is perhaps the most difficult to achieve of all.

One main target

In part 3 we will try to paint a picture of what would need to happen for these targets to be met at the quick speed necessary to avoid the worst of the consequences and what the world (and our lives) might look like if they were met. But before we do this, we need to bring these targets together into one simple, overall aim for the future.

Overall, and perverse as it seems given the size of the task we have already shown we face, we need to think bigger than solving just the energy crisis. The energy crisis is just one of several resource crises facing us as a planet. It is linked to, and sits alongside, a number of others that we face in relation to resources such as food and water. We need to address them all together.

This is about our whole lifestyle and the systems, assumptions and values that overarch our society - including the quest for constant economic growth. We need to think about how we can use and share resources in a fair and sustainable way on a finite planet with a growing population.

Overall, we therefore need just one target - one planet living. In other words, we need to live within the carrying capacity of the one planet we have.

Currently, as a species we use the equivalent of 1.5 planets.[xii] But our footprint varies around the world. Most developed nations have a vast footprint - e.g. if everyone lived like we do in the UK we'd need 3 planets and like the USA 5 planets, but many developing nations are also now on a path of development that could see their footprints (and thus the global footprint) rise dramatically too.

So, to refine the target - we need to live within the carrying capacity of the one planet we have - and do so in a way that is fair for everyone.

To bring things back to energy, our carbon footprint (i.e. level of carbon emissions) represents 54% percent of humanity's overall ecological footprint and is its most rapidly-growing component. Humanity's carbon footprint has increased 11-fold since 1961. So, to quote the Global Footprint Network: *"Reducing humanity's carbon footprint is the most essential step we can take to end overshoot and live within the means of our planet."*[xiii]

The remainder of this booklet will therefore look specifically at the role of energy within this overall 'one planet living' solution. Check out some of the resources on **www.lifesquared.org.uk** for more discussion of other areas of one planet living.

Part 3 - How might we change?

We clearly have some major changes to make. The goals we set in the previous section will require a radical change in the political and commercial infrastructures surrounding our lives, as well as our assumptions about the parameters we should live within. But despite this radical restructuring of principles and infrastructure, the everyday lives we lead are likely to be quite similar to those we currently have - they may well just eliminate some of our wastefulness and enable us to turn our attention to the things that are genuinely more important to us, rather than just consuming more.

In this section, we will look at a few of the things that will need to happen in our individual lives and society more generally if we are to meet the targets we set in part 3 quickly enough to avoid the worst consequences of our energy crisis.

In society

So, what needs to happen in society and globally? Answering this question in detail is one of the biggest problems with this issue because it is so complex - there may well be several ways in which the change we need could be achieved. It would be great to set a clear deadline for change with a clear list of things that need to be achieved but this is beyond the scope of this booklet- mainly because there are very few easily accessible materials currently available that provide this information.

We will therefore simply try to paint a picture of some of the things that would need to happen in governments, international institutions, companies and societies for sufficiently radical changes to be made in a short space of time. Later in the booklet we can then assess the chances of this happening.

- **A recognition that 'parameters trump economics'** - there would need to be a global recognition that we live within a specific set of

parameters as a species and that it is more important to live within these than to maintain infinite economic growth.

- **A changed attitude to regulation** - following on from the above point, we would need national and international institutions with the power to set and enforce binding international rules to ensure that countries, companies and all other institutions operated within the planet's parameters. To achieve this, companies would need to be as accountable as governments - something that has been long due since national governments ceded so much of their power to companies in the last 30 years. There would of course be economic and other consequences of this type of policy - some good and perhaps some bad - but they would not be anything like as bad as those that would emerge if we continued down the path of 'business as usual'.

- **A change in global infrastructure** - it would be unrealistic and foolish to think we could change back from today's globalised world to a pastoral idyll (which never actually existed in the first place). Our globalised, interconnected world is here to stay, but certain aspects of it would need to change, such as the inefficient, wasteful systems that transport energy, food and other items thousands of miles around the globe. These systems are based on their ability to generate profit and economic growth - and in a 'one planet living world' they would disappear, being replaced by a more self-sufficient approach to the supply of energy and other resources within every country, and if additional resources were needed from other countries they would be from efficient, relatively nearby sources.

- **A spirit of cooperation** - if change was to occur with any speed, there would need to be a combined effort on behalf of nations, institutions and corporations to reach a state of one planet living as quickly as possible, and a sense that 'we are all in this together' - rather like being allies together on a war footing.

- **A sense of fairness** - there would need to be a sense of fairness to any changes. For example, countries (like ours) with bigger footprints would need to reduce theirs to fit within the one-planet parameters, but countries with a much lower footprint should be

allowed to increase theirs to a higher level (within a one planet limit, of course). This sense of fairness would also need to be enshrined in the distribution of, and access to, energy resources, so that everyone on the planet had access to a fair (but not necessarily equal) supply.

Together, this point and the 'cooperation' point noted above are perhaps best realised in the model of 'contraction and convergence', which is a proposal originating in the early 1990's of how a global programme of greenhouse gas reduction could be introduced.[xiv]

Our individual lives

Considering the complexities involved in getting change in society, our individual lives may well be simpler to sort out than this - and we have more immediate control over these than we do society.

The infrastructure of society around us can have a big impact on our energy footprint as individuals, even if we feel we are living in a relatively 'green' way. Therefore, until we sort out society's contribution to the energy crisis, it is unlikely we will individually be able to claim to live 'one planet lives'. But this makes it no less important that we do strive to live these lives - as this puts the first piece of the puzzle in place for a one-planet future.

It is difficult to set out in this booklet exactly what a one-planet lifestyle might look like because even organisations that purport to tell us what such lives look like do not actually show us true one planet lifestyles! Instead, most tell us some basic steps of what we could do to improve our energy efficiency (such as insulating our homes) but fail to show what a truly 'one planet' life would really be like. There's a opportunity here for environmental organisations to take up and work on.

In the meantime, we suggest that our lives would look broadly like the one below if we were involved in one-planet living:

- Our houses would be well insulated.
- We'd gain energy from green sources or generate it ourselves.
- We'd fly very little (once a year or less).

- We'd travel less overall - instead we'd stay around our local communities more, which would strengthen them, and we would have more time to talk to each other.

- We'd use alternatives to the car whenever possible - like walking, cycling and public transport. Those of us who did have cars would have one small, fuel-efficient car per family - if we had one at all.

- Most of our food would be locally sourced (at least, within the UK) and we would eat meat rarely (perhaps once a week).

- We would buy less - of everything - from consumer goods to clothes. This doesn't mean we'd be poor - we'd just appreciate things more and recognise when we had enough of anything.

So, this is the type of society and lives we need if we are to deal with the energy crisis in the longer term. We can now explore what the barriers are to achieving these things.

Part 4 - Challenges to change

If the targets discussed in Part 2 are as important as they seem for the future of the planet and human beings, you might be asking why we are failing so miserably at changing our societies and behaviour to reach them? After all, we have the technology to produce ever more sophisticated gadgets and the capacity to produce mass social change on some issues (such as civil rights), so why is it so hard to produce change in our energy use - one of the most important issues of all for humans?

This section considers this question, both at an individual level and a broader societal/global level. We'll see that it may simply be difficult to influence large enough numbers of people to change their behaviour on this type of issue even at an individual level, let alone at a group, societal or global level where many other forces are at work.

Individual level

To date, most of us (including people with the best intentions) have failed to make enough changes to our lives to sufficiently reduce and improve our energy use to the levels needed for a safe future outlined in part 2. Outlined below are some reasons why we might be finding this so difficult:

- **Our makeup as creatures** - there are several psychological issues that influence our capacity for change in issues like energy use. For example, it is difficult to convince people to make short term sacrifices in exchange for medium term rewards, especially when those rewards are intangible at best. People are also much more sensitive to things being taken away from them than being given to them. So, it's hard to make them accept the idea that they'll need to cut back on the possessions and lifestyles that they've currently got.

- **Our lack of knowledge** - the world has changed enormously from a couple of centuries ago - our radius of impact as individuals has

increased enormously and the world has become massively more complex. Together these things make it hard to navigate life as an individual wanting to behave ethically, and the energy crisis is a good example of this. The chain of impacts in our energy use is very complex and most people don't know about them. So, ignorance is one barrier to change. And hopefully initiatives like this Story of Energy project will help to address this point in a small way.

- **The problem seems too big** - this a major issue for our species and individuals may well feel that they are unlikely to be able to make an impact on their own. This feeling of helplessness and/or lethargy is exacerbated by the fact that we see very few of the people and groups with the biggest energy footprint (such as governments, companies) doing anything to reduce theirs - so one might well feel 'why should I bother?'.

- **It is hard to see what we need to do** - the issue is complex and the problem is big - but the guidance and instruction we have been given to respond to these issues has been relatively poor up to now. Organisations seeking change on this issue (such as environmental charities) have raised awareness about these problems but have generally failed to help people understand them or prioritise the actions they can take to deal with this issue most effectively.

  Having said this, it is difficult to prioritise the actions we should take to deal with this issue. nevertheless, organisations seeking change have not helped people to do this very effectively.

- **The society we live in (and the pressures acting on us)** - the factors above would be significant barriers to change on their own. But their effect is intensified by the values of the society we live in, and their influence on us - from the consumerist need to have more stuff through to the opportunity to fly cheaply and easily to any exotic destination we wish. Most of the central driving philosophies behind modern society (e.g. 'consume more, get richer, live faster and be more productive with your time') directly oppose the need to reduce and be more efficient with our energy use. Each of us receives thousands of messages each day that reinforce these ideas - and this can have a strong influence on the way we see the world and behave - whether we are aware of it or not.[xv]

Societal/global level

Given the points identified above, it appears to be a major challenge for us to make the changes necessary to meet the energy targets set out in part 2 - even in our own lives. And there are even more barriers to making this change happen at the wider level societal and global level. Below are a few of them:

- **We rely on these resources** - countries depend on these energy resources for economic growth and to supply the needs of their populations. The priority for any government is to protect and address the needs of their citizens, so maintaining the supply of energy is likely to considerably more important for them than a long-term issue like changing or reducing the energy supply - until the latter becomes an issue of national importance - such as when the supply is under threat or a catastrophe takes place.

- **The structure of our world** - the world is split into independent countries with their own needs and interests - just like individual people. So, some of the problems at international level can be similar to those at national level - i.e. if you're trying to make decisions democratically, you have to be prepared for others not to agree with you and for change to be slow.

  Countries feel they need to protect their own interests, and in any international decision making, agreement has to be reached on a number of contentious issues where national interests often place different countries in opposing positions. Even if a number of countries did want to reduce or change their energy use, others (such as China) would continue to demand increasingly massive levels of fossil fuel resources to fuel their economic growth and changing lifestyles.

- **It takes time** - even if you look at the successes we've seen in voluntary human change - such as the US civil rights movement - these things take decades to achieve. And the scale of global change required for our energy crisis is greater than any other issue in memory.

There is a relatively recent instance of large numbers of people changing very quickly to lead more modest lifestyles but this was enforced rather than voluntary - during the rationing of the Second World War. But there was a sense of being under immediate threat against a terrifying enemy and a desire to come together to fight it which led people to accept hardships. Of course, the current energy situation is completely different from World War 2, but that experience does offer up some interesting ideas of what conditions would need to be in place to make mass change (in the form of a perceived 'sacrifice' of lifestyle) on this issue possible and acceptable.

- **Growing populations** - the world population continues to grow - in 1900 it stood at 1.6 billion people - now, just over a century later, it is around 7 billion and is forecast to reach 9 billion by 2050. Each of these new people creates further demand for energy.

- **Embedded ideas and a lack of perspective** - we're used to our current living standards and most of us feel a sense of entitlement that we should be able to maintain these living standards - as well as the amounts of energy that they require. We also generally lack perspective on the consequences of our current use, the scale of our current use and the transient nature of this profligate phase of our energy use.

- **Political systems** - most societies in the modern world place a high value on the freedom of the individual, and use the model of democracy as their political structure in order to reflect this and give everyone an equal say in how their society is run. To most modern minds, this is a positive thing, but giving people an equal say (in theory) means giving different views an equal say, and therefore any view (however urgent or valid - like the need for less energy use) has to compete against differing views and there is no guarantee it will 'succeed' against them. So, although they are useful and important in many ways, democracies can make it very difficult to gain change quickly.

- **Modern politics** - the above factor is exacerbated by a characteristic of modern politics - the tendency of the main parties to base their policies on what they think the public want rather than offering any real sense of moral and principled leadership on issues. They

are reactive rather than proactive. Whereas in the past, a party might have bravely developed a very strong sustainable energy policy because it felt it to be important (even though it might be controversial), parties are now focussed on hoovering up votes in order to stay in power. Thus short term thinking wins at the expense of longer term issues.

- **Cultural ideas and orthodoxies** - the likelihood of finding a public that is strongly engaged in these issues and would call for these changes is unlikely at the moment, because we are all so immersed in an individualistic and consumerist culture at an individual level, as we argued earlier. At a broader level, ideas such as free market economics and the need for continued economic growth at all costs continue to set the agenda for how the modern world works. Against such a background, calls for reducing energy use, regulation of energy and more sustainable energy sources tend to fall on deaf ears, or are met with tokenistic gestures at best.

- **International institutions** - moving now from the national to the international level, the United Nations and the European Union have been instrumental in developing international policy on climate change. But this isn't an easy process.

  Some members of the United Nations – including one of the biggest energy users, the USA - refused to sign up to the Kyoto protocol aimed at reducing carbon emissions. Meanwhile developing nations find it difficult to accept limits on their carbon emissions which could hinder their economic development, particularly so when countries like the UK and Germany have been burning fossil fuels unchecked for centuries and have reaped the economic benefits of this behaviour. Entrenched positions between nations have meant recent climate negotiations have reached stalemate.

  Here is how George Monbiot described the declaration that emerged from the 2012 Earth Summit: *"There is nothing to work with here, no programme, no sense of urgency or call for concrete action beyond the inadequate measures already agreed in previous flaccid declarations."*[xvi]

  Not only are the international agreements themselves difficult to pin down, but they are also difficult to enforce. Once again this is partly

due to the democratic structures around us - institutions like the UN aren't meant to act as 'police' but as bodies to gain compromise between nations. This again is a positive thing in many ways but can lead to difficulties in gaining quick action on issues like the energy crisis. It would need political will from the majority of nations to push significant climate agreements through, and enforce them properly.

- **A shift in the balance of power** - in addition to the problems with international institutions and agreements outlined above, there is another issue - the fact that many of the biggest consumers and users of energy - i.e. multinational companies - sit outside the regulatory parameters of these agreements. Although some companies might be genuinely trying to tackle their energy issues, there is currently insufficient regulation or power of enforcement (except the power of consumers and shareholders) to ensure large organisations play a sufficient part in changing our relationship with energy.

- **Interest groups** - some people can't agree that there is a problem with our energy use in the first place, nor what the contributing problems are, how important they are or the level of change needed. This can confuse the debate and slow down progress in dealing with the energy crisis - and this is exactly what some interest groups want. A number of wealthy and powerful interest groups exist who don't want us to replace or reduce our energy resources because they make a lot of money from supplying them. These could include energy-rich countries and groups lobbying on behalf of multinational energy organisations. Such groups can have a powerful influence over energy policy.

Broad conclusion

So, given where we are now in our energy situation, as well as where we need to get to and the challenges that face us in getting there, what are our chances of getting the level of change we need within the quick timescales required to avoid serious consequences?

Most of the points we noted at an individual level in Part 3 as to what our lives might look like in a 'one-planet' future don't look too onerous - for example, having a well-insulated house isn't going to cramp our

style - but the sticking point is going to be getting people to pull back on the amount they consume and to restrict themselves from some of the freedoms they currently enjoy, such as unlimited air flight.

In a democratic world (which we largely live in) the will of the people is going to be an important factor in determining whether action takes place and how quickly it takes place - whether it is being prepared to accept regulation imposed by governments, voting for parties with greener policies or being prepared to make voluntary changes in their own lives.

Public opinion (and indeed the opinion of global leaders) needs to change completely so that we see these things not as impositions on our freedom and lifestyles but as important steps towards a better future - one in which we avoid catastrophe and in which we can ultimately also live better lives - in fact, it's a chance for us to remind ourselves what really matters in life.

But neither the 'avoiding catastrophe' nor 'better life' arguments are currently convincing enough for most people living in western societies who are living without any limits, surrounded by the trappings of consumerist life, even though many can see effects of climate change and aren't being made any happier by their 3-planet lives.

So, it looks like it will be very difficult to swing public opinion enough and quickly enough to convince people to change in this way - unless there is a major, catastrophic event that provides a global reality check of the possible consequences of climate change - and that makes the 'avoiding catastrophe' and 'better life' arguments more convincing to people.

And what about our broader prospects for change? As a species, we tend to overshoot things and then eventually bring them back to a state of equilibrium - but the question is whether we have the time to make this overshoot and pull it back to a safe place on this occasion. Clearly, damage has already been done and we've not seen the effects of some of it yet. All we can do is take action now and hope that it will help us to avoid the worst effects.

Taking a broader view of human beings and the earth, we've not been here all that long as a species and there's nothing to suggest we will

survive untouched by major catastrophes in the way that we want to. We have some capacity for self-determination that other animals don't have but the latest scientific thinking seems to suggest that much of our behaviour is not rational, so we are less in control of our own destinies than we may think. Perhaps we have overestimated our capacity to deal with the energy issues we face - even as individuals.

At a group and global level there are even more factors that could further reduce our capacity to respond quickly to our energy crisis, including human group dynamics, cultural forces and the political systems we have carefully crafted over the years to serve us.

With all this in mind, it seems unlikely that we will be able to act quickly or radically enough to reverse our global CO2 emissions to a safe level through our own global behaviour change, as no major political party or national government is likely to sanction radical enough steps unless certain scenarios happen - for example:

- A very wealthy/powerful/influential individual or group of them invests in a massive public advertising campaign to change public opinion on this issue and rally people to lobby their politicians - to such a level that parties will change their policies on energy to a radical level. This is a highly unlikely eventuality.

- A catastrophe occurs that significantly changes public opinion and prompts governments and corporations to override immediate economic needs and take coherent, global action - rather like 'getting onto a war footing'. This seems to be the most likely scenario to achieve fast, large scale change - but it is likely to involve major negative consequences of its own so it is far from ideal.

In our view, the most likely scenario is therefore not the hope of instant, major global behaviour change, but a continuation of 'business as usual' - occasional progress and frequent setbacks as the issue of our energy crisis remains secondary to the desire to maintain our existing lifestyles and political systems. This seems likely to continue until a major event occurs to make governments, companies and individuals quickly pursue a more radical path of change. This is a frustrating alternative to the hope of speedy, major change under our own volition but sadly it seems to be the most realistic scenario.

This may not be a particularly precise or optimistic picture, but we feel it is realistic. But the message of this project is that we should still keep striving and taking action to do something now. Partly because each of us can make our lives better by moving towards one planet living in our own lives. Also, because those of us who 'get it' and care about it should be showing other people the way - if we don't take action ourselves, why should we expect anyone else to?

There is also a growing movement of people around the world who do 'get it' so remember you are not alone! And they are doing some exciting things on a range of topics from energy to food to building stronger communities - all aiming to seek a more sustainable, better world. These organisations include Transition Towns, Slow Food, the New Economics Foundation and many others. See **www.lifesquared.org.uk** for more details of these, and other, organisations.

Also, from a practical perspective of taking action on these issues, we now live in a different world. The internet and social media have brought the potential to gain greater transparency in organisations and governments, as well as more opportunities to hold these bodies to account, through mass campaigning and mobilisation of people.

And a final reason to be taking action with commitment and enthusiasm is because of hope - perhaps an unprecedented change in public opinion and behaviour can be achieved when enough of us take action.

Part 5 - What we can do as individuals

We can take a number of actions in our own lives to improve our energy use, but to make the critical extra difference we each need to go beyond just 'putting our own house in order' - we also need to make the effort to influence other people - including those with a much greater impact and influence, such as companies and governments. So, the actions below focus on this two-stage approach.

When you're taking these actions, the amount of drive and passion you put in will be critical in convincing others - so get stuck in and don't take 'no' for an answer!

Actions in our own lives

1. **Use and waste less energy** - there are a wide range of things we can do to use less energy - from insulating our houses to buying local, seasonal produce that requires less energy to grow and transport it. See **www.lifesquared.org.uk/SOE** for more ideas and links. Make sure you prioritise the steps that will make most difference to your energy use. See our 'What can I do?' leaflet for more details on this.

2. **Buy less stuff** - "The number of electrical appliances, products and gadgets people typically own has trebled since the 1970s. Although these appliances have been getting more efficient, electricity consumption from domestic appliances doubled between 1970 and 2002."[xvii] So, let's buy less of them.

   In particular, be aware of your gadget use - devices such as plasma televisions, high-end PCs and mobile phones are pushing up our consumption of energy. They currently account for 25% of the electricity used by UK households and projections by the Energy Savings Trust (EST) show this will rise to around 45% by 2020.[xviii]

3. **Switch to a green energy provider** - don't just switch to any green energy tariff - be sure to ask the provider how your tariff works - will it be a green supply tariff or will it be contributing to a green fund to support new renewable energy developments?

4. **Cure yourself of the modern disease** - if we ignore the very modern trend for doing things quickly and for hyper-mobility we could not only have better, more fulfiling, calmer lives but we could also seriously reduce our energy use. If we grow up and stop rushing around, we can become more comfortable with ourselves and our localities. We can travel less and when we do travel it could be on slower, more sustainable transport where we enjoy the journey.

5. **Generate your own energy** - think about whether you can become your own energy source, whether by generating your own electricity from solar PV panels or heating your home through ground-sourced heating. If this isn't an option, think about whether there are opportunities for community energy generation – there are some great examples of communities coming together to build wind turbines, solar farms and hydro projects which power their own communities and generate revenues to reinvest in their neighbourhoods.

Actions to influence others

6. **Influence your workplace** - a great place to start influencing other people is your workplace, as this could achieve a big impact. Talk to your manager and senior management about the issues raised by the Story of Energy and what the organisation could do to improve its energy use and energy policies - from reducing its energy use in various areas to using greener energy sources. Speak to your colleagues about the issues and work with them to influence change at your workplace.

7. **Take action online** - join Avaazz, 38 Degrees and other mass-action campaigning organisations, as these are simple ways to add your voice to a large, influential audience on specific issues like energy and the environment. And don't just join - be an active online campaigner.

8. **Influence politicians** - write to your MP and other politicians to get them to take action on the issue of energy. You can use resources like **www.theyworkforyou.com** to find out who your MP is and what they've been saying and voting on in Parliament, and use **www.writetothem.com** to make direct contact with them. Also, most important of all - vote for candidates with a bold, clear-sighted approach to energy use.

9. **Influence companies** - you can use your influence as a consumer in a range of ways to push companies for change. You can boycott companies that have bad policies and records on energy use - and make sure you tell them you're doing this. Conversely, you can actively choose companies with good energy policies - and again, tell them to keep up the good work. Get in contact with influential companies to tell them the role they should be playing in securing a better, more sustainable future for our energy use.

10. **Influence individuals** - whilst you're undertaking all the points above, make sure you're telling as many friends, family, colleagues and other contacts about them as possible. Help to build people's interest and awareness in these issues. You can start by telling everyone you know about the resources in The Story of Energy and get them to understand the issue for themselves and decide if they want to take action. Spread the word!

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The Story of Energy

Energy is critical to our modern lives. But our increasing demand for it has created a range of political, social and environmental problems. This booklet gives an accessible, no-nonsense overview of what these problems are, what level and type of change is needed (both globally and in our own lives) to solve them, why it is proving so difficult to get this change and how we might achieve the change we need - both as a society and as individuals.

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