

LNG	liquid natural gas
NGO	non-governmental organization
NICE	Nuclear Information Committee Europe
NPT	Nuclear Non-Proliferation Treaty
OECD	Organisation for Economic Co-operation and Development
OPEC	Organization of the Petroleum Exporting Countries
OPURE	Open University for Renewable Energies
PV	photovoltaic
PV-GAP	Photovoltaic Global Accreditation Programme
R&D	research and development
RECS	Renewable Energy Certification System
RFF	Resources for the Future
ROC	Renewable Obligation Certificate
RPS	Renewable Energy Portfolio Standard
SEI	Strategic Environment Initiative
START	Strategic Arms Reduction Treaty
TEHG	Treibhausgas-Emissionshandelsgesetz (Greenhouse Gas Emissions Trading Law)
toe	tons of oil equivalent
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Education, Scientific and Cultural Organization
UNIDO	United Nations Industrial Development Organization
VDMA	Verband der deutschen Maschinen- und Anlagenindustrie (German Engineering Federation)
WCRE	World Council for Renewable Energy
WEC	World Energy Conference
WHO	World Health Organization
WSSD	World Summit on Sustainable Development
WTO	World Trade Organization
WWF	World Wide Fund for Nature

From Scherer, Hermann  
Energy Autonomy

## Introduction

# Renewable Energy: The Deceptive Global Consensus

*The method of physics is only of concern to physicists, its impact concerns everyone. What concerns everyone is something only all of us can solve.*

Friedrich Dürrenmatt, *The Physicists*<sup>1</sup>

It seemed as if the new global consensus on renewable energy had been sealed. Early in June 2004, delegates from 154 national governments to the international conference, Renewables 2004, had converged on the city of Bonn, where they passed a 'Political Declaration' and an 'Action Program'. They had been invited there by Gerhard Schroeder in 2002, when the German Chancellor delivered his speech to the UN World Summit on Sustainable Development in Johannesburg. The fact that one of the three largest industrial countries in the world economy had seized this initiative seemed to signal a long-overdue recognition of renewable energy as a grand political theme. A sense of euphoria suffused and enveloped the more than 4000 participants in this cluster of meetings: now nobody can stop the global onset of renewable energy. Germany's Environment Minister Juergen Trittin declared: 'The age of renewable energy has begun.'

Optimism is a psychological drive conducive to motivating oneself and others. Yet it all too easily tempts people into autosuggestion, clouds their view of contrary developments, and lulls them into a false sense of security. In fact, current growth rates



for fossil energy usage remain significantly higher than growth rates for renewable energy resources in active use. In 1990, according to the International Energy Agency,<sup>2</sup> global consumption of fossil energy resources (petroleum, coal, natural gas) came to 5.63 billion (5,630,000,000) metric 'tons of oil equivalents' (the metric 'toe' is the conventional international unit of measurement for all forms of energy); in 2002 it was already 8.13 billion tons, which corresponds to an increase of 44 per cent in just 12 years. In 2003 and 2004, two years for which global statistics are still incomplete, we can expect the figures to show additional growth in the consumption of fossil fuels. Ten global conferences on the politics of climate protection that took place between 1995 and 2002 have not been able to change a single thing about this development: the world's fossil energy consumption grew more rapidly than ever before. In the same period, the share of renewable energy increased from 1.04 to 1.38 billion metric toe, in other words, by 33 per cent. The difference between the use of fossil and renewable energy expanded in just 12 years from 4.59 to 6.74 billion tons. Only when the employment of both fossil and atomic energy actually and irreversibly shrinks in favour of renewable energy will the age of renewable energy have commenced.

Even now that the internationally celebrated Kyoto Protocol on global climate protection has come into force (on 16 February 2005), this disastrous trend is not being reversed. Although the Intergovernmental Panel on Climate Change (IPCC), the official circle of scientific experts advising global climate conferences, regards a 60 per cent reduction of greenhouse gases by 2050 against the base year of 1990 as urgent, the Protocol obligates the industrial countries who are signatories to reduce no more than 5 per cent annually until 2012. But since the US, whose 5 per cent of the world's population consumes 25 per cent of the fossil energy supply, rejects this obligation, and since the developing countries are exempt (including the major growth societies of China and India, who jointly make up a third of the world's population), greenhouse gas emissions are still going to rise sharply even if the Kyoto Protocol were to be implemented (which remains a dubious prospect).

These numbers reveal how the world is heading at breakneck speed towards a debacle. But they also reveal how badly the 'fire brigade' of renewable energy is limping behind this alarming development – because it is so poorly equipped, with trucks that are too slow and a shortage of fire-fighting personnel and hoses. Initiatives for renewable energy lack the radical dynamism needed to match actual dangers. If an immediate and comprehensive shift towards renewable energy is going to take place, additional time is too precious to be squandered.

The clock for the traditional energy system keeps ticking louder. Yet the influence of the established energy corporations has actually grown, and their profound disregard for renewable energy has barely changed. Currently they are mobilizing on an international scale for a 'renaissance' in nuclear energy and for exhausting fossil energy reserves down to their last dregs. The energy corporations seem to be acting in line with that sarcastic remark made by the Polish satirist Stanisław Lec: 'It's true that we're on the wrong track, but we're compensating for this shortcoming by accelerating'. Even Renewables 2004 has not produced any change in the trend. In order to avoid jeopardizing the semblance of a new global consensus, nobody wanted to acknowledge that, in spite of all the rhetorical lip service, there has only been fragmentary progress in overcoming resistance to renewable energy. For the most part, the resistance persists, and to some extent it is even on the rise.

That resistance was signalled in exemplary fashion by two international conferences that took place after Renewables 2004 and that attracted considerably more attention in the international media. Both conferences aimed at a massive 'roll-on' for nuclear and fossil energy and a roll-back of renewable energy. Early in the summer of 2004, the international nuclear community convened in Moscow under the slogan 'Fifty Years of Nuclear Power – the Next Fifty Years'. At this conference the International Atomic Energy Agency declared that there would be twice as many nuclear power plants by 2030 – and four times as many by 2050 – as today. Later that summer, the World Energy Conference (WEC – which represents nuclear and fossil fuel power business internationally) convened in Sydney, Australia. It conveyed the message that there was no way to avoid



increasing fossil energy consumption by 85 per cent by 2050, and that nuclear energy would have to be ranked higher in the future than any variety of renewable energy, which by the same date would only be able to contribute at most 10 per cent of world energy supplies (in other words, less than today). The Sydney Conference based its predictions on the *World Energy Outlook 2004*<sup>3</sup> of the International Energy Agency (IEA), an organization of the OECD countries. The IEA mentions US\$16 trillion of essential energy investments between 2001 and 2030, in other words, US\$550 billion annually, which would have to flow overwhelmingly into the provision of fossil energy.

In the international discussion about energy, there is a greater tendency for the year 2004 to symbolize a worldwide attempt at giving nuclear energy the chance to make a comeback than for that year to signal a breakthrough to renewable energy. To be sure, UK Prime Minister Tony Blair broadcast a video at the Renewables 2004 conference in which he waxed enthusiastic about renewable energy and displayed a determination to lower energy emissions in his country 60 per cent by the year 2050. Environmental organizations worldwide rewarded him with applause but overlooked that Blair was banking more on the expansion of nuclear energy than on renewable energy. Meanwhile, even the internationally renowned ecologist James Lovelock – in a spectacular article in the UK newspaper *The Independent*<sup>4</sup> headlined 'Nuclear energy is the only green solution' – has become a prominent witness for the prosecution advocating a massive expansion of nuclear energy, ostensibly because this would be the only way to avert the threat of global climate change. Although the Commission of the European Union is also not lacking in rhetoric favourable to renewable energy, in practice it has intensively renewed its nuclear orientation. According to a proposal of the EU Commission, the budget for the EURATOM authority, which is under the Commission's purview, is meant to be nearly tripled, and in December 2004 the EU concluded a comprehensive nuclear treaty with China. The Turkish government has promised France that it will order three nuclear reactors with a total capacity of 4500 megawatts; rumour has it that this was done in return for French support of Turkish EU membership. Even at the level of the G8 (the

club of the major Western economic powers plus Russia, which was added to this circle in the 1990s), coordinated action on behalf of nuclear energy is on the agenda. This is something President Bush announced in a speech at the National Small Business Conference on 27 April 2005.<sup>5</sup> That the Bush initiative has a good prospect of success within the circle of the G8 can be seen not only by Blair's vote, but also on the basis of the pro-nuclear priorities of the French, Russian and Japanese governments. The parties in opposition to Chancellor Schroeder's ruling coalition in Germany likewise announced that, if there is a change of government in Berlin, they would cancel the 2001 decision to phase out nuclear energy and attempt to end the so-called 'overstrain' of renewable energy.

Every action provokes a counteraction, yet many advocates of renewable energy are unable either to perceive or take seriously how the forces opposing renewable energy within the established energy system have been fortifying their international line-up. By no means have those decades-long conflicts over energy become pointless all of a sudden. For the stakes in the shift to renewable energy involve nothing less than the most thorough and far-reaching structural change since the beginning of the Industrial Revolution. Only the naive can believe that this change can be achieved without friction and in agreement with the institutions responsible for traditional energy supplies, or even on the basis of common values. The 'energy business' complex is, after all, the largest and politically most influential sector in the world economy. Its resistance to renewable energy will grow to the same degree as the mobilization of the latter has progressed, to the point where renewable energy can not only supplement the supply of nuclear and fossil energy but actually start replacing non-renewable energy.

### Unstoppable onset or danger of relapse?

In every discussion about energy, displaying sympathy for renewable energy has become a matter of good form. But this says nothing about the value actually placed on renewable energy: is it in first, second or third place, or is this just a hypocritical priority? For with every increase in the number of those seriously



advocating renewable energy, there is a parallel rise in the amount of lip service and excuses, which is why, all too frequently, words are not followed by deeds. At the same time, never before has there been such a persuasive case justifying a new energy option. Never has a new energy technology been illuminated down to the last detail, so that sceptical questions can be answered and notoriously dissipated disinformation be countered. Never before has there been a perspective on energy with so many advantages for society, well beyond the immediate concerns of energy supplies and environmental protection. By this standard, strategic priorities should long ago have been initiated in order to help renewable energy achieve a broad-based breakthrough and take action against the forces opposing it – whether in politics, private business or science.

But only recently have efforts been initiated taking this urgent requirement into account. Germany, facilitated by the Renewable Energy Sources Act (the Act on the Priority of Renewable Energy or Gesetz für den Vorrang erneuerbarer Energien – best known in Germany as the Erneuerbare-Energien-Gesetz or EEG), now has the world's largest growth rate for electricity production from renewable energy – not counting traditional hydropower from dams – of 3000 megawatts in new capacity annually. In no time at all, numerous new businesses were established, like the wind power facility producer Enercon, Solar World AG or the Solarfabrik Freiburg. This was a breakthrough that recalled the era of great industrial start-ups in the 19th century, when handicraft operations were turned into global enterprises. In 2002 the EU decided – in an admittedly non-binding recommendation – that renewable energy in its member states should account for a share of 12.5 per cent of energy supplies by 2010. By 2020, California wants to cover a third of its energy needs with renewable energy. In China, in just a few years, over 50 million square metres of solar collectives have been installed, with annual growth rates at present of 12 million square metres, and early in 2005 China passed a Renewable Energy Sources Act that, like Germany's EEG, contains a provision for electricity input at guaranteed prices. Spain is on the verge of making solar installations legally binding for all new buildings. Japan is the world market leader in solar

cell production and is developing a variety of new application technologies. Brazil is activating its programme for bio-fuels and is about to make the flex-fuel vehicle – which can use up to 85 per cent bio-alcohol in fuel – standard. Swedish cities have converted their bus operations completely to bio-fuels. Austria has increased its share of biomass in energy supplies since the start of the 1970s from 10 per cent to over 20 per cent. Cities like Los Angeles, New York, Chicago and San Francisco have started ambitious solar programmes. A growing number of small cities and counties have introduced initiatives to supply themselves completely with renewable energy. The new World Trade Center in New York will draw a major portion of its electrical consumption from wind rotors integrated into the building. The Reichstag in Berlin, the parliamentary building for the German Bundestag, is already being supplied up to 85 per cent with renewable energy from facilities inside the building. The number of 'solar home' systems in rural areas of developing countries has jumped up sharply. Within just five years, the Indian organization, West Bengal Renewable Energy Development, has outfitted complete villages, populated by a total of over 300,000 inhabitants, with solar energy facilities that are going to be financed by the villagers themselves, who will also be paying for the total electricity supply. These examples illustrate that nuclear and fossil energy supplies need no longer be swallowed as something that is 'unfortunately unavoidable'. They illuminate quite concretely the prospects for getting along without nuclear and fossil energy.

Even the economic interest is constantly growing. The number of conferences on renewable energy has become vast. Environmental and development organizations are emphasizing the value of renewable energy. There has been a jump in student interest. Development banks are elaborating financing concepts. In the agricultural sector there is a growing recognition of the prospects offered by the production of bio-energy. In 2002 the World Congress of Architecture convened in Berlin under the slogan 'Resource Architecture' in order to draw attention to solar building. Along with the founding of new firms, major companies are also reporting their entry into the business of renewable energy. Energy and technology corporations like Shell



and BP, General Electric and Siemens have become active in the production of wind power installations. Car companies like Daimler-Chrysler, Ford and Volkswagen profess their faith in bio-fuels as an alternative to fossil fuels. Daimler-Chrysler devoted its 2003 environmental report exclusively to renewable energy.<sup>7</sup>

Yet the practical onset of renewable energy remains confined to just a few nations and regions. 86 per cent of wind power facilities installed throughout the world are located in just five countries: Germany, Denmark, the US, Spain and India. 70 per cent of photovoltaic facilities installed worldwide are located in Japan and Germany. In most countries, with the exception of traditionally used biomass and hydroelectric power plants from dams, the active use of renewable energy has barely gone beyond initial baby steps. And the commitment of global corporations comes in for undue praise. In fiscal year 2003 BP had sales of US\$233 billion. The sales share of BP Solar, however, was only 0.14 per cent (at US\$330 million). Shell had total sales of US\$269 billion, but the sales share of Shell Solar was just 0.11 per cent (at US\$292 million). In their main business field of fuel sales, both businesses are arbitrarily restraining the introduction of bio-fuels.

And yet, most protagonists of renewable energy can no longer imagine that they might experience another setback. It also seemed inconceivable to those in the US who, roused by the oil crisis that started in 1973, set out on the path to renewable energy. In 1974 the widely regarded report *A Time to Choose*, written by David Freeman for the Ford Foundation, opened a view towards the advantages of renewable energy and the practical opportunities available for energy saving through technological productivity increases. The report showed that, by comparison, the nuclear path was full of technological obstacles and paved with immense risks.<sup>8</sup> The climate problem was not yet the issue; instead, the goals were things like clean air and overcoming the political and economic risks arising from dependence on imported energy. At the time, US oil import dependence was less than 30 per cent. President Nixon declared that the US had to become independent of energy imports by the year 2000, and so he started the Independence Energy

System project. In 1977 President Carter stated: 'If we fail to act soon, we will face an economic, social and political crisis that will threaten our free institutions.'<sup>9</sup> At that time the US undertook the largest research and development programme to date on behalf of renewable energy. Thousands of new businesses and grass-roots initiatives mushroomed. Numerous publications proclaimed the dawning of the Solar Age: *Self Reliant Cities* by David Morris,<sup>8</sup> *Reaching Up, Reaching Out: A Guide to Organizing Local Solar Events* by Rebecca Vories,<sup>9</sup> *Rays of Hope: The Transition to a Post Petroleum World*<sup>10</sup> and *Blueprint for a Solar America* by Denis Hayes.<sup>11</sup> The Union of Concerned Scientists, whose members included several Nobel Prize winners in the natural sciences, published a 1979 study describing in detail the possibility of a complete reorganization of US energy supplies towards renewable energy by the year 2050.<sup>12</sup>

Yet the energy business in the US was quick to counter the report, *A Time to Choose*, with its own report, *No Time to Confuse*, in which it attempted to turn fear of an actual energy crisis into fear of renewable energy.<sup>13</sup> In order to undermine renewable energy's development, the energy business pulled out all the stops, down to the systematic purchase of small solar companies that were eventually shut down. Apparently all that mattered was lowering costs and takeovers by professional big business. In his book *The Sun Betrayed*, a thriller about business crime, Ray Reece describes how this 'three billion dollar business' deliberately thwarts the solar breakthrough – with tactics that include the friendly embrace of solar actors in order to crush them.<sup>14</sup> Both President Carter and Congress got cold feet and flinched about carrying through with pro-solar decisions they had already initiated. This was a surrender that Barry Commoner, the pioneering thinker of the US solar movement, was already noting in his 1979 book *The Politics of Energy* when he remarked that there was apparently a political taboo about offending the interests of the private energy business.<sup>15</sup> Finally, there was a definitive backlash when Ronald Reagan became President in 1981. Programmes were radically cut, research institutes were collapsing along with businesses, and the solar movement petered out. 'Who owns the sun?', this question, posed by Daniel M. Berman and John T. O'Connor, was given a clear-cut answer by the



conventional energy powers that be: since the sun cannot belong to any individual – in other words, not even to the conventional energy business itself – it should not belong to anyone.<sup>16</sup> This is how the solar technology revolution in energy supply was thwarted. A project in the making was rigorously demolished. The US – and with it the world, which lost its solar model in America – thereby squandered irretrievable time. Instead of taking bigger steps towards a 'Solar America,' the US became more of a 'Fossil America' than ever before, and today the risks of traditional energy supply are incomparably greater than they were in the 1970s.

Starting in the early 1990s, especially in Europe, a movement arose like that earlier US one. Independent solar organizations and local solar initiatives were shaking up the public. Opinion surveys soon revealed that these enjoyed enormous sympathy. In Germany this led to laws promoting renewable energy that, for the first time, facilitated speedy initiation into the market. In 2006, as a result, Germany alone had 35 per cent of the world's total installed wind capacity and 25,000 megawatts of newly installed electricity production capacity using renewable energy, built on the basis of the EEG law as well as a previous law (the 1991 'Act on Feeding Electricity from Renewable Energies into the Public Grid). Yet the more this development makes visible headway, the greater the vehemence with which established energy businesses attempt to turn things back. Vastly exaggerated assertions about purported increases in electricity costs are made public, with shrill warnings that this would threaten the national economy's competitiveness as well as isolate Germany internationally. Influential media shaping public opinion, like the *Frankfurter Allgemeine Zeitung* (Germany's newspaper 'of record') and *Der Spiegel* (the weekly news magazine noted for its political coverage) loudly join in the chorus.

The opponents of this law even start acting like fundamentalist conservationists over the ostensible issue of wind power stations' destructive impact on the landscape; this, in spite of the fact that these self-styled preservationists are otherwise advocates of economic growth unfettered as much as possible by environmental encumbrances. While they call loudly, out of

one side of their mouths, for technological innovations, they discredit the very innovations that are more vital and dynamic than all the others. They swear by new economic growth and admonish on behalf of creating new jobs. Yet although the growth rate for producing renewable energy facilities is 30 per cent annually, and even though more jobs are created there than in any other sector, this new branch is denounced as 'unfriendly to business'. The attempt is made to inflame public outrage about the additional costs for introducing renewable energy. This campaign is not only way out of proportion, it is also eerily irrational. It has all the features of the kind of 'political neurosis' that the writer Arthur Koestler detected in the 1960s among those who had come to terms with the real danger of a nuclear war 'with an empty grin on their faces and a totem in their hands'.<sup>17</sup>

Current efforts to roll back nuclear energy are strikingly similar to the situation in the US 25 years ago. Germany is experiencing a repeat performance of what happens to a country that has the greatest success mobilizing on behalf of renewable energy: that country also becomes the stage for the most vehement campaign reacting against the progress of renewable energy. This seems like a contradiction only to those who underestimate the dimension of conflict accompanying a shift in energy, and who are therefore incapable of fending off the counter-reformation. If a backlash were to succeed in Germany today, as it did in the US over two decades ago, this would again blunt the spearhead of the breakthrough to renewable energy not just in the pioneering country, but internationally as well.

As always, the dominance of the current energy system is so great, and its sphere of influence so far-reaching, that a fresh setback cannot be ruled out. To be sure, in the long run it will prove impossible to stop the changeover to renewable energy. The bottlenecks and limits of nuclear and fossil energy supplies are just too obvious for that. But every setback results not only in additional lost time; it also breeds social-psychological discouragement. It is difficult for people who have taken the initiative in a spirit of high hopes, only to suffer repeated setbacks and disappointment, to summon up the energy and take a second go at it. That lesson is also something demonstrated



by the experience of the first backlash in the US. Only now, and only slowly, is the enthusiasm that once existed there during the 1970s being renewed by a new generation of activists.

Every social movement needs a productive mutual relationship among impulses, legislation that takes up these impulses, and entrepreneurial initiatives. This is confirmed by developments in Denmark, Austria and Switzerland, where a solar movement arose at the beginning of the 1990s (and in a manner analogous to developments in Germany). In Austria and Switzerland, however, the outcome was not a set of laws that might have given these impulses additional stimulus. In the absence of legislation, the movement's initial atmosphere of a new dawn gave way to overcast skies. Similarly, when the laws promoting solar energy in Denmark were allowed to lapse in 2000, many active groups immediately disappeared from the scene. A social movement needs visible successes to keep going. When there is a political setback, it succumbs to decline and stagnation before new forces begin to stir again after a lengthy interlude.

### Mental hurdles

Given an attitude towards renewable energy that remains overwhelmingly hesitant, the world is living well under the threshold of urgent imperatives and given opportunities. By contrast, when it comes to nuclear and fossil fuel energy, the world continues to live well beyond its means. Nor is this contradiction something that can be explained solely by the power and influence of an energy system oriented around fossil and nuclear fuels, a system whose interest in self-maintenance and structure-conserving behaviour render it relatively calculable. The traditional energy economy is a prisoner of its own energy supply chain. The technological, economic, social and (not least of all) political entanglements of that energy supply chain were the subject of my book *The Solar Economy*.<sup>18</sup> But it is not an omnipotent system. It is not capable of intellectually guiding and corrupting the entire political and economic system, including science and the media.

So what is preventing those who are not directly or indirectly implicated in the traditional energy system from pressing ahead,

resolutely and with the necessary willingness to engage in conflict, with the shift to renewable energy? Why, thus far, have there been no political initiatives promoting renewable energy as a future economic project with the same kind of clear-cut ambition that made it possible to build the modern railway, space travel, nuclear technology and (most recently of all) information technology? Why are there still no European institutions for renewable energy comparable to EURATOM or the European Space Agency (ESA) in their respective fields, or global institutions like the International Atomic Energy Agency (IAEA)? These questions about the actors and fields of action for and against renewable energy must be answered if we want to learn how the shift to these new forms of energy can be decisively accelerated.

These are questions about what proportion of responsibility should be given to political institutions or to 'business', to 'science' or 'the media', but also to the range of actors engaged in environmental protection. Questions, for example, about the lack of standards whereby, for reasons of local land conservation, approval for building wind and water power facilities is frequently and doggedly denied, in spite of the fact that nature overall has long been threatened much more seriously by the waste products that come from nuclear and fossil energy use. Or about the absurd standards whereby action programmes promoting renewable energy are made dependent on whether they match up with certain market dogmas. Or think about the massive funds, in flagrant contradiction to the meagre results they produce, expended on lavish international governmental conferences, with their caravan of environmental diplomats and non-governmental organization (NGO) representatives who make sure to weed out every standpoint that doesn't command a consensus. At these conferences the delegates seem to talk about just everything, though usually while talking *around* the most explosive issues.

A significant example of this was the climate conference that took place in July 2004 at San Rossore, a large estate near Pisa, organized by the regional government of Tuscany. At the beginning of the conference there was a talk by Al Gore, who in the 1990s had captured the world's attention with his book *Earth in*



*the Balance*,<sup>19</sup> which elevated him into an international champion of global climate protection policy before he became US Vice President in 1993. Gore gave a brilliant lecture about threats to the climate and showed frightening charts about the catastrophes that had already set in or were about to happen. The speech made it vividly clear that comprehensive measures were long overdue. Yet as the cause of these catastrophic scenarios Gore named not fossil energy use, but rather the population explosion, scientific and technological developments, and the lifestyle of affluent countries – factors for which everyone, and therefore nobody, is accountable. He received enormous applause from his audience, mostly Italian environmental activists. Yet this way of describing the causes of environmental degradation can only lead to a sense of helplessness: nobody can demonstrate how, in the short or medium term, population growth can be contained, people's lifestyles changed, or how scientific and technological developments with their concomitant demand for more energy can be turned back. The conference participants skirted the subject of renewable energy as a real, tangible key to warding off all these dangers. In my talk at this conference, which came after Gore's, I did address this central issue. My remarks met with a divided response; for some of the conference participants, my statement was not 'fundamental' enough: it was considered too concrete and therefore too much of a direct challenge.

Of course, in order to bring about a shift in energy sources, numerous practical hurdles have to be overcome, impediments that exist alongside the familiar sources of resistance (administrative, technological and economic). But the greatest obstacles are mental, inside peoples' minds. These are the hurdles establishing the contradiction whereby the use of renewable energy has been progressing much too slowly (on the whole) even though everyone perceives the dangers of continuing to use nuclear and fossil energy. These mental hurdles, more than anything else, are what stand in the way of acknowledging and seizing upon the prospects for renewable energy. They are the source of insufficient planning and of evading the decisive question: who are the most suitable social groups – that is, the ones best motivated and most capable of acting competently

and independently – to act as carriers of this energy transformation, who want to and are able to put this change into action? Both things – the plan and the carrier – are directly related to each other. No plan can have just any carrier, and not all the available carriers are suitable for every plan. And, depending on the plan and the carrier, the sources of resistance and the methods to be used may vary in each case. It is of the utmost importance that these questions be clarified in order to establish a strategic profile for renewable energy, which is the subject of this book.

These mental hurdles result from questionable premises that pervade the discussion on renewable energy and cannot withstand closer scrutiny. They have an axiomatic character; that is, they are based on fundamental assumptions that are regarded as established facts and are therefore held to require no additional justification. For better or worse, whoever does not contradict any one of these premises will have to submit to their (quite logically derived) consequences, even if these turn out to be highly unsatisfactory. When it comes to contentious issues with a broad impact, one generally confronts a number of such premises. The American sociologist Amitai Etzioni calls this the 'community of assumptions'. These assumptions are shared by society's functional elites, who practically close ranks around them; they represent their view of things and are 'usually held without awareness of their hypothetical nature'. It is assumed that 'the world really is the way the internalized and institutionalized images depict it', and the assumptions are granted 'absolute validity'. Differences of opinion are then 'tolerated only within the limits of fundamentally the same interpretation'.<sup>20</sup> Thus there arise 'prevailing opinions', carefully cultivated and even respected by those who know better.

Quite apart from all the notorious technical disinformation about renewable energy that has been spread around (though also refuted in numerous writings), there are essentially seven dubious technological or economic premises and six questionable premises of political action that get taken for granted as if they were predetermined, established, almost rock-solid facts. Whoever adopts these assumptions – or even just a few of them – ends up adopting perspectives and plans that recognize just



part of renewable energy's potential, and which therefore leave this potential untapped.

The questionable technological and economic premises are:

- *Insufficient usable potential* – renewable energy's usable potential is not enough for us to afford the luxury of doing without nuclear and/or fossil energy. This premise makes conventional energy's long-term use appear as if it were an objective constraint, something to put up with in spite of all the obvious dangers.
- *The lengthy time requirement* – activating renewable energy on a large scale is only possible over the long run. And therefore, even in the long run, massive investment in conventional energy is indispensable in order to satisfy peoples' energy requirements. This premise, articulated under the guise of advocating renewable energy, is meant to suggest that we take our time about introducing renewable energy and that, in the meantime, we should tolerate continued use of traditional energy supplies.
- *The absolute necessity of large power plants* – the volume of energy demanded by a major industrial and urbanized mass society, this premise goes, could not be met without giant-sized technological facilities; renewable energy, which mainly uses facilities based on small-scale technology, is not suited to meet this volume of demand. This premise, too, serves to assure the acceptance of large energy plants. It is a seductive argument that directs renewable energy technology towards centralized facilities, to the neglect of decentralized applications, which are substantially more diverse and easier to introduce more rapidly.
- *Conventional energy's greater environmental benefits due to increased efficiency* – investing in the enhanced energy efficiency of conventional energy plants and of energy-consuming appliances would be much more cost-effective and contribute faster to solving the problem that renewable energy is supposed to address. This is a premise that exploits improvements in the energy efficiency of traditional technologies in order to play them off against initiatives for renewable energy, as if both are not simultaneously possible and necessary.

- *The functional priority placed on existing energy supply structures* – renewable energy needs to correspond to existing structures of energy provision, in other words, be compatible with these. The existing structure may be regarded – especially when it comes to power supply – as an objective technological requirement. This premise turns the status quo into the standard for determining how much renewable energy can be tolerated; and it asserts an innocent neutrality towards all energy sources even though this kind of neutrality has never existed and never can exist.
- *Protecting economic resources* – all energy policy decisions should be careful to avoid destroying capital in the energy business. In this way, the interests of the economy as a whole are identified with those of the energy business. Behind this premise there lurks the notion of a planned economy that is indelibly associated with the self-image of the traditional energy business and its energy policies. It is also a premise that assumes, almost self-evidently, that the energy business is the general carrier for every kind of energy supply – an assumption that is absolutely erroneous when it comes to renewable energy.
- *The economic burden of introducing renewable energy* – this premise systematically diverts attention from traditional energy's consequential damages in economic terms and from renewable energy's widespread economic and social usefulness. It attempts to play off current interests against future interests and encourage members of society to indulge in egoistic behaviour against the common good.

These fundamental technological and economic assumptions all create the impression of objective constraints that stand in the way of a full-scale reorientation towards renewable energy.

The six other premises relate to political fields of action and methods:

- *Renewable energy's dependence on subsidies* – this premise is not only used to divert attention from the fact that subsidies for nuclear and fossil energy have been (and still are) – as we shall see – many times higher than subsidies previously



provided for all forms of renewable energy. It also diverts attention from the fact that there have long been opportunities for using renewable energy that have not depended on subsidies, but simply on ending the privileges accorded nuclear and fossil energy.

- *The need for consensus with the energy business* – the standing and (therefore) the influence of the established energy business are so great that it has made itself indispensable for any successful shift in energy use. In spite of major conflicts, therefore, one needs to arrive at a consensus with the energy business. This premise accepts the energy business's monopoly on action in every question of energy supply, as if the energy business alone were capable of providing people with energy. The status of the energy business thereby acquires an intellectual 'guarantee of eternity', as if we were dealing with a constitutional institution.

- *Fixation on competitiveness in energy markets* – since liberalization of energy markets is the general trend, even the programmes promoting renewable energy need to be arranged around a liberalized energy market. This premise gives 'the energy market' priority above all other decision-making criteria. It overlooks the fact that mobilizing for renewable energy primarily has to do with technological markets and only partly with the energy market.

- *The indispensability of global treaty commitments* – since energy problems arise globally, solutions to problems can only reside – for reasons having to do with economic cost distribution in international competition – in global community solutions that are negotiated as treaties and are binding for everyone, solutions whose inevitable compromises have to be accepted as a limit on action. This premise pushes the social utility advantages of renewable energy into the background. Furthermore, this premise overlooks the fact that no technological breakthrough has ever arisen from action coordinated by an international treaty, and all the evidence seems to indicate that no breakthrough is ever likely to emerge this way. This is a premise that focuses public attention and environmental actors' efforts on international treaty conferences, in spite of their highly unsatisfactory outcomes, to the neglect of other initiatives.

- *Environmental pollution caused by renewable energy* – since using renewable energy can also lead to environmental pollution, its introduction has to be scrutinized for environmental soundness in exactly the same way as nuclear and fossil energy. This premise blurs elementary distinctions between actual environmental damage and relatively marginal environmental disturbances, between irreversible and reversible environmental burdens, or between energy facilities that produce harmful substances and those that are pollutant-free but take up space.

- *The realism of taking small political steps* – since small steps elicit minimal resistance and are therefore easier to implement, it is a precept of realism not to scare off political institutions, business, and the general public with approaches that go too far. This premise is tantamount to capitulating in the face of real problems, since small political steps quite obviously do not suffice to solve the world-threatening problem of continuing to supply our economies with traditional fossil and nuclear energy.

All these one-sided premises obstruct our view of renewable energy's real potential and of promising approaches to solving our energy problems. They are prejudices that confound discussion and lead to reductionist strategies as well as to accepting energy conditions as they are. The muddle they coagulate in favour of the status quo creates a hidebound mind-set not only among actors in the energy business, but also in politics, economics, science, the general public, and even the strategic thinking of environmental groups and organizations advocating renewable energy. Prejudices are relatively easy to overcome for individuals, who benefit from information and leaps of recognition that fall like scales from their eyes. In society at large, however, overcoming bias is much more difficult to achieve, especially when prejudices keep getting cultivated and updated – cultivated above all by those who profit from their persistence and therefore loudly confirm these prejudices at every opportunity. Not coincidentally, these are the very energy specialists who find it especially difficult to overcome mental obstacles towards renewable energy. Pushing these hurdles aside, and thereby



leading the entire energy discussion out of the intellectual confinement within these obstacles' perimeter, is the most important precondition for a shift in energy use.

One of the consequences of starting from false premises is that discussions end up referring only to a section of the total problem, that guidelines for action are developed relating only to that part of the overall picture, and that these guidelines are subordinated to all other problems – so that one loses sight of solutions to other problems. These patterns of reducing large problems to their smallest components pervade the energy debate. If this debate is mainly conducted from the viewpoint of climate threats caused by fossil energy emissions, the dangers of nuclear energy and questions about energy security are pushed into the background. If it is mainly conducted from the viewpoint of nuclear dangers, this then confines perceptions about the dangers of energy usage. If it is conducted solely from the viewpoint of depleting oil stocks, this will cloud awareness of potential dangers arising from other fossil energy sources and from nuclear energy.

These ways of reducing the overall problem to one of its components always lead to neglect of the diverse and grave reasons that speak on behalf of a general shift to renewable energy. The broad spectrum of reasons for a comprehensive strategy – the motifs of the renewable energy movement – emerge from four elementary differences between nuclear and fossil energy, on the one hand, and renewable energy, on the other:

- The use of nuclear and fossil energy entails massive environmental disturbances, with tectonic consequences across the board, starting immediately with these fuels' initial production and continuing until the by-products of their consumption are emitted into water, air and the Earth's atmosphere generally; by contrast, the use of renewable energy is, in principle, free of such consequences. From this contrast there emerges a general environmental motif for renewable energy that transcends the narrower climate protection motif. Even if the climate problem did not exist,

there would still be a mass of ecological reasons speaking on behalf of an energy shift.

- Fossil energy can be depleted, which is why its continued use must inevitably lead to rising costs and supply bottlenecks and emergencies. Only inexhaustible renewable energy opens up the prospect of a permanent, secure energy supply for people everywhere. From this there emerges the motif of permanently secure energy availability, which speaks for renewable energy.
- Nuclear and fossil energy reserves lie in a relatively limited number of producing regions around the globe, so that their use requires lengthy supply chains. This inevitably entails major outlays in infrastructure, leads to growing dependence, and provokes economic, political and military conflicts. Every form of renewable energy, by contrast, is a type of energy that fits in with its natural surroundings and can be recovered directly with much smaller requirements in the way of infrastructure. From this there emerge such motifs of renewable energy as macroeconomic efficiency, political independence and peacekeeping.
- Fossil and atomic energy, as a result of the above-mentioned differences, are becoming increasingly expensive, both with respect to their direct and their indirect costs. Renewable energy, by contrast – if only because it accrues no fuel costs (with the exception of bio-energy) – becomes increasingly cheaper in the course of continuous technological improvement, industrial mass production, and intelligent new forms of application. From this there emerges the motif for renewable energy having to do with social welfare and economic strategy.

All these motifs coalesce into a single grand motif – as comprehensive as it is existential – of surmounting and avoiding crisis, a motif that (in light of the different worldwide crises discussed in Part II) is as explosive today as it ever was. The key to solving energy-determined crises is the shift to renewable energy. Focusing on this is not a 'one-issue' but rather a 'multi-issue' approach.



## The unexhausted social potential

'The problems that exist in the world today cannot be solved by the level of thinking that created them.' This statement by Albert Einstein also means: they can hardly be solved by the same actors who brought them about. Those who want to replace nuclear and fossil with renewable energy, and who are actively pursuing this goal, are – whether they want to or not – more than merely economic competitors in the established energy business. They are the established energy's structural opponents. There has always been economic competition between energy suppliers, always a struggle for market share: between electricity and fuel suppliers in the heating market, among coal, petroleum and gas suppliers, or between one energy corporation and another. Yet it is striking how these competitors stick together when it comes to opposing new forms of renewable energy; not letting renewable energy make it is their common cause. As far as the Lord Privy Seal of the established energy business is concerned, the stakes go beyond simply maintaining a supply monopoly and keeping the infrastructure designed to corner that market operating at capacity; also at issue is the conservation of established energy's social role, of its deep-rooted technological world view.

The faster conventional energy is depleted, the more its suppliers will rely on giving each other mutual support. For this reason alone there has been an intensification of the trend for former competitors in the supply of conventional energy to merge into integrated energy companies. Although one may discern thoroughly divergent attitudes towards renewable energy crystallizing within the energy business, a hard common core is unmistakable: the status and structures of conventional energy dare not be shaken.

In his work *The Art of War*, written 2500 years ago and regarded as a literary and philosophical masterpiece on methods for settling conflicts, the Chinese general and philosopher Sun Tzu wrote: 'If you know the enemy and know yourself, you need not fear the result of a hundred battles. If you know yourself but not the enemy, for every victory gained you will also suffer a defeat. If you know neither the enemy nor yourself, you will

succumb in every battle...'<sup>21</sup> Decades ago, in officer training, I learned what is required for successfully settling a conflict: defining a goal. This means gaining a genuine picture of one's opponents, recognizing their strengths and weaknesses. It means analysing the field on which conflicts are settled and making an appropriate estimation of one's own forces: attacking where the opponent is weakest, using the instruments with which one is superior to him at this particular site; securing one's own surroundings in order to stand firm against counter-attacks. When, in the parallelogram of antagonistic positions, resistance against renewable energy proves too strong, its protagonists must attempt to change the field of forces in their favour. This requires making an effort at conceptualizing and communicating, and it means that coalitions have to be forged. Whoever accepts a disadvantageous constellation as inalterable fact is condemned to a Sisyphean labour, to surrender or being co-opted.

In the energy debate, 'energy carrier' is a technological or economic concept. It refers to energy sources and technologies. With respect to renewable energy, distinctions are drawn here between 'natural potential', 'technological potential' and 'economically usable potential'. Yet the most decisive thing heading the list of what it will take for renewable energy to prevail is the *social* potential: the people who can be won over to solar initiatives. Every proposal, no matter how appropriate, remains barren for as long as a 'carrier' cannot be found to sponsor it. In saying this, I do not by any means wish to diminish the value of analysing problems and finding creative solutions. But strategy is implementation, and there is no implementation without active carriers who have adopted prospects for action as their own because these correspond to their values and interests. Therefore the question of who will be the potential carriers of the shift to renewable energy must lie at the heart of any strategic discussion. This also sheds light on questions about, first, to whom proposals for action might be addressed, and second, if, and under what conditions, those carriers deemed indispensable for implementation are even movable. If the fundamental assumptions of a strategy are too one-sided at the very outset, it is also usually the case that the circle of actors derived from the strategy will



prove to be ill-suited or too small. Paying attention to these connections is something that is lacking in many analyses and proposals from the debate on renewable energy – and this includes some prominent writers on the subject.

Thus, in his book *Plan B*, Lester Brown from the Earth Policy Institute calls for efforts that are analogous to 'wartime mobilization' and 'greatness' in the book's political ambitions for an ecological economy, after the model of the Marshall Plan following the Second World War.<sup>22</sup> Yet he does not pursue the question as to why similar calls repeatedly run dry – including the plan presented by Al Gore in 1989 for a Strategic Environment Initiative (SEI), which was not even taken up by Gore himself after he assumed national office in 1993. The 'Global Marshall Plan' for a worldwide eco-social market economy – an elaborate plan promoted by (among others) futurologists Franz-Josef Radermacher and Ervin Laszlo as well by Mikhail Gorbachev, by the Club of Rome as well as by the Club of Budapest – is addressed generally to the governments of the major industrial states, as if the only thing they've lacked so far has been a plan.<sup>23</sup> But then why didn't these same governments ever get around to implementing a programme already elaborated by the task force on renewable energy appointed by the G8 Summit in 1999, which submitted an implementation plan for supplying energy to a billion people in the poorest developing countries?<sup>24</sup> The ambitious recommendations of the EU Commission White Book on renewable energy from 1997 also remained on paper because the Commission has not assumed sponsorship for it.<sup>25</sup> And why, in spite of negotiations about global climate protection that went on for years, was the result such a meagre Kyoto Protocol? What has become of the celebrated, earth-shaking final declarations delivered by the UN World Summits at Rio and Johannesburg?

*Mainstreaming Renewable Energy in the 21st Century*, a publication by the Worldwatch Institute, describes the policies – few in number – that have proven successful.<sup>26</sup> But even this publication does not mention which carriers it was who prevailed against the kind of resistance one finds everywhere, and how they managed to do so. The same goes for the book *Energy Revolution* by Howard Geller, in which the various policy approaches, along

with their respective successes or failures, are described, though (again) without reference to the play of forces underlying each case.<sup>27</sup> This lack of strategic assessment also applies to the 'Policy Recommendations for Renewable Energies' of the Renewables 2004 conference.<sup>28</sup> These recommendations contain an overview of numerous conceivable approaches to action, a menu à la carte. But no distinction is made between hors d'oeuvres and main courses, not even between their respective nutritional values. Not everyone can digest everything, and to some extent the entrées are not compatible with each other. Some have stood the test, like the plan to introduce renewable energy by legally guaranteed input rates. By contrast, trade in certificates for renewable energy only brought about a few ripples in the water, without making any major waves. Yet both plans are discussed alongside each other. So what is the 'political recommendation'? Accentuating the plans and broadening sponsorship for renewable energy are apparently necessary in order to achieve a definitive breakthrough that is broad and durable. To this end the character of the resistance and the intentions and methods should be acknowledged. Only then is it possible to brace oneself adequately against these adversaries.

If an about-face to renewable energy cannot be pulled off over the next two decades, the world can be expected, in the foreseeable future, to slide into resource conflicts rife with violence. An about-face means not only expanding renewable energy, but also cutting back on the consumption of fossil and nuclear energy. It means preventing additional trillions from being devoured on the construction of new fossil and nuclear power plants and thereby from cementing the conventional structures of energy supply. It requires renewable energy to be activated much more quickly and in a manner that is more forced (both qualitatively and quantitatively) than is currently envisioned by government action programmes – especially since it can be foreseen that the goals most of these programmes proclaim cannot possibly be achieved given the plans and carriers they envision.

This book is mainly addressed to the growing number of renewable energy advocates, and to the even greater number of those who are simply curious about it. It is meant to outline



approaches and mobilize forces that can make an unstoppable breakthrough succeed in the near future. According to the Swedish Nobel Prize winner for economics, the sociologist Gunnar Myrdal, it is possible for a social project to prevail if it is purposefully and tirelessly pursued by an impassioned following of just 5 per cent. These will then bring an additional 25 per cent of the society in tow. That is sufficient, because the majority of people is habitually indifferent – but, in principle, they are ready to go along with movements and the forces behind them if these can offer the general public a persuasive prospect.

'How long? Not long!'. During the 1960s this resounding reply to an equally brief question was hammered by Martin Luther King into the consciousness of the US civil rights movement, in order to persuade that movement that its chance to realize its goals was not far off. It is with this kind of determination and confidence that the imagination of many is stirred, the social atmosphere is revived and practical new ideas sprout up. Then, in no time at all, unanticipated leaps of development become possible. 'How long? Very long!'. This is the kind of thinking that, unfortunately, has been dominant in previous discussions about the time frame for a shift in energy. Even convinced ecologists behave this way to show that they are 'realistic'. But lengthy time horizons release people from direct responsibility and lead them to surrender matters to professional experts. Then the most important resource for renewable energy – the social resource – remains untapped. This is why my main interest is in discerning those approaches to renewable energy that permit the frequently posed question 'how long?' to be answered with 'not long!'.

The leitmotif for all of this is energy autonomy. It is a theme intended to be, in equal measure, political, economic and technological. It is, as a generalizable plan, only possible with renewable energy. But energy autonomy is not just the outcome of a shift to renewable energy; it is, at the same time, the hard core of a practical strategy: autonomous initiatives by individuals, organizations, businesses, cities and states are required in order to get everything moving. The new politics of renewable energy is about opening up spaces for these initiatives, spaces in which the initiatives can develop unhindered.

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## Part I

# Sun or Atom: The Fundamental Conflict of the 21st Century

There is one forecast of which you can already be sure: someday renewable energy will be the only way for people to satisfy their energy needs. Because of the physical, ecological and (therefore) social limits to nuclear and fossil energy use, ultimately nobody will be able to circumvent renewable energy as the solution, even if it turns out to be everybody's last remaining choice. The question keeping everyone in suspense, however, is whether we shall succeed in making this radical change of energy platforms happen early enough to spare the world irreversible ecological mutilation and political and economic catastrophe.

How far we remain from recognizing the signs of the times is something that developments in the 1970s showed us. Before the outbreak of the global oil crisis in 1973, world energy consumption, according to statistics from the International Energy Agency, came to 6034 million metric toe. In 2002 the figure was 10,213 million metric tons – an increase of 69 per cent, more than two-thirds. Throughout this period renewable energy's share remained constant at barely 14 per cent. Actually its share is substantially smaller than that. The renewable share consisted of 85 per cent biomass in 1971 and then 80 per cent in 2002 – and in developing countries this was largely based on ruinous exploitation of local vegetation, without replanting, which is why the label 'renewable' is so misleading here. The