



WCRE

World Council for Renewable Energy

Civilization at the Turning Point: A Breakthrough for Renewable Energy

The World Renewable Energy Agenda

World Council for Renewable Energy

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Executive Summary

At the turning point

World civilisation is at the turning point. Faced with an accelerating compound crisis of the globally established atomic/fossil energy system, an immediate breakthrough for Renewable Energies is inevitable. No more time can be wasted. Further postponement would be irresponsible and further excuses are unacceptable. Escalating oil prices indicate the depletion of fossil resources and the urgent need to replace the current mix of fossil transport fuels. The outcome of the elections in India indicates that the large majority of people who live in the rural areas of developing countries no longer accept their state of increasing poverty. This situation is largely the result of a lack of access to commercial energy. The ongoing climate change is causing an increase in flood and drought catastrophes. These catastrophes are an indication of the disastrous consequences of our society's continuous use of fossil energy. Widespread power grid failures and blackouts in the westernized world demonstrate the limitations of atomic and fossil power production. The atomic catastrophe in Chernobyl, and the continually escalating dangers of atomic weapon proliferation, testify that the use of atomic technology is not a viable option for the future.

Renewable Energy technology presents the best alternative and prospect for our global future. The potential to substitute atomic and fossil energy with Renewable Energy has already been practically proven. For instance:

- Germany has installed 16.000 MW of new renewable electric power capacities over the course of one decade. Reaching a capacity over and above the traditional large hydro power. The German Renewable Energy Act gave most of the incentives to new development. The installed Renewable Energy capacity for 2003 was 3000 MW.
- Brazil provides a practical example of rapid substitution of bio-fuels for oil in cars. In Sweden entire public transport systems are run off of bio-fuels.

- Some towns in China demonstrated how to mobilize solar thermal collectors on a large scale.
- Austria currently uses more pellets made from Biomass than oil and natural gas for the heating of buildings.

A total substitution of atomic and fossil energy is necessary and possible

An increasing number of cities and regions have created and implemented plans for covering all their energy needs with Renewable Energy. Scientific scenarios for the replacement of atomic and fossil energy on a national scale have been available since the 70s: for the USA and France (collaborated in 1978), for Europe (1981), for Sweden (1985), for the European Union (1999), for Germany (2002) and for Japan (2002). The White Paper of the International Solar Energy Society “Transitioning to a Renewable Energy Future” shows the various technological options for the achievement of comprehensive Renewable Energy strategies. A total replacement of atomic and fossil energy by Renewable Energy is necessary and possible. This could be realized until the year 2050, if a dynamic process can be initiated as it is described in this World Renewable Energy Agenda.

Atomic and fossil energy prices will inevitably increase due to the exhaustion of natural resources as well as the additional costs from environmental damages. Renewable Energy prices will continue to drop due to the increase in mass production and improvement of technology. Renewable Energy, with the exception of biomass, has most of its costs based in technology, as there are no fuel costs for wind, solar or hydro resources, the energy system is more cost effective overall.

No more lip-service

Numerous science and technology conferences on Renewable Energy were organized in the last decades. The conferences indicate that Renewable Energy has been investigated and developed more for market introduction than was ever the case for atomic and fossil energy. However, due to an ongoing underestimation of the actual potential of Renewable Energy as well as their numerous benefits, there has been a large gap between recognition and implementation. The shift to

Renewable Energy has been misunderstood as an economic burden and not as a comprehensive prospect with diverse political and economic benefits.

Time is overdue

- to set aside the multiple mental and structural barriers against Renewable Energy,
- to create Grand Renewable Energy Strategies in every country and
- to launch common international actions.

The time is overdue to promote a comprehensive Renewable Energy program with at least the same political power as atomic energies which were supported by strong policies in former decades. In contrast to the impressive scientific and technological conferences held by the global Renewable Energy community, the increasing number of official policy conferences result primarily in lip service. Instead of preparing for action many of the conferences themselves became a substitute for action, the only practical decision being that of a follow-up conference.

A call for industrial, national and regional Grand Strategies for Renewable Energy

Half a century ago, grand strategies were initiated for the promotion of Atomic Energy in order to enter the post-fossil era. Now is the time for an equally strong commitment to Renewable Energy.

Governments should no longer wait for a global consensus. In order to fill their responsibility to the people they are called to determine their own strategies in the common interest of the people. Pioneer governments, organizations, and companies will stimulate others thereby creating a new technological and industrial revolution. At the same time a new agricultural revolution based on the extension of food production to biomass production will be spurred. Biomass for energy and renewable raw materials will be produced whilst simultaneously safeguarding water resources. These aspirations combine to compose the main challenge of the 21st century.

Basic Considerations

In order to overcome the deep discrepancies between the global needs for Renewable Energy on the one hand and the insufficient business-as-usual attitude on the other, the World Council for Renewable Energy presents the World Renewable Energy Agenda at the Second World Renewable Energy Forum, by submitting the following basic considerations:

- to governments and to the parliaments, and
- all Renewable Energy supporters around the globe.

1. Change the current energy paradigm

The world society is at the defining moment of the change of the energy-paradigm from atomic/fossil energy to Renewable Energy. All policies should terminate the public promotion of atomic and fossil energy. Renewable Energy and energy efficiency promotion require top priority. 500 billion dollars are spent annually for conventional energy investments. The shift to renewable energy requires a change in the investment flows to Renewable Energy, under the auspice of legal frameworks tailored to accommodate them. New energy strategies must be focused on comprehensive national and global product calculations. These calculations show that the atomic and fossil system is already more expensive on a macro economic basis than an economy based on Renewable Energy is. The additional expense of fossil and atomic systems create an insurmountable social and environment burden of debt for generations to come. The political goal is to transform these benefits into microeconomic incentives for Renewable Energy investments.

2. Security policy is Renewable Energy policy

Our dependency on exhaustible fossil and uranium resources leads to the vulnerability of societies. Moreover, it is impossible to overcome the water crisis and resulting conflicts without shifting to Renewable Energies. The atomic and fossil energy system is the main water consumer in many countries. An in depth look at international security requires the transfer of military expenditures for the safeguarding of fossil and atomic fuels and processing to the promotion of Renewable Energy. The conversion of military

expenditure to Renewable Energy is the main focus of a new security policy. This is the fundamental idea of the Green Cross movement.

3. Overcoming poverty with Renewable Energy

Promoting Renewable Energy is the most important step to fighting poverty. Developing countries are economically overloaded by the introduction of power lines in rural areas as well as by the import of fossil energy products based on world market prices. Only local Renewable Energy can overcome the problem of energy imports consuming increasing shares of wealth in developing countries. Only Renewable Energy can stop the marginalization of rural areas in the world and the desperate living conditions of people in overcrowded cities. The unique opportunity to achieve this is to provide electricity to decentralized rural areas as well as mobilizing the production of biomass in agriculture and agro-forestry.

4. Overcoming the double standard of energy market dogmas

A “leveling of the playing field” with nuclear and fossil energy is required that ensures market privileges for Renewable Energy in order to compensate for the long-term advantages which atomic and fossil energies have enjoyed by:

- public research, development, subsidies, development credits, and insurance and tax privileges totaling an amount in the trillions of dollars
- global agreements for tax free fossil air and sea-transport fuels,
- unpaid environment damages,
- protected regional and electric power markets,
- trade privileges and publicly financed infrastructures,
- international institutions aimed at atomic technology transfer and fossil energy.

These privileges established the myth of a superior competitiveness of atomic and fossil energy; Leading to the overall underestimation of Renewable Energy resources and blockades against them. This unfair double standard leaves the introduction of Renewable Energy to the market.

5. Initiating a new industrial and agricultural revolution

Promoting Renewable Energy creates new industrial jobs and revitalizes the agricultural economy. There is a large variety of new industrial incentives given to Renewable Energy technologies and their mass production. The incentive covers the entire building industry including small and medium size enterprises (“solar architecture”), the automobile-industry (new generation of solar fueled motors), the entire field of electric and electronic, machinery and chemical industries (Renewable Energy conversion and applications, PV cell and glass materials, information technologies), the steel industry (windmill towers), the shipbuilding industry (energy self-sufficient ships). Extending agricultural yield to energy and industrial raw material will revitalize the sector.

6. Renewable Energy: the short-term alternative

Since decentralized Renewable Energy options do not require extraction or mining technologies, international transport infrastructures, long construction time for power plants, or cross-country transmission lines, they can be more easily and quickly introduced and decentralized than atomic and fossil energy. A Renewable Energy system consists of many modules each module capable of working independently from others. The installation of a wind power or PV-Module takes just few days. Every village in the world could have an immediate power supply or could implement the production of transport fuels from biomass. Renewable Energy makes it possible to tailor energy investments to actual energy needs in a flexible way, while avoiding overcapacities. Renewable energy can be introduced extremely quickly to meet the energy demands of the people. Renewable Energy can serve as a short-term alternative as soon as there is manual capacity for its applications and adequate financing opportunities.

7. Energy independence for all nations and regions

Energy independence is in everyone's best existential interest, and with Renewable Energy it is possible for all. Energy independence would stabilize national and regional economies as well as reinforcing peacekeeping efforts. Releasing countries from incalculable economic risks caused by the increasing fossil energy prices. Renewable Energy makes national economies more

stable and leads to more equality within the world economy because of the rationalization of yielded resources.

Actions and Strategies for effective promotion of Renewable Energy

Based on these basic recommendations, the World Renewable Energy Agenda appeals to all political institutions on, local up to international levels, to launch Renewable Energy strategies and give them top priority.

For the local level we present the guidelines for “Solar Habitat in Cities and Villages”;

For the national levels we recommend:

- to follow the example of the German Renewable Energy Act for the transition of electric power to Renewable Energy,
- tax free rules for bio-fuels for transport vehicles,
- Renewable Energy construction obligations for buildings,
- incentives for farmers to extend their production to biomass for energy and industrial raw materials,
- a shift in the contemporary energy subsidies to the direct promotion of Renewable Energy.
- a broad public initiative for an increase in manual capacity in the fields of education and job training, mainly for architects, engineers, farmers and craftsmen.

On the international level we call for common actions with considerations beyond the Kyoto-Protocol's meager obligations:

1. The establishment of an International Renewable Energy Agency (IRENA)

Renewable Energy needs an international home. The International Renewable Energy Agency (IRENA) must act as an independent organization, endorsed by member countries, based on a voluntary will to join it. As a consensus of all governments for the establishment of IRENA is not currently possible within the framework of the UN, it should be established by an initiative of countries, open to the future membership of every further country that wishes to join. The main task of IRENA should be consulting of governments, governmental agencies, organizations and NGOs for Renewable Energy programs.

Furthermore IRENA should promote human capacity buildings, the creation of a global information pool, the elaboration and awarding of technical norms and standards, as was described at the EUROSOLAR conference “Promoting international transfer of Renewable Energy” in June 2001 in Berlin. The IRENA is not proposed as a centralized administration, but as center of policy excellence, giving impulses for decentralized networking activities.

As there is no comparable international organization for Renewable Energy IRENA will overcome institutional bias in international relation sectors where international agencies for atomic energy and fossil energy security operate. We welcome the program of the governing coalition in Germany suggesting the initiative for an IRENA, backed by a resolution of the German parliament. One option for the implementation of IRENA is an alliance of some governments for the initiation. Another option could be an initiation by UNESCO, based on its mandate by the United Nations General Assembly for the World Solar Programme.

2. A Renewable Energy Proliferation Protocol be added to the Nuclear Non-Proliferation Treaty

We call for a supplementary protocol to the Nuclear Non-Proliferation Treaty (NPT), which could be passed at the Review Conference in 2005. This protocol should allow the signatory states to fulfill their obligations, stated in Art. IV, by supplying technical aid for Renewable Energy instead of for atomic energy. This protocol would be an additional step toward avoiding nuclear proliferation and would be a strong incentive for focusing future energy strategies on Renewable Energy.

3. An international university for renewable resources

A scientific think tank is necessary for the anchoring of renewable resources and their technologies. Therefore, we call for the establishing of renewable energy faculties in universities and academies. To highlight this initiative we propose the establishment of an international university for renewable resources, mainly for postgraduate education.

4. A Renewable Energy priority in public and private finance

The WCRE calls on national and international development banks to start portfolios for financing Renewable Energy and energy efficiency offering zero-interest-rate and low-interest-rate grants. This financing initiative must include an unprecedented level of cooperation between government financial agencies and private sector financial firms. The initiative should be achieved by the adoption of the new proposal for Global Development Bonds (GDBs) by all OECD countries. Also referring to and underlining the “Extractive Industries Report” for the World Bank we call for full concentration on Renewable Energy and energy efficiency in international development banks’ programs (World Bank, the African, Latin American, Asian Development Bank) with respect to the decentralized and local character of Renewable Energy. Energy portfolios for fossil energies should be cancelled. Exclusions from the full concentration of energy portfolios on Renewable Energy and energy efficiency should only be made, if it is for the use of domestic fossil energy potentials for domestic energy supply.

5. Providing guidelines for effective implementation of sustainable project

To ensure the cost efficiency of public funding and the sustainability of investment projects, we propose the independent auditing of project execution organizations. We present together with Grameen-Shakti guidelines for these organizations. Project execution organizations should ensure that at least 75% to 85% of project investments are directed to the technical project and to maintenance.

6. A fixed and increasing quota for Renewable Energy in developing aid budgets of industrial countries

We propose that industrialized countries secure in their developing aid allowances a fixed and increasing contribution for the promotion of Renewable Energy. This contribution should be around 5% of the development aid budget and should increase by 2% annually for the next ten years.

7. Global industrial norms and standards

In order to enable rapid development, it is necessary to introduce international industrial norms and standards. The norms would provide a compatibility of different technical components as well as facilitating the trade of Renewable Energy technologies. The WCRE appeals to the UN to advance the standardization of norms within the ISO with special attention and participation of experts from all continents.

8. Complete emission measurements for the Clean Development Mechanism and emission trading of the Kyoto Protocol

So long as no comprehensive analysis of the energy flow of fossil/nuclear energy carriers and their losses and emissions exist, the clean development mechanism and emission trade will continue biased actions against Renewable Energy. As quantified emission reductions are measured only by the efficiency of power stations or engines, they permit rewards for emission reductions even when primary energy usage is increased due to longer transport distances. The actual ecological advantage of Renewable Energies is undervalued within this limited calculation.

The WCRE calls on the governments to permit only those Clean Development Mechanisms which are based on a complete calculation of energy carriers emissions.

9. Suspension of trade barriers for Renewable Energy technologies and efficiency technologies

The unjust situation wherein international trade with fossil primary energies is subject to fewer limitations than the trade with Renewable Energy technologies and energy efficiency technologies must be corrected. This leads to the one-sided liberalization of world trade which in turn intensifies the global environmental crisis. The WCRE requests the World Trade Organization to generally eliminate tariffs from Renewable Energy technologies and harmonize trade barriers.

10. Integrated strategies for UN-Organizations

The mobilization of Renewable Energies does not only refer to the private sector of the energy industry. The economic and ecological advantages of Renewable Energy result in particular from concepts for resource planning, agriculture, forest maintenance, economy, construction, city planning, prevention of health damages, measures to fight desertification, population planning and for the protection of biodiversity.

Therefore, the WCRE calls upon the United Nations and their organizations to integrate the promotion of Renewable Energies into the implementation of their original tasks as UNEP already does with its environmental programs:

- at the FAO, in the promotion of food and agriculture;
- at the UNESCO in programs for education and science;
- at the UNIDO in programs for industrial development;
- at the UNDP in its development projects;
- at the WHO in programs for health.

The production and use of Renewable Energies can make an indispensable contribution to the prevention of desertification and to the protection of forests by realizing the transition to agro-forestry instead of further forest clearing.

Renewable energy – a definition

Renewable energy includes solar, wind, hydro, oceanic, geothermal, biomass, and other sources of energy that are derived from “sun energy”, and are thus renewed indefinitely as a course of nature. Forms of useable energy include electricity, hydrogen, fuels, thermal energy and mechanical force.

More broadly speaking, renewable energy is derived from non-fossil and non-nuclear sources in ways that can be replenished, are sustainable and have no harmful side effects. The ability of an energy source to be renewed also implies that its harvesting, conversion and use occur in a sustainable manner, i.e. avoiding negative impacts on the viability and rights of local communities and natural ecosystems.

Explanatory Memorandum

I. Preamble

“The Sun in the Service of Mankind”: under this motto Renewable Energy experts came together in Paris in 1973, the year of the first World Oil Crisis. Werner von Braun, the space-program leader of NASA, announced the coming solar age as the major challenge for the future. Governments began to launch Renewable Energy research and development programs. However, since the end of the last Oil Crisis in the early 80s, these programs have declined.

In 1981 the UN Renewable Energy Conference took place in Nairobi. Developing countries asked for Renewable Energy technology in order to meet their increasing energy needs, overcome their energy import dependencies and fight poverty. However, there was no response because of the minimal will of industrial countries to change the established conventional atomic and fossil energy paradigm.

In 1992 the United Nations Conference on Environment and Development took place in Rio de Janeiro and adopted the “Agenda 21”. Yet, under the strong influence of the conventional energy supporters, the origin of the dominating non-renewable energy system addressing the most environmental problems, and for many failing developments, became phased out in the declaration. Therefore, the Rio-Conference was a missed opportunity to become aware of the common challenge of the century, to replace conventional energy by Renewable Energy.

A G8 Task Force for Renewable Energy in 2001 elaborated an ambitious feasibility-plan for Renewable Energy introduction, benefiting the poorest people in developing countries, again without reaching implementation.

In 2002 the United Nations Conference on Sustainable Development took place in Johannesburg and adopted “The way forward to Renewable Energy” with the recommendation to the world’s society to push Renewable Energy strongly, acting

fast and soon. Yet, very few governments started truly ambitious programs, although some remarkable policy concepts like the German Renewable Energy Act and Local Renewable Energy Actions set examples for how to implement Renewable Energy.

The “Power failures” of the World Bank and of other intergovernmental development banks were identified years ago, showing a very low level of Renewable Energy portfolios in contrast to the continuously high level of conventional energy portfolios – again without real consequences. Furthermore, guidelines and support for national programs with Renewable Energy often deny recognition of its decentralized nature, concern for national interests, and involvement of the local users and operators.

The world is facing enormous challenges which are fundamentally linked to the increasing impact of humanity on its natural living base. For decades, several government declarations, reports by the scientific community, and appeals by civic organisations and leaders have identified many of the global, regional and local ecological challenges.

Since the North-South-Report in 1980, the Global 2000 Report in 1981, the Our Common-Future-Report in 1987 and follow ups in Rio 1992 and Johannesburg 2002, the world has begun to place the global ecological and development crisis on the international agenda as well as to discuss possible solutions. However, only very few effective initiatives have been developed and successfully implemented after long consultation processes. Nevertheless, all major challenges still need to be taken up very quickly in order to avoid an unprecedented catastrophe in the history of humankind.

A global energy supply in harmony with nature is fundamental to human survival. The laws of thermodynamics and the Earth's atmosphere as a closed and living system must be respected.

International conferences routinely call for the efficient use of non-renewable and environmentally harmful energies. Yet the primary axiom of sustainable development remains virtually ignored: no clear and consistent strategies have been developed to globally promote Renewable Energy. Indeed, global meetings have become a

surrogate for action, as if under the spell of an unwritten motto “Talk globally, postpone locally”.

This World Renewable Energy Agenda (WREA) provides guidance for governments, civil society, and the business, scientific and academic communities to overcome this discrepancy by acting alone as well as collectively to replace fossil and nuclear energy with Renewable Energy.

This WREA is written with the conviction that the 20th century will be looked back upon as the age of global ‘unsustainability’. An era which is caught up in dizzying ‘economic growth’ yet mired in ecological catastrophes and trapped by inefficient and toxic fossil and nuclear fuels. It is also written with the knowledge that the 21st century is remembered as the age of transition to the age of renewable power and environmental healing.

The aim of the World Renewable Energy Agenda is to map a practical path to

- avert a climatic catastrophe and other environmental disasters, such as health hazards from air and water pollution;
- provide a lasting supply of renewable energy for all societies, without any political or financial dependence on conventional energy markets;
- reduce international conflicts and wars over energy resources and the proliferation of nuclear weapons;
- overcome the vulnerability of societies due to their fundamental dependence on the nuclear and fossil energy regime;
- reveal the link between the global energy and water crisis;
- create new industrially manufactured products to harness and clean up, rather than destroy, the natural environment, while creating significant new employment;
- regenerate agriculture as the basis of inexhaustible resources for the future economy;
- develop socially and ecologically compatible economies of all scales; and
- help relieve a widespread, paralysing, doom-and-gloom despondency that is gaining ground as more and more people become anxious about their future and that of their children.

This Agenda focuses on the main challenges of the present energy system. It calls on the global community to implement effective strategies and policies to end reliance on fossil and nuclear energy while providing constructive paths towards the realistic vision of a global Renewable Energy habitat for all.

The major premise of the Agenda is:

Atomic and fossil energies are entirely unnecessary. Renewable Energy can meet the energy demands of mankind. The shift to Renewable Energy is a golden, historic opportunity, not a burden or a threat. This inexorable shift offers many benefits for the renewal of societies.

II. Overcoming the contradictions of the 20th century

The contradictions of the 20th century are evident, but still far from being overcome.

1. Although humanity is well aware of the serious ecological threats we are facing, political and economic decision-makers have not yet embraced the imperative of taking a bold and immediate action towards replacing fossil and nuclear energy with renewable sources as the major strategy to achieve sustainable development;
2. Since the dawn of industrialisation national economies operate under the principle of permanent growth, yet rely on non-renewable and finite resources;
3. Human and natural resources are squandered on a massive global scale because of overall inefficiency and excess. This excess is often supported by military action, despite improvements in the efficiency of economic production on a local scale and the potential of renewable resources;
4. Likewise, substantial scientific and technical knowledge and money are being invested in fossil and energy production processes that cause destructive impacts on the environment and on society, such as the civil and military use of nuclear energy. However, very few comparable efforts are made to avert and prevent the inevitably destructive effects. These efforts should include the overwhelming promotion of research and development in Renewable Energy technologies.

1. Renewable energy: Agenda 1 of global action

Ever since the “Agenda 21” resolution made over a decade ago by the UN-Conference on Environment and Development in Rio, ‘the Earth Summit’, the ecological world crisis has become more and more acute. Although the World Summit on Sustainable Development in Johannesburg in 2002 raised energy as one of five main topics for the first time, the decision-makers have failed once again to make the inescapable conclusion, and call for an end to fossil and nuclear power.

The worldwide abundance of environmental conferences has not led to improved environmental conditions, despite the sincerest global promises and hopes. The environmental conditions of most countries have worsened. The promise to inaugurate the age of "sustainable development" has not been fulfilled. New concepts are needed to revitalize the "Agenda 21" process on global environment and development.

The original "Agenda 21" document, still considered as a main reference for sustainable development strategies, described the dangers confronting the world civilization. However, the most important root causes of these threats have been omitted: the lack of energy in poor countries and the overwhelming dominance of the use of atomic and fossil power all over the world, despite all their inherent problems.

The relation between the economic development of the third world and energy-dependency became evident during the oil crises between 1973 and 1982: During this period, developing national debt increased from 200 billion to 1.2 trillion US dollars, a crippling burden which still exists today. The expected increase of prices, which will parallel the coming oil shortage in the next two decades, will confront developing countries with even more dire problems. An increasing number of countries spend more on the import of fossil primary energy than they receive from export earnings.

As energy investments in developing countries follow the example of developed industrialized countries, rural areas remain excluded from the access to electricity in most developing countries, because they cannot afford the high cost of energy transmission and its extensive infrastructure. The established energy system of industrial societies has been built up during a whole century of economic development, from an agricultural economy and rural settlements to an industrial and modern service economy in large urban areas. Simply imitating this and thus imposing an inadequate structure is the main reason for the persistent power supply problems and failing developments in many countries in the southern hemisphere. Energy supply problems intensified the migration of rural population to a point where urban areas have mushroomed uncontrollably, widening the poverty gap between

cities and rural areas. Only a sufficient supply with local Renewable Energy can permit developing countries to escape this trap.

The "Rio Declaration on Environment and Development" failed to recognize this intimate link between energy and development, as well as the direct relation between conventional atomic/fossil energy supply and the following major global environmental problems:

- a. a rapidly changing world climate and a global increase in extreme weather conditions;
- b. pollution of the atmosphere causing hundreds of thousands of fatalities, forest dieback and water pollution through acid rain;
- c. the degradation of ecosystems and destruction of landscapes through coal and uranium mining, oil and gas production, pipeline spills and oil-tanker wrecks;
- d. the destruction of soils through an industrialised system of fossil fuel powered, hyper-intensive forms of agriculture;
- e. the risks of nuclear radiation, insoluble plutonium contamination, nuclear proliferation and unresolved waste storage problems, burdening human civilisation for hundreds of thousands of years to come; and
- f. massive levels of energy production related water consumption and pollution.

Indeed, one of the most dramatically ignored environmental costs of conventional energy system is the massive consumption of scarce water reserves. The increasing scarcity of natural fresh water supply, an urgent matter in the international discussion, is dangerously exacerbated by the use of fossil and atomic energy, which consume and pollute tremendous amounts of water throughout their entire resource chain.

Yet initiatives to mitigate the global water crisis fail to even mention the destructive impact of the atomic/fossil energy system on the world's fresh water resources. At the same time, international institutions and water conferences ignore the potential of Renewable Energy to contribute to sustainable patterns of water use. Renewable Energy does not consume and pollute water at anywhere near the levels comparable

to fossil systems, and can be deployed to desalinate sea water and operate water pumps, especially in areas where no grid exists.

Similarly, the devastating impact of the burning of fossil fuels on human health is widely underestimated, although the scientific facts are well established. According to the WHO 800,000 people die each year due to particulate emissions from traffic and combustion plants. This corresponds to 1.4% of the total global mortality rate. Moreover, in industrialised countries the annual costs of diseases and fatalities caused by fossil energy emissions already amount to more than 500 € per capita. Factoring these figures into cost efficiency analyses of different energy options demonstrates that fossil energies are scarcely competitive. It is safe to assume that the investments and economic incentives necessary to accomplish a world-wide transition to Renewable Energy would make up a fraction of these costs.

Problems of bio-degradation, deforestation and other vegetation loss over large land surfaces are also linked to dysfunctional energy consumption patterns, because large quantities of biomass used for energy demands are not renewed. Therefore, in a nuclear and fossil energy regime, and in a non-renewable biomass system, true sustainability of development cannot be attained. None of the pending and some of the already visible dangers can be overcome without substituting nuclear and fossil power for Renewable Energy. Renewable Energy is the key to sustainable development, clearly the first priority, i.e. "Agenda 1" of "Agenda 21".

2. Energy: the driving force of societies

Cultural and economic progress in the history of human civilization is largely defined by breakthroughs in energy conversion technologies. This applied to the highly evolved classical Chinese culture as well as to the advanced worlds of Mesopotamia, Egypt, Greece and Rome, with regard to irrigation technologies and improved transportation facilities. Likewise the early industrialization in the Middle Ages, was powered by water and wind.

This theory also applies to the Industrial Revolution in modern times, which was made possible by the steam engine, used in production processes, navigation, rail

transport and which continues to be used today in contemporary steam-powered plants, whether operated by fossil or nuclear energy. The steam engine was the most important fossil energy converter of the 19th century. Powered by coal and later oil and gas it launched the fossil energy economy.

Accelerated by the combustion engine the “fossil revolution” burst across the entire world. It enabled various decentralized applications for consumers: emerging as the energy technology of the 20th century. The atomic energy economy was added to the fossil economy in the second half of last century, a nuclear era was to replace the fossil era. The very depth of dependence of modern society on fossil energy in maintaining its way of life is illustrated by the fact that certain countries do not shrink from any monetary or human costs to secure remaining energy resources by military means, even if it means the violation of international law. Indeed, the numerous negative macroeconomic side-effects of fossil/atomic energy are staggering. The increasing need to protect the long-distance global power lines against terrorist attacks; the high water consumption for mining, extractions and for heating power stations; the costs of imports; and the extraordinary environmental and health risks are all consequences of the fossil industry.

Initially, Renewable Energy systems as an element of modern energy supply were traditionally considered only in the form of large hydro-electric power dams. After the oil crisis in 1973 other forms of Renewable Energy began to be considered as a perspective for future energy needs. However, political institutions, both national governments and the UN system, did not pursue this strategy nearly as ambitiously as they pursued fossil and atomic energy technologies. In politics, the economy and science the potential of Renewable Energy continues to be underestimated. This historical psychological barrier remains one of the reasons for the failure of the Rio Declaration to even acknowledge the significance of Renewable Energy for environment and development. It is also responsible for the fact that in Johannesburg the international community remained paralysed and unable to adopt common goals and instruments to foster Renewable Energy.

3. The dead end of the fossil/nuclear paths

Today, at the beginning of the 21st century, the world is frozen in an energy deadlock. The situation becomes worse the longer the fossil/nuclear energy dominance continues and the substitution with Renewable Energy is put off. The hopes and promises of the nuclear era cannot be fulfilled. The dangers and risks of atomic energy, whether nuclear fission or nuclear fusion, were underestimated or even covered up, and their economic possibilities were greatly exaggerated.

The fossil energy system is approaching, with fatalist logic, three limits that will increasingly place the world civilization at risk:

1. Humankind approaches the exhaustion of conventional finite energy reserves: first liquid oil, then natural gas and later coal. Fossil energy consumption increases faster than the discovery of new reserves. The world fossil energy system now approaches the final exploitation of these reserves. This causes risks of growing international political conflicts for remaining fossil reserves, despite the hopes for peaceful cooperation through trade in Renewable Energy technologies.
2. The ecological system of the Earth has already been heavily damaged, primarily due to the substantial increase in the world fossil energy consumption, especially since 1950. The ecological limit will be reached before the limits of energy exploitation.
3. The fossil energy system created dependencies worldwide because fossil and nuclear energy mines and fields are concentrated in relatively few locations. Societies that are dependent on fossil energy imports are extremely vulnerable. Dependence on relatively few energy producing regions not only advanced a global process of concentration of the energy economy, but also led to constantly rising costs of the global energy infrastructure, and increasing trade imbalances. It is more reasonable for every economy to secure its own essential energy supplies internally, and not to rely on foreign sources. Economic damage due to the irreversible increase of energy prices will inevitably mount in the next decades along with the danger of social tensions within nations and the world community

as a whole. The victims of this development are above all the poor, in wealthy as well as in the poorest countries.

These physical, ecological and economic limits demonstrate that the time is overdue to globally substitute atomic and fossil energy with Renewable Energy. Only in this manner the basic needs of all humans for a sustainable and economic power supply can be satisfied, the natural basis of life for all humans preserved, and energy conflicts and the increasing gap between poor and rich prevented. It was a historical mistake of the 20th century that Renewable Energy sources have been so utterly disregarded. It would be the tragedy of the 21st century if the change to the Renewable Energy age did not proceed with the utmost urgency and commitment.

4. Research and development as key factors in technology developments

Energy and technology form two sides of the same coin. Technology cannot be developed without the input of energy; and most energy generated by humans for necessities is converted by systems of technology. Today's advanced technologies were developed mostly by the input of fossil or nuclear energy and still depend on these. However, the environmental, economic and physical limitations of the fossil/nuclear energy system are also limitations for the present technology system and threaten its very existence. Renewable Energy presents practical means to place today's technology system on new foundations that do not threaten humankind.

It is essential that actual technological progress is made subject to the aim of replacing all fossil and nuclear power by renewable energy systems. Future technologies must be operated by Renewable Energy. At the same time new technology needs to be developed to convert renewable primary energy to secondary use power. Instead of supporting research and development in fossil fuel derivation and conversion systems, or nuclear energy development, public and private budgets need to be diverted to the development of renewable energy.

Between 1984 and 1995 OECD countries spent 106,205 billion dollars on energy research alone, 67% of the sum was spent on nuclear and 16% on fossil energy research. These numbers do not include the immense amount of public money for

industrial and military research, frequently linked to energy issues. Although the research of nuclear energy received so much attention, it provides just 6% of the global energy supply and has no future, given the decline of uranium resources and the unpromising radiation intensive nuclear fusion technologies. Indeed, even if the attempt succeeded to develop reliable nuclear fusion technologies, it would cement the resource and economic dependency and relations more than ever before. There is no need to produce energy from such processes on earth, where the sun is already an abundant and safe resource.

On the other hand only 8% of the OECD energy research budget has been allocated to the further development of Renewable Energy technologies, although they have the great potential to supply the world with environmentally sound and unlimited energy. Therefore, the incongruity of deploying valuable research efforts into fossil energy production processes while ignoring the immense benefits and potentials of Renewable Energy must be overcome.

III. Renewable Energy for the world: taking up the key challenge of the 21st century

To overcome some of the most important contradictions of the 20th century and to avoid their perpetuation in the 21st century, humankind must use the historical opportunity to take up the challenge to transform today's unsustainable fossil/nuclear practices into a sustainable energy based economic framework. The energy potential for renewable sources in the world is many times greater than will ever be required for efficient, wealthy, technologically and environmentally progressive societies, now and in the future.

The potential of Renewable Energy

The natural and technical potential of Renewable Energy is sufficient to satisfy all energy needs for the world population. Many scientific studies over the past several decades have documented the technical possibility of a complete energy supply using Renewable Energy on local, national and global levels. These studies show

that the natural potential of Renewable Energies available on earth is 20,000 times that of the daily consumption of atomic and fossil energy. The physical potential of Renewable Energies is inexhaustible, until the end of our solar system, and it is available to everybody no matter where they live or work.

Today's technical potential is already developed to a point where it could supply six times more energy than is demanded by today's global primary energy demand. These findings relied on current technologies which are available and do not take into consideration the extraordinary potential of future developments. This optimism is justified: several technical revolutions have already prompted important structural changes, transforming societies, creating new jobs and displacing earlier technologies and economic strategies.

Although the economic potential for Renewable Energy is still below that of its technological capacity, many arguments about the cost-effectiveness of Renewable Energy are flawed. Social and environmental costs of conventional energy consumption, such as the costs of climate change, health damages, and military costs etc., are not reflected in the market price, but are covered by public tax money and many hidden subsidies. Other such external costs are incurred by the importing of energy rather than the use of local supplies, government research expenditures and past and current subsidies.

On the other hand constant technical improvements, industrial mass production and multiplied experiences in the use of Renewable Energy technology improve the performance of the systems and lower costs. Moreover, increasing the efficiency of energy conversion and consumption allows Renewable Energy to further improve their market competitiveness. Renewable Energy systems must be introduced on the basis of economic decision making criteria that recognise the external, social and environmental costs of all energy supplies. This internalises the societal benefits of renewable energy sources and the corresponding disadvantages of conventional energy sources.

The very availability of the vast physical, technological and economic potential of Renewable Energy makes it no longer ethically acceptable to permit the continued pollution and damage from conventional energy sources. All political and economic decisions affecting energy planning need to be refocused on the development of sustainable renewable forms of energy.

The benefits of Renewable Energy

If all these alleged economic burdens were justly and publicly compared to the combined economic, social, ecological and cultural benefits of Renewable Energy, decision makers and the society as a whole would without a doubt enthusiastically and change to the use of Renewable Energy.

These economic benefits include:

- g. avoiding environmental damages, such as the destructive effects of climate change;
- h. avoiding energy imports for every national economy – to the point of replacing the import of conventional energy sources and fuels by domestic Renewable Energy;
- i. reducing the vulnerability of the energy system, a renewable system is independent from sources from outside and more decentralized;
- j. avoiding subsidies for atomic and fossil energies, which amount at present around 300 billion dollar annually world-wide;
- k. avoiding health damage and fatalities in humans;
- l. avoiding infrastructure costs, to the extent of replacing conventional central energy supply systems, including their unavoidable distribution transport expenditures;
- m. avoiding political, economic and military conflicts over limited fossil energy prospects;
- n. economic opportunities for new industries and new services, industrial and manufacturing jobs, as well as economic opportunities for the design, production, installation and maintenance of Renewable Energy systems;

- o. opportunities for revitalising the agricultural and forestry sectors by producing biomass as an energy carrier, and delivering raw material for a sustainable chemical and building industry;
- p. opportunities for stabilizing local, regional and national economies by becoming independent of the risks and uncertainties of global energy markets;
- q. social and psychological benefits that result from an end to "no future"-thinking that has begun to pervade the minds of the many individuals who have come to regard the ecological collapse of the world economy as inevitable.

Renewable Energy meets several basic needs of the poor. Nearly half the world's population lives in developing countries in the southern hemisphere. One third of the world's population has no access to a modern electricity supply. These two billion people depend significantly on biomass, including firewood, for energy supply. In many instances, due to increasing population, the wood supply is exploited without full renewal. Consequently, increasing areas of land are deforested and deprived of plant regeneration. Many of these countries are compelled to pay more for imported energy than they earn in foreign trade from their exports. Resulting in a state of economic dependency essentially barred from developing their economies. The use of renewable energy from local sources, requiring no central infrastructure for distribution and supply, constitutes the quickest and usually only available means for helping to

- end the destruction of vegetation,
- obtaining energy to satisfy basic needs and facilitate economic activities,
- stem the steady migration from rural areas to urban slums,
- initiate a development process that is independent of energy imports,
- practise agriculture with the aid of irrigation systems,
- avoid the danger of copying the wastefully and exploitatively growth-minded economies of the industrialised countries in the northern hemisphere. Countries that have pushed the very limits to global growth, despite having only one quarter of the world's population.

Only Renewable Energy sources can help poorer countries combat the rapid growth of population and rural migration. If the energy is not brought to the people in rural areas, they will come to the cities in mass, where they expect to find energy and economic stability. All developed countries have a particular responsibility to assist, especially the neglected continent of Africa, in which poverty, hunger, excessive population growth and destruction of the natural environment are the most widespread.

Adequate framework conditions enabling new shareholders to implement Renewable Energy

The energy industry, by virtue of its investments and structures, is geared to the extraction and exploitation of conventional sources. It has thus so firmly bonded itself economically to conventional energy systems that the required immediate and bold move toward Renewable Energy supplies cannot emanate from the energy industry alone until Renewable Energy is no longer seen as a threat to their own economic interests. The energy industry needs to make a structural shift and change from the role of suppliers of fossil and nuclear power to a new role as producers of technology and systems for renewable energy.

This transition to a Renewable Energy economy can only be achieved when adequate framework conditions exist as incentives for both old and new stockholders to foster the development of Renewable Energy. Local, regional, national and international political institutions must formulate coordinated strategies for the introduction of renewable energy sources, ridding current national and international political frameworks of their fossil and nuclear bias.

Although national judicial systems are largely responsible for determining energy supplies and structures, there are also several international institutions and treaties that tirelessly pursue the continuing yet doomed development of fossil and nuclear energy. These include the International Atomic Energy Agency (IAEA) and the European Community Treaty EURATOM, which promote nuclear energy on a European and global level. The most prominent advocate for securing the fossil energy supply of the OECD countries is the International Energy Agency (IEA) and

the European Energy Charter of 1995 that has the objective to improve the trade of fossil energies among the USA, Canada, Russia, Australia and some other OPEC countries.

Programs, institutions and treaties for renewable energy at national and international levels must not be restricted to the conventional processes involving only organisations responsible for energy policy on the one hand and the energy industry on the other. Use of renewable energy sources should become an integral component of future urban and rural planning, architecture, agriculture, transportation systems, and of industry. Our political and cultural task is to create new opportunities for the use of renewable energy sources. Nevertheless, strategies to introduce renewable energy sources must not be made contingent upon having a consensus with the conventional energy sector. Also, there is no need for binding international agreements, because all the benefits of Renewable Energy should be incentive enough to launch national programmes and to become an international forerunner for the promotion of Renewable Energy.

Taking up the challenge

If one considers the immense potential and immense benefits of Renewable Energy while recognizing the vital importance of a sustainable energy supply for all societies; the need to take up the exciting and liberating challenge of a comprehensive and radical shift from the fossil and nuclear paradigm to a new economy based on Renewable Energy is the inescapable solution. The historical opportunity for the 21st century is to renew our energy system, offering practical hopes of a better and more peaceful world.

IV. Strategies for building a global economy based on Renewable Energy

Nuclear and fossil energy can be replaced faster than most energy experts assume. Since Renewable Energy systems do not need international infrastructures for the primary energy supply, they can be introduced more readily and swiftly than is the case for highly centralised nuclear/fossil energies that take many decades to construct. However, to overcome institutional and economic inertia, and accelerate the structural change from conventional to Renewable Energy several fundamental and unequivocal actions need to be taken. It is essential to immediately initiate, promote, and support all measures on a national and international level that support the continuing technical development and implementation of renewable energy; circulate information about these opportunities; and enlarge the political and economic responsibilities for the practical exploitation of renewable energy sources.

Sector strategies

While fossil and nuclear power produces vast negative effects, Renewable Energy technologies give rise to a number of benefits, which are excluded from most cost estimates. Integrated strategies are therefore recommended. The multiple benefits must be considered and included in the consideration of Renewable Energy investments: the impact of reduction of water, health costs, infrastructure costs, future opportunities for agriculture, the improvement of the quality of life in cities and an increased international stability.

Water supply

The increasing water crisis poses a fundamental threat to the lives of over one billion people and can only be overcome with a global transition to Renewable Energy, because:

- Renewable Energy technologies consume almost no water thus leaving natural supplies untouched;
- Renewable energy does not produce the multiple adverse water impacts that the nuclear and fossil energy system produce, thus protecting river, lake and maritime ecosystems and preserving biodiversity;
- small scale hydropower plants have a positive impact on regional water balances because they help to manage runoff and to retain water in the region;
- Renewable Energy can be used in remote, even off-grid areas to pump water and to operate irrigation systems, particularly in water deprived areas in the southern hemisphere;
- Renewable Energy can be used to desalinate seawater, generating fresh water either as a by-product of solar thermal plants or with existing desalination techniques powered by Renewable Energy; and
- integrated water treatment plants combine the purification of water with the production of biomass from aquatic plants and biogas for energy generation.

Health

Nuclear and fossil energy sources subject people to considerable health hazards. The deformed children of Chernobyl compose a warning to humanity. The use of fossil fuels leads to cancer, circulatory disease, respiratory ailments, and skin damage. The use of renewable energy sources will improve the health situation of people and lead to lower healthcare costs.

Therefore, it is urgent that healthcare institutions, health insurance companies, health departments, medical schools and organisations, the WHO and ministries of health, recognise the importance of renewable energy sources for benefiting health. All such organisations should encourage and promote the introduction of renewable energy supplies.

Agriculture

The agricultural sector will receive a regenerating boost through the growth of plants for energy and raw materials, alongside food crops. Similarly the agricultural sector

will benefit from harnessing renewable energy in general, and in particular such as wind and water power. For many regions, this is an opportunity for preventing or reversing the social degradation and economic marginalisation of the agricultural sector and rural regions. By producing energy, the agricultural sector can supply all of its own energy. In addition, natural residues from biomass are sources of environmentally friendly fertilisers, allowing the ecological cycling of nutrients and soil conditioners. In order to make the most of these opportunities, land on which food crops are no longer grown must be devoted primarily to the production of biological energy and organic produce. Funds to set aside land should be allocated so that, by the year 2010, 50 % of such areas are used for energy crops. Regulations should ensure that gas or oil derived from biomass is purchased by the petroleum and gas companies at a guaranteed price level sufficient to compensate for the unfair price advantage of conventional energy. Eventually, when total agricultural yields of biomass for energy production are substantial and secondary effects are taken into account, all compensatory payments can be eliminated. Regulations are required so that no restrictions, e.g. maximum quotas, are placed on the production of energy and raw materials from biomass. Restrictions may only apply to cropping techniques and be aimed at protecting the soils and ground water as well as avoiding harmful monocultures.

Transport

The use of Renewable Energy in present and future transport systems can make a crucial contribution towards improving the quality of life in cities, keeping water supplies clean and preventing any further negative repercussions on the chemical composition of the atmosphere. The fuels used for all combustion motors can be replaced by biomass derived fuels. New means of transport need to be developed and introduced to permit the use of hydrogen and electricity from renewable energy sources. Wherever possible, this should lead to improved traffic patterns and behaviour without the need for any additional administrative measures. Programs need to be developed that foster engines, which are fuelled by biofuels, including biogas and vegetable oils, and by hydrogen derived from primary renewable energy. Moreover, electric vehicles with new charging technology need to be supported: including electric light vehicles, solar-powered boats, and boats and ships with

engines that run off of vegetable oil (thus also making a major contribution to keeping oceans, seas, lakes and rivers clean). After a short time, the registration of additional boats that run on conventional fuels must be prohibited. Government institutions should set an example by re-equipping their own vehicle fleets with boats powered by renewable energy. Guidelines are required so that by the year 2010 every major automobile producer manufactures at least one model of electrically powered lightweight vehicle, and a vehicle capable of being powered by bio-fuels, e.g. from vegetable oils, or hydrogen.

Urban development and Renewable Energy

The WCRE supports all single and united efforts to study, develop strategies for, and rectify the mounting greenhouse gas emissions load and fossil/nuclear fuel dependency of the world's growing urban agglomerations. The WCRE supports all integrated and transparent urban efficiency measures, prototype and demonstration projects. public transport and energy conscious land use planning practices, local generation capacity, equitable urban power pricing, decentralisation of power generation and consumption, local renewable energy ordinances, and all programs that are suitable for an accelerated reduction in fossil and nuclear fuel consumption, including measures that may lead to a carbon trading credit scheme involving cities.

Fossil fuel dependency affects and threatens all cities, from the poorest to the wealthiest, but the issues vary dramatically.

- Poorer cities and towns experience problems with local health, basic sustenance and income generation. Many of the problems are due to acute levels of energy poverty, i.e. a lack of ready access to locally generated, affordable and renewable power and fuel.
- Cities which are more developed have accelerating urban economies and struggle with fossil fuel induced local air, water and soil pollution.

- The major challenge of cities and towns experiencing increasing wealth and consumption has become massive and dangerous greenhouse gas emission, due to extraneously high levels of fossil fuel use.

Global urbanisation is both driven by subsidised fossil fuel supply systems, and depends on the massive expansion of conventional energy supply systems. It depends on central supply nodes and routes. Rural urban migration and other regional development problems have sharply accelerated as cities and towns become industrialized. The introduction of Renewable Energy sources provides an opportunity to reverse this trend. An opportunity to achieve uniformly distributed centres of economic activity, and to ease the burden on towns and cities. Urban policymakers and planners must become aware of Renewable Energy sources and their urban applications.

Renewable energy also offers an opportunity to boost public transport. After the initial investments in equipment have been made, the use of renewable energy is associated with lower operating costs and can yield an affordable range of public transport services. As the noxious emissions and noise caused by conventional energy sources decline and are eventually eliminated, people in cities will be inclined to start riding bicycles again and to walk more, providing the appropriate infrastructure is built.

Programs to renew human settlement processes must include incentives to render buildings in municipalities as well as rural areas independent of external energy sources, through the combined use of efficiency and Renewable Energy. This has both ecological and social importance. These programs lower running costs, thus making occupants more economically self-reliant. They lead to the use of architectural approaches that interact more with the community. They also change lifestyles, by allowing people to participate in the natural cycle of the seasons without lowering their quality of life.

This historical challenge faces architects, construction engineers, the building industry, the building trades, building developers, investors and government regulators. It not only drives new legislation, but also makes it necessary for

occupants to be educated in the new opportunities and building environments. Regulations in all countries require that new buildings are designed for both passive and active solar energy gain. Consequently, the use of Renewable Energy generation would become obligatory for all new buildings. Any conditions preventing the use of solar water heaters or solar photovoltaic cells on buildings need to be immediately overcome. Regulations should encourage solar technologies to be optimally integrated into building structures.

To avoid unnecessary municipal waste and its disposal, Renewable Energy sources can and must make a fundamental contribution. Measures must be initiated:

- to replace packaging materials that cannot be recycled, by materials made from biomass that can be naturally recycled;
- to promote the use of solar thermal power for high temperature processes breaking down synthetic materials into their constituent elements;
- to develop and use construction and other materials, medications, paints, inks and dyes made from plants, thus preventing hazardous wastes and their health risks.
- Blanket waste incineration is not a form of Renewable Energy and municipal reliance on it as a power source should be avoided.

Towns and cities should install appropriate facilities to derive usable energy from organic waste from households and industry in biogas facilities. The energy is best utilised within the village, town or city in which it has been produced. Low interest loans can be given by national governments to municipalities to support the investment costs, which can be paid back from the eventual revenues.

Integrated strategies for UN-organizations

The mobilization of Renewable Energy does not only refer to the separate sector of the energy industry. Its economic and ecological advantages result in particular from concepts for resource planning, agriculture, forest maintenance and economy, construction, city planning, avoidance of health damages, measures to fight desertification and population planning as well as for the protection of biodiversity.

Therefore, the United Nations and their organizations must integrate the promotion of Renewable Energies into the implementation of their original tasks:

- r. at UNEP into its environmental programs;
- s. at UNCHS for its settlement and urban development programs;
- t. at FAO into the promotion of agriculture;
- u. at UNESCO into programs for education and science;
- v. at UNIDO into programs for industrial development;
- w. at UNDP into its promoted development projects;
- x. at WHO into programs for health and health recovery;
- y. at UNICEF, to help liberate children held captive, labouring in fossil fuel industries, and suffering from their environmental consequences.

Key global strategies

To create the effective dynamic of a global structural change towards Renewable Energy, by rejecting all forms of fossil and nuclear energy, humanity needs to focus on international key strategies that achieve the above mentioned integrated strategies. These key strategies embrace new concepts for developing aid, the implementation of an Renewable Energy Proliferation Treaty and an International Renewable Energy Agency, the optimisation of international research training and education activities for Renewable Energy, new financial frameworks, renewed infrastructure, global and national targets, a complete emission measurements for the Clean Development Mechanism and Emission Trading of the Kyoto Protocol, reduction of trade barriers and conversion strategies for fossil energy producing countries.

Renewable Energy and developing countries

Renewable energy sources have significantly greater importance for the developing countries than all other development measures. We therefore call for a complete reorientation of all cooperative development activities in the energy sector, in order to focus on renewable energy sources whenever primary energy is required. This should also include an international forestation initiative to encourage the

development of agro-forestry in developing countries in order to revitalise regional ecological systems and to make a major contribution towards mitigating the greenhouse effect. Governments, international institutions, non-governmental organisations, and development banks should acknowledge this as their highest priority task.

The aim must be for Renewable Energy technologies to be produced as quickly and as extensively as possible in the developing countries, so that a future and currently mounting lack of foreign exchange will not needlessly limit the spread of these technologies.

Research, education and ethics for a renewable age

In view of the fundamental importance that Renewable Energy sources have for all areas of life, we call for public and private research endeavours to receive a new orientation. Energy research must concentrate on improving the generation of Renewable Energy, and on raising the efficiency of energy conversion and use. Research on fusion power must be halted because the vast potential of Renewable Energy sources completely eliminates the need for any new sources of energy, and especially those that would create new and incalculable risks.

Where basic research is concerned, it is necessary to investigate new technologies and also new materials from biological substances. Renewable Energy technologies have already reached a mature status of development. However, their efficiency and cost-effectiveness can be even further improved by additional research efforts and public and private funding. Moreover, research should be intensified for crops, substituting plant materials for fossil minerals and chemicals.

Great importance accrues also to studies of the causal relationships among natural forms of life. Instead of manipulating genes and producing new life, it is essential to shed more light on natural biodiversity, which is characterised by a previously unimaginable wealth of sustainable, continually renewable possibilities for utilisation. For ethical reasons, the granting of patents on plants and other living creatures must be prohibited. The products of nature belong to everyone and it must be possible for

them to be freely used by all, provided this is done in a way that always ensures their renewability and sustainability.

These research and development activities can be best achieved by more cooperation among existing and new research institutes. It is therefore a necessity that institutes and centres form an international network to exchange basic information and to commonly enhance the research and development of Renewable Energy technologies.

Moreover, in any country these research outcomes should be made available to everyone who plays a key role in the implementation of Renewable Energy technologies. Adequate educational and training opportunities need to be developed, for instance, for architects, planners, lawyers, tradesmen, engineers and agricultural experts. However, it is necessary that an overall public awareness exists that understands for the requirement of Renewable Energy as a key to sustainable development. This can be achieved through implementing educational trainings in every school or university curricula. Such curricula should create an understanding of how the issue of energy is linked to the key challenges the world is facing today. Educated students of today will be critical and sustainable consumers in the future.

New financial frameworks for promoting Renewable Energy

The approximately 300 billion dollars of energy subsidies spent annually on nuclear and fossil power are four times of what has been spent on the promotion of Renewable Energy over the last 20 years. These energy subsidies contradict the very spirit of the World Trade Organization. They serve to protect certain branches of the energy industry, in particular in the area of coal and nuclear power. In addition, social reasons exist to give energy users access to economical energy. Therefore, it is not realistic to expect an immediate reduction or cancellation of these subsidies. However, the extraordinary gap between high nuclear/fossil energy subsidies and marginal public support for Renewable Energies must be overcome. The path to it is the gradual conversion of these subsidies into Renewable Energy promotion programs.

Development policies of industrialized countries and credit policies of international development banks within their energy portfolios must place absolute priority on Renewable Energy and must commence programs for an aggressive finance framework for Renewable Energy and energy efficiency with zero- and low interest rate investments. This financing initiative must include co-operation with private development banks, solar banks, micro-credit initiatives and Renewable Energy investment funds, which are active at local level. Only small-scale loans meet the need of the numerous potential local users of renewable energy.

So-called Regional Structure Funds should focus on funding industrial development wherever renewable energy is clearly incorporated. The extra support would be funded by reductions in the financial allocations to inappropriate projects. This policy will accelerate manufacturing production and lower the costs of renewable energy equipment and services. In addition, a large number of new and permanent jobs will be secured.

Likewise, we advocate pricing and taxing reform for ecological sustainability. This will make it more expensive to use non-renewable energy, mineral raw materials and environmentally harmful chemical stocks than more benign renewable supplies. Therefore renewable energy sources, raw materials from plants, and biological base materials would be favoured. Depending on the region of the world, there are various methods employed in achieving this; the most important being taxation, real-cost pricing, as well as Renewable Energy certificate trading schemes and policies. The aim is not to raise the total taxation or cost burden, but rather to change taxation and cost structures. Such modifications of economic structures are in the interests of ecological compatibility. It is necessary to tax non-renewable and harmful substances, so raising their costs and forcing their abandonment. The German Parliament has initiated a promising way by tax-exempting bio-fuels.

Where the trade in Renewable Energy Certificates (REC) is applied, the setting of bold and increasing Minimum Renewable Energy Targets (MRET) is essential, thus enabling the unfolding of a national and international financial support schemes for Renewable Energy and sustainable development.

Renewing the energy infrastructure

In addition to all other measures that may be applied, all countries should provide legally backed guarantees for electricity derived from renewable energy sources to be sold to the power grids. The price should at least equal to the average price for electricity from conventional sources including all external costs, which are not reflected in the end price. These guaranteed feed-in-tariffs should be granted to all electricity derived from all forms of renewable energy, such as photovoltaic, solar and geo-thermal energy, wind energy, wave and water energy, biomass etc.

There also needs to be a separation of the businesses operating power grids and gas distribution networks, from businesses generating electricity and gas. Consumers purchasing electricity from the power and gas grids, should be able to state a preference for supplies from renewable energy sources. Therefore these grids must, like roads and streets, be treated as essential elements of the general infrastructure and as such be subject to public supervision. Each country should choose whether a given grid is supervised at the national, regional, or local level.

Setting global and national targets and strategies for the introduction of Renewable Energy, based on best-practice benchmarks

We appeal to the governments to determine national targets to increase the share of Renewable Energies on their energy supply. We recommend to establish national targets of minimum 2% annual Renewable Energy growth. The most appropriate political step to reach these minimum targets is a legal framework to put Renewable Energies from domestic sources first in relation to nuclear/fossil energies. This includes,

- a guaranteed minimum feed-in reimbursement in the current sector for Renewable Energies to make private investments profitable;
- energy tax exemption for Renewable Energies;
- public construction regulations for the installation of solar systems into new and reconstructed buildings;
- promotion programs for Renewable Energies through low interest credits.

Such a legal framework proved to be more effective than the fixing of introduction quotas. The broad promotion of all Renewable Energies and certainty for investment are not easily attainable in ways that involve a competition between technologies against simple quota. In addition, investment criteria are in the centre of interest, which considers only current capital costs, but not the costs avoided on a long-term basis.

Complete emission measurements for the Clean Development Mechanism and Emission Trading of the Kyoto Protocol

As long as no complete analyses of the energy flow of fossil/nuclear energy carriers and their losses and emissions exist, the Clean Development Mechanism and emission trade cannot work. As quantified emission reductions are measured only by the efficiency of power stations or engines, they permit rewards for emission reductions even when primary energy is increased due to longer transport distances. The actual ecological advantage of Renewable Energy is undervalued within this isolated calculation.

We call on the governments to permit only such Clean Development Mechanisms which are based on a complete calculation of emissions of energy carriers. Beyond that, we request the World Trade Organization to develop in cooperation with ISO environmental standards for energy trade considering all energy emissions. These are to permit all countries to limit the free energy trade to such carriers, which do not fulfil this measure criterion. Hence, all domestic energies with small transportation efforts and above all Renewable Energies would be automatically privileged.

Global technology market for regional Renewable Energy

The contradiction must be overcome that international trade with fossil primary energies is subject to fewer limitations than the trade with Renewable Energy Technologies and Energy Efficiency Technologies. This leads to the fact that this one-sided liberalisation of the world trade intensifies the global environmental crisis. The WCRE requests the World Trade Organization to generally exclude tariffs from these technologies.

In order to enable a rapid technological development and international trade on Renewable Energy Technologies, it is necessary to introduce industrial norms and standards. In that way, a compatibility of different technical components can be achieved and trade of Renewable Energy technologies facilitated. We appeal to the UN to advance the standardisation of norms within the ISO with special attention and under participation of experts from all continents.

Conversion strategies for fossil-energy-producing countries

The global conversion from fossil to Renewable Energies will expose most fossil fuel exporting countries to an extreme structural change. It is necessary that these countries adjust to it in time and receive support by the international community to do so. The prospect that in coming decades these fossil energy exporting countries turn into those of hydrogen exporting, produced by solar power plants, can hardly be realized due to the overwhelming capability of today's energy importing country to use Renewable Energies from indigenous resources. The most realistic prospect for today's energy exporting countries is for them to become producers of new energy technologies and to revitalise their agriculture and forestry by, for instance, the restoration of water deprived or denuded regions in the Middle East with the help of seawater desalination plants. Additionally, this includes the production of raw materials of plants for the coming world demand of the chemical industry on non-fossil hydrocarbons.

A Renewable Energy Proliferation Treaty

A supplementary protocol to the Nuclear Non-Proliferation Treaty (NPT) is needed, which should permit the signatory States to fulfil their obligations stated in Article IV of the NPT by supplying technical aid in form of Renewable Energy Technologies. Art. IV of the NPT guarantees technical aid to the states, which commits them to renounce nuclear weapons and use nuclear energy peacefully, and obligates the nuclear weapons possessing states to offer this technical aid. The supplementary protocol in form of a Renewable Energy Proliferation Treaty should be the basis of an international treaty for the introduction of Renewable Energies and internationally

legitimise an International Renewable Energy Agency (IRENA). The WCRE will suggest this supplementary protocol prepared by EUROSOLAR to the signatory States of the NPT.

An International Renewable Energy Agency (IRENA)

The contradiction must be overcome that fossil and nuclear energies have international institutionalised advocates for their further development. For example, the IAEA – supported by membership fees from governments – promotes with its "Technical Development Programme" the international proliferation of atomic technologies, while there is no comparable international organisation for Renewable Energies.

Among other international actors, the German parties in government recommend in their current programmes the establishment of an IRENA. With this political support the German government needs to start the international initiative for the establishment of such an governmental organization. The function of this agency is in particular to assist in building "human capacity" in the field of Renewable Energies, including co-operation by establishing "Centres of Excellence for the Application of Renewable Energies" on a regional level for the transfer of technology. Under its auspices a network of regional technology transfer centres is encouraged to promote the use of renewable energy sources at the regional and local levels. IRENA is not meant to compete with other international institutions or initiatives that promote Renewable Energy, it will strengthen and coordinate existing activities and it will dedicate itself to activities now neglected by other organisations.

V. Towards a global renewable energy habitat

A major change is urgently needed for energy supplies. Civilisation is caught in a process of disintegration as a result of the destruction of natural resources by fossil fuel consumption. In addition, in view of the lethal threats being imposed on civilisation by the critical dangers of nuclear power, the task of switching to energy supplies based on renewable sources has a historic dimension.

Attempts to introduce solar energy have been repeatedly handicapped. Nevertheless, the benefits of developing the basic technologies are owed to the stubborn persistence of responsible researchers and developers. Many of the outstanding practical examples in renewable energy are due to the endeavours of individuals who have refused to be discouraged despite overwhelming obstacles. However, public awareness of the outstanding opportunities offered by renewable energy sources need to grow all over the world and decision makers in every country need to meet these central challenges of our age.

A broad socio-cultural global movement for solar energy must begin. This will give rise to innumerable individual initiatives to create a better life on the basis of renewable energy sources. As such initiatives spread and encourage more and more people in all walks of life to follow suit, a new brand of quality will be imparted to all society and the entire economy - culminating in a "sustainable society". This movement, based on renewable energy sources, offers an ethically and socio-economically superior alternative to the economic power of the fossil and nuclear energy industry and the major influence it wields on political institutions.

However, humanity is in a race against time. Although many options of Renewable Energies are already established and practically at work, global energy demand increases faster than the introduction of Renewable Energies. This demonstrates that the introduction of Renewable Energies needs to be substantially accelerated. It is necessary to declare the change to Renewable Energies as the strategic project of

the 21st century – on national as on global level, supported by an increase of energy efficiency.

We all, as a private user of small appliances; as a house owner; as a manual tradesman or producer; as a company shareholder; as an architect or scientist; as a farmer or business person; as a motor vehicle owner; or as a teacher or journalist; we all, the societies in the world need to overcome the contradictions of the past and take up the gauntlet of the 21st century to realise a global Solar Habitat for all.