
Internationale Konferenz
für Erneuerbare Energien, Bonn
International Conference
for Renewable Energies, Bonn


# International Sustainable Energy Organization

# ISEO

**The Global Mechanism for Bundling the Forces**
**towards the Transition to the Clean, Sustainable Energy Age**

March 2004

**Editing Team:**

**Gustav R. Grob, Executive Secretary, ISEO, Geneva: Coordination / Chief Editor (Importance of International Standards)**

**Hans Hänni, Vice President, ISEO – Web Portal Chapter**

**Johann Widmer, President, ISEO - Strategy Chapter**

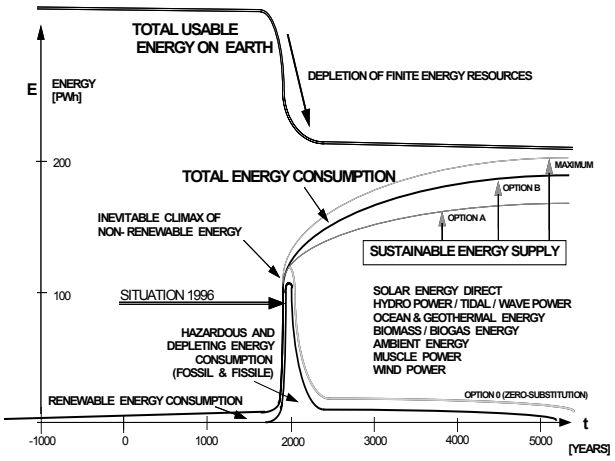
**reviewed by:**

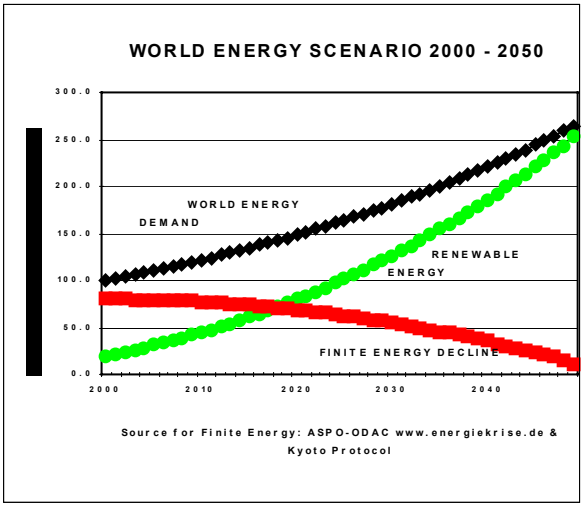
**Richard Ottinger, ISEO Co-Founder, Dean-Emeritus, Pace Law School and former US Congressman, and by Heidi Buettgen with other ISEO Members and office staff**

# Executive Summary

ISEO, the International Sustainable Energy Organization for renewable energy[1] and energy efficiency, was initiated as parliamentary motion by independent Swiss National Councillor Roland Wiederkehr, supported by a large number of National Council members from six political parties in 2002, and then presented at the Johannesburg WSSD Summit. ISEO was registered in Geneva in 2003 and unanimously passed as a postulate to the Executive by the National Council in 2004. ISEO has now members in over hundred nations. The mandate of ISEO is to facilitate the world-wide transmission to a Clean Sustainable Energy Economy, based on the Global Energy Charter for Sustainable Development, appropriate international ISO standards and benign clean, renewable energy technologies.

Besides governments and communities, relevant private sector decision makers from energy stakeholders and NGOs are involved, embracing industry, finance and academia, including also individual research & technology development experts. ISEO's web portal www.uniseo.org serves as global information exchange platform on energy technologies, sustainable energy legislation and policy, sustainability education & training, benign energy systems and infrastructure financing, international standardization, full energy costing, human behaviour, energy statistics and forecasting. ISEO is compiling complete world renewable energy mix forecasts for feasible sustainable global energy scenarios and action plans as illustrated by the graphs below:




## About the Authors and Reviewers

Gustav R. Grob is professional industrial engineer, member of the Swiss Electrotechnical Association, former Dean of the world-wide SGS-Redwood Petroleum Training School, Chairman of the ISO/TC203 WG for energy systems analysis, initiator of ISO TC197 on hydrogen energy and other ISO committees, President of the International Clean Energy Consortium ICEC, President of CMDC and Executive Secretary of ISEO.

Johann Widmer graduated as process engineer, has world-wide project experience, was energy storage expert at the Swiss Federal Institute of Technology, is Vice President of the international consultancy group Cosit AG, Zurich, President of the Competence Transfer Foundation, Board Member of CMDC, and co-founder and acting President of ISEO. He is lecturer and author of books on IT and material sciences.

Hans Hänni holds a PhD in physics from Berne University, was program director of ProClim, the climate protection department of the Swiss Academy of Science, didactic internet program coordinator at the Swiss Federal Institute of Technology, and is now Secretary General of the Swiss Academy of Technical Sciences, was confounder of ISEO and one of its first Vice Presidents.

Reviewed by ISEO Co-Founder Richard Ottinger, Dean-Emeritus, Pace Law School and former US Congressman, who co-initiated and reviewed also the Global Energy Charter for Sustainable Development, and by other ISEO Members for completeness and Secretarial Staff for proof reading and formatting.

## Table of Contents

## 1. Introduction

For the historic World Summit for Sustainable Development at Johannesburg (WSSD) a motion for an UN Agency for sustainable energy was submitted by 41 Swiss parliamentarians from six political parties of the Swiss National Council, which passed in March 2004 without opposition. In other nations similar initiatives were made before - in 1980 by German Chancellor Willy Brandt, in 1990 by Austrian Chancellor Vranitzky, at the World Clean Energy Conference in 1991 and the CLEAN ENERGY 2000 Conference in Geneva, attended by Minister-level delegates, UN agencies, academia and NGOs from over 100 countries. It was again reiterated in 2001 at the 9th Session of the UN Commission on Sustainable Development CSD9, by its Energy Caucus, at the World Summit on Sustainable Development WSSD in Johannesburg and most recently in the German Parliament.

The idea to create such an organization matured since the Rio United Nations Conference on Environment and Development UNCED in 1992, because all initiatives for more renewable energy were systematically watered down to a farce by special interest groups, as observed again at the Johannesburg Summit, which came under heavy criticism, because the energy and climate issues are still not resolved with the incessantly rising pollution from fossil fuel combustion. At meetings with governments and stakeholders it was then decided that ISEO shall be a hybrid organization like IUCN with private sector and governmental members, establishing strong NGO and UN links.

ISEO gives practical action-oriented answers to the crucial question, how the cause of most global and local environmental and health problems can be eradicated: global warming resulting in sea level rise, flooded coastal areas and ocean islands, lost mangroves and wetland biotopes, melting glaciers, ruined ski resorts and riverside inundations, mountain erosions and land slides, health problems from pollution and noise, fertility, mortality, protection of biospheres and aquaspheres from fossil energy causing also disastrous oil spills and acid rains, endangering agriculture, piscicultures, forestry, food security, water quality, and provoking desertification, migrations, trade imbalances, oil wars, etc.

If future generations want to have a chance of survival on Earth, the energy dilemma must be resolved fast and effectively - reason for the creation of ISEO as a global mechanism and efficient network and for the rapid transition to cleaner energies in harmony with the many other likeminded agencies, networks and initiatives.

In order to fulfill its task efficiently and speedily, ISEO is actively covering following subjects:

Establishment of a complete energy statistics and forecasting standard with ISO, and a world-wide network in following areas: Hydropower (small, medium, large and pumping); wind power, wind pumping, sailing; biomass (solid, liquid, gaseous, energy from waste); geothermal (heat, power); solar (PV, heat, solar ponds, food and laundry drying, solar architecture and solar air conditioning, solar pumping, sterling engines); ocean energy (OTEC, waves, tidal); clean fuel production and storage; heat pumps; co-generation; sustainable architecture; sustainable transport (road, off-road, rail, water, air); muscle energy (animals, human, cycling, walking); efficiency measures (insulation, lighting, leaner vehicles, car pooling etc.); education, human behavior, awareness creation etc.; more and easier financing of projects, R&D and education; legal aspects, environment and energy laws; energy policy for clean, sustainable energy.

Competence centers on all these subjects are coordinated by qualified experts and a statistics and forecasting task force is conducting world-wide surveys to set the targets for meeting the goals of a 50-year sustainable energy scenario.

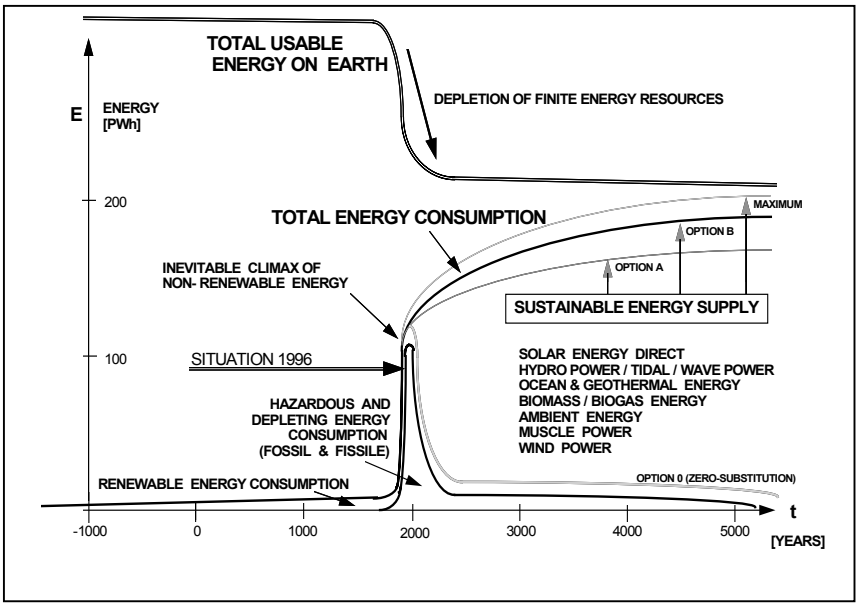
The website www.uniseo.org is the platform for communication and dissemination of ISEO information. A professional internet team is editing, formatting and updating the website.

## 2. The Position of ISEO among International Institutions and Activities

To be able to resolve the most gigantic task in human history – the restructuring of the entire energy sector from predominant finite energies - now contributing about four fifth to the world energy mix - to a sustainable energy economy, all governmental and private sector forces must be called upon.. Therefore ISEO is conceived as a world hybrid organization similar to IUCN with the joint motto

***Intact Nature & Health through Clean Energy - Renewable Energy from an intact Nature & Climate***

ISEO member categories embrace governments with several ministries, relevant non-governmental organizations (NGOs), communities, industry, finance & insurance and academia, including research & development experts, thus being less vulnerable to political changes, to avoid delaying the smooth transition to the clean, sustainable energy age.




The transition to a truly sustainable energy economy requires a huge world-wide annual investment of at least 1000 billion USD or EURO over the next few decades, to prevent the remaining mineral resources from getting totally depleted. They will be needed over centuries to come for the essential organic chemical and metallurgical industries, reason why the entire financial sector must be involved in the redirection of funds from unsustainable to sustainable ends.

The many regional agencies, specialized NGOs and UN bodies cover only part of the energy spectrum, like IEA, mainly concerned with mineral fuel security of 26 OECD member states, IAEA, solely focusing on unsustainable nuclear power and safety and WEC, representing the large business-as-usual energy interests. UN agencies, programs and commissions are covering various energy aspects, but none in its entirety, and international NGOs specializing in various energy fields like ISES and EUROSOLAR for solar energy, IHA for hydropower, IBA, ITEBE and EUIBIA for biomass, IAHE for hydrogen, IWEA and EWEA for wind energy, ISO and IEC for international standards, WTO for trade rules, WHO for health, FAO for Food and agriculture, WMO with IPCC and UNFCCC for the climate and greenhouse gas mitigation, UNESCO for educational and science policies, UNEP, IUCN, WWF, Greenpeace and Green Cross for nature protection and other environmental aspects, UNDP and UNIDO for development at large etc.etc.

To bundle all these forces, establish complete world energy statistics with a better forecasting methodology and mechanisms for the application of total energy costing in conjunction with tax reforms, advancing sustainable energy policies and better education, ISEO is acting as an integrating world network, including the SME sector of economy, which plays an increasingly important role in decentralized clean, sustainable and efficient energy systems to make nations energy-self-sufficient.

North-South and South-South technology transfers are other urgent coordination tasks for ISEO to enable developing nations to catch up with industrial nations in a sustainable way. For the implementation of IPCC and UNFCCC greenhouse gas mitigation recommendations ISEO offers an effective internationally operating mechanism, networking with all interest groups and stakeholders.

## 2.1 History of ISEO

| | |
|---|---|
| November 1990 | 2nd World Climate Conference in Geneva: Birthplace of the 1st World Clean Energy Conference and the Global Energy Charter for Sustainable Development. After the frustration about the procrastination of rules for remedial action, some of the energy working group members decided to take action on greenhouse gas mitigation measures. |
| November 1991 | 1st World Clean Energy Conference in Geneva proposing a joint NGO-Government International Sustainable Energy Organization in the framework of the Global Energy Charter for Sustainable Development, which was officially proclaimed by participants from over 60 nations, including many Minister-level, NGO and UN delegates. |
| June 1992 | World Summit on Environment & Development (UNCED) at Rio de Janeiro receives the Global Energy Charter with the proposal for the creation of an International Sustainable Energy Organization through CMDC-WSEC (World Sustainable Energy Coalition), AIT-FIA and IAHE, but the sustainable energy issue was boycotted by special interest groups. |
| 1993 - 2001 | The Global Energy Charter and the ISEO idea was proposed again and again at UN-DESA-CSD meetings, the last time at CSD 9, which was fully dedicated to energy, but sustainable energy concepts were systematically delayed by some parties. |
| January 2000 | The world met at CLEAN ENERGY 2000 in Geneva to hear over 100 energy, health and environment experts from four continents, to be compiled as the "Blueprint for the Clean, Sustainable Energy Age", containing the updated Global Energy Charter and the proposal for an International Sustainable Energy Organization. |
| June 2002 | The Swiss National Council launched the ISEO motion Wiederkehr, which was signed by 41 parliamentarians from six political parties for the incorporation of ISEO in Geneva. |
| July 2002 | At the last PrepCom for the Johannesburg Summit in Bali it was proposed by CMDC President G.R. Grob to amend Agenda 21 with a sustainable energy chapter, suggesting again a specialized sustainable energy agency also by the "energy caucus" and to promote the Global Energy Charter - in vain due to persistent delaying tactics by reactionaries. |
| August 2002 | World Summit on Sustainable Development (WSSD) at Johannesburg: the "njet" game by the business-as-usual lobbies continued throughout, killing all attempts to fix RE targets.. ISEO held its first meeting at the IUCN Environment House with Ministers, NGOs and Academia attending – see illustrated report about this historic ISEO event. |
| January 2003 | The new ISEO logo is created and filed with WIPO in Geneva and UIA in Brussels. Meetings with the Swiss and several foreign governments, NGOs, academia and industry representatives. Preparation of official ISEO registration. |
| February 2003 | The first ISEO PrepCom Meeting took place at WMO in Geneva with governments, NGOs, Experts and Academia attending and deciding on the formal registration in Geneva and with Swiss Federal Authorities. |
| March 2003 | Constitutional Founding Assembly in Geneva to get ISEO officially registered in Geneva as a hybrid intergovernmental-NGO-Academia and Industry Organization. |
| June 2003 | First ISEO General Conference at WMO Headquarters in Geneva with WHO and several NGOs, government envoys, academia, community and industry representatives of 54 enrolled nationalities attending to decide on ISEO work priorities – see proceedings and congress summary in the 2003 Summer Issue of the ISEO Newsletter Series. |
| July 2003 | Presentation of ISEO at the session of the Johannesburg Renewable Energy Coalition Initiative during the Green Week of the European Union in Brussels. |
| April 2004 | Unanimous submission of the ISEO postulate by the Swiss National Council to the Swiss Government Executive. |

## 2.2 The Mandate of ISEO and Memberships

ISEO is mandated by its members and the world community, who want a sustainable life base for future generations, to solve the energy problem in a holistic, interdisciplinary way by its institutional platform. ISEO has the international task of setting agendas, developing expertise, organizing action-oriented networks, providing technical assistance for those in need, and to act as normative body enhancing international standardization for the analysis of energy systems, equitable statistics and forecasting methodologies, as well as enhancing harmonized energy laws for sustainable development.

ISEO is focused on promoting a sustainable model of energy supply with a primary focus on finite energy conservation for higher added value purposes, implying better energy efficiency to reduce the burden on planet Earth and the promotion of decentralized renewable energy in global energy policies. ISEO does not compete with the many existing national, regional and international organizations, but rather supports them in their work towards a sustainable energy economy with a global perspective.

**Membership categories**

| | |
|---|---|
| Category A: | (a) States, government agencies and regional state unions |
| | (b) Political and/or economic integration organizations |
| Category B | (a) UN accredited national Non-Governmental Organizations (NGO) |
| | (b) UN accredited international NGOs |
| Category C | (a) Local communities |
| | (b) Local volunteering groups |
| Category D | (a) Industry, Finance & Insurance (non UN accredited NGO) |
| | (b) Trade Associations (non UN accredited) |
| Category E | (a) Academia and RD institutions |
| | (b) Experts and Honorary Members |

The **Central Board of ISEO** consists of five members elected by the General Conference: the President, two Vice Presidents, the Executive Secretary and the Treasurer. The Executive Secretary and his/her staff is taking care of the daily business.

The **Board of Governors** is composed as follows:

1. The ISEO members shall designate at the General Conference Governors who are most advanced in the technology of sustainable energy, including sources, transportation and applications from following geographic areas:

    - North America, Hawaii, Bermuda, Bahamas
    - Latin America and Caribbean Island States
    - Western Europe, Iceland and Greenland
    - Central and Eastern Europe, including Russia
    - Africa, including its islands and Madagascar
    - Middle East, South Asia, Indian Ocean islands
    - South East Asia and all Pacific Nations
    - Far East, including China, Mongolia, Korea and Japan (excluding Russia)

2. The General Conference shall elect the members of the Board of Governors as follows:
Sixteen (16) government members, with due regard to equitable representation on the Board as a whole of the members in the areas as listed above, so that the Board shall at all times include two representatives of category A (a) of article IV A each of theses areas, of all of which at least one representing endangered small island states, one representing mountainous regions and ice caps and one representing desert regions. The Board may also accept representatives from 16 major supranational NGO member of category B (b) of article IV A, active in sustainable energy for Board Membership election. Members in any one term of office will be eligible for re-election in the same category.

The ISEO world energy forecast in each nation is proving that there are more than enough renewable, viable energies available on Earth as illustrated with the following matrix and graph:

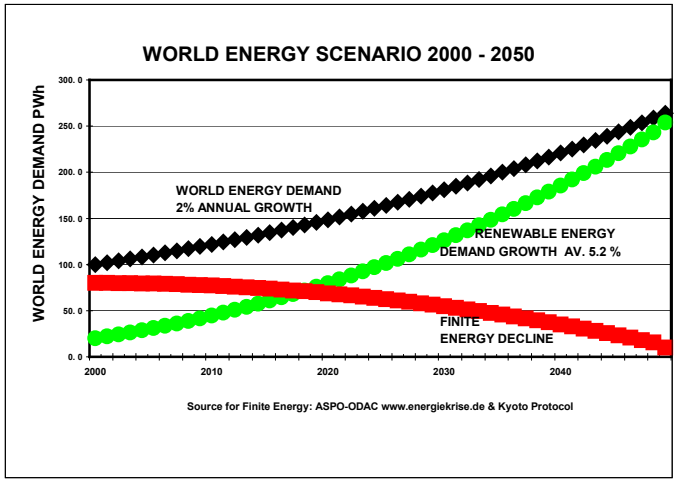
**ISEO Renewable Energy Questionnaire** | **Country** | **Country ISO Code**

| Subject | | Total Generation Capacity (MW = 1'000 kW) and Energy Supply (GWh = 1'000'000 kWh) | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Energy Categories** | | 2000 | | 2005 | | 2010 | | 2015 | | 2020 | | 2025 | | 2030 | | 2035 | | 2040 | | 2045 | | 2050 | | Maximum * | |
| | Note | MW | GWh | MW | GWh | MW | GWh | MW | GWh | MW | GWh | MW | GWh | MW | GWh | MW | GWh | MW | GWh | MW | GWh | MW | GWh | MW | GWh |
| Biomass (solid direct use) | 3.06 | | | | | | | | | | | | | | | | | | | | | | | | |
| Biogas | 3.07 | | | | | | | | | | | | | | | | | | | | | | | | |
| Biofuels (liquid) | 3.08 | | | | | | | | | | | | | | | | | | | | | | | | |
| Bio-energy cogeneration | 3.09 | | | | | | | | | | | | | | | | | | | | | | | | |
| Hydro Power | 3.11 | | | | | | | | | | | | | | | | | | | | | | | | |
| Hydro Pumping | 3.12 | | | | | | | | | | | | | | | | | | | | | | | | |
| Wave Power | 3.11 | | | | | | | | | | | | | | | | | | | | | | | | |
| Tidal Power | 3.11 | | | | | | | | | | | | | | | | | | | | | | | | |
| Wind Power | 3.13 | | | | | | | | | | | | | | | | | | | | | | | | |
| Geotermal Power | 3.14 | | | | | | | | | | | | | | | | | | | | | | | | |
| Geothermal Heat | 3.15 | | | | | | | | | | | | | | | | | | | | | | | | |
| Solar Power | 3.16 | | | | | | | | | | | | | | | | | | | | | | | | |
| Solar Heat (active) | 3.17 | | | | | | | | | | | | | | | | | | | | | | | | |
| Solar Heat (passive) | 3.17 | | | | | | | | | | | | | | | | | | | | | | | | |
| Ocean Power (OTEC) | 3.18 | | | | | | | | | | | | | | | | | | | | | | | | |
| Ocean Heat / Refrigeration | 3.19 | | | | | | | | | | | | | | | | | | | | | | | | |
| Heat by Heat Pumps | 3.20 | | | | | | | | | | | | | | | | | | | | | | | | |
| Muscle Energy | 3.21 | | | | | | | | | | | | | | | | | | | | | | | | |
| **Total Renewable Energy** | | | | | | | | | | | | | | | | | | | | | | | | | |

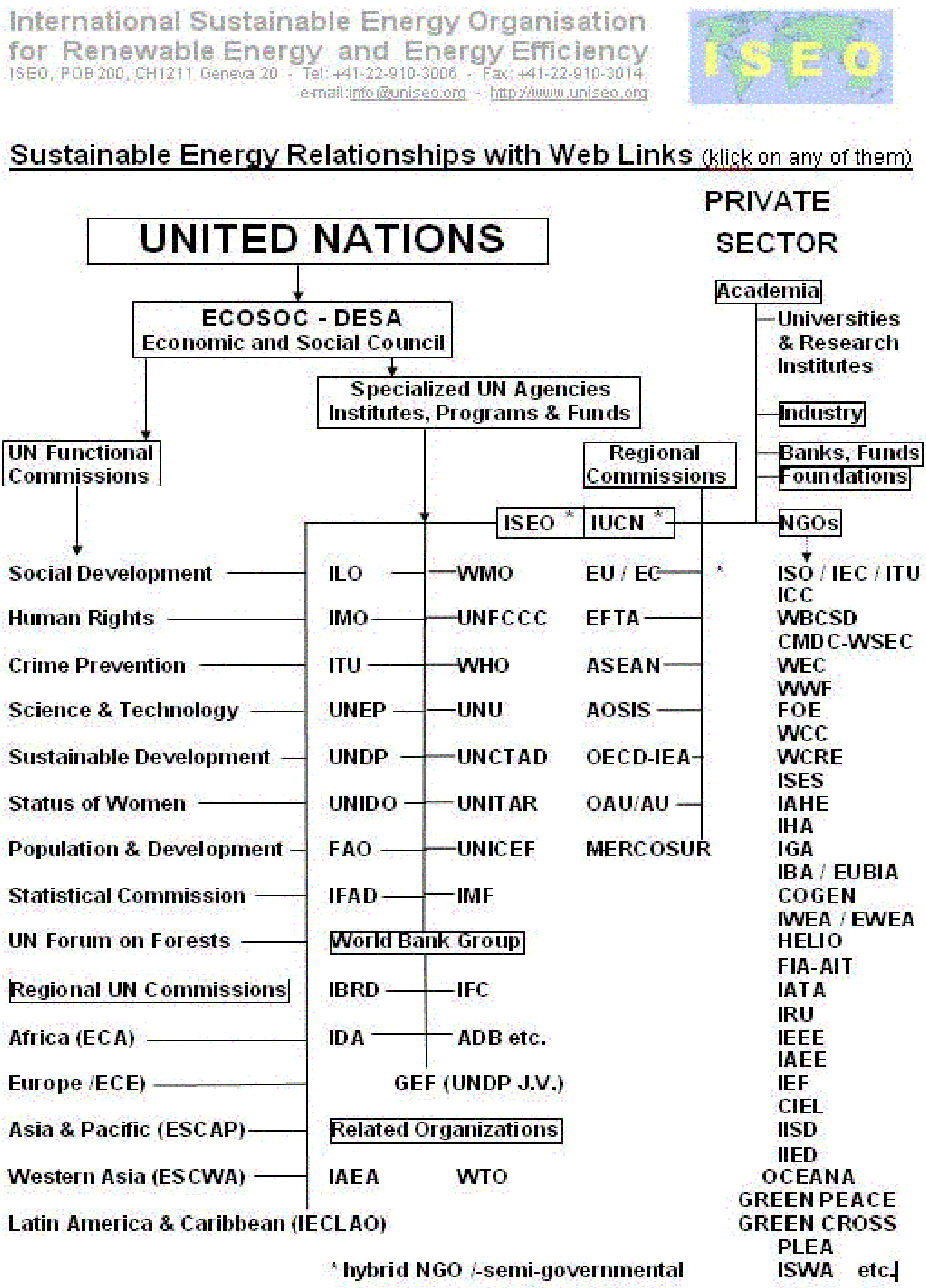
**Explanatory Notes:** **Left colums:** Generation Capacity in MW for electricity production on and off the grid **Right colums:** Supplied total energy for heat and power

3.06 **Biomass** incl. woodfuels, agricultural energy crops & residues, municipal waste, black liquor, commercial & non-commercial
Woodfuels include fuelwood, forestry and mill residues, energy plantations like willow, poplar, eucalyptus etc. and charcoal & pellets made from such woodfuels
Agricultural energy crops & residues include herbaceous & perennial like miscantus, reed grass, rapseed, bagasse, straw, stalks, husks & dung and pellets made thereof
3.07 **Biogas** like landfill & sludge gas, digester gas, gasified biomass etc.
3.08 **Liquid biofuels** like ethanol, methanol, biodiesel, alcohols
3.09 **Co-generation** from any biomass energy systems if not included in the respective figures
3.11 **Hydro**, **Wave** & **Tidal** power for electricity production on and off the grid and mechanical power such as for milling and pumping
3.12 **Hydro pumping** capacity is indicative only because it uses electric energy possibly from other sources for hydraulic storage and re-use in peak hours
3.13 **Wind power** including electricity generation on and off the grid and mechanical wind pumps and mills - see wind energy potentials in national wind atlas !
3.14 **Geothermal power** for electricity generation on and off the grid (if there is co-generation include it in 3.15)
3.15 **Geothermal heat** used directly without heat pumps (heat pumps see 3.20)
3.16 **Solar power** from photovoltaic collectors or from solar thermal power generators or solar chimneys on and off the grid
3.17 **Solar active heat** from thermal solar collectors, hybrid PV collectors, solar ponds, salt ponds and for solar dryers, and (next line) **solar passive heat** heat in buildings
3.18 **Ocean power (OTEC)** for electricity generation. It may also produce heat or refrigeration - see 3.19
3.19 **Ocean heat or refrigeration** directly or as calorific component from combined heat & power (CHP) of OTEC
3.20 **Heat produced by heat pumps** utilizing air, water, waste heat, soil etc.
3.21 **Muscle Energy** from humans or animals for transport and mechanical work (which could alternatively be performed by electric or fuel driven vehicles or machines)
* **Maximum** means the maximum possible indigenous energy production for each option beyond 2050

**Please return this questionnaire by April 2004 to ISEO, Geneva e-mail: info@uniseo.org or Fax: +41-22-910-3014 For questions call +41-22-910-3006**



**The international positioning of ISEO is shown in following network overview:**



## 2.3 The Global Energy Charter for Sustainable Development

### Preamble

The World Sustainable Energy Coalition,

*Considering* the crucial role which energy plays in world-wide economic and social development;

*Taking* into account the necessity to increase energy services, particularly in developing countries;

*Recognizing* that sound energy policy is essential to sustainable, affordable economic and social development;

*Wishing* to mitigate and prevent adverse local and global impacts of energy generation, transmission and use on human health and the environment, including all living species;

*Noting* especially the climate implications of increased atmospheric concentrations of greenhouse gases, as established by UNEP, WMO/IPCC and WHO;

*Proposes* that the principles in the Global Energy Charter for Sustainable Energy Development be adopted by the United Nations as the basis for either an international Convention, or as a Protocol to the United Nations Framework Convention on Climate Change, or as an international declaration;

*Proposes* further that the principles in the Global Energy Charter be adopted by national governments in domestic legislation.

### Objectives

1. To act as a framework for a world energy strategy aimed at concerted international, regional and national programs for harmonious and sustainable economic and social development, in order to ensure the survival of living species;
2. To urge governments to give the rational use of energy, energy efficiency and renewable, clean, safe and sustainable energy technologies the highest priority in national, regional and international development and implementation programs on a scale comparable to the former United States' Apollo and Manhattan projects;
3. To promote a plan of action to ensure that the services which energy can supply are available in sufficient quantity to all human beings to satisfy their development needs;
4. To propose the establishment of an international energy organisation dedicated to the achievement of the Charter's objectives, through amongst other measures, research, development and commercialisation of relevant technologies, information exchange, training, consultancy, program monitoring and mobilisation of adequate financial resources.

### Principles

1. The establishment of targets, programs and other action to reduce energy-related atmospheric emissions, and the enactment by legislation of performance standards and labelling for energy services and systems, based on international best practice.
2. The establishment of guidelines and internationally standardised methods of evaluation for determining the external effects and total lifecycle costs and risks for all energy systems, taking into account the environmental, health and other damage caused by energy-related activities.
3. The creation of international, regional, national and local programs for energy efficiency improvements, safety controls, waste management and emissions reductions in the production, storage, transportation and consumption of all types of energy.
4. The creation of international, regional, national and local programs for the substitution of non-renewable energy resources by environmentally benign sustainable energy technologies.
5. Based on the guidelines established under Principle 2, the provision of a system of full-cost pricing to reflect accurately the total life-cycle social and environmental costs of energy production & consumption.
6. The establishment by the United Nations of a sustainable energy fund to finance the use of energy efficiency improvements and the best available environmentally sound energy technologies, with special allocations set aside for developing nations.

7. The promotion and monitoring of the principles and implementation strategies under the Global Energy Charter for Sustainable Energy Development and the development of new financial instruments and investment mechanisms, involving both the private and public sectors.
8. The promotion of worldwide cooperation and exchange of technology, expertise, education, training programs, information and statistics on the best available environmentally sound energy technologies, energy efficiency, performance standards, safety codes, methods of energy costing and means of internalizing external costs.

## Details of Principles

### 1. The establishment of targets, programs and other action to reduce energy-related atmospheric emissions, and the enactment by legislation of performance standards and labelling for energy services and systems, based on international best practice.

The emissions from all energy technologies must be controlled by setting standards: for example, for emissions; ambient air quality; water quality; soil acidity; performance; and hazardous substances.

Some limited emissions controls have been provided for in the Kyoto Protocol to the United Nations Framework Convention on Climate Change. This Protocol should be immediately ratified by the signatory parties so that its provisions may become effective. In addition, the following action is necessary:

- Appropriate means of enforcement and sanctions should be provided to ensure that each country's commitments are respected.
- By further negotiations all nations should commit themselves to binding targets for emissions reductions. Appropriate incentives and guarantees should be offered by the developed nations to all developing nations to ensure that their development is not adversely affected by their emissions reductions targets.
- The current commitments of developed countries, to reduce relevant atmospheric emissions by an average of 5.2 per cent over 2000 values by the commitment period of 2008-2012, is inadequate to provide effective relief against global warming, and should be renegotiated as soon as possible.
- The Protocol should also establish principles of verification for the agreed emission targets. This must include: methods and techniques of data collection; the computational procedure; keeping statistical records; instruments for achieving the emission targets; and control mechanisms by international law concerning emissions and international standards and trade.

### 2. The establishment of guidelines and internationally standardised methods of evaluation for determining the external effects and total lifecycle costs and risks for all energy systems, taking into account the environmental, health and other damage caused by energy-related activities.

The establishment of appropriate guidelines and internationally standardised methods of calculation will require a consideration of the following factors:

- The identification of the limits of economic indicators and tools, ie, the principles for political action (market imperfections/failures, external effects, intergenerational equity, social rate of interest, collective goods, etc).
- A framework to identify the external effects of the pollution caused by energy systems on the environment and human condition (eg. environmental consequences, socio-economic consequences).
- The different economic methods used to evaluate these external effects.
- The abatement/mitigation costs associated with the implementation of reduction measures on polluting activities in order to reach a target (for example, the reduction of C02 emissions) in case the damages are either unknown or non-quantifiable in monetary terms.
- The elaboration of a risk premium insurance for not achieving targets due to errors in dose-response functions (modelling uncertainties, thresholds, synergetic effects, positive feedbacks, etc).

This principle involves further study into the following issues:

- Identification of the lifecycle costs (including external costs) for every energy system in order to compare the total known/valuable costs: extraction, processing/refining, transportation, as well as waste disposal and decommissioning activities.
- Identification of the lifecycle costs that may not be properly valued in monetary terms (climate change, nuclear weapon proliferation, major nuclear accidents, irreversible biodiversity losses, health risks, etc).
- Establishment of internationally standardised methods of calculation/ comparison.

**3. The establishment of international, regional, national and local programs for energy efficiency improvements, safety controls, waste management and emissions reductions in the production, storage, transportation and consumption of all types of energy.**

Energy efficiency improvements and emissions reductions to be addressed should include not only technical issues, but also the need to educate and train the public as to methods of improving energy efficiency, reducing stand-by losses, minimising emissions and as to necessary behavioural changes. A comprehensive approach should be adopted. This means that all available techniques are used simultaneously.

The specific plans for energy efficiency improvements and emissions reductions should include the following. In many cases, national legislation will be required to implement them:

- A comprehensive International Convention on Rational Use of Energy.
- The creation of an international body dealing with energy efficiency and conservation.
- Harmonisation of actions carried out by various UN agencies (UNDP, UNEP, World Bank, etc).
- The issue of energy efficiency should be a consideration for all loans by international donors.
- Energy audits should be conducted in all energy consuming sectors of the national economy.
- Energy conservation techniques should be taught in secondary schools.
- Low-interest loans for energy conservation measures should be available.
- Energy conservation should be an important feature in all national energy planning.
- Energy conservation should be encouraged to the maximum extent practicable.
- Minimum efficiency or performance standards for various types of industrial plant (such as motor drives and boiler and process heating applications) are required.
- Financial incentives should be given to encourage industry to adopt energy conservation measures.
- The energy efficiency of car engines and the associated fuel consumption figures must be significantly improved.
- Road laws designed to conserve energy must be introduced. These include the legal recognition of car pooling; parking taxes; the coordination of traffic flows; the prohibition of cars into designated downtown areas of cities; and various fiscal incentives and penalties, such as a "gas-guzzler" tax and motor registrations fee reductions for fuel efficient cars.
- Public transport should be encouraged by new laws (for example, the provision of special bus lanes and financial subsidies).
- All clean transportation fuels should be encouraged. These include ethanol, compressed natural gas and hydrogen.
- Cities should be designed so as to reduce travel distances between home and work and to make public transport economically viable.
- Energy performance standards for all types of buildings should be prescribed for all newly-constructed buildings.
- All possible means of increasing the efficiency of existing buildings should be explored.

- Energy conservation measures in respect of buildings should be applied to rented as well as owner-occupied buildings.
- Efficiency standards should be prescribed in respect of designated domestic appliances.
- A system of labelling with respect to the average energy consumption of each domestic appliance should be established.
- Governments at all levels should ensure that they procure efficient products and buildings.

**4. The creation of international, regional, national and local programs for the substitution of non-renewable energy sources by environmentally benign sustainable energy technologies.**

Renewable energy sources are now competing effectively with fossil and nuclear resources in many applications. If environmental externality costs are considered, including conventional air pollutants and C02 emissions, the economic attractiveness of renewable energy sources is further enhanced. In addition, as technologies continue to advance, renewable energy will become more economic in an increasing number of applications. Among the most promising renewable energy options considered here are: biomass energy, low-head/cascading hydropower; wind power; geothermal energy; passive solar and other thermal heating; solar thermal power generation; and solar photovoltaic power. These renewable energy sources are an essential and economic component of any large-scale effort to reduce C02 emissions, and are ideally suited for the introduction of decentralised energy systems.

The key to realising the potential of renewable energy is the formation of effective international, national, state, and local programs to encourage their commercial development and implementation. First, spending on renewable energy and energy storage R&D must be substantially increased so as to enhance the commercial availability of renewables. Secondly, environmental externality costs need to be incorporated in energy cost accounting, either via energy/C02 taxes or via laws or utility regulations that implicitly incorporate environmental costs in new plant selection. Thirdly, electricity and gas grids should be opened to renewable energy suppliers on a competitive basis, at a cost that recognises the environmental externalities associated with fossil fuels.

A concerted international effort is needed to ensure that the developing countries realise the economic and environmental benefits that can be achieved with the rapidly evolving renewable energy technologies. Renewable energy industries can provide the foundation for equitable and sustainable economic development, particularly in rural areas where renewables are essential to help people meet their basic needs. Additional financial resources are needed to transfer the technology and infrastructure capability the developing countries need to accelerate the use of the many renewable energy technologies that are ideally suited to the technological capabilities and labour availability in developing nations. Some of the resources can be made available via re-channelling of World Bank energy loans, and the rest can be raised via an international energy/CO2 tax.

**5. Based on guidelines established under principle 2, the provision of a system of full-cost to reflect accurately the total life-cycle social and environmental costs of energy production and consumption.**

All countries should institute a more realistic cost structure, in order to reach a maximum cost pricing of energy cycles, gradually eliminating all energy subsidies and trade barriers. The known or estimated costs to society of pollution from all energy resources should be internalised through internationally applied revenue- neutral pollution taxes where possible (offset by reductions in other taxes). The form of tax could be a value added tax. Taxes should be fixed at a level that ensures that the effects of the environmental costs of energy are reflected through the life-cycle of the resource.

**6. The establishment by the United Nations of a sustainable energy fund to finance the use of energy efficiency improvements and the best available environmentally sound energy technologies, with special allocations set aside for developing countries.**

The proposed fund should be established on the following bases:

- The fund should be a new facility independent of existing development funding mechanisms.

- The objective of the fund should be to ensure that finance is available at an affordable cost at the point of need by industry, communities or individuals in developing countries as a part of the global and national strategies to introduce new energy technologies for sustainable and equitable development.
- The fund should be used for the following purposes: to assist developing countries to establish integrated national energy plans; to pay for prototype and demonstration plants; to finance the difference of investment costs between conventional (polluting) and new clean(er) energy plants, which will be more capital intensive; to provide a part of the investment capital for setting up manufacturing facilities in developing countries and assist manufacturers in developing countries to participate in joint venture networks; to provide a risk net for entrepreneurs who start the commercialisation of new clean energy technologies; to provide finances for promoting the sale of equipment through loans and grants, eg, for leasing by consumers; and to support the build up of infrastructure and training facilities, centres of expertise for test and certification, information dissemination, etc.
- The composite initial size of the fund should be at a multi-billion (US) level.
- The source of the fund should be taxes on the use of fossil fuels and electricity in all countries and/or pollution levies, money liberated as part of the international demilitarisation programs and money made available through cuts in subsidies to existing unsustainable energy systems.
- The fund should be administered by competent banking organisations under the control of an executive board of management with the majority of members from developing countries, answerable to an international body representing the donor and recipient countries. The funds may also be managed by energy corporations under the tight control of an independent supervisory body.
- There are various alternatives for the administrative agency, such as: (i) the World Bank, which would bring the fund within the framework of present development policies; or (ii) a purely banking organisation like the Bank of International Settlements, Basel; or (iii) a new bank run by a consortium of private and public sector banks from the industrialised and developing countries. A detailed examination of the advantages and disadvantages of these alternatives is required.

**7. The promotion and monitoring of the principles and implementation strategies under the Global Energy Charter for Sustainable Development and the development of new financial instruments and investment mechanisms, involving both the private and public sectors.**

*7.1 Performance monitoring*

Performance monitoring is considered vital for the Global Energy Charter for Sustainable Energy Development to achieve long term success. The key issues are:

- Internationally agreed guidelines should be defined allowing a standardised integral quantification of the environmental and economic performance related to energy use (refer to revised energy calculation standards of ISO).
- Performance reporting is required on an annual basis. The data should become unrestricted public domain and presented as an "Ecology index" in a uniform and fully transparent way.
- To better substantiate current performance under the principles of the Global Energy Charter, historic energy use and related quality information should be standardised.
- Though initial participation in the Global Energy Charter is voluntary, commitment to its principles should be treated as a compulsory national goal, eg of the Ministry of Environment, Energy and/or Foreign Affairs. Continuation of the principles must be guaranteed independent of government and policy changes, as in the case of human rights principles.
- A bonus/malus system affecting the "Ecology index" must be established to validate economic and technology-based partnership between developed and developing nations (eg emissions trading, financial aid for sustainable projects abroad, etc).

*Financing*

Alternative financing schemes designed to achieve optimum benefit to society need to become common practice. In principles, there is a need for:

- The adoption of life-cycle costing as a standard economic tool for decision-making based on avoided costs to society. Performance, quality and risk assessment is necessary in addition to the inclusion of external costs (see principle 2 of the Global Energy Charter).
- The introduction of new banking policies favouring efficient, non-polluting technologies. This may cover issues such as dynamic discount rates that are individually designed for customer needs (eg an initially digressive rate that later turns into a progressive rate). Options of low-cost utility-like financing, billing and promotion services should also be considered.
- Initiation of investment schemes with government back-up applicable to projects optimised for life-cycle costs (refer to government risk capital guarantee for foreign investment, and equity or infrastructure bonds). Preference should be given to small- and medium-scale projects which support decentralisation and the development of rural areas, and which feature comparatively short project lead-times.
- The introduction of "community service obligations" between government and utilities designed to ensure financing for enhanced research, development and demonstration of renewable energy technologies, at levels equivalent to historic funding for fossil and nuclear technologies. Since governments are ultimately responsible for the welfare of society, renewable energy RD&D should be part of their portfolio. Performance-linked tax incentives and subsidies should be introduced to foster renewable energy utilisation. Furthermore, governments should regulate access to the electricity grids to increase community interest and decentralisation of power supply.
- International aid funds as offered by the World Bank, the United Nations, etc should evaluate new eligibility schemes, giving preference to the "Ecology index" and community support.

**8. The promotion of worldwide cooperation and exchange of technology, expertise, education, training programs, information and statistics on the best available environmentally sound energy technologies, energy efficiency, performance standards, safety codes, methods of energy costing and means of internalising external costs.**

The following action should be undertaken in order to implement this principle:

*8.1 Promotion*

- Establishment of promotion agencies, advisory councils, information centres, and expert groups, specialising in the different energy sources and technologies.
- Construction of small and large demonstration facilities.
- Organisation of conferences, meetings, seminars, trade fairs, expositions and other public events.
- Proclamation of special days or years (eg, Solar Energy Year, Biosphere Day).
- Granting of quarterly or yearly awards.
- Setting of quantitative targets.
- Compilation and publication of statistics.
- Promotion of international harmonisation and standardisation in cooperation with ISO and IEC.
- Implementation of international conventions, agreements and recommendations.

*8.2 Dissemination of Information*

Information should be disseminated through computerised public data banks and information systems, publications, films, posters, pamphlets, directories, compendiums, satellite broadcasting, creation of networks and others. The information should relate to the following:

- National incentives, policies, programs and practices;

- Sustainable energy equipment and technologies, suppliers, installers, consultants, prices, comparative performance, sources and terms of financing;
- "Success stories";
- Country situations (country profiles in comparable format).

*8.3 Education and training*

Education and training programs are required in respect of the following:

- Educational programs for children;
- Preparation and promotion of curricula for the study of clean energy technologies;
- Information and training programs on Internet resources;
- Preparation of a guide book on courses and other forms of training (eg fellowships) in the field of clean energy technologies;
- Exchange of students and teachers;
- Conducting special courses for teachers;
- Organisation of lecture series for adults;
- Organisation of television programs/open universities;
- Special short courses, seminars and workshops for decision makers;
- Competitions to demonstrate clean energy technologies (eg zero-pollution automobile rallies: Ecotouring World Grand Prix);
- Excursions to clean energy installations;
- Entertaining educational programs for all ages.

*8.4 Technology Transfer and Commercialisation*

The following action is required:

- Establishment of the methodology for energy and environmental impact assessment as the basis for project selection;
- Design of financing programs/packages for all facets of projects, including maintenance and servicing;
- Establishment of public agencies for quality control and performance guaranties;
- Promotion of programs which benefit from economies of scale and of manufacture;
- Promotion of all forms of cooperative or joint ventures;
- Facilitating of producer-user dialogue;
- Encouraging utilities to foster clean energy technologies and to feed electricity/gas from clean(er) sources into the network;
- Encouraging small and medium sized enterprises to engage in equipment manufacturing, trading, installation and maintenance;
- Promotion of the use of local expertise, especially in developing countries;
- Trade facilitation.

## 2.4 The Impact of ISEO on Legislation

The nature of human behaviour and the forces of free trade require legal rules for the survival of humanity on planet Earth and mutual respect of its inhabitants also as regards nature conservation. The past two centuries were characterized by martial self-destruction and overexploitation of natural resources. A balanced nature is the basis for healthy survival of life on our planet. Selfish interests too often ignored this fact, by putting money over livelihood.

ISEO is coordinating its legal recommendations with the IUCN Commission of Environmental Law, particularly the Global Energy Charter for Sustainable Development.

International Standards issued by ISO in the general energy field and IEC in the electrical field provide internationally harmonized terminologies, units and specifications, which serve as a basis for national laws, particularly also the International System of Units (SI).

ISEO is promoting international standards and is enhancing new standardization where it is missing such as for bio energies in their solid, liquid and gaseous forms, constituting the fourth largest energy sector. Also for geothermal energy, ocean energy, safety, environmental compatibility and clean transport vehicles more standardization has to be done to facilitate also legislation.

The inclusion of external, social effects in energy costing will positively influence power generation and transport concepts towards sustainable, emission-free solutions, but this can only be achieved by a world-wide harmonization of the legislation prescribing the “polluter-pay” principle.

On the ISEO website www.uniseo.org the legal chapter describes some of these principles.

## 3. The Implementation Means and Tools

To implement a sustainable, i.e. renewable, efficient energy economy a common platform for all sustainable energy initiatives on Earth is needed, based on the common principle

***Intact Nature & Health through Clean Energy***
***Renewable Energy from an intact Nature & Climate***

### 3.1 Baselines of the ISEO Strategy

The purpose of ISEO as it is mentioned in the statutes is:

ISEO seeks to enlarge and accelerate the contribution of sustainable energy to economic and social development throughout the world. Sustainable energies include any energy source, system, carrier and use, that does not harm the health, environment, climate and peace on Earth.

To attain these objectives, ISEO

a) Mobilizes its members, committees, components and partners to build alliances for the promotion of clean, sustainable energy systems, based on the Global Energy Charter for Sustainable Development;

b) Strengthens the institutional capacity of its members to implement sustainable energy systems at global, regional, national and local levels at an accelerated pace to avoid an ecological and climate collapse and safeguard mineral resources for longer-term added values instead of burning them up;

c) Promotes enhanced cooperation between its governmental and non-governmental members to strengthen the capacity of its members and affiliated organizations towards its goals;

d) Encourages research and development related to sustainable energy systems, enhances the cooperation with and between academia and disseminates information about such work;

e) Provides a forum and clearing house with its internet portal, symposia and workshops for discussion of energy related health, environment and climate issues, including their scientific, educational, legal, economic, social, environmental and political aspects, at global, regional, national and local levels.

f) Develops expert networks and information systems to support its members and associates;

g) Enhances and disseminates relevant standards, guidebooks and reference materials on clean, sustainable energy systems, drawing on the expertise of its members and associated organizations;

h) Influences national and international legal and administrative instruments to enable societies to enforce and enjoy the advantages of clean, sustainable energies;

i) Makes representations to governments, international agencies and commissions to influence energy policies towards the transition to the clean, sustainable energy age;

j) Assists in the development of mechanisms for easier and increased financing of sustainable energy systems, education and research, and to decrease harmful subsidies for unsustainable systems;

k) Contributes to the preparation of international agreements relevant to sustainable energy and the mandatory introduction of a full energy accounting system, including all externalities and risks.

l) Takes any other appropriate action which will promote the clean, sustainable energy age and

m) Implements the provisions of these statutes

These goals out of the statutes are the baselines for the strategy of ISEO and the program of activities.

### 3.2 Program of activity

With an assumed world average energy consumption growth of only 2 %, the anticipated fossil energy resource depletion and Kyoto protocol obligations, the share of clean, renewable energy will have to grow annually by 5 %, necessitating more than 1000 billion $ investments in energy production alone, plus a similar magnitude on the demand side for cleaner, more efficient vehicles, processes and buildings - a colossal task for financial institutions, if the civilized standard of living shall be maintained and the less-developed countries to be enabled to catch up !

To reach these goals, ISEO has identified the following 10 main activities:

1. ISEO invites experts from all continents to participate in a global network.
2. ISEO assists in designing more effective financing tools and mechanisms
3. ISEO promotes education & training for clean, sustainable development
4. ISEO enhances international energy standardization (ISO, IEC, EN etc.)
5. ISEO facilitates complete statistics & forecasting for the entire energy mix
6. ISEO disseminates the Global Energy Charter for Sustainable Development
7. ISEO operates a clearing house mechanism for project proposals
8. ISEO supports the development of national & regional policies & regulations
9. ISEO has issued the "Blueprint for the Clean, Sustainable Energy Age"
10. ISEO operates the Internet based Portal http://www.uniseo.org

**Goals of the ISEO General Conference**

Elaboration of ISEO Priorities and Programs with the Stakeholders with
Keynotes about the main activities of ISEO.

**Summary**

- ISEO enables the teamwork between all organisations working in the field of sustainable energy. It is important to know, that ISEO is specially inviting the industry and finance sector to participate in the enormous goals of the clean sustainable energy age.

- In this spirit ISEO helps investors to identify profitable initiatives and projects ready to invest into. It can be proven, that an investment in such projects, dealing with sustainable energy is highly profitable and thus a valuable investment object.

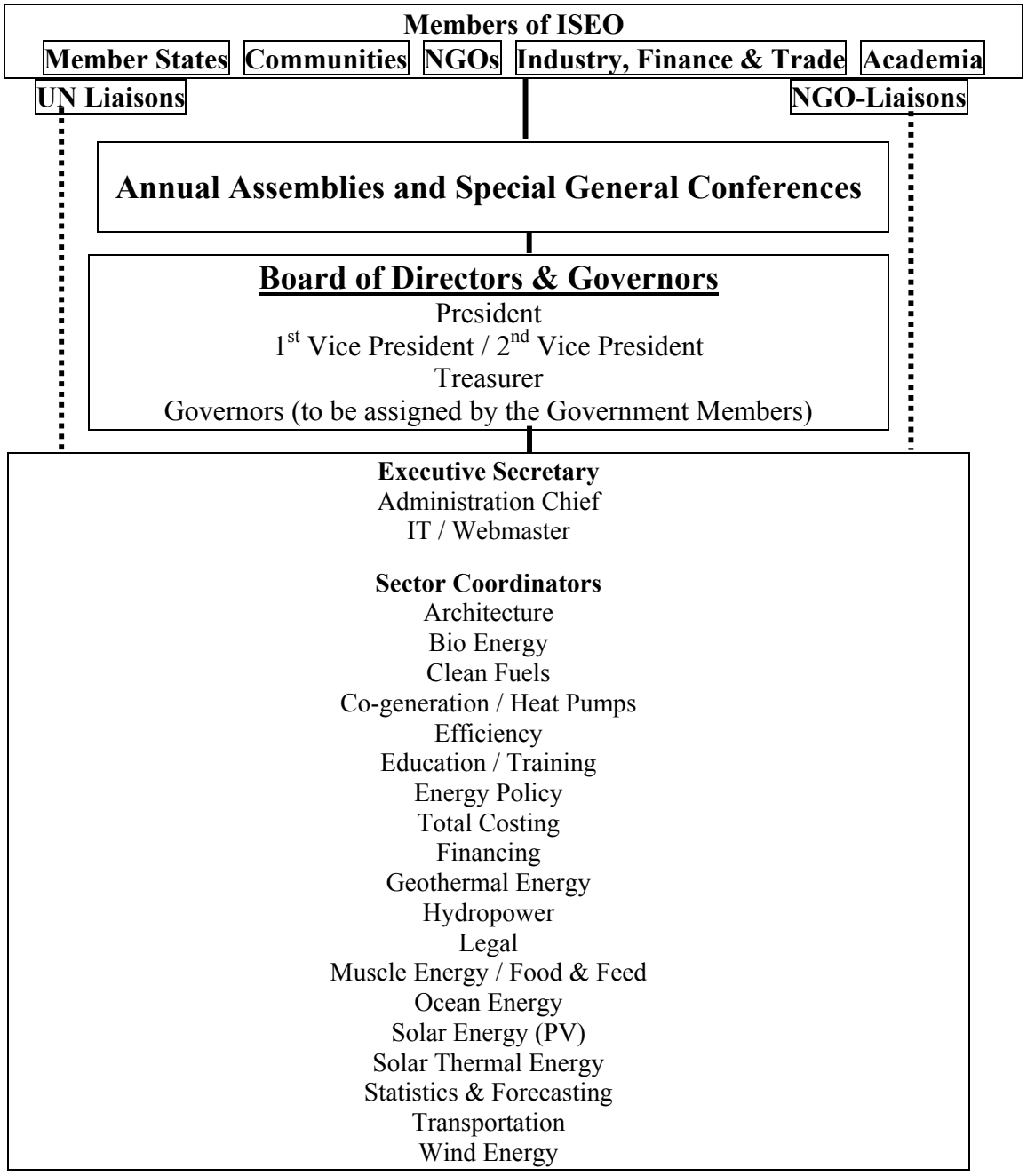
- To better analyse the sustainability of projects, great efforts have been undertaken, to specify international Standards (ISO, IEC) and defining a world energy charter. Further more the standard tool "Blueprint for the Clean Energy Age" could be elaborated out of the contributions of the Energy 2000 conference.

- ISEO is the most important move to enable the clean energy age – no other organisation has taken this role so far. Therefore all initiatives, NGO's, Communities, Academia, Research Institutes and Governments are invited to tam up with ISEO.

### 3.3 Organization Chart and Role of the ISEO Sector Coordinators

For the multitude of he ISEO Tasks coordinators are assigned to liaise with relevant experts and organizations world-wide, organize the experience exchange, update the ISEO web portal in the related sections and organize support where help is needed on particular subjects.

The subject areas can be seen form the ISEO organization chart:




Current assignments and updates can be seen on web portal www.uniseo.org

### 3.4 The ISEO Webportal www.uniseo.org

The ISEO web portal has to cope with following needs of a world sustainable energy interface:

Use of the ICTs to the benefit of a sustainable energy future
Information Exchange and (Virtual) Networking

- Technically, networking has become (almost) trivial:
  Billions of computers and millions of servers connected together
- Internet services widely available:
  - Email
  - File Transfer
  - World Wide Web

Problems

- North–South gap
- information abundance crisis
- data safety and integrity

The Information Crisis

- Computers, Email and the Web turn more and more into a real pain:
- People write and write and write...
- … and are increasingly unable to digest all the information available to them
- The continuing increase of the email ping-pong starts to use-up most of our time
- The number of Web pages and even Web links are getting "unvisitable"

Calculation Example (modest assumptions):

- 20 emails/day, each one with 4 pages of attachments (average)
- Each email: 3 min to read and reply
- Each attachment page: 3 min to read and act upon
- Each email/attachment contains 1 link to be checked: 3 min per link
- Result: 360 min = 6 hours

What we (scientists, economists, engineers etc.) need

- No faster lines and no increased storage possibilities

but:

- more structured, condensed and reflected information
- less time and storage consuming blablabla
- no just hacked-in, but well prepared texts
- more facts and science-funded arguments
- less writing and more doing-it

What society urgently needs

- a well structured, professionally managed open Web-based platform which serves as
- a virtual interface for
  - scientists, engineers, technicians
  - politicians, administrators
  - the public

### 3.5 Importance of International Standards

International performance and interface standards and harmonized terminologies are the prerequisite for the successful transition to the clean, sustainable energy age.

The list below shows the multitude of technical standards needed in the energy and environmental field, to be complemented by missing standard series like the important biomass family of renewable energy, better passive solar and low energy building standards and an energy statistics standard.

**ISO and IEC technical committees on energy production and use**

From the early days of ISO energy was a dominant subject for standardization and in the much older IEC it was even the "raison d'être" of the commission itself, since electricity is one of the main energy carriers. Fifty years of energy related standardization in specific areas of ISO and IEC were culminating in the all-embracing **TC203** ***Technical Energy Systems***, which started work in 1991, defining common denominators like "***energy service***" for the final output of an energy consumption system, "***gray energy***" for the embedded energy in products and "energy ware" ***for tradable energy carriers***.

**Energy service:** Useful energy output of any final technical energy consumption system. Examples of energy services:

- mechanical work, transportation, force
- pumping, venting and vacuum applications
- thermal uses (specific heating and cooling)
- audio and ultrasound applications
- vibrations for useful purposes
- lighting / illumination / magnification
- magnetic applications
- data processing, information
- telecommunication, television, visual displays
- physical therapy and diagnostics
- measurement and control
- electrochemical and physical processing

**Embedded energy:** the sum of the needed energy to produce or process inputs to be *embedded in technical energy systems* which may be partly reclaimable.
Note: Gross embedded, in German called "gray", energy is the total energy needed to produce or process any such inputs. Net embedded energy is the difference between the gross embedded energy and the reclaimed embedded, i.e. saved energy from technical energy systems decommissioning and through recycling.

Historically energy standardization started in **ISO** just after the 2nd world war in 1947 with ISO/TC 27 on ***solid mineral fuels***, i.e. coal and coke with its related TC 82 on ***mining***. TC 28 on ***petroleum*** products and lubricants started also in 1947 with its related TC 67 on ***materials, equipment and offshore structures*** for ***petroleum and natural gas*** industries. TC 85 on ***nuclear energy*** started in 1956 and TC 180 on ***solar thermal energy*** in 1980. ***Natural Gas*** followed in 1988 with TC 193 and ***gas turbines*** are dealt with in TC 192, and - last but not least - with ISO/TC 197 work started in 1990 on the cleanest of all fuels ***hydrogen***.

**IEC** covers with TC 2 ***rotating machinery*** in general and with TC 4 ***hydraulic turbines*** for electricity generation in particular; TC 82 is dealing with ***photovoltaics*** and TC 88 with ***wind turbines***.

Fields like energy from ***biomass,*** which is the fourth largest energy supply sector representing over one seventh of total prime energy production, the large ***geothermal sector*** and the advancing ***tidal*** and ***wave power systems*** are not yet covered by any international technical standard committees (TC), but should be dealt with soon by ISO in view of their future energy generation potential.

On the ***energy transportation and demand*** side there are many active **ISO** committees: ISO/TC 8 is dealing with ***ships and marine technology***, TC 11 covers ***boilers and pressure vessels***, TC 20 ***aircraft and space vehicles***, TC 22 ***road vehicles***, TC 23 ***tractors and machinery for agriculture and forestry***, TC 29 ***small tools***, TC 39 ***machine tools***, TC 58 ***gas cylinders***, TC 70 ***internal combustion engines***, TC 72 ***textile machinery***, TC 86 ***refrigeration***, TC96 ***cranes***, TC 100 ***chains and wheels for power transmission***, TC 101 ***continuous mechanical handling equipment***, TC 110 ***industrial trucks***, TC 112 ***vacuum technology***, TC 115 ***pumps***, TC 116 ***space heating***, TC 117 ***industrial fans***, TC 118 ***compressors, pneumatic tools and machines***, TC 127 ***earth moving machinery***, TC 131 ***fluid power systems***, TC 148 ***sewing machines***, TC 149 ***cycles*** (in connection with muscle power), TC 178 ***lifts, escalators and passenger conveyers***, TC 188 ***small crafts*** including their propulsion and gaseous fuel systems, TC204 ***transport information and control systems*** and TC 28 ***thermal turbines*** for industrial applications.

**IEC**'s TC 9 covers ***electric traction equipment***, TC 17 ***switchgear and control gear***, TC 18 ***electrical installations of ships and offshore units***, TC 20 ***electric cables***, TC 21 ***secondary cells and batteries***, TC 22 ***power electronics***, TC 26 ***electric welding***, TC 27 ***industrial electro-heating*** equipment, TC 34 ***lamps*** & related equipment, TC 35 ***primary cells & batteries***, TC 59 ***electrical household appliances***, TC 69 ***electrical road vehicles & industrial trucks*** and TC 90 ***superconductivity***, to mention just the more important subjects, apart from the many related standards on materials, components, measurement & testing and electricity installations.

**Energy safety, health & environment protection through ISO and IEC**

Most technical energy concepts affect the life, climate and environment if they are not safely engineered and monitored. Both, ISO and IEC, run many technical committees which produced hundreds of international standards helping to better protect the life, biosphere and climate from adverse effects of energy systems.

**ISO**'s TC 21 covers equipment for ***fire protection & fire fighting***, TC 30 ***measurement of fluid flow*** in closed conduits for fuels, TC 43 ***acoustics*** and their effects on humans and the environment, TC 92 ***fire safety***, TC 94 ***personal safety***, TC 108 ***mechanical vibration and shocks***, TC 113 ***hydrometric determinations***, TC 135 ***non-destructive testing***, TC 138 ***plastic pipes, fittings & valves*** for fluids, TC 146 ***air quality***, TC 158 ***analysis of gases***, TC 161 ***control & safety devices for non-industrial gas-fired appliances & systems***, TC 163 ***thermal insulation*** related to energy services in the form of heat, TC 176 covers the all-important ***quality management & assurance*** with its ISO9000 standards series, TC 185 ***safety devices for protection against excessive pressure***; TC 190 ***soil quality*** needed to protect soils from the effects of energy releases, TC 205 ***building environment design*** helping the energy conservation and efficiency and - last but not least - TC 207 with its crucially important ISO 14000 series on ***environmental management***, auditing, labeling and life cycle assessment.

**IEC**'s most relevant bodies related to electrical energy safety, efficiency and environment protection are IEC/TC 13 on ***electrical energy measurement & control***, important for energy management systems, TC 31 on ***electrical apparatus for explosive atmospheres*** and for the ***detection of flammable gases***, TC 50 on ***environmental testing***, TC 56 on ***dependability*** of electrical systems, TC 61 on ***safety of household appliances*** and TC 75 on ***classification of environmental conditions.***

ISEO is promoting that more experts are participating in the important energy standardization tasks to enable a smoother and better harmonized development of clean, sustainable energy systems.

ORGANISATION INTERNATIONALE DE NORMALISATION

ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

IEC

*Commission Electrotechnique Internationale*
International Electrotechnical Commission
Международная Электротехническая Комиссия

### 3.6 The Blueprint for the Clean, Sustainable Energy Age

The **Blueprint for Clean, Sustainable Energy Age** deals with all problems, impacts, mechanisms and tools for the transition towards a sustainable energy economy:

- The roles of UN Agencies, Commissions, Intergovernmental and NGO Agencies
- Energy Impacts on the Economy, Environment, Climate and Health
- Depletion of Non-Renewable Energy Resources and Conservation
- Energy Costing in the Total Economic, Social & Ecological Context
- Energy Efficiency Impacts and Options
- Renewable Energy[1] Solutions, Cost and Future Market Shares
- Clean Transport Solutions
- Sustainable Habitat and Industry
- Financial Mechanisms for the Clean, Sustainable Energy Age
- Clean Energy Implementation Steps
- National and Regional Energy Characteristics and Case Studies

The history of technical energy systems started in the stone age when humans started to make fires by friction rods and spark stones and used biomass to heat caves and to cook primitive meals. Later the wind force was used to move simple sail ships and to turn the wheels of the first wind mills. Animal power with simple gears and water mills were added as additional forms of renewable energy.

With the discovery of fossil fuels and the development of electricity energy started to become an industry which was growing into a mighty octopus and ultimately became the largest single economic and industrial sector with a lot of political weight, often causing oil wars and creating power monopolies with huge generating units, large power grids and pipeline systems, nearly all of them relying on polluting, non-renewable energy in the hands of governments and huge multinationals.

Independent small power producers and environmentally compatible new energy technologies had little chance to compete with the energy giants, who tried everything to keep their dominating position world-wide until legislation was spreading for the liberalization of the power business, by enforcing anti-trust laws and breaking up the power production, transmission and distribution trusts.

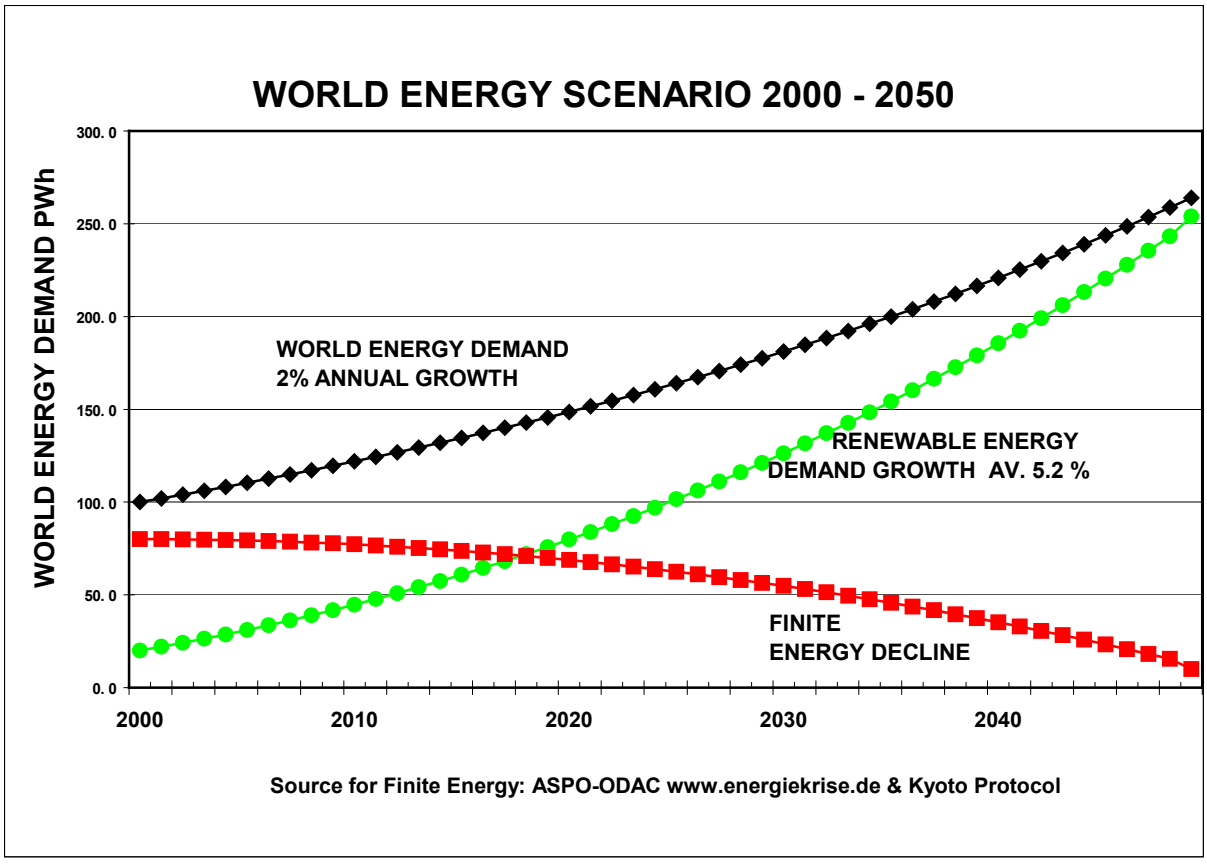
However, the main power suppliers, the petroleum multinationals and national oil companies continued to control the energy business with over 80 % market share. Only in the nineties a few major oil companies started to think about the longer term resource depletion problem and looked hesitantly at renewable energy alternatives.

### 3.7 Environmental Imperatives

Since the seventies more and more scientists and environmentalists started to prove that the threats to the health, biosphere and climatic balance by polluting energy must be eliminated by clean, renewable systems. The first and second oil shock made people think more about alternative solutions, followed by a virtual R&D rush into new, benign energy system developments, including photovoltaics, hydrogen, advanced biomass systems, wind power and heat pumps. However R&D continued to be awfully biased towards risky non-renewable systems of the mighty power players, including "clean" coal (with its high specific $CO_2$ emission !), deep sea drilling, hot fusion and new fission ideas in order to cement the dominating role of the power lobbies with their centralized generation concept.

Developers of small, decentralized energy systems received only from the nineties onwards some encouragement by state-enforced special electricity rate decrees, sparing subsidies and received some help from "solar energy exchange cooperatives" by a few liberal power companies and self-help groups of idealistic NGOs.

ISEO's "Blueprint for the Clean, Sustainable Energy Age" and the "Global Energy Charter for Sustainable Development" enable all stakeholders to implement the following environmentally compatible energy scenario:




**More on website [www.uniseo.org](http://www.uniseo.org)**

## 4. Outlook

The world is facing the historic challenge to restructure the entire energy sector according to ISEO's principles in a 50 year scenario, if development goals and population growth have to be satisfied, while improving the quality of life and assuring sustainable prosperity and happiness to coming generations – a demanding task, also recognized by some energy multinationals.

To cope with this enormous task all governmental and private sector forces and talents have to work together very intensely and funds have to re-channelled from harmful subsidies and wasteful expenditures to a sustainable production of energy, food and hardware.

The United Nations has to be reformed in order to play a more effective, pro-active role in this process. Unnecessary duplications of efforts have to be avoided by all organizations including a better cooperation with and between NGOs, public and private research institutions.

Legislators must aim at better international laws on the sustainable conduct of decision makers and consumers and by better international communication between parliamentarians.

All societies need a level playing field as regards external cost levies and eco taxes which are influencing their competitiveness, national households and balances of payments.

Polluting, wasteful transportation modes must be replaced by clean, renewable energy[1] concepts, whereby electric rail and road transport has to play a more important role.

Defence budgets should be reduced in favour of sustainable development budgets.

Renewable energy[1] systems create a lot of new, safe jobs and have therefore to be given a more prominent role by governments and the International Labour Organization (ILO) in Geneva.

ISEO has to ascertain that UN Specialized Agencies, Programs, Commissions and the World Bank Group harmonize their efforts in the energy field and to stop the promotion and financing of environmentally incompatible energy systems[2].

**Endnotes:**

[1] Renewable energy (RE), primary energy, energy services, embedded energy, releases and other energy terms are defined in the international standard series ISO 13602, especially in its Part 1 on Methods for Analysis. The internationally agreed ISO terminologies and SI system of units serve as a legal basis for all energy codes, standards and laws.

[2] ISO and IEC standards specify the ecological and economic performance of energy systems.