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ADDRESSING THE CHALLENGES OF CLIMATE CHANGE

THE 7 AARHUS STATEMENTS ON CLIMATE CHANGE
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AARHUS UNIVERSITY

Theme 1
Climate policy: the role of law and economics

Involve all sectors in climate solutions

Theme responsible
Professor, dr.jur. Ellen Margrethe Basse, Head of the Climate Secretariat, Aarhus University

Far greater efforts are needed to ensure the involvement of the private sector and civil society in climate solutions. All sectors of society are needed in the fight against global warming.

The involvement of governments should ensure international law and regulations that are fair and cost effective, and that promote sustainable development. We don't need less regulation, we need better regulation. For example, future financial mechanisms should have clear and focused objectives for each mechanism, implemented in a more strategic and holistic way. Financial mechanisms should be framed with a view to promoting further investments from the private sector, and international regulations should be formulated in a way which can be accepted and understood by citizens.

It will be of crucial importance that the new legal framework for climate change mitigation and adaptation invite and include both the private sector and civil society in future processes. Climate change is one of the biggest challenges facing human civilization – we all need to be part of the solution. The transformation into a non-carbon society faces many challenges and includes much potential.

The involvement of civil society is crucial in both negotiating and implementing international treaties and protocols on climate issues – with a view to ensuring both the human rights of citizens and the efficiency of the global agreements, for example in areas of big cities in which national laws are not always necessarily obeyed. Removing the barriers and harvesting the potentials will require the involvement of all members of society.

We have to involve the private sector to ensure the necessary funds and innovation. Public funds are also important with a view to generating private funds, but the private sector has to deliver the vast majority of the required investments in climate change mitigation. Consequently, we need to look at incentives and barriers for private investors in these fields.

This action could be taken immediately because the legal framework has already been established in the climate convention and there is plenty of interest in both the private sector and civil society. The barriers to the full involvement of all sectors are more of a political and cultural kind.

Climate policy, the role of law and economics: **10 key issues**

The CONCITO rapporteur:
Martin Lidegaard, Chairman of CONCITO

CONCITO

1. Far greater efforts are needed to ensure the involvement of the private sector and civil society in climate solutions. All sectors are needed in the fight against global warming.

2. Governments should ensure international climate laws and regulations that are fair and cost-effective, and that promote sustainable development. Legally speaking, a new treaty replacing the existing Kyoto protocol and the UNFCCC climate convention would probably be the best way to ensure this.

3. We don't need less regulation, we need better regulation. Regulation should preferably be international to ensure fair and cost-effective greenhouse gas reductions, but national regulation is also required due to the very different energy systems in the different countries.

4. The obligations in a new treaty should strictly follow the financial ability of each country to contribute to mitigation and adapt to global warming – rather than following the present division into artificial UN groups such as Annex1 and G77.

5. The present patchwork of various small financial funds should be turned into fewer funds with more financial power. The existing funds should be carefully evaluated to ensure the proper financing of a new treaty. Each financial mechanism should have a clear and focused political objective, and should be monitored in a strict and unbureaucratic way.

6. CDM should switch from a project-based approach to a more strategic and programme-based approach to make it possible to integrate mitigation, adaptation and sustainable development in each country and region.

7. An international CAP and trade regime must be combined with concrete agreements about greenhouse gas reductions in the sectors not included in the CAP system. A CAP and trade regime system should include a "buy-in" system in which the supplier of quotas ensures a minimum market price by buying quotas and destroying them when the market price sinks too low. It is necessary to have market security for investments in energy efficiency and renewable energy to make climate change mitigation a winner.

8. There should be a limit on the extent to which a country can fulfil its climate commitments through flexible mechanisms, to prevent the trading system stopping technology development in rich countries and to make it difficult for developing countries to harvest the low-hanging fruits in their commitments.

9. Incentives and barriers for private investments in mitigation and adaptation should be identified and dealt with. The architecture of public funds should be designed to promote further private investments, as the private sector has to deliver the vast majority of the required investments.

10. The involvement of civil society is crucial in implementing international treaties and targets in an efficient and democratic way – for example in areas of big cities where national laws are not obeyed, or in areas where new energy systems may be a threat to the human rights of present groups of citizens.

Theme 2
Biodiversity and ecosystems

Biodiversity needs to be an integrated part of the general mitigation and adaptation efforts

Theme responsible
Professor Jens-Christian Svenning, Department of Biological Sciences

Biodiversity needs to be an integrated part of the general climate change mitigation and adaptation efforts

Climate change (CC) constitutes a major threat to the Earth's biodiversity
Currently, biodiversity is under negative pressure from land-use, biological invasions and pollution. As a result, numerous species are threatened with extinction (25% of the roughly 5,500 mammal species in the world, for instance). Over the next 100 years CC will constitute an additional pressure, with potentially severe impacts. CC is already affecting ecosystems and biodiversity globally, causing changes in the functioning of ecosystems, species abundance and species range. With an increase in global mean temperature of just >1.5-2.5°C, 20-30% of the species studied may experience an increased risk of extinction.

Although major losses are unavoidable if climate change is not strongly curtailed beyond business-as-usual expectations, the CC impact will depend greatly on interactions with other pressures, notably land-use. Key adaptation strategies are:

1. Reducing other pressures on biodiversity: One key adaptation strategy would involve decreasing other pressures on biodiversity (habitat loss etc.) to increase resilience to CC. It is therefore crucial that CC mitigation and adaptation (especially in land-use, e.g. biofuel crops) should be implemented in ways that alleviate pressure rather than placing additional negative pressure on biodiversity.

2. CC-integrated conservation planning: Maintain viable, connected and genetically diverse populations by a variety of means (expanding reserve systems, designing reserve systems so they are resilient to CC, CC-off-setting local management (controlled burning to reduce fuel loads etc.), captive breeding, assisted migration/translocation, engineering new habitats etc.)

Forest conservation including reduced emissions from deforestation and degradation (REDD) constitutes a major and cost-effective CC mitigation opportunity
Biodiversity and in particular forests also constitute a major part of the solution to the CC problem. Emissions from land-use change, especially tropical deforestation, contribute to about 20% of total anthropogenic CHG emissions. Consequently, one important facet of CC mitigation is forest conservation, including reduced emissions from deforestation and forest degradation in developing countries (REDD), especially in relation to carbon- and biodiversity-rich tropical forests. By reducing pressure on tropical forests, REDD is also likely to have direct benefits for biodiversity. Afforestation/reforestation can also contribute importantly to carbon sequestration and reduce pressure on forest biodiversity. To achieve this key form of CC mitigation, it is absolutely crucial that economic structures providing incentives for forest conservation are implemented.

Key point: Biodiversity needs to be an integrated part of CC mitigation and adaptation efforts
CC adaptation and mitigation in other sectors may have positive, neutral, or negative impacts on biodiversity. Synergies could be promoted by formulating integrated policies cross-linking major UN conventions, notably UNFCCC (United Nations Framework Convention on Climate Change) and CBD (Convention on Biological Diversity).

Biodiversity and ecosystems:
10 key issues

The CONCITO rapporteur:
Sine Beuse Faurby, Head of Section, Climate and Energy, The Danish Nature Conservation Society

CONCITO

1. Biodiversity conservation should be an integrated part of general climate change adaptation and mitigation efforts.

2. On a macro-political level synergies between adaptation and mitigation in other sectors and biodiversity should be promoted by formulating integrated policies cross-linking major UN conventions, notably UNFCCC (United Nations Framework Convention on Climate Change) and CBD (Convention on Biological Diversity).

3. There is plenty of evidence to prove that nature is highly sensitive to climate changes of the scope expected in the 21st century.

A. New studies show that nature, ecosystems and biodiversity are even more sensitive to climate change than reported in the IPCC 2007 report.

4. It is scientifically clear that if anthropogenic climate change continues unabated, ecosystems will not be able to adapt naturally to the changes resulting.

5. It is scientifically clear that in the 21st century climate change and human land-use constitute major threats to biodiversity.

6. Considerable biodiversity losses are unavoidable if climate change is not strongly curtailed beyond business-as-usual expectations.

7. Climate change poses a risk of widespread forest decline, including tropical forests, representing not only a risk to biodiversity but also a risk of additional destabilisation of the climate system.

8. Reducing other pressures on biodiversity: one key adaptation strategy involves decreasing other pressures on biodiversity (habitat loss, fishery, etc.) with a view to increasing resilience to climate change. It is therefore crucial that climate change mitigation and adaptation (especially in land-use, e.g. biofuel crops) should be implemented in ways that alleviate pressure rather than putting additional negative pressure on biodiversity.

9. Forest conservation including Reduced Emissions from Deforestation and Degradation (REDD) constitutes a major and cost-effective climate change mitigation opportunity.

A. To benefit from this key mitigation opportunity, it is absolutely crucial that economic structures providing incentives for forest conservation are implemented.

B. It is important to place a value on large tropical forest areas located outside the deforestation frontiers.

C. Forests provide a host of co-benefits, including water recycling, erosion protection, and the mitigation of weather and temperature extremes.

10. When planning and implementing general climate change mitigation and adaptation efforts, cross-sector integration is highly important to avoid unintended adverse effects.

A. The negative effects of biodiversity can often be avoided by adopting best practices in the implementation of mitigation and adaptation policies.

Theme 3
Agriculture and climate change

We must increase agricultural productivity and use less water and land. This urgently requires a substantial increase in research, innovation, education and advice.

Theme responsible
Professor Jørgen E. Olesen, Faculty of Agricultural Sciences

We must increase agricultural productivity and use less water and land. This urgently requires a substantial increase in research, innovation, education and advice.

The primary aim of agricultural mitigation options is to reduce emissions of methane and nitrous oxide, and to increase soil carbon storage. Globally agriculture also contributes to CO2 emissions from deforestation, which can only be reduced if the productivity of existing agricultural land is improved through improved crops and better soil and water management. To reduce the reliance of society on fossil fuels there is a high demand for increasing the use of bioenergy and biofuels. This can only be achieved by developing new highly productive bioenergy cropping systems that make use of land which is not suitable for food and feed production, and which does not currently have high biodiversity and/or high carbon stocks.

Adaptation in agriculture to increased climate variability involves increasing the resilience of production systems. This can be done by improving soils, water use, crops and cropping systems. Soils will need to harvest and store rainwater more effectively; irrigation water must be used more efficiently; crops must be made more drought resistant through breeding; and cropping systems must be designed to conserve more water and provide better protection from the consequences of droughts, heat waves and floods.

The greatest challenge facing agriculture during the 21st century is probably how to feed the increasing number of increasingly wealthy people on Earth while maintaining high-quality soil and water resources. Climate change significantly adds to this challenge by reducing the quality of soils and the availability of water in many regions, and by increasing the variability of temperature and rainfall. The already large contribution of agriculture to global greenhouse gas emissions will increase in importance unless more effective and climate-friendly farming systems are adopted. The challenge within agriculture is therefore three-fold: to increase production, to reduce emissions, and to adapt to a changing and more variable climate.

There is a particular need to increase agricultural productivity, reduce greenhouse gas emissions and adapt to climate change in developing countries. This requires an urgent and substantial increase in the focus of research, innovation, extension and education at all levels across all sectors related to agriculture. To do so will in many cases call for capacity building, which requires the focus not only of national and local governments, but also of international donors and the international research community. There is a further need internationally to promote the development of cropping systems and technologies that deliver highly productive systems for combined food, feed and bioenergy production. This requires a collaborative effort across private and public research institutes and across many research disciplines.

Agricultural, food and energy policies should be better integrated at international, regional and local levels. They should seek to use, develop and maintain the available resources more effectively (land, soil, water, nutrients, agrochemicals, energy, genetic diversity, research capacity, information systems, infrastructure, culture) in a climate change and variability context. There is a need for flexible policies that focus on the multidimensional roles of agriculture, where the priorities vary from one region to the next depending on local resources, capabilities and demands.

Agriculture and climate change:
10 key issues

The CONCITO rapporteur:
Thomas Færgeman, Director of CONCITO

CONCITO

1. Agriculture is a culprit and a victim of climate change. Worldwide, agriculture emits 20-30% of all greenhouse gasses and consumes 80% of the freshwater extracted. The biosphere is becoming gradually saturated with reactive nitrogen. In addition, world grain production is expected to double by 2050.

2. Agriculture has a great potential to reduce emissions of greenhouse gasses from its current practices, and to sequester carbon dioxide. So agriculture is an important part of the solution to climate change.

3. Overall, agriculture must increase efficiency, implement new technologies and management, contribute renewable biomass for energy purposes, and abandon certain practices (such as the cultivation of peatlands). This can be achieved through a number of measures such as subsidies, taxation and the banning of certain practices.

4. The development of agricultural practices with a high resilience to climatic variability and better use and management of water is essential. Biotechnology in combination with improved crop and soil management may prove to be of key importance in this respect.

5. In the developing countries, climate change is detrimental (especially for poor people) due to the depletion of soil and water resources, the increase in water- and vector-borne diseases, and decreases in agricultural productivity. The increase of world food prices actually leads to a decrease in agricultural production in developing countries due to the increased price of inputs. Consequently, international measures must be implemented that counteract large fluctuations in international food market prices.

6. It is essential to develop mechanisms on an international scale by which farmers are paid for using farming practices which emit low levels of greenhouse gasses as well as for carbon sequestration in the soil. The current CDM system is not efficient for smallholder farmers, mainly due to high transaction costs.

7. Conservation Agriculture is a key concept in applying sustainable agricultural practices. It comprises three principles: no or reduced tillage, diverse crop rotations, and constant ground cover. It significantly saves energy use in farming, it sequesters carbon in the soil (an average of 0.5 t/ha/year), and it has the potential to save 1,200 km3 of water per year by 2030, according to FAO.

8. Livestock production is increasing rapidly on a global scale. Meat production will double between 2000 and 2050. In the long term, food consumption in the developed countries must shift from an animal-based protein diet to a vegetable-based diet supplemented by fish and poultry.

9. Biomass is a valuable renewable source and has the highest greenhouse gas effect when it is used instead of coal, oil and natural gas in the production of electricity and heat. Biofuel efficiency is currently low due to conversion losses and low efficiency in combustion engines. However, biofuels have a great potential to substitute fossil fuels in the existing vehicle fleet.

10. ioenergy production should not take place on land that is currently used for food and feed production, it should not require irrigation with potable water, and it must prove a significant positive greenhouse gas balance. On a global scale there is a large potential for bioenergy cropping on marginal lands.

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Theme 4
Nanotechnology solutions for the future

Nanotechnology will lead to the next industrial revolution and provide technological breakthroughs in developing sustainable energy technologies and improving the energy efficiency of current systems

Theme responsible
Professor Flemming Besenbacher, iNANO

Nanotechnology will lead to the next industrial revolution and provide technological breakthroughs in developing sustainable energy technologies and improving the energy efficiency of current systems.

As clearly stated by the IPCC report, a business-as-usual approach to research and development will not result in the fast implementation of renewable energy sources which is mandatory i) to cope with the predicted increase in energy consumption worldwide, and ii) to limit emissions of greenhouse gasses and thereby potentially catastrophic climate changes. The challenge of renewable energy sources is in general to improve their energy efficiency, to reduce the price per kWh produced, and to increase the scale of systems so they become large commercial systems. Nanotechnology provides new scientific and technological breakthroughs in the synthesis, characterisation and production of new functional nanomaterials with tailored properties optimised for applications within the fields of (for instance) solar energy, biofuels, fuel cells, catalysts, wind energy and hydro energy – as well as being used for energy storage and improving the energy efficiency of existing systems.

The increase in the world population and the increase in GNP (not least in Asia) are expected to result in a 200% increase in world energy demand by 2050. If this energy demand is to be supplied by increasing the use of fossil fuels alone, it will most probably lead to unacceptable and potentially catastrophic CO2 levels in the atmosphere. The development of renewable energy technologies such as solar energy, wind energy, biofuels, new energy storage systems and a new worldwide grid transmission system is therefore unavoidable. Nanotechnology offers the tools needed to design and develop new functional nanomaterials for sustainable energy systems to cope with increasing energy demand. So investments in nanotechnology research with a view to developing new nano-structured energy materials could create immense economic and environmental benefits.

Increased investments in research into (and the development of) new functional nano-energy materials and renewable energy technologies must be the top priority for any government wishing to address the challenges of increased energy consumption and climate change. Funding should stimulate both research and development both at the fundamental level at research institutions and in industry. And it is just as important to maintain the connection between the two.

Investment in nanoscience and nanotechnology is evolving rapidly, and nanotechnological applications have already started to emerge at research laboratories within areas such as solar energy, bio-fuels, fuel cells, catalysts, wind energy, hydro energy and energy storage. However, there is a need for significant improvements with respect to efficiency, stability, scale-up to mass production, and reductions in the cost per kWh produced. If renewable energy systems are going to revolutionise our energy supply, the investments involved should have a commercial pay back time of 5-10 years. This means that public funds must be made available in the transition period until renewable alternatives have matured to a level that ensures economic viability.

Nanotechnology solutions for a sustainable future:
10 key issues

The CONCITO rapporteur:
Tobias Lau, Founding Partner, Social Action

CONCITO

1. We need to understand the audacious potential of nanotechnology: nanotechnology holds many promises and should be included as an important science to create a sustainable future. Many of the energy challenges our civilization faces in the coming decades can be guided and tackled by breakthroughs in the field of nanotechnology.

2. We need to realise that nanotechnology can create new, cheap materials that will make it easier to invest in sustainable solutions. Today, many sustainable technologies are expensive, partly because of material costs. This barrier can be broken by the creation of new, cheaper materials which will make it easier for corporations and governments to adopt sustainable solutions.

3. We need to explore all kinds of new energy solutions. We shouldn't choose winners too early. Nanotechnology can be used in several energy solutions. The actual use of nanotechnology in everyday situations will depend on the market.

4. We need behavioural change to make nanotechnology succeed: in order to unleash the potential of nanotechnology, we must make sure that nanotechnology is embraced broadly by various organisations such as corporations, NGOs and governments. Otherwise, nanotechnology and the promises it holds might not be accepted by the general public and thereby the political arena, which would be a major loss as far as the development of a sustainable future is concerned.

5. We need to inspire concrete missions that illustrate the use of nanotechnology: to many people, nanotechnology is a complex, futuristic science. What is needed at all levels of society is to communicate inspirational missions within nanotechnology. This could happen within a corporation, a research institution or a nation. Concrete missions will make the science easier to comprehend, as well as stimulating the ability of more people to collaborate on nano-related issues that could help to engineer a better future.

6. We need to understand that nanotechnology is too important to leave to a small group of stem scientists: nanotechnology has the potential to change the way we live in new, radical ways. The process by which nanotechnology will be integrated in society should be influenced by more scientists, which means that more effective methods of recruiting people with innovative mindsets to the scientific arena are needed.

7. We need to ensure that nanotechnology does not remain in the pockets of major corporations: the understanding of nanotechnology should happen across departments. This would help efforts to attract funding for nanotechnological projects.

8. We need to adopt a closer relationship between nanotechnology research departments and business departments: efficient knowledge-sharing between R&D and business departments will be essential to promote the implementation of nanotechnological solutions

9. We do not need to be afraid of bold visions: nanotechnology can create solutions that force society to seriously consider ideas that were once regarded as utopian. One such idea is the liberation of energy from mass and the creation of a global energy net that transfers renewable energy across continents through wires consisting of bundles of nanowires.

10. We need to celebrate nano-scientists as the co-creators of a new world to attract the attention of society as a whole. One way to attract broad attention to nanotechnology would be to collaborate with the entertainment industry to capture the public's imagination. Whatever holds the public's attention can change the world.

KYOTO NANOTECHNOLOGY SOLUTIONS FOR A SUSTAINABLE FUTURE

Theme 5
Citizens and society

The agreement to be adopted at CoP-15 should include the commitments of the Aarhus convention as well as incentives to support participation and empowerment of the citizens

Theme responsible
Professor Jeppe Læssøe, Danish School of Education

The agreement to be adopted at CoP-15 should include the commitments of the Aarhus convention as well as incentives to support participation and empowerment of the citizens

People's legal rights to information and participation constitute a necessary precondition for addressing the challenge of climate change. The Aarhus convention has proved that it is possible to persuade government and local authorities to commit themselves to an agreement on these rights.

Furthermore, there are good examples at companies working with social corporate responsibility and in the educational sector proving that citizen participation can help to promote ownership and social learning, thereby guiding people's actions in meeting the challenge of climate change.

Mass media communication also plays an important part in the task of education. However, in this field there is a need to improve the public service contribution to the involvement of citizens in deliberation and innovative efforts to find socially robust solutions regarding the climate change challenge.

To involve more companies, activate the whole educational sector and influence the public-service media, there is a need for both schemes and incentives. Hence, in addition to an agreement regarding legal rights to information and participation, the forthcoming global protocol on climate change should also include commitments regarding supportive schemes and incentives.

Citizens and society:
10 key issues

The CONCITO rapporteur:
Kristoffer Kej, Communication Advisor, RelationsPeople

CONCITO

1. Change the global public dialogue about climate change: shift the focus from diagnosis ("is there a climate problem?") to solution ("how do we solve it?"). Continuous focus on diagnosis by academics and political decision-makers diverts time and mental effort from creating solutions.

2. Help the markets: create a market pull of climate-friendly products and buildings through public labelling schemes and reporting programmes. Transparency and comparability are important factors, and it must be possible to adopt schemes at a low cost to companies. Labelling and reporting should also be audited: what gets measured gets managed!

3. Make the climate-friendly choice the easy choice: make energy-efficient technologies for buildings easy to understand, apply and use. We all need to be early adopters! The potential impacts of more energy-efficient buildings are vast, and the required investments are relatively low.

4. Promote research to identify the most efficient drivers of behavioural change. The knowledge is available to the public(s) today; but it needs to be presented in the right way, through the right channels and in the right situations to achieve the intended changes in behaviour.

5. Promote the climate cause as a winning strategy to businesses. The public sector should lead the way to help prove the business case for climate-friendly business conduct, promote best practice and good examples, and facilitate networks for companies and NGOs with the focus on climate actions.

6. Legislation and corporate social responsibility (CSR) need to go hand in hand. The public sector should encourage corporate actions through incentives. Global legislation is necessary to level the playing field and thereby create real room for turning climate activities into competitive advantages.

7. More and clearer communication is needed about the impact of meat production and consumption on deforestation, loss of biodiversity, "grain drain", climate change and personal health. We need to decrease meat consumption in the western world – for the sake of the climate AND our health.

8. Information doesn't work – but communication, participation and learning do. Involve the general public in the discussion of climate solutions and reconsider the role of education systems. Social questions should stimulate joint creativity and real, innovative and pragmatic solutions that are widely valued.

9. The financial crisis should only be regarded as a "bump on the road" compared to the climate crisis. Short-term considerations must not stand in the way of necessary decisions. In many ways the financial crisis is an opportunity to promote the necessary changes and move towards a greener economy.

10. The new Copenhagen Agreement should include a provision on access to information, public participation and access to justice in relation to climate change. Such a provision should build on the broad global consensus reflected in article 6 of UNFCC and Principle 10 of the Rio Declaration, drawing on elements of the Aarhus Convention and the revised New Delhi Work Programme as appropriate.

Theme 6
The Arctic

Ensure a sustainable development of the Arctic region in collaboration with the local population

Theme responsible
Associate Professor Marit-Solveig Seidenkrantz, Department of Geological Sciences

Ensure a sustainable development of the Arctic region in collaboration with the local population

The Arctic is a region of extreme and rapid climate changes, with fragile ecosystems to a large extend inhabited by people with traditional lifestyles. Its natural and traditional cultural setting is under pressure from climate change, a growing industrial interest and enhanced exploitation of non-renewable resources. The development may promise increased wealth but also encompasses a significant risk of degradation of existing social structures.

Actions are needed to address these concerns and to ensure that management of natural living resources is sustainable and based on the best available knowledge of the consequences of climate change. In many areas this would depend upon the development of relevant institutions as well as research and education facilities.

Likewise, it is important to focus on the environmental and socio-economic impact on all utilization of non-renewable resources such as oil, gas and minerals as well as shipping in vulnerable areas. Preferably a moratorium should be implemented. New technology should be developed and environmental risk assessments as well as socio-economic studies are needed before lifting the moratorium. Particularly fragile areas should be protected against non-sustainable exploitation.

Participatory processes should be used in order to address the needs and concerns of local people whenever decisions are made to begin any kind of economic development in the Arctic. People in the Arctic often have traditional lifestyles such as reindeer herding, hunting and fishing, often based on a non-monetary economy. There are far too many examples of economic development in the Arctic where local people have suffered a complete break-down of social structures resulting in poor health and loss of identity leading to alcoholism and abuse. Part of a participatory process is to develop tools and mechanisms which enable local people to address the inevitable social and economic changes in a world dominated by climate change.

In order to improve our understanding of human impact and to distinguish it from the natural climate variability as well as augment our appreciation of non-linearity and tipping-points (points of no return) we need an enhanced understanding of all elements constituting the climate system such as ocean currents and atmospheric conditions through the interdisciplinary study of the (palaeo)climate record in order to better explain and predict present and future climate changes. In conjunction, we need to establish a firm understanding of how the structure and function of ecosystems react to short- and long-term changes in climate and, in particular, how resilient ecosystems are to extreme changes.

A particular effort should be made for understanding the interaction between climate, ecosystems, natural-resource utilization and socio-economic consequences and development.

Partnerships between governments, scientists, industry, environmental NGOs as well as local and indigenous people organizations are need in order to identify problems and find solutions.

The initiative to create these partnerships must taking immediately after the COP15 embracing both perspectives of short- and long-term changes and consequences.

Ideally, a legally binding treaty protecting the Arctic Ocean against non-sustainable exploration should be implemented following the Conference of the Parties of the Climate Change Convention (COP15) in Copenhagen, December 2009.

The Arctic, region of extreme and rapid climatic changes:
10 key issues

The CONCITO rapporteur:
Anne Marie Bjerg, Greenland Program Manager, WWF

CONCITO

1. Ensure that the management of all natural living resources is sustainable and based on the consequences of climate change.

2. Relevant governments should agree on a moratorium on all utilisation of non-renewable resources such as oil, gas and minerals as well as on shipping in vulnerable areas which will become more accessible as the sea ice retreats and temperatures increase.

3. Ensure a fully participatory process in which all needs and concerns of the local people are addressed in connection with all kinds of economic development.

4. Develop tools and mechanisms to enable local and indigenous people to address inevitable social and economic changes in a world dominated by climate change.

5. Ensure that adequate resources are made available to interdisciplinary scientific research in order to widen our understanding of the climate system dynamics and the ecosystems of the Arctic.

6. Ensure an enhanced understanding of all elements of the climate system such as ocean currents and atmospheric conditions through the interdisciplinary study of paleoclimate records in order to explain and predict present and future climate changes more effectively.

7. Ensure that historical data concerning the Arctic is collected and preserved for the future.

8. Take into account that some climate changes are only reversible until a certain point of no return, after which the earth and ecosystems may find a different steady state and new measures for sustainability must be applied.

9. Ensure that areas expected to be the refuge of perennial sea ice are protected against non-sustainable economic development.

10. Ensure through a legally binding treaty that the Arctic Ocean is protected against all non-sustainable exploitation.

Theme 7
Integrated energy solutions

Establish a new carbon trading/carbon tax system, which directly stimulates use of new technologies

Theme responsible
Professor Lene Lange, Aalborg University

Establish a new carbon trading/carbon tax system, which directly stimulates use of new technologies

The most urgent need is to stimulate the maturation and implementation of the many new, promising technologies

For this we need an international fund and political support to create the market.

Proposal: Establish strong incentives for the implementation of CO2-emission reduction technologies through a new CO2-quota system.

Methodology: The creation of a CO2 central bank which manages the CO2 quota system and sets long-term CO2 emission goals by reducing the CO2 quota amount.

The current carbon trading systems are not providing sufficient stimulation for the use of new technologies.

The next proposal, a more far-reaching one, would be to suggest the following: The depletion of limited natural resources should be counteracted by a compulsory investment in sustainable replacement technologies.

During the last decade a wealth of new technologies have been developed.

It is important that society establish framework conditions which create markets that will pull the new technologies into use.

This will in itself stimulate investments in zero carbon-emission technologies.

Such investments in new technologies followed by the creation of markets will lead to the establishment of many new industries, thereby creating a great number of jobs as well.

Methodology: The creation of a CO2 central bank which manages the CO2 quota system and sets long-term CO2 emission goals by reducing the CO2 quota amount

The initiative could be implemented globally or regionally. The COP15 meeting in December 09 in Copenhagen is an excellent opportunity for this.

This proposal is a good match to the proposal by Barack Obama regarding Cap and Trade.

The proposal could go into action with almost immediate effect once it has gained international support.

Need for integrated energy solutions:
10 key issues

The CONCITO rapporteur:
Jakob Worm, Manager, Energy Service Denmark – Mid-Eastern Jutland Office

CONCITO

1. Establish a new carbon trading system which directly and efficiently stimulates the use of new sustainable technologies.

2. Heat as a by-product of electric power generation. In Denmark we have experienced great success by utilizing heat from electric power generation. There is a great need for utilizing these technologies internationally. In many countries ineffective power stations only utilize approximately 30-40 % of the fuel energy potential. By utilizing the by-product, the total efficiency of a power station can reach 90 %. Utilizing by-products can also account for distant cooling.

3. District heating distribution, organizational and economical. In many cities district heating will replace natural gas, oil or other fossil fuels. When district heating is established in a city it presents an opportunity for alternative supply with e.g. solar hearing, geothermal heating, heat pumps or biomass heating or utility of industrial surplus heating. Denmark has extensive experience with organizing district heating and can aid many larger cities with the implementation of district heating thus realizing vast CO2 reductions.

4. Coherent energy planning in municipal and government level. Corresponding electrical systems based on wind power (50 %+) combined with an effective market and flexible consumption of cooling, heating and in the long term: electrical transportation, ethanol and hydrogen productions.

5. Zero emission carbon society needs development of a number of renewable technologies. The electricity needs of the society can be met with solar or wind technologies etc. Biomass can play a crucial role for the implementation of this, by giving back-up buffer when the wind is not blowing and the sun is not shining. Biomass can in this way be seen as a storage possibility for renewable energy ready to switch between renewable technologies.

6. Research and development of new technologies within biotechnologies. There is a great demand in Denmark for further funding intended for research and development within a wide variety of energy technologies. Biomass can be used to establish sugar and ethanol platforms which again can be upgraded to higher value chemicals, hereby substituting both fossil energy and fossil chemicals.

7. Market development and maturing of biotechnologies. Introductions have shown that there is great potential for industrial utility of biomass by combining microorganisms, gasification and chemical processes. At present a significant and exciting development takes place. Let the market pick the winners. The politicians should define the goals and not the technologies.

8. Drivers for efficiency in industry and institutions are needed. Incentives and organization of consumer energy savings is needed.

9. Drivers for combined systems for electricity and heat supply based on biomass, solar energy and geothermal energy are needed. Drivers for co-operation between industrial production and the power and heat sector, including both power planted heat and products, are needed.

10. The greatest potentials for utilizing biomass are in the tropical areas. To develop these areas one should also process raw materials and place more advanced production here. Thus the countries should be aided with technological development.

The Beyond Kyoto conference took place in Aarhus on 5 -7 March 2009 and was organised in collaboration with many researchers from different areas at Aarhus University and other knowledge institutions. The collaboration established with different authorities and companies was crucially important as regards the content and actual holding of the conference.

The conference was a joint interdisciplinary project involving the nine main academic areas of the university, resulting in 7 individual conference themes. More than 1000 participants from business, science and policy sectors discussed the challenges and solutions connected with climate change. At the conclusion of the conference, each of the seven theme organisers delivered a statement about the most important messages expressed in the presentations covered by their themes. The 7 Aarhus Statements on Climate Change were developed during the conference in collaboration with seven rapporteurs from the Danish think tank CONCITO. In addition to the seven statements CONCITO developed 10 key issues for each theme which elaborates on the additional issues addressed at Beyond Kyoto.

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