Theme	**2. Advancing Human Development and the MDGs**
Topic	**2.2 Water for energy and energy for water**[1]
Main Question	Should strategies and policies for energy and water related management issues be further integrated on a national and global scale in order to foster a more harmonized approach, increase efficiency and cope with conflicting goals?
Identified sub-questions – on-line questionnaire	•
	Water & Energy: the two crises Water and energy have a long common history starting much before the industrial age. They are intrinsically linked. Most energy production requires abundant access to or uses of water resources; in the production (hydropower, bio-energy, geothermal energy, wave and tidal energy) or for cooling purposes. Most of the initial industrial developments in the world were hydropower based. However the more comprehensive use of energised pumping of water has been recent. In irrigation for instance it is only since 20th century that fuel and electrical at system level as well as field level. Before that gravity limited use of hydraulic ram pumps were the only options. Energy has also been important for drainage purposes particularly on polders land. Finally with the advent of rural electrification in south Asia particularly , there has been a massive uptake of submersible pumps to service irrigated areas with groundwater. Groundwater depletion and saline intrusion are some of the resulting externalities, but also the near-bankruptcy of electricity utilities supplying subsidised energy to farmers. Beyond this, further demands in energy are anticipated as food cold-chains develop and become more sophisticated. Marketability and food safety often hinge on maintaining correct temperatures in food processing and storage. As large areas of the world are reaching the natural and economic limits to development, the story of water and energy is entering a new chapter. The forum will be one starting point of this new chapter. **The unquenchable thirst for energy** Global energy demand, if current policies are maintained, is expected to grow by as much as 55% until 2030 according to the International Energy Agency (IEA). China and India alone would account for about 45% of that increase (based on quite conservative figures on economic growth) and developing countries for 74% of the total increase. Although the statistics from the same agency clearly points out that oil, coal and gas will continue to dominate, also other sources of energy will need to expand. Renewable energy production (including biomass and hydro-power) is also expected to increase by 60% until 2030 but will still only cover a very small part of total energy demand. **The energy needs of the poor are non-negotiable** There are a number of complex, and partly competing, challenges associated with energy production, environmental issues and water resources management. On the one hand, there is an urgent need to supply billions of poor people around the world with basic energy and foster economic growth. As with water, there are huge imbalances in energy consumption. While the average commercial energy use (kg of

[1] Initial discussion paper to form basis for the elaboration of sessions. Prepared by Johan Kuylenstierna, UN-Water (johan.kuylenstierna@fao.org)

	oil equivalent per capita) in an average OECD country is around 5000, it is well below 500 in most developing countries (World Bank, 2002). Energy consumption will thus need to increase in developing countries as part of any strategy to foster economic growth, combat poverty and sometimes minimize impact on environmental systems. Practices such as deforestation for fuel wood are causing degradation to the natural resources basis for the disadvantages. The question of distributing low cost energy/electricity services to the poor should be the priority of the MDG as it has very strong positive impacts expanding livelihood choices, education of children and domestic health. Many in the developed word have simply forgotten what life without electricity was. Although we have time to time some big power failures which make the headlines. Therefore a debate on energy provision and environmental impacts needs to address issues of coverage, efficiency and overall environmental sustainability **Energy and electricity availability are fundamental to all MDGs** Targets 1 and 2 of MDG1 (poverty and food supply) are directly implicated. Electricity (form of energy) clear indirect impact on education Target 3 MDG2, again energy and electricity supply to all will have a strong impact on Gender issues MDG3 (freeing women from many tedious tasks), infant mortality can benefit from availability of energy/electricity transport to the next dispensary, etc.. MDG4, for MDG 5 and 6, health women mortality, HIV aids and malaria, again transport to the next dispensary access to medical etc.. might be related to energy and electricity availability. on MDG 7 water and sanitation can easily be strengthened, local environment better if energy comes from a grid, dwellers and habitat improved. Although not explicitly mentioned in any of the MDGs, the ENERGY is a ubiquitous and instrumental agent throughout MDGs. ********** **Water for Energy**
introduction to topic "water for energy"	Apart from the satisfaction of the poor in energy needs, major challenges remain on energy development. The pressure to extend hydro-power on the basis of its comparative sustainability will stir discussions on environmental and social impacts, including the regulation of hydropower dam releases to optimise downstream uses and maintain aquatic ecosystems. Expansion of thermal power producing facilities will require cooling water. Although none of these activities are water consumptive in nature (apart from evaporation from reservoirs), the environmental impacts can still be considerable and complex. Beyond this the issue of storage of nuclear waste will always depend on the threats to groundwater contamination. However, we also need to pay more attention to "emerging challenges" that will have an effect on both the energy sector and therefore also on water resources. The most obvious such example is climate change that may well influence the global energy future more and faster than what has been (and still partly is) perceived. The pressure on the political system is mounting and there is likely to be increased calls for actions to deal with greenhouse gas emissions over the next decades. This can, ultimately, change the energy production landscape. Although the IEA in its 2007 World Energy Outlook still argues that not only will fossil fuels be the completely dominating energy source in 2030 but they will also represent the brunt increase will also come for such energy resources, this may possibly dramatically change. We already see an emerging debate on the effects (on water) due to a dramatic increase of energy production from other sources, in particulate bio-fuels. The pressure on hydro-power development may also increase further due to climate change. The potential for 'competition' between various MDGs is clear if poverty, food, water supply and environmental sustainability all have to be met and the task to identify innovative institutional solutions could form the basis for the sessions.

Resulting Question(s) to consider in the development of sessions	… *How far water can help building a greener world by boosting hydropower generation?* … *How far water can contribute on bio-energy without compromising other MDGs?* … *How much bio-energy can help poor people and disadvantage communities embarking into a virtuous circle of development?* … *How much can we expect from development of low cost small scale technology for hydropower generation?* … *What should be the target for minimum supply to all of energy and electricity? and how water can help achieving that target?* … *What are the area of conflicts between hydro-power generation and others uses of water such as irrigation? what are the possible solutions ?* … … ========== … *What policy and management changes are needed to cope, in a comprehensive way, with the global commitments on water security, food security and energy security while at the same time ensuring environmental sustainability?* … … *Are water and energy professionals (planers, policy makers, experts...) severely underestimating the changes that may occur in the water-energy nexus over the next decades(s) due to calls for urgent actions to combat climate change?* … … *How may a post-Kyoto agreement influence the energy-water interface? Can we make scenarios depicting different outcomes (commitments to expand renewable energy by x%...2030....)? Can we start to prepare already now?* … … *What will be the drivers of change that need to be considered to better understand and plan the future water-energy nexus? How are they interacting?* o *Demographics (growth, migration..)* o *Consumption patterns* o *Production patterns* o *Economic development* o *Technological development* o *Globalisation and trade* o *Environmental issues* o … *Is there a need to make more comprehensive scenario assessments of "alternative futures", in particularly considering the multitude of drivers (and their interaction) for change, on the energy-water-environment nexus?* … … *How will current planning policies and strategies need to change in order to cope with the complexity of interacting drivers related to water and energy?* … … *Are we facing a period of planning instability where the call for immediate actions to change energy production patterns may lead to massive investment in alternative systems (such as bio-energy) that, in turn, will demonstrate to be unsustainable and therefore require alternative solutions?* … … *What kind of networks and professional partnerships do we need to form in order to coop with current and emerging energy-water issues?* … … *How much will changing energy markets (such as increasing regional energy transfers) affect (transboundary) water issues?* … … *How can/should various instruments (economic, legal, managerial....) be used more efficiently to steer the development?* … … *What are the potentials to generate positive economic and environmental benefits following changes in the energy sector? What could be the benefits from a water perspective?*

Introduction to topic "energy for water"	**Energy for water** Much of the development in the 20th century (not least in relation to increased food production through irrigated agriculture ("green revolution") can be attributed to low water and energy prices. Energy subsidies (as water) are still substantial in many parts of the world. Globally, the values presented in various sources range from just above USD 100 billion to more than 300 billion. the delivery of subsidised rural electricity services has boosted the agricultural production of existing irrigated areas through conjunctive use and introduced irrigation in areas beyond surface irrigation demands. Arguably this has pre-empted the prospect of famines in many contexts in spite of the doubling of the population between 1960 and 2000. The energy provided through electricity and fuel as well as low cost technology for pumping have generated tremendous changes in agriculture water management. The results of such subsidies are manifested through for example the over abstraction of ground-water in many irrigated agricultural areas (groundwater accounts for about 40% of the water use in irrigated areas). Subsidies, at the same time, fulfil important socio-economic goals if properly used. The challenge is the find a balance; to still encourage efficiency and to ensure that it is the people in need who actually benefits from the subsidy. Energy prices tend to be increasingly volatile and it will therefore be very important to consider how future energy prices and market changes will affect water use and, ultimately, production patterns and costs. Currently, there is more or less a consensus on the fact that energy prices will increase world-wide (due to increasing competition, the increasing utilization of more expensive sources). Apart from the effects on production costs, such a "threat" is likely to influence the willingness to make investments in areas where the price of energy is an important factor (from the farmer to the corporate levels - impacts are likely to be very heterogeneous). It may have a positive impact on the willingness to make efficiency related investments, but negative effects on overall sector investments (for example resulting in a slower increase in food production). Also, what can be considered as indirect effects, are also important such as increasing transportation costs. Such complex cause-effect relationships and the necessary adaptation strategies need to be further explored and could form the basis for the discussions in the forum.
Resulting Question(s) to consider in the development of sessions	… *How much can we expect as energy savings from pumping of groundwater by improving the water services provided by canal managers to users in conjunctive use system?* … … … … … ========== … *Do we fully understand the complex cause-effect relationships in relation to "energy for water"?* … *What would be the (positive and negative) effects of dramatically lower energy subsidies in different sectors (in particular agriculture but also for urban areas relying increasingly on long-distance transport of water)?* … *Are there any best practice mitigation/adaptation strategies to cope with negative (social) effects while at the same time encourage increased efficiency?* … *Will increasing food prices (due partly to increased bio-fuel production) put even more pressure on securing low energy prices (subsidies) to keep total food prices "under control"?*
(Types of) Organizations to be involved in topic	It will be important to "think wide and innovative" when identifying key organisations and actors. This is an area that will clearly require new thinking and therefore, likewise, new actors need to be involved. New types of cross-disciplinary approaches and innovative partnerships must be sought. Associations: Farmers/Water Users, bio-fuel producers, industry associations, energy

consultations	producers (traditional and emerging), technology developers International Agencies: International Energy Agency, UNDP, FAO, UNEP, UNIDO, OECD.... Other International Organizations: WBCSD, IWMI, World Economic Forum.... National Governments (min of planning/energy/water/industry/finance/agriculture/....) Trade organizations: WTO, … Professional Associations: Association of Energy Engineers (AEE), International Hydropower Association, IEEE (name was originally an acronym for the Institute of Electrical and Electronics Engineers), associations representing water, agriculture, industrial development, planning..... Research Institutions: Global and national Multilateral donors: World Bank, AFDB, ADB..... Environmental agencies / NGOs: WWF, IUCN, Wetlands International, energy and development oriented NGOs (both global and national) Individual corporate actors: Energy companies, suppliers (ITT, Grundfoss....) Related national organisations, NGOs and Local civil society