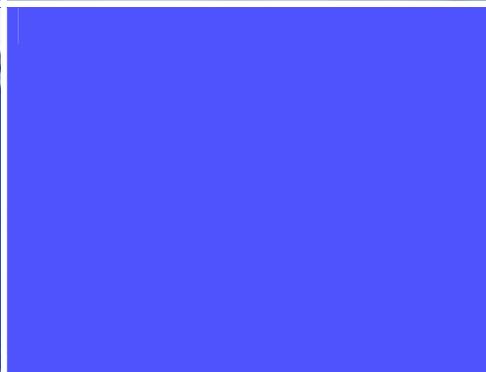
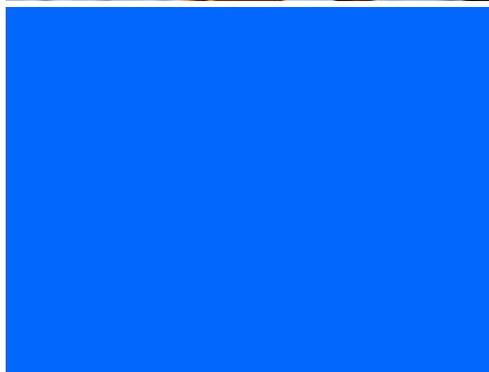
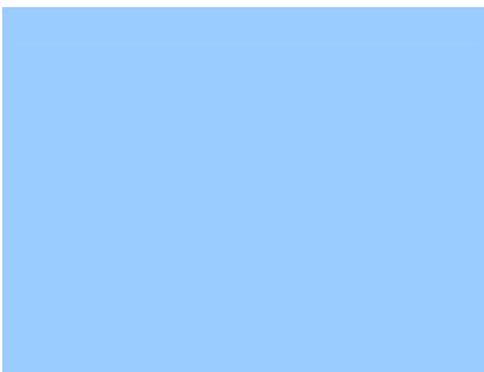


**UN-Energy**



UNITED NATIONS

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## **ENERGY, DEVELOPMENT AND SECURITY**

**Energy issues in the current  
macroeconomic context**



UNITED NATIONS  
INDUSTRIAL DEVELOPMENT ORGANIZATION



## FOREWORD BY THE SECRETARY-GENERAL

**Ensuring access to sustainable and cleaner energy is a key objective for the international community. It is clear that we will not be able to meet the Millennium Development Goals and the development needs of the poor without increasing their access to energy. And without a shift to cleaner energy supplies it will be impossible to adequately tackle climate change.**

**At its October 2008 session, the UN Chief Executives Board discussed the many dimensions of this complex issue. The paper reproduced here was prepared at my request by the Director-General of UNIDO, in his capacity as Chair of UN-Energy, and stimulated a lively session. I recommend it to Member States and to a wide global audience.**

**Ban Ki-moon  
Secretary-General of the United Nations**

## FOREWORD BY THE DIRECTOR-GENERAL

The United Nations system has become increasingly involved in promoting the development, transfer and diffusion of clean energy technology and services. There remains, however, much more to be done if we are to ensure that the world's poor have access to sustainable and reliable energy supplies. The scale of the investments that will be needed in the energy sector in the next 30 years – some \$20 trillion – can seem daunting. The international community therefore needs to work together to identify how this can be best achieved, and to decide on the most effective role of the UN system in these efforts.

## **Energy, Development and Security:** *Energy issues in the current macroeconomic context*<sup>1</sup>

### **I. Introduction**

1. The development of a sustainable, long-term solution to meeting the world's energy needs is a defining issue of our time. Energy is directly linked with the key global challenges that the world faces -- poverty alleviation, climate change, and global, environmental and food security.
2. Current energy systems are failing to meet the needs of the world's poor. Worldwide, 2.6 billion people rely on traditional biomass for cooking and 1.6 billion people – about a quarter of the human race - do not have access to electricity. The projected cumulative investment required between 2005 and 2030 to meet energy needs is almost US\$20.1 trillion, but even if this investment is secured over the next thirty years, 1.4 billion people will still lack access to electricity in 2030 and 2.7 billion will still rely on traditional biomass for cooking and heating.
3. Global energy-related carbon dioxide emissions (CO<sub>2</sub>) will increase by some 50 percent between 2004 and 2030 unless major policy reforms and technologies are introduced to transform the way energy is produced and consumed. Coal has overtaken oil as the leading contributor to global CO<sub>2</sub> emissions. Developing countries will account for three quarters of the increase in carbon dioxide emissions between 2004 and 2030 unless major transformative policies and technologies are introduced in the next few years.
4. Per capita emissions in developing countries will remain small compared with those in developed countries. Yet, the share of developing country emissions is expected to rise from 39 percent in 2004 to over half of the total world emissions in 2030 unless mitigated by policies that promote more efficient production and use of energy, switching to cleaner fuels, more efficient transportation, and cleaner electricity supply. Many fast-growing developing

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<sup>1</sup> Prepared for UN Energy based on inputs from UNDP, World Bank, UNIDO, UNEP, FAO, UNESCAP and UN DESA

countries will make their major energy-related investments in the next decade. There is a short window of opportunity to ensure that the energy infrastructure and industrial facilities are as energy efficient as possible.

## II. Growing global vulnerability in a rapidly changing environment

5. The global economy is currently caught between a severe credit crunch, slowing demand in many developed countries and rising inflationary pressures in emerging and developing economies. This is compounded by volatility in energy and commodities prices. **The most pressing global challenges such as energy and climate change will now have to be addressed in an increasingly more fragile macroeconomic context, especially in poor developing countries.** For the first time since 1973, the world is witnessing a combination of high oil and food prices<sup>2</sup>, undermining gains achieved in fighting poverty. The current financial and economic crisis will require protracted adjustment as developing countries face a shortfall in capital flows, reduced demand for exports and rising inflation.

6. For many developing countries, the recent food, commodities, and oil price shocks are already having severe implications particularly among the poorest. The World Bank estimated that for countries in Africa, the impact of high food, oil, and other commodity prices since January 2007 have reduced their gross domestic product by 3 to 10 percent. The terms-of-trade effects of the combined food and energy price increases are in excess of 10 per cent of GDP in more than 15 developing countries, where the room for maneuver on the macroeconomic front is limited. With millions living on the margin between subsistence and starvation, high food and fuel prices may represent a threat to their survival. Thirty-six countries in Africa, Asia and Latin America now face acute food security crises requiring external assistance.

7. Most commodity prices have now peaked and are expected to fall in response to improved supply and slowing demand. Food prices are expected to fall on good supply prospects and weaker oil prices. However, food and fuel prices will remain high and their volatility will continue to be a major concern. While global prices of food and fuel have dropped in recent months, domestic prices remain much higher than in previous years and show few signs of abating.

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<sup>2</sup> Over the past 12-18 months the world experienced sharp volatility in the food prices. Grain prices have more than doubled since January 2006, with over 60 per cent rise in food prices occurring since January 2008. Since then prices of most food commodities started to show some decline, after peaking in June 2008. The FFPI continues to register decline, showing 5 percent down from the previous month in September this year, but is still up 10 percent from the corresponding period last year. Since 2001 the price of oil has risen from \$20 per barrel to over \$140 in July 2008, with prices more than doubling since January 2007. Since then oil prices have declined by more than 50 per cent (from \$147 to below \$75) from it's their peak in early September and remain highly volatile. While commodity prices appear to have peaked and moderated in the second half of this year, they are still expected to stay at high levels in real terms.

8. The global credit and financial crisis could have a major impact on infrastructure financing in general and energy financing in particular. Some sources suggest that the financing for energy infrastructure will be severely affected – a view that is somewhat moderated by a more optimistic outlook from the renewable energy market. However, some shortfall in the financing for energy sector could be expected.

9. For regions such as Africa, where the provision of electricity is by far the greatest infrastructure challenge,<sup>3</sup> this is indeed bad news. Compared to other regions of the world, Sub-Saharan Africa has one of the lowest rates of energy access, capacity per capita and electricity consumption per year. But Africa will not be the only region affected. Immense investment requirements still exist in most developing countries to build additional generation capacity, extension of electricity grids in urban areas, mini-grids in medium-sized settlements, and decentralized installations providing energy services to remote and rural areas. Given the prominent role that foreign banks play in developing countries, scaling back on financing will likely decrease energy financing. According to the World Bank, private capital flows in the energy sector are also expected to decline<sup>4</sup>.

10. On the other hand, the economies of the Asia-Pacific region, despite the financial crisis, will continue to have robust economic growth and high energy demand. This, in turn, will have a deleterious effect on climate change. Widening access to energy services will continue to be a major challenge to the region along with addressing climate change. In Asia and the Pacific, a **low carbon development path** would effectively meet the region's development needs while addressing the challenges of climate change and local pollution.

### III. Energy, poverty reduction and climate change

11. **Energy today is at the heart of every economic, environmental and developmental issue.** The world needs clean, efficient and reliable energy services to meet its long-term needs for economic growth and development. Developing countries need to expand access to reliable and modern energy services to alleviate poverty and increase productivity, to enhance competitiveness and economic growth.

12. **Climate change is an urgent and critical challenge that the international community needs to address now.** An effective response to climate change must combine mitigation of global greenhouse gas (GHG) emissions — to avoid the unmanageable — and adaptation at regional, national, and local levels -- to manage the unavoidable.

13. According to the IPCC Fourth Assessment Report, **the largest growth in GHG emissions between 1970 and 2004 has come from the energy supply sector (an increase of 145 per cent).** During this period, the growth in direct emissions from transport was 120

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<sup>3</sup> The World Bank estimates that Sub-Saharan Africa needs an annual addition of 4 GW in order to power its economic growth and keep up with the demand for electricity, which is growing at about 5 per cent per year or more in many countries in the region. Only 1 GW is being added annually!

<sup>4</sup> While private investment in electricity projects in the developing world increased through most of the 1990s, it fell off sharply after the Asian Financial crisis, from US\$46 billion in 1997 to less than US\$15 billion in 1999, recovering only to US\$30 billion in 2000.

per cent. From industry it was 65 percent, and from land use, land use change, and forestry (LULUCF) 40 percent.

14. If business-as-usual trends in the global energy mix continue, fossil fuels will maintain their dominant position, resulting in continuing growth of CO<sub>2</sub> emissions. The projected increase in carbon emissions is expected to reach 40 to 110 per cent over the period of 2000-2030. Two thirds of this increase is expected to come from developing regions. However, per capita emissions in developing countries will remain substantially lower than those in developed countries. Decisions taken today on the choice of energy technology will thus have profound consequences for global development over the next 40 to 60 years.

15. The demand for primary energy is expected to increase significantly in the next few decades<sup>5</sup>. Increased energy demand will give rise to challenges in poverty reduction, development and macroeconomic stability worldwide. Some of these challenges will have distinct economic effects on developing and developed countries and are highlighted below.

#### A) Improving Energy Service for Economic Growth

High costs and unreliable electricity service constrain economic activity in many countries: for example, 97 percent of firms in Nigeria, 73 percent in Bangladesh, 36 percent in Honduras and 33 percent in the Philippines identify poor electricity service to be a severe obstacle to business operation and growth. Higher productivity, enhanced competitiveness and better growth prospects in developing countries are contingent on low-cost reliable electricity service. The electricity sector's ability to deliver improved service is, however, constrained by poor resource utilization, low asset yields and commercial and technical inefficiency with system losses ranging from 15 percent to 45 percent of electricity distributed.

#### B) Energy and food security

In recent months, higher food and oil prices have pushed many more people into poverty. While the prices are moving away from their recent peaks, they will remain high over the medium term, feeding domestic inflation in many countries.

A number of factors propelled the sharp rise in food prices, posing a serious challenge to global economic stability and reversing years of progress in many poor countries. Food prices have been driven by a combination of rising fuel and fertilizer costs, bio-fuels production and unfavorable weather conditions, further accentuated by trade restrictions, low stocks and domestic supply constraints.

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<sup>5</sup> According to IPCC, the demand for primary energy in developing countries and transition economies could increase by a factor of three to five by 2050. By 2050 the approximate distribution of projected demand for primary energy among developing countries and economies in transition compared to developed countries will be about 80 per cent to 20 per cent, compared to 53 per cent to 47 per cent in 2000. However, the per capita use will still be higher in developed countries.

In the longer term, increasing prices from agricultural commodities could stimulate agricultural and rural development. But in order for poor farmers with low resource endowments to be able to respond to increased demand, complementary investments in research, infrastructure and enabling institutions are needed. The production response to recent price hikes has so far occurred mostly in industrialized countries.

Policy responses to the inflationary price shocks and price volatility are generating fiscal pressures in many developing countries, resulting in greater fiscal imbalances and vulnerability that threatens the continuation of sectoral reforms and financing of existing and future projects. As the “fiscal space”<sup>6</sup> for the development of the energy sector is constrained by growing domestic macroeconomic vulnerability, costly projects, particularly those that are intended to expand energy access for the rural poor, will once again be out of reach for many developing countries.

A recent World Bank report, *Rising Food and Fuel Prices: Addressing the Risks to Future Generations*, highlighted the impact of oil and food prices on developing countries:

- *The more profound consequences are the impacts of rising prices on households who already were poor. For those already struggling to meet their daily food and nutrient needs, the double shock of food and oil price represents a threat to basic survival. The poorest households are reducing the quantity and/or the quality of food, schooling, and basic services that they consume, leading to irreparable damage to the health and education of millions of children.*
- *The effects of the recent food and oil crisis on malnutrition and schooling can undermine years of progress on the MDGs. Estimates suggest that the total number of malnourished people worldwide could increase by up to 44 million in 2008 alone to reach 967 million, up from 848 million in 2003. Unhealthy, less productive populations are less able to generate the growth needed to lift themselves and their country out of poverty.*

**The severity of the recent price fluctuations points to an important need to both finance and facilitate assistance to the most vulnerable until more lasting, medium-term reforms that reduce vulnerability can be put in place and take hold.** In these circumstances, innovative thinking and the proper sequencing of policy and technical assistance interventions are vital.

### C) Energy for the Poor and Energy Access

Access to modern energy services is necessary for productive activities and essential services, as detailed in a recent UNDP publication:

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<sup>6</sup> Fiscal space is understood here as room in a government's budget that allows it to provide resources for a desired purpose – in this case, the development of the energy sector - without jeopardizing the sustainability of its financial position or the stability of the economy.

- *Energy, poverty and economic growth:* While energy services, by themselves, are not sufficient to eradicate extreme poverty, they are necessary for creating the conditions for economic growth and improving social equality. Modern energy services help drive economic growth by improving productivity and enabling local income generation. Modern lighting can extend livelihood activities beyond daylight hours. Energy is important in supporting productive activities in both the formal and informal sectors. Once access is established, modern energy services help reduce spending, because of the inefficiency of traditionally used energy devices, the poor often pay higher unit costs for energy than do the rich. In addition, with 95 percent of all food requiring cooking in order to be eaten, modern cooking fuels contribute to alleviating hunger and food insecurity while reducing environmental degradation.
- *Energy and education, health, gender equality:* Women and girls in many developing countries spend a huge amount of time collecting wood and carrying water: time lost for schooling and revenue generating activities. Furthermore, indoor air pollution from low quality solid cooking fuels (wood, charcoal, dung, waste) imposes a major health burden on those who spend their days close to the cooking area, again, women and girls, responsible for more than 1.5 million deaths per year. The solutions are available, and often cost little: provide a small amount of energy to pump water for cooking and agriculture; provide improved fuels and appropriate stoves.
- *Energy and Improved Quality of Life:* Most of the 1.6 billion people that do not have electricity in their homes live in rural areas of Asia and Africa. High transaction and unit investment costs constrain service provision in rural areas because of low demand and dispersed populations. The cost of connections can range from \$400 to \$1,000 for households that may only consume \$4 of electricity per month. Utilities that are commercially and financially weak cannot drive access expansion of the network but nevertheless occupy a monopoly position in many countries. In countries where there are no explicit barriers that prevent new rural service providers to enter the market face difficulties in domestic capital mobilization, regulatory uncertainties and lack of technical capacity stymie entrepreneurship. While problems of access are now far greater in rural than in urban areas, the rapid growth expected in urban populations in the next decades could lead to growing gaps in access to electricity in cities. In urban areas where there are already service providers but where poor neighborhoods often go unserved, lack of good regulation including appropriate pricing rules restrict greater access.

#### D) Energy, Environment and Climate Change

The climate system's warming trend is unequivocal, likely caused by anthropogenic greenhouse gas (GHG) emissions, mainly carbon dioxide (CO<sub>2</sub>) from burning fossil fuels and changing land use. The poorest countries and communities will suffer the earliest and the most. Climate change has the potential to reverse the hard-earned development gains of the past decades and the progress toward achieving the Millennium Development Goals (MDGs). It can cause mass migration and contribute

to conflict. An effective response to climate change must combine mitigation of global GHG emissions.

Energy-related greenhouse gas emissions are the dominant contributor to climate change and are projected to increase by 57 per cent by 2030. Current patterns of energy production and consumption are unsustainable and threatening the environment on both local and global scales. Emissions from the burning of fossil fuels are major contributors to urban air pollution, acidification of land and water, and the unpredictable effects of climate change. The use of biomass (e.g. fuel wood and charcoal) can be unsustainable when it leads to land degradation or deforestation.

Reducing CO<sub>2</sub> and other greenhouse gas emissions from the burning of fossil fuels is at the heart of current efforts to address climate change. Accelerated use of renewable and more energy efficient technologies can provide 'win-win' options to tackle global and local development challenges. In the current context of rising and volatile energy prices, many developing countries are looking for alternatives to imported energy sources.

Local energy renewable resources and improved energy efficiency help create local jobs and save foreign exchange. But they also contribute to increased energy security through increased energy supply and climate security through reduced greenhouse gas emissions. Pursuing energy and climate security in tandem will create greater scope for diversifying energy sources, increasing local energy production, improving access to energy by the world's poor and reducing dependence on oil and gas imports.

#### E) Towards sustainable, low-carbon path to development

The International Energy Agency (IEA) in its latest World Energy Outlook notes that one of the biggest challenges of the 21<sup>st</sup> century is for all countries to put in motion a transition to a more secure, low-carbon energy system without undermining economic and social development.

The current financial crisis has made it more difficult to meet this challenge. But it could also be seen as a unique opportunity to re-direct investments towards a more secure and sustainable path to development. While the world is locked into a fossil fuel regime and the rising energy demand from China and India will be mostly met from coal and oil in the foreseeable future, the world now has the technology and resources to make this transition a reality at a cost significantly lower than would otherwise be. Approximately 70 per cent of the abatement requirement can be met over the next two decades with existing or near-commercial technologies. But to turn this potential into a reality, countries must put in place policies and measures that would change the way energy is produced and consumed around the world. In so doing, they would bring about a win-win scenario of greater energy security, increased energy for poverty reduction and development and improved climate stability. Time however is of the essence: the longer we wait the more expensive and abrupt the transformation towards decarbonization will be. Recent reports show that

delaying the start of emissions reductions from 2010 to 2020 will almost double the annual rate of reductions required.

### *Energy efficiency*

Energy efficiency is called the low-hanging fruit for a good reason. It alone could cut energy demand by 20-24 per cent and save hundreds of billions of dollars per year. In countries with high energy prices and high energy intensities, energy efficiency is the least-cost strategy for improving economic efficiency across sectors. According to the IEA, the implementation of a few policies could result in nearly 40 percent of avoided greenhouse gas emissions by 2030. The policies that are most effective in reducing emissions are also effective in lowering the energy bill and dependence on oil and energy imports or could make available further resources that can be used for development purposes, which would otherwise be wasted.

### *Renewable Energy*

Switching to low- or zero-carbon fuels can contribute to significant emission reductions. The IEA estimates that a 50 per cent reduction in CO<sub>2</sub> emissions by 2050 would require an increase to 46 per cent share of renewable energy in global power generation. The five most used sources of renewable energy – hydropower, solar, wind, geothermal and biomass -- are already contributing and achieving higher levels of penetration in energy generation and consumption. In 2006, about 18 percent of global final energy consumption came from renewable, with 13 percent coming from traditional biomass, such as wood burning. Hydropower was the next largest renewable source, providing 3 percent, followed by solar hot water/heating, which contributed 1.3 percent. The potential for their use remains very large, exceeding all other readily available sources and has been proposed as a potential primary energy source.

While renewable energy technologies are being introduced in many large-scale energy projects throughout Europe and the United States and China, renewable energy technologies are also suited to small off-grid applications, sometimes in rural and remote areas, where energy is crucial to human development. Investment capital flowing into renewable energy climbed from \$80 billion in 2005 to a record \$148 billion in 2007, with total financial transactions reaching \$204.9 billion for the sector<sup>7</sup>. This level of investment combined with continuing double digit percentage increases each year has moved what once was considered as alternative energy source to the mainstream.

While renewable energy financing reached a global milestone of US\$100 billion in 2007, the prospects for financing of the current and future projects could be affected by the current financial crisis. Safeguarding existing and future investments in

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<sup>7</sup> UNEP, 2008

renewable energy through legislation and regulation and governance at all stages may be required.

Renewable energy sources also face sustainability challenges. The recent growth in the use of biofuels has contributed to rising food prices and greater food insecurity. Performance of biofuels in reducing greenhouse gas emissions varies significantly between different technologies and production areas, and is likely to be negative whenever high carbon content land is converted for feedstock production. Land conversion also threatens biodiversity. Appropriate production methods and technologies must be adopted to ensure sustainable use of land and water resources. Policies to promote their development must give incentives to production methods with lower GHG emissions across the supply chain and end use.

### ***Energy and Trade***

Trade plays an important role in energy policy. It can bring about greater energy security for countries that are not energy producers and improve access to energy and energy services for poor countries. It is also an important source of revenue for energy exporters. Trade in energy is a vital component of global security and peace. Since 1990, developing countries have accounted for around 60 per cent of the world's annual fuel exports.

Trade in energy and energy services has been growing between developed and developing countries and amongst developing countries. This is primarily due to the increased demand for primary energy in the rapidly growing economies of China, India and Korea. Although tariff barriers to trade in energy are already low, there are other barriers, such as export restrictions, quotas and restrictions on transit. Such barriers will have to be addressed. Trade is also an important dimension for the transfer of environmentally-sound technologies.

Although the Kyoto Protocol does not have specific trade-related obligations, the use of policy tools for climate change mitigation will almost certainly have trade implications. The introduction of energy taxes, subsidies, energy efficiency standard, product labeling, border tax adjustments and specific criteria for government procurement tenders are already being discussed in the context of growing concerns over the trade implications of the post-2012 climate change framework.

### ***Policies and institutions***

Appropriate energy policies may spell the difference between benefiting from more efficient industries, transport and households and loss of national income from high energy prices and inefficiencies in energy use. According to the World Bank, major GDP losses have already occurred in many developing countries as a result of high oil

prices. Many countries, in an attempt to address the cost-of-living effects of the twin shocks of high food and oil prices, have introduced fiscal responses that have exacerbated fiscal imbalances.

But in other areas such as trade, the key will be to assess how today's rapid global changes, compounded by a major financial crisis, may affect trade flows; what consequences are to each country's competitive edge, and what policies will need to be introduced to mitigate the negative impacts and enhance the positive ones.

#### IV. Issues for discussion

16. The foregoing discussion highlighted the centrality of energy in meeting the challenges facing the international community. The importance of energy for achieving the MDGs and addressing climate change clearly calls for enhanced international cooperation and coordinated action within the United Nations system.

17. The mechanism for ensuring coherence in the United Nations system's multi-disciplinary response to the World Summit on Sustainable Development (WSSD) and for the effective engagement of non-UN stakeholders in implementing WSSD energy-related decisions is UN-Energy. Under the Chairmanship of the Director-General of UNIDO, UN-Energy brings together 20 UN system organizations. It focuses on substantive and collaborative actions in energy-related policy development and implementation in maintaining an overview of major ongoing initiatives within the system based on the UN-Energy work programme at global, regional sub-regional and national levels. UN-Energy has organized its work into three clusters: energy access, energy efficiency and renewable energy. The Johannesburg Plan of Implementation (JPOI), decisions taken at CSD-9, the Programme for the Further Implementation of Agenda 21, and Agenda 21 serve as the basis for the UN system's action on energy.

18. CEB may wish to consider the following issues for reflection and discussion:

- (i) The world is experiencing three interlinked crises -- food, fuel and financial – and faces the prospect of a global economic slowdown with serious implications for poverty eradication programmes, aid flows, levels of production and employment, food security, and domestic, regional and global security in general.

**Questions:** *How should the UN system respond to the inter-related food, fuel and financial crises? How can it best support the poor countries in addressing this triple crisis? What role should the UN system play in bringing about a cleaner energy future and a more sustainable low-carbon path to development for all countries? What role should UN Energy play in this context, given its mandate from the World Summit for Sustainable Development and from Commission for Sustainable Development (CSD)?*

- (ii) The current financial and economic turmoil is likely to re-shape the way financial systems, governments, markets, and multilateral institutions operate in the future. But the current crisis also represents a unique business opportunity. It has the

potential to create new markets and to steer economies and financial systems towards “green growth”.

**Questions:** *What should the UN system do to help make bring this about? An important lesson to be gleaned from the current financial crisis is that financial markets throughout the world only began to respond positively **after a coordinated effort by world leaders**. Is there a role for the United Nations in supporting such cooperation and coordination? If countries call for major reforms of global multilateral institutions, what should the response of the UN system be? Is this an opportune time to further enhance the complementarities and synergies between various parts of the UN system on energy?*

- (iii) Although the prices of oil and food have started to decline, the expectation is that these will remain highly volatile for the foreseeable future. This volatility will continue to have major implications for the national budgets and economies of developing countries. With the likelihood of a slowdown in the global economy, the effects are likely to have consequences for incomes and employment, trade and economic growth in general.

**Questions:** *How can the UN system best support poor countries in this period of high and volatile oil and food prices? How should it scale up its support for improved energy access for the poor? How can the UN harness the resources and expertise within the system on energy and related issues for greater impact?*

- (iv) The UN system as a whole is a relatively small player in the world energy scene. UN-Energy is making a major effort to ensure that the UN system, including the World Bank and the Regional Commissions, contribute in areas where the system’s strategic interventions can create major impact.

**Questions:** *What further steps are required for UN-Energy to have a greater impact in its areas of work that would also enhance the visibility of the UN system in the field of energy? How should UN-Energy effectively engage non-UN stakeholders and contribute to enhanced cooperation on energy? How should UN-Energy contribute to addressing the energy-related aspects of the food, fuel and financial crisis? What is the most effective and appropriate means of funding UN-Energy’s initiatives and activities?*



