

Energy and the World Summit on Sustainable Development: what next?

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Abstract

Given the importance of energy issues to sustainable development, energy was a priority issue at the World Summit on Sustainable Development in August 2002. The objective of this paper is to examine the outcomes of the Summit on energy, and to assess them against proposals to address the lack of access to modern energy and the need to move toward a cleaner energy system. We find that lack of political leadership from key countries prevented agreement not only on targets for renewable energy, but also on a programme to promote access. The achievements of the Summit were limited to enabling activities such as capacity building and technology transfer, rather than substantive agreements. While WSSD put energy higher on the agenda than before, no institutional home or programme to take the issues forward has emerged. This therefore remains a critical challenge to be addressed. Achieving this broad goal will require building a coalition to promote cleaner energy, and committing resources to programme for energy access. Based on analysis of proposals and the negotiations, we propose several key areas where progress is still possible and necessary, including: shifting more international public and private energy financing toward access investments and cleaner energy investments, advancing regional approaches to access and renewable energy targets, and a range of mechanisms to strengthen institutional capacity for integrating energy and sustainable development.

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1. Introduction

Energy is critical to economic and social development, but depending on the way it is produced, transported and used, it can contribute to both local environmental degradation, such as air pollution, and global environmental problems, principally climate change (Davidson and Sokona, 2001; Farinelli, 1999; Johansson and Goldemberg, 2002). Providing affordable, adequate, and reliable modern energy supplies to the vast majority of the world's population remains a major challenge: these supplies are still beyond the reach of some two billion people (UNDP et al., 2000b). At the same time, current methods of producing and using energy have environmental and health impacts that increasingly endanger the welfare of communities and biodiversity world-wide, while problems of oil supply security are linked to increasing regional political instability (Goldemberg, 1996; Holdren and Smith,

2000; Romm and Lovins, 1993). The environmental impact that has received the most attention in the 10 years since the United Nations Conference on Environment and Development (UNCED) is climate change, and this problem cannot be addressed without major changes in the energy sector (IPCC, 2001c).

The challenge for the global energy sector is twofold: first, to dramatically increase access to affordable, modern energy services in countries that lack them, especially for poor communities; and, secondly, to find the mix of energy sources, technologies, policies, and behavioural changes that will reduce the adverse environmental impacts of providing necessary energy services. Energy was one of the key themes in the World Summit on Sustainable Development, and this was an opportunity to take stock of international accomplishments and identify specific national and international action plans for moving forward. With the Summit now past, it is time to reflect on whether the outcomes match the challenges, and what actions are required to implement the energy aspects of the Johannesburg Plan of Implementation (UN, 2002).

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The objective of this paper is to examine the outcomes of the Summit on energy, framed primarily by a proposal put forward by the Africa group for a comprehensive plan of action to address the lack of access to modern energy and the need to move toward a cleaner energy system. The outcomes of the Summit are examined from their capacity to address the challenges for energy and development. If they fall short, then the international community needs to consider how to take forward the principles agreed in Johannesburg. We acknowledge that while international effort is needed, a significant number of domestic policies and measures can make major contributions to meeting these challenges, which have been explained elsewhere (Farinelli, 1999; Jefferson, 2000; Reddy et al., 1997). Our task, however, is to identify those international actions that will support the implementation of national policies to promote sustainable development.

The next section briefly reviews the key issues related to energy and sustainable development. This is followed by discussion of the proposals on access to energy services and cleaner energy for WSSD. Section 5 then analyses the outcomes of WSSD for energy, and finally Section 6 discusses the way forward.

2. The challenge of energy and sustainable development: access and cleaner energy

The development challenge in the energy sector is to promote access while simultaneously making a transition to a cleaner energy future. There are tensions between these goals, making their joint achievement a challenging task. Yet there are also synergies and opportunities that can be harnessed.

2.1. Access to modern energy

The most critical energy issue for almost all developing countries is the lack of access to affordable, adequate modern energy services. In many of the poorest countries, less than 10% of the population has access to electricity, and in most of sub-Saharan Africa only 10–30% has access (Davidson and Sokona, 2001; IEA, 2002b; NEPAD, 2001; UNDP et al., 2000b; Wamukonya, 2001). A large share of the population in both rural and urban areas in these countries does not have access to safe, affordable fuels to provide cooking, lighting, or heating. Furthermore, wide disparities exist within and among developing countries, which in certain cases contributes to social instability and affects basic human development.

The fact that two billion people live in energy poverty (UNDP et al., 2000b), despite the implementation of a wide range of grant- and loan-based programmes in the developing world, is the most compelling evidence that a

new approach is needed—one that can mobilise significantly more financial resources and direct them in a way that will have the greatest effect on development. Key areas that must be addressed include the impact of energy reform programmes (including private sector investment) on the poor, the excessive focus on upstream investment and large-scale fossil energy supply projects, the lack of appropriate institutional structures to support international energy and development programmes, research and development not being sufficiently relevant to policy, and the lack of funding to support major infrastructure investments (Davidson and Sokona, 2001; Spalding-Fecher et al., 2001). As one example of the research focus, between 1974 and 1998, International Energy Agency (IEA) member countries spent 8% of their research and development budgets on renewable energy, 7% on energy efficiency, 14% on fossil fuels, and 59% on nuclear technologies (IEA, 2002a).

Energy sector reform, particularly in the electricity sector, has become a priority of the multilateral institutions involved in energy and development, and is having a profound impact on access (Dubash, 2002). This shift in donor priorities, from development planning and ‘basic needs’ to structural adjustment and reforming governance, has had a major impact on the sector (Sachs, 1996). Far from increasing funding for infrastructure investment, the multilateral institutions are increasingly leaving this to the private sector, and pushing for ‘cost-reflective’ pricing of all services (Karekezi and Kimani, 2002; e.g. World Bank, 2000). The problem is that, in electricity for example, the private sector simply cannot make a financial return on investment given the current low levels of energy consumption by poor communities (Davidson and Sokona, 2002). Even where electrification has been subsidised, as in South Africa, most poor communities do not use enough power to pay back the initial investment (Borchers et al., 2001). In fact, for the South African off-grid electrification programme using renewable energy, government will need to subsidise the entire capital cost of the solar home systems (SHS) and charge customers 30 times the grid residential electricity tariff for the rural private sector utilities to break even (Qase, 2000; Spalding-Fecher, 2002a). There is a growing concern that further reform programmes in developing countries raise additional obstacles to increasing access (Dubash, 2001, 2002; Johansson and Goldemberg, 2002; Reddy, 2001).

To illustrate the magnitude of resources required, we can use a simple example about the costs of providing one billion people with modern energy service. The World Energy Assessment estimated that basic human energy requirements would be 700 kWh-equivalent per capita each year, with 80% used for cooking and 20% for lighting and other uses (Reddy, 1999; UNDP et al.,

2000a, p. 369). Since much of the population without access to modern energy services is in rural areas, let us assume that these energy needs can be met by off-grid electricity, such as SHS, with gaseous fuels for cooking for half the households, by grid electricity alone for 30% of households, and by grid electricity and gaseous fuels for cooking for 20% of households. Using standard assumptions on the costs and performance of grid and off-grid technologies, as well as costs of electrification, the investment in grid and off-grid power generation necessary would range from \$180 to 360 billion over 13 years (2002–2015). On top of this, additional investment in distribution infrastructure for LPG would add \$20 to \$40 billion, for a total investment of \$200 to \$400 over 14 years (see Appendix A for detailed assumptions).

Multilateral financing institutions have been important players in the development of the energy sector, particularly in the poorer countries. For example, at the end of 2001, \$15 billion of the World Bank's total portfolio of \$105 billion was devoted to energy sector projects (World Bank, 2001). Most of this investment, however, is related to upstream activities such as electric power supply and oil and gas exploration and production. These investments do not necessarily increase the access of the poor to modern energy services, especially the rural poor. In addition, the Bank has shifted since 1993 from financing infrastructure towards funding policy studies and structural reform. Other institutions have also followed this trend. Clearly the level of investment is not sufficient for the task at hand.

2.2. The need for cleaner energy

2.2.1. Local environmental and health impacts

The production, distribution and use of energy, particularly fossil fuels (coal, natural gas, and petroleum) and traditional biomass, have significant environmental impacts, which can affect human health and cause ecological damage (Dincer, 1999; Goldemberg, 1996; Holdren and Smith, 2000). By far the most important of these in developing countries is air pollution, both indoor and outdoor (Goldemberg, 1996; Krewitt, 2002). Indoor air pollution includes particulate matter from wood and coal smoke, as well as carbon monoxide and other unburnt hydrocarbons from wood, coal, and paraffin. Exposure to the latter can lead to headaches, fevers, and even death, while particulate matter leads to acute and chronic respiratory problems that claim the lives of many people, especially children. In certain developing countries, indoor air pollution levels are often an order of magnitude higher than levels recommended as safe by the World Health Organisation (WHO) (Holdren and Smith, 2000; Reddy et al., 1997; Spalding-Fecher et al., 2000).

Outdoor air pollution from motor vehicles, power stations, industrial facilities, and household use of fossil

fuels frequently exceed WHO allowable limits, especially in the growing number of cities with populations over one million (UNEP and WHO, 1992; Wicking-Baird et al., 1997). Transport energy use is responsible for the majority of emissions of toxic substances such as lead. As a consequence, unleaded fuel is being promoted in a growing number of cities world-wide (Holdren and Smith, 2000). Other health impacts of energy use include the high risk of accidental poisoning of children from paraffin ingestion and of fires in overcrowded areas started by candles and paraffin stoves and lamps (Mehlwana, 1999; Spalding-Fecher et al., 2000). Oil spills from tankers and leaching into groundwater from refineries and petroleum storage facilities present a major danger to groundwater supplies and the health of surrounding communities.

2.2.2. Global climate change

Greenhouse gas (GHG) emissions from human activities, largely from the combustion of fossil fuels, are threatening the delicate balance of the world's climate. This will lead to higher global temperatures, dramatic fluctuations in rainfall, increased frequency of severe weather events, and sea-level rise (IPCC, 2001d). These climatic changes will adversely affect food systems, increase the spread of diseases such as malaria, and lead to loss of life and property from sea-level rise and severe weather events (IPCC, 2001b). Climate change poses serious threats to developing countries and will hit Africa particularly hard (IPCC, 2000), because of its lack of resources, technology, infrastructure and preparedness to adapt to the predicted impacts (Sokona and Denton, 2001; IPCC, 2001b).

The energy sector is by far the largest contributor to the climate change problem, with energy-related carbon dioxide emissions accounting for 84% of total GHG emissions of Annex B countries in 1990 (IEA, 2000, p. 230–1).¹ Climate change also, however, provides opportunities for mobilising resources for cleaner energy development. The synergies between climate change and sustainable development are the central theme of the IPCC's Third Assessment Report (IPCC, 2001a, c). This is because the impacts of climate change can have a serious negative impact on prospects for sustainable development, while action in the energy sector and other sectors to deal with climate change can actually support sustainable development (Beg et al., 2002; IPCC, 2000). Lower-emissions scenarios require different patterns of energy resource development and research and development of environmentally sound technologies, especially in the energy sector (IPCC, 2001a).

¹If land use and forestry are excluded, the figure is 80%. The remaining 20% of total GHG emissions in 1990 came from CH₄ (13%), N₂O (6%) and the three groups of trace gases HFCs, PFCs and SF₆ (1%) (IEA, 2000, p. 230–232).

Box 1

Millennium Declaration targets related to energy and development

- “To halve, by the year 2015, the proportion of the world’s people whose income is less than one dollar a day and the proportion of people who suffer from hunger and, by the same date, to halve the proportion of people who are unable to reach or to afford safe drinking water....
- To make every effort to ensure the entry into force of the Kyoto Protocol, preferably by the tenth anniversary of the United Nations Conference on Environment and Development in 2002, and to embark on the required reduction in emissions of Greenhouse gases....
- To intensify collective efforts for the management, conservation and sustainable development of all types of forests....
- To take special measures to address the challenges of poverty eradication and sustainable development in Africa, including debt cancellation, improved market access, enhanced Official Development Assistance and increased flows of Foreign Direct Investment, as well as transfers of technology.” (UN, 2000).

The problem is that the vast majority of financing from the development finance institutions is still going to large-scale fossil fuel energy supply projects, rather than alternative energy sources, demand-side investments or investments in access. For example, from the Earth Summit in 1992 to October 2001, the World Bank Group approved funding for more than \$20 billion in oil, gas, and coal extraction and power projects around the world (SEEN, 2001). Over that period the World Bank spent 25 times more on fossil fuels than on all renewable energy (SEEN & ITIS, 1998). Moreover, bilateral public funding also plays a critical role in directing private sector investment in the South through export credit agencies (ECAs). Of foreign project and trade financing to developing countries between 1994 and early 1999, for example, 60% was for fossil fuel energy supply projects and energy-intensive industrial investments—and half of this was directly supported (i.e. subsidised) by ECA funds (Maurer and Bhandari, 2000).

2.3. Energy on the international agenda

Energy was not on the agenda at the 1992 Summit, nor does it have its own chapter in Agenda 21; energy issues are addressed indirectly by chapter 9 on Protection of the Atmosphere (UN, 1992), because energy use is the major source of many atmospheric pollutants. The review in 1997 by the United Nations General Assembly of the progress since the UNCED suggested energy as one of the top priority issues for comprehensive treatment. As a result, energy was placed on the agenda of the Commission on Sustainable Development (CSD) at its ninth session (UN, 1997)

The most significant progress in international negotiations made since UNCED related to energy has been on climate change, which in turn influences energy investments. Over 170 countries at UNCED adopted the UN Framework Convention on Climate Change (UNFCCC, 1992) to focus international efforts on climate change. The Convention seeks to stabilise atmospheric concentrations of GHGs at safe levels and promote sustainable development. The Kyoto Protocol (UNFCCC, 1997), adopted in 1997, calls for

a 5.2% GHG emissions reduction from 1990 levels for industrialised countries between 2008 and 2012. Despite the US pulling out of the Kyoto Protocol in early 2002, ratification has proceeded in many countries and entry into force is expected during 2003. Meeting climate change commitments will require a major transition to lower-carbon fuels in industrialised countries.

The United Nations General Assembly Millennium Declaration sets out the key international development targets for the coming 15 years. This declaration does not have any specific energy or climate change targets—with climate change targets only featuring in the Kyoto Protocol. Energy will clearly play a role, however, in delivering the needed services and contributing to poverty reduction. Related targets are shown in Box 1.

Other initiatives on energy have also helped to improve global understanding of the need for international co-operation on energy and development. The 2000 World Energy Assessment, led by the UN Department of Economic and Social Affairs (UNDESA), the United Nations Development Programme (UNDP) and World Energy Council (WEC) included a comprehensive review of energy and development issues and a useful set of policy recommendations for governments and international co-operation (UNDP et al., 2000b). The European Union has also commissioned extensive analysis of energy issues in developing countries, including how international co-operation can assist in promoting access to energy services (Farinelli, 1999). UNDP established a Thematic Trust Fund on Energy for Sustainable Development in 2001 to focus on four main areas: strengthening national policy frameworks on energy for poverty reduction, promoting rural energy services to support growth and equity, promoting clean energy technologies, and increasing access to investment financing for sustainable energy (UNDP, 2002).

The G8 Renewable Energy Task Force was convened by the Group of 8 (the wealthiest countries in the world plus Russia) to look at renewable energy development (G8 RETF, 2001). This Task Force was a multi-stakeholder body consisting of members from the public and private sectors of both developing and developed countries, as well as multilateral organisations and

Box 2

Recommendations for international co-operation from CSD9

- Increase financing resources and create innovative financing solutions to support energy for sustainable development, including debt relief, promoting foreign direct investment, meeting the Official Development Assistance target of 0.7% of GNP, and incorporating energy issues into development co-operation and poverty reduction strategies.
- Continue dialogue on energy and sustainable development issues within the WSSD process.
- Promote international public-private partnership co-operation programmes for promoting affordable, energy efficient and advanced fossil fuel and renewable energy technologies.
- Promote networking between centres of excellence on energy for sustainable development to promote capacity-building and technology transfer activities, as well as serve as information clearing houses.
- Make available grants and loans to developing countries on favourable terms that would permit sharing the cost of the development of energy infrastructure, including rural and remote energy infrastructure, with relevant international lending institutions and private sector investments.
- Use existing international mechanisms for financing infrastructure development to identify risks and ensure they are managed on a transparent basis, with an effective equitable partnership between investors and host countries, since developing countries do not have institutional structures that are adequately prepared to deal with the scale of commercial risks associated with major energy investments.
- Support the international endeavours to promote equal access and opportunities for women in relation to energy, including credit facilities and involvement in energy policy decision-making processes. (UN, 2001a).

NGOs. The recommendations of the Task Force covered four key areas: reducing technology costs by expanding markets, building a strong market environment, mobilising financing, and encouraging market-based mechanisms. They also included specific targets for increasing access to energy services. Unfortunately, the G8 is yet to accept these recommendations, and some governments, notably the US, moved almost immediately to distance themselves from the conclusions. This highlights both the opportunities and challenges from agreements reached outside the formal multilateral negotiating process, which was to come up again at WSSD.

2.4. CSD9

The 9th Session of the CSD, held 16–27 April 2001 in New York, was the first time energy was addressed in an integrated way within the United Nations system. The conclusions of CSD9 are particularly important because they formed much of the basis for WSSD negotiations, and even the final text of the Johannesburg Plan of Implementation (JPOI). Leading up to CSD9, the UN Secretary General prepared background documents on energy and transport, including possible actions and recommendations (UN, 2001b,d). The Ad Hoc Open-ended Intergovernmental Group of Experts on Energy and Sustainable Development in parallel prepared draft decisions for the CSD, as a starting point for the debate (UN, 2001c; Wamukonya, 2001). Even with this considerable preparation and expert input, however, CSD9 proved to be a frustrating process for many delegates, according to reporting at the session by the Earth Negotiations Bulletin (ENB, 2001). The conclusions and recommendations from CSD9 on energy were organised both by subsectoral issues (access to energy, energy efficiency, renewable energy, rural energy, advanced fossil energy, nuclear energy, energy and transport) and cross-cutting issues (research and devel-

opment, capacity building, technology transfer, information sharing and access, mobilising finance, market reforms—including removing harmful subsidies—and participation) (UN, 2001a). Most of the recommendations are essentially menus of options to promote energy for sustainable development.

More importantly for the WSSD, CSD9 also put forward a set of recommendations for increased international co-operation as the basis for more concrete plans of action. The recommendations were particularly important because of the influence they would have on the WSSD discussion, and the use of CSD9 conclusions as a “fall-back position”. The recommendations are shown in Box 2.

CSD9 did not, however, propose targets, implementation mechanisms, or plans of action to achieve these goals. Nor were any steps taken to rationalise the different institutional programmes within and outside the UN system. The CSD9 negotiations to some extent were a preview of WSSD, and reflected the major North-South divides on energy issues. At CSD9 the strongest fault-lines were between the EU and the G77/China, although this may have been in part because the JUSSCANNZ (Japan, USA, Switzerland, Canada, Australia, Norway, New Zealand) group let these groups fight their battles for them. The EU favoured some of the national recommendations being more prescriptive, while the G77/China feared that this would obstruct their development—particularly the need to bring access to energy to more people and to use locally available energy resources (ENB, 2001). The EU also favoured the term “sustainable energy”, while the G77/China insisted on “energy for sustainable development”—meaning “providing universal access to a cost-effective mix of energy resources compatible with different needs and requirements of various countries and regions” (UN, 2001a). This formulation means that an energy and development strategy could include giving a greater share of the energy mix to renewable energies,

Box 3

Access proposals in Africa Non-Paper

- Launch a global energy access fund.
- Redirect energy funds in international financial institutions to support a global energy access fund.
- Redirect export credit agency-supported energy investment toward access and infrastructure projects.
- Ensure that energy sector ODA for the poorest countries will include a focus on access programmes.
- Support targeted capacity building in the energy sector.
- Support local energy centres that promote access to energy, disseminate information, and serve as a focus for capacity building and job creation.
- Integrate energy access into mainstream development co-operation;
- Create a structured, ongoing dialogue on energy access and development through global and regional energy forums.
- Support initiatives on regional integration and trade, harmonisation of energy product and technical standards, and regulatory co-operation.
- Develop and implement integrated energy plans at the national, regional and international levels.
- Develop large-scale infrastructure as a mechanism for more efficient use of regional resources.

improving energy efficiency and also reliance on advanced energy technologies, including fossil fuel technologies and possibly nuclear.

3. Improving energy access: moving from consensus to action

In the next three sections, we analyse some key proposals put forward for WSSD, what the outcomes were, and what strategies can move these issues forward beyond WSSD. The policy questions are how the specific agreements reached at WSSD will be implemented and, where there was no agreement on action plans, what alternatives are available to address these issues within the multilateral system.

We begin with the access issue, because of the need for a global commitment to increasing access to modern energy services as part of any global initiative to address sustainable development (Goldemberg, 2000; Jefferson, 2000; WEC, 2000). Developing an access strategy must start from people's needs—in the household (lighting, cooking, heating/cooling), at work (productive activity) and in the broader economy (industrial development) (Reddy, 1999; Reddy and Goldemberg, 1990; Reddy et al., 1997). Different kinds of energy are appropriate for meeting these needs at different times and places. Meeting energy and development needs will require large-scale investments in energy infrastructure—supply and distribution—as well as demand-side interventions, and will include investments in both renewable and non-renewable energy sources (such as natural gas) in the short-to-medium term (see Davidson and Sokona, 2002; Dunkerley, 1995; Reddy, 1999).

At the third session of the preparatory committee in April 2002, the Africa Group put forward a Non-Paper with comprehensive programmes of action on water, energy, agriculture and food security, technology and education (Africa Group, 2002). South Africa, in particular, as the host country, hoped to facilitate a successful outcome at WSSD by focusing the negotiations on plans of action that would include targets,

timeframes, implementation plans, resources and monitoring and institutional arrangements. The Department of Environmental Affairs and Tourism (DEAT) commissioned background papers and policy frameworks on several key issues, including energy and climate change (EDRC, 2002a b; Spalding-Fecher et al., 2001; Winkler et al., 2001). The Africa Group proposal (see Box 3) contained the most comprehensive energy action plan put forward by governments during the WSSD process, and also reflected many of the ideas put forward by the UN agencies. We first describe some of the key elements of that plan related to access before looking at what went through to the final WSSD outcome.

3.1. Target for access

Setting targets has been a key instrument to mobilise political support for global programmes within the UN system, with the Millennium Declaration being one of the most prominent examples (UN, 2000). Much of the debate leading up to WSSD was around what targets would be set in each of the major themes identified in the preparatory process—particularly water and sanitation, energy, health, agriculture and biodiversity (CSD, 2002a b). The target proposed by Africa Group and the UN “WEHAB”² group was to provide modern affordable energy services to half of the two billion people who currently do not have access to them by 2015 (Africa Group, 2002; WEHAB Working Group, 2002). This reflected the language of the Millennium Declaration on reducing poverty by half over that period.

3.2. Financing access to energy

Setting a target for increasing energy access would be meaningless unless the international community could

²WEHAB stands for Water and sanitation, Energy, Health, Agriculture and Biodiversity, and was an interagency initiative proposed by UN Secretary General Kofi Annan to provide input documents and support to WSSD on each of the five key areas.

mobilise the resources to finance access investments. The financial resources for addressing access issues continue to be insufficient. While development assistance will still be the most important resource for the poorest countries, for most developing countries the priority must be to leverage additional private sector financing. This is the most important way to fund the necessary large-scale energy infrastructure projects in emerging economies (see discussion of costs of access in Section 2.1). The Africa Group proposal contained some specific policy tools to address the financing gap (Africa Group, 2002). The principle was to influence the flows of private capital by supporting enabling environment activities—the public finance that will catalyze private sector investment flows. This would include not only capacity building, technical support and similar activities already being carried out within the UN system, but also creating sound business and investment environments in developing countries that need energy infrastructure.

A key instrument in for financing access would be the creation of a new Global Energy Access Fund (Africa Group, 2002). This proposed new financing mechanism would use new public and private financial resources to leverage private investment. The focus would be on investments in access, including distribution investments, and related capacity building; grant funding for feasibility studies and capacity building; seed funding for innovative delivery models; and micro-financing for entrepreneurs, particularly for women. This fund and enabling environment activities would be primarily supported by redirecting current financial flows through international financial institutions (e.g. World Bank Group, regional development banks, bilateral financing institutions) and export credit agency supported investments. The export credit agency (ECA) shift is particularly important, because each dollar of support from ECAs catalyses another dollar and a half of private sector investment, so only by shifting ECA funding priorities can we expect a significant change in private sector investment patterns from the North (Hampton, 2001; Maurer and Bhandari, 2000). Targets for each relevant institution for the shift of financing would be crucial to monitoring this fund and securing necessary resources. The fund could be located in a development finance institution or new energy agency. This would build on existing local financial institutions and systems where possible, both to integrate access issues into mainstream development finance and also to reduce the transaction costs associated with donor funding and other funding sources.

4. Promoting a cleaner energy system

Without a major long-term shift in global sources of energy supply, the environmental and social impacts of

the energy sector will cripple attempts to move toward a sustainable development path. Energy use in high consuming countries is still largely built on unsustainable fossil fuels, and this pattern of consumption (and over-consumption) must change to support sustainable development in the North and to help to South leapfrog cost-effectively to cleaner technologies.

The target put forward by Africa Group was to “diversify energy supply by developing cleaner and more efficient fossil fuel technologies, advanced energy technologies and decentralised energy systems achieving a target of 5% of total primary energy use with [new] renewable energy resources by 2010”. Given that energy efficiency is already cost-effective in most situations, the main challenge is to bring down the costs of “modern” renewable energy sources so that they are competitive in a wider range of applications in the North and the South. This can only happen by a dramatic up-scaling of renewable energy investment in the North, where it is easier to bear the higher costs in the short term. Deployment in the South should happen in applications where renewables are currently the least cost option or where there is incremental financial support from the North.

4.1. Financing cleaner energy

As with financing access to modern energy services, the central strategy for financing cleaner energy was to redirect current multilateral and bilateral financial flows to more sustainable investments. This included redirecting current harmful subsidies to conventional fossil fuel investments within industrialised countries (see Section 4.3). Once the targets for access investments were established, international funding agencies (from the World Bank to ECAs) would commit to a timetable to shift greater resources in renewable energy and energy efficiency investments and away from traditional fossil fuel supply investments. Implementing this shift, however, will pose very significant political challenges at an international and national level. Many countries have already begun to devote public funds toward renewable energy development, even in the South. Significantly enlarging these funds, however, challenges powerful vested interests not only in the conventional energy supply industries (e.g. oil and gas development, coal mining, fossil fuel-fired power stations) but also in the institutions that finance and support foreign investments in developing countries, such as the ECAs and multi-lateral development banks. Governments will not need to agree to coordinated international action, but also convince domestic constituencies that long-term expansion of alternative energy markets, and more sustainable development in the South, will provide benefits that will outweigh the short-term costs to more conventional energy sector interests. To track implementation of the

shift in funding, public and private funders would be required to report the annual and lifetime GHG emissions from their investments. As an additional tool to mobilise greater funds for cleaner energy investments, countries should also scale up contributions to the climate change funds (e.g. GEF, special climate change fund, LDC fund) and utilise the Clean Development Mechanism to support cleaner energy investments. The current work of many donor governments, researchers, and multilateral agencies to reduce the transaction costs of Clean Development Mechanism projects is a vital element in this strategy.

4.2. Technology development and transfer

Countries should commit to supporting accelerated technology development and dissemination for renewable energy, energy efficiency and natural gas. The responsibility for funding this research and driving market development should be primarily on those with the greatest energy emissions, namely the industrialised countries. The strategy should include collaborative research, development and deployment partnerships. The Climate Technology Initiative (CTI, 2001) is one example of a public–private partnership that could provide a useful model, although it is not clear whether these technology collaborations are leading to actual transfer of technology. This is one of the main challenges in this area, since many Northern governments continue to stress that technology from the private sector in their countries can not simply be “transferred” to the South, but more creative agreements on joint development and application of advanced technologies are required. In addition, countries should ensure that all export credit agency and export–import bank supported projects meet investor country environmental standards—this is to ensure that export credits should not be used to dump outdated technology on developing countries.

4.3. National incentives

Industrialised countries should take the lead in full-cost pricing of energy services and removing harmful subsidies, and redirecting these funds to support access and promote cleaner energy. These two policies work together because prices will only reflect true costs when harmful subsidies are removed for non-renewable energy sources and when external costs are included in the price of energy services. Full-cost pricing in developing countries, however, must be accompanied appropriate measures to ensure that the poor can afford adequate energy services. Tracking progress toward these goals is essential, and should include reporting of all public funding (e.g. research and development, ECAs, etc.) to support different energy technologies,

as well as timetables for a shift toward renewable energy and energy efficiency.

5. Analysis of WSSD outcomes

While the lack of agreement on a target for renewable energy was not surprising to many observers, the inability of the world’s leaders to make any meaningful commitment to providing greater access was more so. Other than putting energy on the international agenda (Erwin, 2002), little concrete was achieved on energy at WSSD.

5.1. On the agenda, but no ‘home’ for energy

Energy was discussed more intensively at WSSD than at Rio. The profile of energy issues was raised and extended beyond energy ministries. Energy still lacks an institutional home in the multilateral UN system, however (Erwin, 2002). As in Agenda 21, it continues to be a ‘cross-cutting issue’, with no dedicated institutional structure for energy within the UN system. Several energy initiatives were launched at WSSD, but all of them have the character of loose networks rather than an international negotiating forum.

The alternative to a stand-alone institution would be a co-ordinated programme. The Africa Group proposed building on existing institutions and programmes within the Bretton Woods institutions, regional development banks and institutions and key UN agencies, but with greater co-ordination. In addition, regional and country-level support structures would include regional development banks, energy and development specialists in the national UN and World Bank offices. However, WSSD did not succeed in launching even a coordinated international programme on energy.

5.2. No target for renewables

Setting a target for renewable energy proved to be one of the most controversial issues during the Summit, and one which was debated until the early morning hours of the final days of the meeting. The fundamental issue was whether to set any global target at all. The EU (which already had a target to double the share of renewable electricity to 12% by 2010) (EU COM, 2000) and Brazil strongly supported targets, and they were included in the Africa Group non-paper floated by South Africa. On the other hand, the US and many of the other G77/China countries—particularly oil-exporting countries—strongly opposed any target (Doran, 2002; ENB, 2002). After long negotiations at both the official and ministerial level, the target was dropped from the final agreement. The breakdown of the renewable energy discussion led to a declaration by the EU that they and a

group of “like minded countries” would set out their own targets and timetables to advance the share of renewable energy globally.³

Another blow for the cleaner energy agenda was that there was also no agreement on timetables for reducing energy subsidies, which had been included in the negotiating text until the last few days of WSSD. Again, the EU and a few others such as New Zealand supported targets and timetables, while the US, G77/China, Japan, Australia and Canada opposed (ENB, 2002). The Plan of Implementation only included language to encourage the reduction market distortions “including restructuring taxation and phasing out harmful subsidies, where they exist” (UN, 2002, p. 17). Even the language encouraging countries to implement CSD9 recommendations to encourage renewables, energy efficiency, and cleaner fossil fuels was weakened from “Develop action oriented recommendations...containing proposals for implementation” to “implement, taking into account national and regional specificities and circumstances, the recommendations and conclusions adopted by the CSD” (UN, 2002, p. 17).

5.3. Lack of support for access

While negotiators in the preparatory meetings, and during WSSD as well, had no problem agreeing that increasing access was in principle a good idea, views on targets and implementation mechanisms were quite different. After the fourth session of the preparatory committee (Prep Com IV) in Bali in June 2002, the idea of an energy access target was already off the agenda, and delegates could not agree on whether they should “launch an action programme” on access or simply “take actions” to improve access (CSD, 2002c, paragraph 8). While this may not seem to be a vast difference, the wording reflected very different views on whether industrialised countries should commit to new action, including additional financing, or whether they could simply continue with existing, ad-hoc actions. In other words, despite a large number of actions identified in the paragraph on access, without language on a new programme of action, this list would be no more than a menu and not any real commitment.

The conflict over committing additional resources to energy access continued through the Summit, with the EU pushing for a new programme of action, which could be monitored and measured, and the US and G77/China opposing a global action plan (ENB, 2002, p. 6). The final agreement, contained in the JPOI, only has the

text “take joint actions and improve efforts”, so does not represent any significant new commitment of resources or target (UN, 2002, p.11). The only agreement was on increasing access to energy services in Africa, in support of the NEPAD (New Partnership for Africa’s Development) goals.⁴ This regional approach to energy access is one potential path for moving forward. In addition, several “type 2” initiatives were launched at WSSD, such as the EU-led “Energy for poverty eradication and sustainable development” programme and the World Bank “Global village energy partnership” (World Bank, 2002). The EU and the USA pledged financial commitments to the access programme of \$700 and \$43 million respectively, while the various type 2 initiatives amounted to \$26 million. This is in contrast to the analysis presented in Section 2.1 that several hundred billion dollars would be required to make a meaningful attempt at halving energy poverty.

5.4. Capacity building and technology transfer

While capacity building programmes do exist in many international institutions, they need to be more focused on critical areas and better delivery models for capacity development. In terms of focal areas, capacity building programmes need to be more focused on removing the current barriers to providing affordable energy access to the poor. This means building capacity programmes around, for example, policy and strategy development on access, regulatory capacity for restructuring markets, project development capacity and local financing mechanisms and institutions.

One strategy for this, which has received wide support in the WSSD preparatory process is to support networking of centres of excellence on solutions to access problems. These centres would focus not so much on basic research as on applied areas such as entrepreneurship development, project development capacity, technology adaptation and application, up-scaling new technologies. The network would utilise benchmarking, dissemination of good practices, and regional expert groups on focal area issues. Another important local strategy is to support local energy centres that promote access to energy disseminate information, and serve as a focus for capacity building and job creation. One example of such a network launched at WSSD is the Global Network for Sustainable Energy (GNESD, 2002), a global network of centres of excellence in developing and industrialised, known for advancing knowledge and policy on energy and development. The objective of GNESD is to enhance the ability of the centres to contribute to the provision of environmentally

³“Joint declaration by Bulgaria, Cyprus, Czech Republic, Estonia, The European Union, Hungary, Iceland, Latvia, Lithuania, Malta, New Zealand, Norway, Poland, Romania, Slovakia, The Alliance of Small Island States, Switzerland and Turkey. The Way Forward on Renewable Energy.” Non-paper released during WSSD.

⁴The NEPAD target is to increase access to reliable and affordable commercial energy in Africa from 10% to 35% or more by 2015, and to cut existing extreme poverty in half by that time (NEPAD, 2001).

sound energy services supporting sustainable development, by supporting capacity development, joint activities, information exchange, and policy analysis and development.

6. Conclusions: what next?

6.1. A home for energy

The first challenge in finding a way forward is to set the goals and time-frames that could not be agreed at WSSD. To do this, an appropriate forum for discussion needs to be identified—one that has a specific focus on energy, but addresses the economic, social and environmental impacts of energy production and use as part of a larger framework. This could build on the Africa Group proposal for greater coordination among existing institutions. Such a programme is still needed to carry out four groups of functions:

- agreeing on goals and time-tables and monitoring progress towards them;
- disbursing funds for investments in energy access and cleaner energy;
- providing additional technical support, capacity building, and information dissemination; and
- co-ordinating and/or sharing information about the activities of existing institutions—both within and outside of the UN—on energy access and cleaner energy.

These functions do not all necessarily have to be in the same place. UNDP, for example, is the main technical support agency within the UN on development assistance, and does not fund major investments, but only smaller projects that will catalyse larger initiatives. Large scale infrastructure financing has generally been through multi-lateral and bilateral development banks (e.g. World Bank, regional development banks) and the private sector. UNEP also runs large programmes that deal with cleaner energy sources and development, but again the funding is related to capacity building and technical support, not infrastructure financing.

In the absence of an institutional structure or co-ordinated programme, energy access issues should be addressed on an ongoing basis through some form of Global Energy Forum, which could either be a non-UN, multi-stakeholder group, similar to current Global Forum on Sustainable Energy, or a model similar to the World Commission on Dams that would develop guidelines or priorities for energy access programmes or funding.

6.2. Political leadership

Political leadership will be required on both energy access and cleaner energy. On cleaner energy, a major step forward would be if the EU is also to enlarge its partnership of “like minded countries”. While the CSD may continue to debate these issues, no concrete progress is likely without leadership by progressive countries and regions. Developing countries need to reflect why they failed to coordinate their efforts for promoting access. Major investments in energy access will not occur if the G77 does not call for it clearly.

The most important step for renewable energy, however, is likely to be the entry into force of the Kyoto Protocol, which is expected in 2003 after Russia ratifies. These targets within the Protocol, even with the US outside of this framework, will induce increased investment in RE both in the North and, through the Clean Development Mechanism, in the South (Spalding-Fecher, 2002b).

6.3. Action on access

Even though WSSD failed to agree on a major global access programme, the concepts of the access fund and shifting financing remain important. Accelerated access to energy services will be essential to meeting any of the targets agreed in the JPOI. The access fund could still be created within the multilateral system, even if all countries could not agree at WSSD. More importantly, donor coordination, such as the OECD Development Assistance Committee, should still consider a much more coordinated and large-scale approach to financing access to energy services, including monitoring the impact of the access programmes. Shifting the portfolio of ECAs is also still on the agenda, and should be taken up in the climate change negotiations.

One option for integrating energy access issues into mainstream development co-operation would be, for example, including energy specialists within country offices of World Bank, IMF, Regional development banks, and bilateral aid agencies. Bilateral and multi-lateral development assistance strategies should also include energy access as a priority issue. Even more importantly, political commitment is needed to ensure that market reform programmes (such as structural adjustment programmes), particularly privatisation, do not compromise access goals.

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Table 1
Estimated average cost of power supply, 2010

	Projected capacity (GW)	Share of capacity (%)	Capital cost (\$/kW)	Notes on cost
Coal	1311	27	1090	Pulverised fluidised bed coal with flue gas de-sulphurisation
Oil	466	10	1090	Assume coal
Gas	1226	25	468	Natural gas combined cycle air-cooled
Nuclear	926	19	2400	
Large hydro	926	19	2250	
Total	4855	100	1404	

Sources: UNDP (2000a) and IEA (2002b).

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Appendix A. Assumptions for access and renewable energy costs

A.1. Centralised electricity capacity requirements and costs

For centralised electricity supply, we first convert energy consumption into generation capacity using an availability of 80% (following Reddy, 1999). For All-grid homes, this means 500 W per household, while for Grid + Liquefied Petroleum Gas (LPG) it is 100 W per household. For the 60 million All-grid homes, this is 30 000 MW total capacity needs, while for the 40 million Grid + LPG homes, we need 4000 MW. (By way of comparison, South Africa's current installed capacity is about 40 000 MW.) We derive the unit cost of different technologies for grid electricity production from the World Energy Assessment, and the mix of grid technologies globally from the International Energy Agency's World Energy Outlook projections for 2010 (IEA, 2000) (see Table 1). This gives a weighted average unit cost of \$1400 per kW. Total grid capacity costs for the All-grid group is therefore \$42 billion, while for the Grid + LPG group it is \$5.6 billion by 2015. This does not include the cost of connecting homes to the grid, which is addressed below.

A.2. Decentralised electricity capacity requirements and costs

SHS have a much lower availability rating (e.g. they provide electricity fewer hours of the day and year) the

centralised electricity generation capacity, so that we need 400 W of capacity to get 700 kWh annual output (this is the amount of electricity needed for the SHS + LPG household—20% of 3500 kWh). Total capacity needed for the 100 million SHS + LPG group is 40 000 MW. The unit cost of decentralised solar photovoltaic power ranges from \$5000 to \$10 000 per kW, so the total investment in decentralised capacity ranges from \$80 to \$160 billion.

A.3. LPG distribution requirements and costs

For LPG, recent experience has shown that the limiting factor in the future will be reliable distribution networks and an appropriate policy environment, rather than new refining capacity (Belguedj, 2001; WEC, 1999; World Bank, 1996). LPG is one of many petroleum products produced by refineries, and refiners have some flexibility in how much is produced. Furthermore, the total amount of LPG for this access programme is very small compared to global petroleum demand. Our costing, therefore, is for LPG distribution infrastructure only, not the cost of refining. We estimate distribution investment by assuming that one third of the retail price of LPG is to cover distribution, and that this investment has a simple payback of 5–8 years. Unsubsidised retail prices for LPG in Africa range from \$410 to \$490 per tonne (World Bank & World LP Gas Association, 2001). This gives an investment requirement of \$670 to \$1300 per tonne of LPG delivered annually. For the 40 million Grid + LPG households, the total distribution investment is \$5.5 to \$10.6 billion, while for the 100 million SHS + LPG households, the investment is from \$13.8 to 26.6 billion.

A.4. Cost of grid electricity connections

For households that will get grid electricity, we must also include the cost of the connection to the grid. This unit cost ranges from \$500 to 1500 per household (World Bank, 1996, p. 50). For the 60 million All-grid households, therefore, the cost of connections is \$30–90 billion. For the Grid + LPG group, the connection cost is \$20 to \$60 billion.

Table 2

Cumulative and annual investment needed to provide access to modern energy services to 1 billion people (\$US billion)

	Low	High
<i>Cumulative investment (2002–2015)</i>		
Electricity supply	128	208
Grid connections	50	150
LPG	19	37
Total	197	395
<i>Annual investment (2002–2015)</i>		
	14	28

A.5. Summary of cost of access programme

As Table 2 shows, the total cumulative investment required is between \$180 and \$395 billion by 2015, or \$13–28 billion per year. This is comparable to earlier estimates from the World Energy Council of the cost of providing 500 kWh per capita for two billion people of \$600 billion over 20 years (cited in UNDP et al., 2000a, p. 420).

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