



**ACCESS TO SUSTAINABLE ENERGY:**  
**What role for international oil and gas companies?**  
**Focus on Nigeria**

**Brian Shaad and Emma Wilson**

International Institute for Environment and Development (IIED)



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## ACRONYMS AND ABBREVIATIONS

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AGFA	Associated Gas Framework Agreement
bbl/d	Barrels per day
BUC	Bonny Utility Company
CDCF	World Bank Community Development Carbon Fund
CDM	Clean Development Mechanism
CERs	Certified Emissions Reductions
DFID	United Kingdom Department for International Development
EIA	Energy Information Administration (USA)
EITI	Extractive Industries Transparency Initiative
FAO	Food and Agriculture Organization of the United Nations
GGFR	Global Gas Flaring Reduction Initiative
GMoU	Global Memorandum of Understanding
GTL	Gas to liquids
ICT	Information and communication technology
IFC	International Finance Corporation
IOCs	International oil companies
IPIECA	International Petroleum Industry Environmental Conservation Association
IPPs	Independent power projects
KW	Kilowatts
LEEDS	Local Economic Empowerment and Development Strategy
LNG	Liquefied natural gas
LPG	Liquid petroleum gas
MDGs	Millennium Development Goals
MoU	Memorandum of Understanding
MW	Megawatts
NDDC	Niger Delta Development Corporation
NDWC	Niger Delta Wetlands Centre
NEEDS	National Economic Empowerment and Development Strategy
NEITI	Nigerian Extractive Industries Transparency Initiative
NGO	Non-governmental organisation
NLNG	Nigeria Liquefied Natural Gas
NNPC	Nigeria National Petroleum Company
NOCs	National oil companies
NORAD	Norwegian Agency for Development Co-operation
PV	Photo-voltaic
REEEP	Renewable Energy and Energy Efficiency Partnership
REMP	Renewable Energy Master Plan
SEEDS	State Economic Empowerment and Development Strategy
SHS	Solar home systems
SIDA	Swedish International Development Cooperation Agency
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
USAID	United States Agency for International Development
US EPA	United States Environmental Protection Agency
WAGP	West African Gas Pipeline

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**E**nergy is critical to achieving virtually all the Millennium Development Goals. Whether it is electricity for schools or clinics, energy for the delivery of health, education and sanitation services, clean fuel to reduce indoor pollution, energy for pumping water or heat for cooking food and boiling water, energy in all its forms will be required to achieve these ends. The servicing of this sector, obviously, requires a cross-sectoral integrated approach and interventions together with supportive policy frameworks.

*Shoji Nishimoto, United Nations Development Programme  
Energy for Development Conference, Noordwijk-Netherlands (December 2004)*

## EXECUTIVE SUMMARY

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Increasingly the private sector is expected to have a key role to play in addressing some of the world's development challenges. Moreover, there is a growing business case for the private sector to become involved in development, including the need to mitigate political and social risks, address community expectations and secure future investment opportunities with host governments.

In this report we explore some of the ways that international oil and gas companies (IOCs) can tackle energy poverty in the regions in which they operate. We focus on Nigeria, a country with huge energy resources, yet suffering an ongoing energy crisis; a country that benefits from considerable oil investment, revenues and aid money, yet faces major environmental and poverty challenges.

We describe a number of initiatives relating to both renewable energy and gas utilisation in Nigeria, implemented by IOCs and other actors, including donors, government and non-governmental organisations (NGOs). So far, very few pilot initiatives have been scaled up or replicated. Our research demonstrates that IOCs do not yet fully appreciate the opportunities to address energy poverty in a substantial way.

We suggest that there are three levels at which IOCs can engage in tackling energy poverty, ranging from:

1. **improving current practice** and maximising core business opportunities, for example by engaging meaningfully with local people and diverting associated gas for local energy needs rather than flaring it; *to*
2. **pushing the boundaries** a little further by engaging in innovative partnerships with governments, donors, NGOs and communities and directing social investment funding not only towards gas-based projects, but also towards renewable energy projects; *to*
3. **more radical change**, such as establishing sustainable community-based utilities for decentralised power generation and taking a more decisive role in the policy arena.

Contributing effectively to sustainable local development does not necessarily require investment of additional funds, but it does require a proactive approach aimed at satisfying local needs, rather than a reactive response to political pressure. The key aspects of successful access to energy initiatives identified in this report include:

- aiming for broader sustainable development impact
- building effective dialogue and partnerships
- ensuring the flow of information
- establishing monitoring and evaluation systems
- ensuring financial sustainability
- tackling corruption, funds management and security issues
- stimulating innovation and creating markets.

# 1. ENERGY POVERTY: WHY SHOULD INTERNATIONAL OIL COMPANIES GET INVOLVED?

---

Development experts agree that ensuring access to modern energy services is critical to achieving the Millennium Development Goals (MDGs). Some 2.4 billion people still use traditional biomass fuels for cooking, while around 1.6 billion people have no access to electricity (Modi *et al*, 2005). In this report we explore how international oil and gas companies (IOCs)<sup>1</sup> can tackle energy poverty (i.e. the lack of access to reliable, affordable, safe and clean energy resources) in the regions where they operate.

It is worth noting that energy poverty cannot be addressed in isolation from other development challenges, including overall poverty alleviation, clean water, agricultural development, and provision of education and health services. Initiatives implemented in partnership with other actors (government, donors, NGOs and communities) are more likely to be effective.

The local and national context is crucial for this kind of study. This report focuses on Nigeria, a country which has huge energy resources and receives considerable oil investment and revenues, as well as aid money, yet which continues to suffer from an energy crisis and faces major environmental and poverty challenges.

## 1.1. The business case

Increasingly the private sector is expected to have a key role to play in addressing some of the world's development challenges,<sup>2</sup> including energy poverty (DFID 2002; Magradze *et al*. 2007). IOCs are frequently engaged in extracting oil and gas from a region mainly for export to more lucrative markets. There is a business case for these companies to support local 'access to energy' initiatives, which includes:

- addressing government and community expectations and needs
- mitigating political and social risks
- recruiting and retaining reliable local staff
- enabling the smooth running of operations by avoiding conflict
- maintaining a positive international image
- securing future investment opportunities.

Companies have some responsibility for addressing development challenges as part of their role as good corporate citizens in the countries and communities that host their operations. Increasingly this will be recognised by host governments when choosing favoured investment partners.

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<sup>1</sup> In this report we focus on potential roles and opportunities for international oil companies (IOCs). Many of the issues discussed are also relevant to national oil companies (NOCs) that are operating internationally. However, many NOCs have very different drivers and ways of working that are determined by national state interests. In this report, StatoilHydro is included alongside IOCs, due to its values and ways of working, including the company's commitment to transparency and international good practice standards, and the nature of its community investment programmes. The issues and opportunities discussed in this report may also apply to major engineering contractors, who are increasingly significant players in oil and gas developments globally.

<sup>2</sup> See for example UNDP (2005) and DFID (2005).

In some cases there may be core business opportunities for IOCs in providing energy to local markets. In Nigeria, for example, there may be viable business opportunities for using associated gas instead of burning it off (flaring).<sup>3</sup> Further business opportunities may emerge if IOCs create markets for their renewable energy branches. Appropriate regulation and favourable market conditions are required to provide an enabling environment for such investment. However, the lack of collaboration between IOCs' hydrocarbon and renewable branches and IOCs' apparent shift away from investment in renewable energy innovation currently hinder this kind of progress.<sup>4</sup>

In some cases, access to energy initiatives may be an appropriate response to new regulations at the national or international level. For example, using associated gas to meet local energy needs is a way to respond to new national legislation, international demands to halt gas flaring and international pressure for IOCs to reduce their carbon footprint (see below).

## 1.2. Social investment

Corporate social investment funds<sup>5</sup> can be used broadly and effectively to support innovation and to catalyse development projects. Social investment funds can be matched by funding from national and local government, donors and NGOs. Further incentives may also come from evolving carbon finance mechanisms (see Section 3.7). IOCs might also offer technological support and skills transfer, and engage in multi-stakeholder dialogue aimed at policy reform.

Below we distinguish between mandatory and voluntary social investment. Mandatory social investment is directed largely by government interests, and IOCs have little control over how this money is spent. Voluntary social investment gives IOCs' more flexibility and choice in how to direct the spending.

### ***Mandatory social investment***

Host governments often try to control how IOCs spend their social investment funds. Mandatory social investment clauses may be included in host government agreements, or government preferences may be stipulated less formally in negotiations. An example is IOCs' annual contribution to the Niger Delta Development Commission of 3 per cent of their revenues. In relation to energy, mandatory social investment may be encouraged via investment in independent power projects (IPPs) or infrastructure development.

Mandatory social investment can become a kind of tax. IOCs frequently end up filling gaps where governments cannot fulfil their social obligations themselves. They should try to avoid this and resist pressure to fund the pet projects of key power holders.

In Nigeria, mandatory social investment has mostly been focused on large-scale projects such as infrastructure development. IOCs in Nigeria do not feel that it is their responsibility to make such investments and they would like the federal government to provide more support and incentives. The federal government would like to see IOCs raise the investment through international financial markets.

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<sup>3</sup> Associated gas is natural gas that is found in association with crude oil, either dissolved in the oil or as a cap of free gas above the oil (definition provided at: [www.offshore-technology.com/glossary/associated-gas.html](http://www.offshore-technology.com/glossary/associated-gas.html)).

<sup>4</sup> On 17 March 2009, Shell announced that future investment in renewable energy would focus not on wind and solar energy, but primarily on biofuels ([www.guardian.co.uk/business/2009/mar/17/royaldutchshell-energy](http://www.guardian.co.uk/business/2009/mar/17/royaldutchshell-energy)).

<sup>5</sup> Social investment programmes are defined as the voluntary contributions companies make to the communities and broader societies where they operate, with the objective of benefiting external stakeholders, typically through the transfer of skills or resources (see IPIECA 2008).

There will be limitations to IOCs' potential for influencing the nature of mandatory social investment. Dialogue and transparency are two powerful principles for ensuring that such investment is made in a way that contributes to local sustainable development. IOCs can engage with governments on the policy aspects of infrastructure development to make such investments more sustainable – and relevant. This may also be an area where IOCs can come together to discuss common approaches and good practice.

### ***Voluntary social investment***

Voluntary social investment is currently motivated by a company's desire to demonstrate corporate social responsibility (in the public relations sense), to secure a social licence to operate<sup>6</sup> from local communities and to establish a competitive edge in negotiations with host governments. This type of social investment theoretically offers more opportunities for IOCs to invest more strategically in order to contribute more effectively to sustainable local development.

However, in practice voluntary social investment tends to be used primarily by IOCs to smooth relations with host governments and communities. In Nigeria, voluntary social investment has typically been used in response to government or community pressure. Furthermore, the voluntary social investment model in Nigeria has tended to create community dependency that is proving difficult for IOCs to disengage from. It has rarely been used to address community needs, nor has it led to local ownership of initiatives. So-called 'benefit captors' have frequently taken advantage of social investment flows. Corruption has also become a serious problem within social investment programmes.

IOCs are aware of these issues and are increasingly seeking to ensure that their voluntary social investments are economically, socially and environmentally sustainable. They are now developing new socially-oriented enterprise-based models to this end. Such projects generally rely on some form of subsidy, such as covering the cost of electricity or providing free gas, but otherwise seek to promote sustainability.

These new models emphasise local consultation, local hiring and use of local contractors. Some projects are testing out community ownership models. However, so far these are isolated approaches, with little evidence of lesson learning, replication or scaling up.

### **1.3. Combining business and development goals**

IOCs can share their expertise in business development by taking an enterprise-based approach to their access to energy initiatives. This involves creating markets for energy services and supporting local entrepreneurs. Addressing local development needs effectively does not necessarily require investment of additional funds, but it does require a more focused and *proactive* approach aimed at addressing local needs, rather than *reactively* responding to political pressure.

In their article *The Fortune at the Bottom of the Pyramid*, Prahalad and Hart (2002) argue that multinational corporations can do profitable business at the same time as helping people out of poverty by bringing them into the market economy. Hart's initiative, the Base of the Pyramid Protocol, sets the framework for a new ethical business approach – inclusive capitalism – which advocates business partnerships between corporations and local communities.<sup>7</sup> The World Resources Institute publication, *The Next Four Billion* (Hammond *et al.* 2007), provides statistics

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<sup>6</sup> A company's social licence to operate can be defined as the broad acceptance of an industrial activity by local society, in particular by local communities (see for example: [www.oncommonground.ca/publications/license.htm](http://www.oncommonground.ca/publications/license.htm)).

<sup>7</sup> <http://bop-protocol.org>.

to demonstrate the market opportunities at the base of the pyramid, including in energy service provision in Nigeria (Chapter 7).

In advocating enterprise-based development, the Shell Foundation urges development actors, such as donors and NGOs, to apply “business DNA” (i.e. business development skills and market principles; see Shell Foundation 2005 and 2007). For businesses to act as effective development actors, they need to acquire “development DNA” (i.e. the skills and knowledge that are required for effective development interventions; see Wilson *et al.* 2008, p. 54). Corporate social investment programmes frequently encounter problems if they are not led by experienced development practitioners.

Effective, sustainable and scalable development interventions depend on the successful marriage of business DNA and development DNA and the collaboration of business and development actors. Partnerships between IOCs and development actors can enable effective use of available skills, capacity, experience and financial resources. IOCs and development actors need to overcome their traditional reluctance to collaborate on development initiatives.

In most cases, long-term ownership of and responsibility for the running of a business venture is likely to be handed to local companies, communities and authorities. IOCs need to build effective partnerships with these actors, while incorporating exit strategies into the design and planning of the intervention.

Governments and communities frequently expect companies to take on traditional government roles, such as infrastructure development. Niger Delta communities approach IOCs rather than the government with requests for schools, water pumps, clinics and roads, because the IOCs are more visible and accessible than government. Some of these issues can be addressed through dialogue and partnership arrangements.

#### **1.4. Report outline**

Access to energy is an area where IOCs (and their contractors) can offer relevant expertise and technology and can demonstrate corporate citizenship to positive effect. However, our research demonstrates that IOCs do not yet fully appreciate the opportunities for addressing energy poverty in a substantial way. We suggest that – so far – the standard business case driver has not resulted in effective investment in sustainable local energy provision. We argue for a more “nimble” approach that focuses on addressing local needs and takes into consideration the range of potential investments and interventions that an IOC can undertake.

In Chapter 2 we explore Nigeria’s energy crisis and community energy needs; current trends in oil and gas development; and the evolving national energy policy framework. Key challenges in sustainable local energy service delivery are addressed in Chapter 3. Our findings and recommendations are summarised in Chapter 4.

## 2. NIGERIA'S ENERGY CRISIS AND ENERGY POTENTIAL

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Poverty is widespread among Nigeria's 148 million inhabitants. In 1980, 28 per cent of the population was considered poor. Today, 71 per cent live on less than one dollar a day, while 92 per cent live on less than two dollars a day (UNDP 2006). Poverty in the Niger Delta is higher than the national average, with about 70 per cent of the population having no access to basic services (clean water, electricity and medical services). Yet the Niger Delta accounts for 90 per cent of national exports and 70 per cent of government revenue, mainly from oil and gas (Idemudia 2006). A survey of community needs posted on the Delta State<sup>8</sup> website found that respondents demand improved access to energy more than any other service.<sup>9</sup>

As a country with vast oil and gas reserves, abundant sunlight and significant hydropower potential, Nigeria should not be suffering an energy crisis. The energy sector is characterised by missed opportunities and wastage, due to poor regulation, lack of maintenance, and entrenched corruption. Inadequate power generation and transmission, limited access to the national grid, and generator fuel costs are persistent problems for nearly every Nigerian.

### 2.1 The energy crisis

For most Nigerians, cooking is the most important energy need. Sixty-seven per cent of the population uses wood or charcoal as a cooking fuel.<sup>10</sup> Wood fuel cooking is inefficient and is believed to be responsible for about 79,000 deaths annually from indoor air pollution.<sup>11</sup> Kerosene is also used for cooking, but is polluting, hazardous and expensive. People also tend to prefer the taste (and experience) of food cooked on a fuel wood stove. In urban areas, the cost of fuel wood is increasing. In rural areas, fuel wood gathering takes 3-6 hours per day. Unsustainable use of fuel wood also contributes to deforestation (see below).

About 60 per cent of Nigeria's population has no access to electricity (90 per cent in rural areas).<sup>12</sup> People need power for lighting (e.g. for evening study); household appliances; irrigation pumps; health clinics (e.g. vaccine refrigeration); food and agricultural processing (e.g. cassava driers and rice mills); and transport fuel. Small-scale traders, manufacturers and craftspeople also require power for small-scale machinery, such as sewing machines.

Lighting is the most expensive energy need. The poorest African households may spend 10-15 per cent of their income on kerosene lamps or candles.<sup>13</sup> Nigeria's poorest households earn 1-2 USD per day, but they spend on average 0.40 USD per day on their energy needs (Hammond *et al.* 2007). Kerosene lamps provide poor lighting and are expensive, inefficient, highly polluting and dangerous. Contaminated and low quality kerosene is widely available on the black market. Kerosene prices fluctuate with the price of oil. Small diesel generators are an option for those with sufficient cash, but these carry high fuel costs and require maintenance. They produce polluting fumes and noise and they often generate excess unused power. For a small business, generator costs can represent a major portion of overheads, which is stifling the development of small-scale enterprise in the country.<sup>14</sup> The cost of energy is blamed for the collapse of the textiles and auto manufacturing industries in Northern Nigeria. Firms have relocated to Lagos where power supplies, though intermittent, are more reliable (Malik *et al.* 2004).

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<sup>8</sup> There are nine Niger Delta states and three core Delta states.

<sup>9</sup> See: [www.deltastate.gov.ng](http://www.deltastate.gov.ng).

<sup>10</sup> [www.iceednigeria.org/ImprovedWoodstoves.htm](http://www.iceednigeria.org/ImprovedWoodstoves.htm).

<sup>11</sup> See: [www.who.int/mediacentre/news/notes/2007/np20/en/index.html](http://www.who.int/mediacentre/news/notes/2007/np20/en/index.html).

<sup>12</sup> See: [www.eia.doe.gov/cabs/Nigeria/Full.html](http://www.eia.doe.gov/cabs/Nigeria/Full.html) and <http://www.psuru.org/reports/2006-09-WE-Nigeria.doc>.

<sup>13</sup> [www.independent.co.uk/news/world/africa/lighting-up-africa-why-todays-residents-are-still-making-do-with-wax-and-wicks-463266.html](http://www.independent.co.uk/news/world/africa/lighting-up-africa-why-todays-residents-are-still-making-do-with-wax-and-wicks-463266.html).

<sup>14</sup> [www.vanguardngr.com/content/view/9147/137](http://www.vanguardngr.com/content/view/9147/137).

**Supporting sustainable energy service provision for communities will help to meet the MDGs, while building community resilience to climate change.** Energy can be used for pumping clean water from wells close to villages, thus reducing waterborne diseases and the time taken to collect water. Affordable and efficient cooking fuels and stoves could help to reduce indoor air pollution, cutting household energy costs and time lost in gathering fuel wood. This time could be used by children and adults (particularly women) for education or to develop small businesses. Reliable, affordable electricity will enhance opportunities for local manufacturing and crafts businesses. Good quality, safe lighting (e.g. via small-scale solar panels) could increase safety and business opportunities for night-time market stalls.

### ***Energy and the environment***

Unsustainable fuel wood gathering puts Nigeria's forests under pressure, particularly in the north. This has led to desertification, drought, arid land and a decline in crop production.<sup>15</sup> These combine with the regional effects of climate change: a drop in the water table and a decline in rainfall.

Gas flaring also has significant negative impacts on the environment, not least due to its climate change impacts. Associated gas has been flared since the start of oil production in the Niger Delta (see below). Nigeria flares about 2.5 billion cubic feet (over 70 million m<sup>3</sup>) of gas per day<sup>16</sup> (or 40 per cent of its annual gas production, which is 12.5 per cent of all globally flared gas).<sup>17</sup> This amounts to about 70 million tonnes of carbon dioxide.<sup>18</sup>

Gas flares release toxic substances, including benzene and particulates, which damage the human immune system and increase the acidity of rain. Health risks include child respiratory illnesses, asthma and cancer. Households that rely on traditional livelihoods such as fishing and crop production have suffered due to negative impacts on fish and vegetation.<sup>19</sup>

**Putting a stop to gas flaring will greatly improve the environment, health and livelihoods of local communities and improve relationships between IOCs and local communities in the Niger Delta.** While gas is a finite hydrocarbon resource, the switch from gas flaring to the rational use of this resource (particularly to satisfy domestic needs) can make an important contribution to climate change mitigation, reduction in deforestation, and meeting the MDGs.

<sup>15</sup> According to the Food and Agriculture Organization of the United Nation's *State of the World's Forests* report (FAO 2005), between 1990 and 2005, Nigeria lost 35.7 per cent of its forest cover.

<sup>16</sup> [www.reuters.com/article/rbssEnergyNews/idUSLO486900120071204](http://www.reuters.com/article/rbssEnergyNews/idUSLO486900120071204) and <http://allafrica.com/stories/200810271488.html>.

<sup>17</sup> The 40 per cent figure is provided by the Nigerian National Petroleum Company (NNPC) while the 12.5 per cent figure is a World Bank estimate, both cited on [www.eia.doe.gov/emeu/cabs/Nigeria/NaturalGas.html](http://www.eia.doe.gov/emeu/cabs/Nigeria/NaturalGas.html).

<sup>18</sup> See paragraph 2.5 of the 2004 Joint UNDP/World Bank/ESMAP *Strategic Gas Plan for Nigeria*.

<sup>19</sup> Gas flaring from Bayelsa State alone is believed to be responsible annually for 49 premature deaths, 4,960 children's respiratory illnesses and 120 asthma (see testimony of Nnimmo Bassey to the US Senate Judiciary Subcommittee on Human Rights and the Law, 24 September 2008 at: [www.eraction.org/publications/presentations/senate\\_testimony\\_24\\_09\\_2008.pdf](http://www.eraction.org/publications/presentations/senate_testimony_24_09_2008.pdf)).

### ***Power generation and distribution***

The failure of national electrification in Nigeria over the last three decades is attributed to corruption, poor maintenance and uncompleted projects. Of Nigeria's 79 power stations, most of which date from the 1970s and 1980s, only about 15 are currently working – often not to full capacity (*The Economist* 2007). The country's demand for energy is an estimated 7,600 megawatts (MW). However its total installed generating capacity is only 6,000MW. The government has set a target of achieving a further 6,000MW additional capacity by mid-2009, with a total of 20,000MW achievable by 2011.<sup>20</sup> Most power generation comes from three conventional sources: hydropower, coal (thermal) and diesel or gas-fired power plants. These currently account for the intermittent generation of 3,500 MW, or about 20 watts per person.<sup>21</sup>

Electricity transmission is a major problem in Nigeria. The centralised grid system is dependent on large-scale generation, and considerable amounts of energy are lost in transmission. The government acknowledges the need for greater investment in decentralised power generation, but still prioritises infrastructure for centralised generation.

### ***The oil industry legacy***

Oil production started in commercial quantity in the Niger Delta in 1958. Proven oil reserves are estimated at 27 billion barrels. In 2006, total Nigerian oil production averaged 2.45 million barrels per day (bbl/d), of which 2.28 million bbl/d was crude oil. With new projects coming online, the Nigerian government hopes to increase oil production capacity to 4 million bbl/d by 2010.<sup>22</sup> The oil industry has been responsible for damaging the environment in the Niger Delta region through construction work, dredging, oil spills, leakages and gas flaring. Moreover, despite significant social investment in the Niger Delta region, the industry has not stimulated improvements to the general socio-economic situation in the region or the country as a whole – including Nigeria's energy crisis. Continuing allegations are aimed towards the government regarding corruption and misuse of revenues and other associated financial flows.

Locally, IOCs are widely perceived as being unaware of the implications of their activities on the ground. This includes environmental damage and its impact on livelihoods; inherent problems with community relationship-building processes; and the tendency to devise development programmes without due consultation. Development initiatives have failed to be sustainable and have resulted in a dependency culture and a subgroup of benefit captors (who engage in patronage networks, criminal activities and political corruption) within the Niger Delta.

The perceived failure of the industry to improve local living conditions has exacerbated unrest in the Delta. This includes hostage taking, pipeline sabotage and accusations of human rights violations by all sides. The conflict has caused considerable reputational damage to IOCs, and has had a negative impact on the investment climate in the country. As a result, IOCs are actively seeking ways to address development issues in the Delta to improve relations with local communities and the government, and improve international perceptions of oil and gas development in Nigeria. There is a sense of urgency and considerable amounts of money are being directed to the region. Yet there is also a sense that IOCs and other players are unsure where they should focus their efforts in order to be most effective.

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<sup>20</sup> *This Day* newspaper, Tuesday 25<sup>th</sup> November 2008.

<sup>21</sup> <http://news.bbc.co.uk/1/hi/business/4650924.stm>.

<sup>22</sup> [www.eia.doe.gov/cabs/Nigeria/Oil.html](http://www.eia.doe.gov/cabs/Nigeria/Oil.html).

## 2.2 Nigeria's energy potential

### *The policy framework*

Much of President Yar Adua's *Seven Point Agenda to Transform Nigeria* is devoted to energy and power generation.<sup>23</sup> The National Planning Commission (NPC) oversees the National Economic Empowerment Development Strategy II (NEEDS II), and state-level (SEEDS) and local-level (LEEDS) programmes.<sup>24</sup> All Nigerian states have SEEDS programmes with energy plans and targets, but little is actually being implemented, due to shifting political priorities – most recently as a result of the 2007 elections.

The Nigerian government's strategy for upgrading energy infrastructure focuses on: (1) strategic partnerships with other countries (e.g. Brazil, France, Germany, India and China); and (2) opening up the Nigerian energy sector to foreign investment through partnerships with states, local companies and IOCs. In some cases, government requirements for investment in infrastructure are part of overall negotiations between the federal government and IOCs in the form of mandatory social investment.

### *Independent power projects*

Legislation passed in 2000, which supports independent power production, permits Nigerian states to build their own decentralised power plants, known as independent power projects (IPPs). IPPs can be partnerships between the private sector and federal or local government. Some Niger Delta states have partnered with IOCs to develop and repair a number of power plants. The joint ventures of Agip, Chevron, Shell and Total have funded a number of IPPs (see Box 2.1). IPPs are business ventures, but IOCs tend to treat them as social investments, rather than core business.

IPPs provide an opportunity for the domestic use of flared gas and they help companies meet their gas flare reduction goals. The government offers generous tax incentives for gas powered IPPs and they may also be eligible for carbon credits. However, they are not an ideal solution to Nigeria's energy crisis. They have experienced delays with construction and accusations of misappropriation of funds. Furthermore, the current IPP approach prioritises large-scale projects. The challenge is to support more small-scale community-based approaches.

#### **Box 2.1. The Egi Electrification Programme**

Total's Egi Electrification Programme is an IPP and community development project undertaken in partnership with the Nigerian National Petroleum Company (NNPC). The aim is to provide uninterrupted electricity to all communities of Egi District, Rivers State, in the Niger Delta. A 13 MW independent power station uses associated gas from the nearby Obagi field. The plant generates electricity that is distributed through a local transmission network. The project includes the renovation, expansion and activation of the electricity network in communities already connected to the grid, and a new transmission network to bring further communities onto the grid.

IPPs in southern Nigeria are most likely to use gas, since they are situated close to wells, the West Africa Gas Pipeline and other gas supply infrastructure serving Lagos. However in the Middle Belt and the north the IPP model could be applied to smaller-scale renewable energy provision (wind, solar, hydropower and biomass). Partnerships could include the government, IOCs, donors and other private sector actors. Such IPPs would be much smaller in terms of

<sup>23</sup>The seven major issues are: (1) power and energy; (2) food security and agriculture; (3) wealth creation and employment; (4) mass transportation; (5) land reform; (6) security; (7) qualitative and functional education. Two special interest issues are: the Niger Delta and disadvantaged groups.

<sup>24</sup> These provide Nigeria's road map for achieving the MDGs.

output but would help government reduce its reliance on hydrocarbon energy sources. One example of a biomass based IPP is a joint initiative between United Nations Industrial Development Organization (UNIDO) and Ebonyi State, south-east Nigeria (see Box 2.10).

**Investment in a range of small-scale decentralised power generation plants (based on renewable resources or natural gas) could provide a viable long-term solution for Nigeria's energy needs, particularly for low-income markets.** Connecting rural areas to the grid will be slow and expensive. IOCs could play a key role in facilitating decentralised energy provision, based on both natural gas and renewable energy sources, by focusing social investment towards decentralised energy initiatives. The challenge is not only to focus on the hardware (i.e. generating capacity and infrastructure), but also the "software" (i.e. involving communities, getting the finance right, and supporting the development opportunities – health, education, enterprise development – afforded by energy provision).

### ***Natural gas production and flaring***

Nigeria has traditionally been an oil producer, but it is clear that natural gas will play a major role in the country's future. The increasing global demand for liquefied natural gas (LNG) has spurred interest in Nigerian gas reserves, which were previously considered to be stranded or difficult to transport to global markets. Reserves of associated and non-associated gas are estimated to be over 160 trillion cubic feet. Proven natural gas reserves are among the 10th largest in the world; production is estimated to be over 100 years.<sup>25</sup>

Nigeria's natural gas resources are under-utilised domestically and most gas is exported. According to the US Energy Information Administration, in 2004, Nigeria produced 800 billion cubic feet, consumed 325 billion cubic feet, and exported 475 cubic feet.<sup>26</sup> In 2008, Reuters reported that Nigeria was exporting about 3 billion cubic feet of gas per day (in the form of LNG), while flaring approximately 2.5 billion cubic feet per day, and delivering only 0.5 billion cubic feet per day to the domestic power sector.<sup>27</sup> With so much gas being flared, Nigeria is missing out on significant revenue, while valuable resources are being wasted that could be used by communities for power generation and other needs if the appropriate infrastructure were in place.

Nigeria is the second largest gas flarer behind Russia.<sup>28</sup> Gas flaring was officially banned in Nigeria in 1984 and a groundbreaking court case ruled against flaring in November 2005.<sup>29</sup> Although IOCs have made efforts in the last 10 years to reduce gas flaring, it has been impossible to achieve a total "flares out" because of the lack of domestic gas pricing in Nigeria and the technological and political challenges of gas capture and transportation in isolated areas. Under the gas flaring policy that took effect from 1 January 2008, companies pay a fine of \$3.5 for every 1000 standard cubic feet of gas flared. They were also required to shut down any oil field where associated gas is flared after 31 December 2008. However, it proved impossible to ensure full compliance and the deadline for 'flares out' has now been shifted to 31 December 2011.<sup>30</sup>

<sup>25</sup> From the Nigeria Liquefied Natural Gas (NLNG) website at [www.nlng.com](http://www.nlng.com). Note there are different statistics from Energy Information Administration (EIA): Nigeria has about 180 trillion cubic feet (around 36 billion barrels) of proven gas reserves (the largest in Africa and the seventh largest in the world) See: [www.eia.doe.gov/](http://www.eia.doe.gov/) and [www.ogj.com](http://www.ogj.com).

<sup>26</sup> [www.eia.doe.gov/cabs/Nigeria/Profile.html](http://www.eia.doe.gov/cabs/Nigeria/Profile.html).

<sup>27</sup> [www.globalinsight.com/SDA/SDADetail11539.htm](http://www.globalinsight.com/SDA/SDADetail11539.htm).

<sup>28</sup> <http://allafrica.com/stories/200902230222.html>.

<sup>29</sup> See: <http://news.bbc.co.uk/2/hi/africa/4438182.stm> and related press releases at [www.foe.co.uk](http://www.foe.co.uk).

<sup>30</sup> <http://allafrica.com/stories/200905060528.html>.

The government intends to divert gas from flaring towards domestic uses (Box 2.2). This includes the construction of conventional large gas-fired plants. The West Africa Gas Pipeline (WAGP) was intended to carry gas to satisfy the energy needs of some coastal cities. However, the project is mired in delays and cost overruns, with much of the gas being directed towards other West African states rather than the domestic market.

### **Box 2.2. The Nigeria Gas Master Plan**

The Nigeria Gas Master Plan aims to exploit the potential for gas to promote rapid economic development and to enhance Nigeria's competitiveness in gas markets. It seeks to do this by rapidly expanding the domestic market (including gas-to-power, methanol, liquid petroleum gas or LPG, urea and gas-to-liquids or GTL); consolidating Nigeria's regional position through development of the West African Gas Pipeline (WAGP) and the Trans-Saharan Gas Project; and rapidly increasing export of liquefied natural gas or LNG.

Challenges to achieving the goals of the master plan include the following:

- large projects require significant investment and lead time
- projects are vulnerable to corruption and delays (e.g. WAGP, LNG projects)
- decentralised small-scale options are not considered to be viable
- federal planning is not linked with state level energy planning
- consultation with stakeholders is inadequate and the plan lacks credibility
- the process is becoming increasingly politicised.

The terrain in the Niger Delta makes it difficult to lay transmission lines and other infrastructure. However, the large number of flare points near rural communities could provide a reliable off-grid source of electricity for communities that do not have access to the national grid. Gas-derived products could also be produced at source (see below). Box 2.3 summarises government incentives for stimulating investment in use of associated gas.

### **Box 2.3. Incentives for commercial use of associated gas**

In 1992 the Associated Gas Framework Agreement (AGFA) was introduced as part of a package of fiscal incentives for the commercial use of associated natural gas. It allows IOCs to deduct from their oil taxes capital expenses and operating costs for associated gas use. However, AGFA is also criticised for stimulating investment in export-led projects rather than in domestic development and supply.

**Current gas incentives are covered under the following:**

- Associated Gas Framework Agreement (AGFA) 1992
- Financial (Miscellaneous Taxation Provision) Acts 1998 and 1999
- Nigerian Liquefied Natural Gas (NLNG) Act 1990

**Collectively the incentives provide for:**

- an initial tax-free period of three years, renewable for two more years
- a reduced tax rate
- investment tax credit and allowances
- the quick recovery of investment
- application to LNG, gas-to-liquids, independent power projects, distribution/transmission infrastructure and fertiliser production.

In response to calls for greater gas use, the IOCs currently favour high return export options – liquefied natural gas (LNG) and gas-to-liquids (GTL). In February 2008, President Yar Adua approved a new gas policy and gas pricing regime aimed at increasing the supply of gas for domestic use. Under the new policy, oil and gas companies are obliged to allocate to the domestic market a specified amount of gas from their reserves and annual production. This puts pressure on companies to find locally oriented solutions. The Russian state company Gazprom is proposing to support flare-out technology and harnessing of associated gas for domestic energy generation in return for access to Nigeria's oil and gas blocks. This may raise the bar for other oil and gas companies in the region.

A key international donor-led initiative aimed at eliminating gas flaring is the World Bank/Norwegian Government partnership, the Global Gas Flaring Reduction Initiative (Box 2.4).

#### **Box 2.4. The Global Gas Flaring Reduction Initiative (GGFR)**

The GGFR is a partnership between the Government of Norway and the World Bank that aims to strengthen efforts to reduce and eliminate gas flaring globally. In Nigeria the GGFR aims to assist the government in designing financial mechanisms related to carbon credits, building capacity within Nigerian government institutions and the oil and gas sector and supporting demonstration projects to show the effectiveness of this approach. A major challenge is securing access to the gas for demonstration projects, and establishing the pricing structure for domestic use.

#### ***Production of gas-derived products***

One solution to the use of gas from isolated sources is to produce gas-derived products at source. For example, nitrogen-rich fertiliser, aqua urea, is an undersupplied but highly sought-after product in the agriculture sector. Methanol and ethanol can be used for liquid cooking fuel and as transport fuel additives for cleaner emissions. Liquid petroleum gas (LPG) can be used as a cooking fuel and as a transport fuel for public transport.

With a co-ordinated approach, oil companies, methane processors and stove distributors can profitably provide energy products to millions of people in the Niger Delta region. IOCs are not currently involved in such projects, but donors are exploring them. One such example is the USAID Methane to Markets programme, a public-private partnership focusing on methane recovery from landfill, agriculture, mining, oil and gas activities, for use as a clean energy resource (see below).

**There is a strong business case for IOCs to invest in the use of flared gas for local benefits.** Gas flaring poses a critical issue for IOCs that requires urgent action and a unique opportunity both for direct business investment, and social investment. Shutting the flares down and diverting the resource for local benefits will address climate change, company CO<sub>2</sub> targets, local environmental issues such as air quality, Nigeria's energy crisis and overall poverty in the country. It will contribute towards Nigeria's achievement of the MDGs. It will provide a clear response to criticism from communities, international environmental groups and the Nigerian Government. If the IOCs could demonstrate that they can shut the flares down and divert the gas to domestic use – bringing energy and power to communities – then it would go a long way towards improving their social licence to operate in the region.

## ***Coal***

Nigeria's coal reserves, estimated at 2 billion tonnes, were mapped and inventoried during the colonial era (US EPA 2006). Recently there has been renewed interest in exploiting these resources, particularly by India and China. In 2001 coal accounted for just 0.2 per cent of the total national energy mix. Recently, the government has sought to increase its use to reduce oil dependency and reduce deforestation caused by fuel wood collection.

Coal is used by cement producers, brick factories, foundries, laundries, bakeries, tyre and battery manufacturers and for domestic use (smokeless coal briquettes). Coal is also proposed for off-grid power plants. The national government (Nigerian Coal Corporation) owns the entire coal industry. Our research has yielded no information on clean coal technology in Nigeria. Methane is a useful by-product of mining but is frequently burned off and wasted.

## ***Renewable energy***

The Nigerian government launched its Renewable Energy Master Plan (REMP) in January 2007 (Box 2.5). This provides a roadmap for the gradual move away from fossil fuels, and an increase in the role of renewable energy in satisfying the country's energy needs. It aims to facilitate greater access to energy for Nigerians in order to improve living standards, especially in rural areas. The plan includes programmes to promote solar, micro-hydro, wind and biomass including investment in research and development.

### **Box 2.5. Renewable Energy Master Plan**

1. **Policy guidelines to improve market development** including local manufacturing of renewable energy components, strategic agreements with technology providers (private sector/international governments) and skills development (e.g. maintenance, installation).
2. **A Donors' Consultative Forum** to mobilise resources from development partners for achieving the aims of the National Action Programme.
3. **Media and communications strategy** to enhance public awareness of renewable energy and energy conservation.
4. **Pilot projects** to support the implementation of solar and other rural electrification pilots.

REMP supports an energy service delivery model involving community-based approaches and micro, small and medium-sized entrepreneurship in energy service delivery. REMP includes recommendations for rural electrification; dissemination of improved woodstoves, biomass, solar and micro-hydro development; and promotion of biogas technology. Policy recommendations also support the exploration of opportunities for investment via Kyoto Protocol mechanisms.

International donors have shown considerable interest in supporting and stimulating renewable energy initiatives in Nigeria and more broadly throughout Africa. Key players include the European Union, United States, World Bank Group, and other major development partners. Some of these initiatives focus on a specific type of energy (see below). Others cover more than one form of energy, such as the International Finance Corporation's Lighting Africa initiative<sup>31</sup> and the Ashden Awards (see Box 2.7).<sup>32</sup>

<sup>31</sup> [www.ifc.org/ifcext/africa.nsf/Content/Lighting\\_Africa](http://www.ifc.org/ifcext/africa.nsf/Content/Lighting_Africa).

<sup>32</sup> The Ashden Awards are presented to enterprise-based sustainable energy projects worldwide. The aim is to stimulate the sector and change thinking and policy by governments, donors and NGOs. ([www.ashdenawards.org](http://www.ashdenawards.org)).

### ***Solar power***

There is considerable potential for solar-powered energy service provision in Nigeria's rural communities, in the form of solar photo-voltaic (PV) or solar thermal power. Solar energy can power water pumps, fridges, lighting systems and information and communications technologies (ICTs). Combined models, e.g. with jatropha oil back-up systems, are also an option. (Jatropha is a plant that produces seeds containing up to 40 per cent oil.)<sup>33</sup> Community-based solar enterprises can be set up with training in installation and maintenance skills and loans for solar entrepreneurs, and with introduction of flexible and appropriate payment systems for consumers (including loans for initial purchase of systems).

Government-led projects are targeting rural communities but are having limited impact, with particular challenges in the areas of maintenance and replication (Box 2.6).<sup>34</sup> There has been less commercial interest in supporting renewable energy. The current available technology is not yet cost effective, but this is expected to change between 2010 and 2015, if the market is supported and nurtured. More affordable solar technology components and services are beginning to emerge in local markets, many being imported from China.

Small-scale initiatives are being developed with the support of donor agencies and NGOs (Box 2.7). The challenge is how they can be scaled up beyond the pilot phase, and how sustainable local energy markets can be created.

#### **Box 2.6. Lagos State solar power project for island community**

In May 2007 the Lagos State government launched a pilot solar power project on a small offshore island where the local population (5,000 people) practise fishing and boat-building. Due to its isolation, the island had no access to electricity apart from diesel generators. The USD 83,000 project has provided the village with electricity to power a fish drier, the community hall, churches, mosques and the main street. The electricity has also improved information flow by powering televisions and increasing the use of mobile phones. It has enhanced attendance at the local school by encouraging children to remain on the island rather than commute to Lagos. Power is still intermittent but more reliable than that provided by the national grid in neighbouring communities. The project has a market model, with a price structure that requires businesses to pay business rates for their energy provision. However residents have to be careful not to overload the system which then requires re-setting by Lagos State officials. Training local residents to maintain and service the system would help to improve the turn around time for re-setting.

<sup>33</sup> See: [www.sonne-ueber-mbinga.de/en](http://www.sonne-ueber-mbinga.de/en).

<sup>34</sup> See: [www.enn.com/business/article/28308](http://www.enn.com/business/article/28308).

### **Box 2.7. KXN Nigeria Ltd.**

KXN Nigeria Ltd. is a commercial renewable energy company providing solar distribution, installation and maintenance services. Its primary customers are development agencies, foundations, government contractors, oil companies, and engineering firms. In 2005, KXN Nigeria Ltd. won an Ashden Award for a programme to install 189 solar-powered vaccine refrigerators in 90 villages in Northern Nigeria.<sup>35</sup>

KXN worked with the government to develop the specifications for the refrigerators, and trained local technicians to install and maintain them. They helped technicians to become solar entrepreneurs selling commercial products and services (e.g. solar home systems, battery charging and water pumping). KXN estimates that about 6,000 vaccine refrigerators could be installed in Nigeria over five years. They plan to train over 100 technicians as accredited PV installers for Nigeria's six northern states. They also aim to create an independent private-sector network to monitor and maintain the solar vaccine refrigerators and deliver additional solar services.

A number of social enterprise initiatives have demonstrated some success in introducing solar power into rural settlements. An example is the work of the Niger Delta Wetlands Centre (Box 2.8).

### **Box 2.8. Niger Delta Wetlands Centre**

The Niger Delta Wetlands Centre (NDWC) has installed solar systems to support water pumping, lighting, medical refrigeration and communications systems in remote Niger Delta communities. NDWC has a training programme for graduate engineers and technicians to enable them to design and install solar systems. Challenges include damage, theft and neglect of components, and instilling a sense of local ownership over projects. Efforts are being made to overcome these challenges through community engagement and awareness-raising, skills training and practical steps such as installation of heavier components to combat theft. NDWC is now focusing on how to scale up and replicate successful pilot initiatives. NDWC also has pilot solar projects at its office training centre in Yenagoa, Bayelsa State. A stand-alone security light and a solar water pumping system have been in place for four years. A demonstration traditional mud and thatch hut was constructed to show the efficacy of solar energy systems in a typical simple Niger Delta home.

However, despite several successful small-scale and pilot initiatives, there has been limited penetration of solar technology. The overall approach to solar energy development in Nigeria requires more coherence, collaboration between actors, and policy support. It requires broad promotion of successful demonstration projects to overcome people's mistrust of the technology.

### ***Wind***

Nigeria has significant onshore and offshore exploitable wind energy reserves, but so far this remains an under-explored sector. Wind-powered water pumps were once a common sight, but today these simple structures are no longer maintained and people collect water by hand. There is a lack of know-how, capacity and encouragement from the government and other development actors on how to tap into wind energy.

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<sup>35</sup> [www.ashdenawards.org/winners/kxn](http://www.ashdenawards.org/winners/kxn) (accessed 24 June 2008).

A potential solution might be to rehabilitate existing wind pumps and equip them with a solar unit as a back-up source. This could take care of water needs for entire communities, while providing some power for lighting. Offshore oil platforms could also be used to erect turbines to provide power to island and coastal communities via transmission cables. Northern Nigeria and the Middle Belt have particularly good potential for wind power. These are areas where IOCs are not active, but should be considered as part of the mix.

### ***Hydropower***

Historically there has been substantial investment in large-scale hydro-powered dams; however, much of this infrastructure has fallen into disrepair. Hydropower remains a particular interest in the national energy strategy. There are 278 identified but undeveloped sites for small-scale hydropower production, with a total capacity of 734MW.<sup>36</sup> However, these are geographically concentrated and becoming increasingly less reliable due to more frequent droughts in the north and to civil unrest in the oil producing regions. The World Bank and UNIDO are focusing heavily on micro-hydro with some pilot initiatives (Box 2.9).<sup>37</sup> There are also some independent local initiatives.<sup>38</sup>

#### **Box 2.9. UNIDO micro-hydro support programme**

UNIDO recently completed two of four planned pilot projects intended to build awareness and create capacity for micro-hydro power development in Nigeria. The projects in Enugu State (30KW capacity) and Bauchi State (150KW) were undertaken through a partnership, with UNIDO providing the equipment and expertise, and states and local government providing other logistics and work in-kind. Power generated from the projects will provide electricity for light, agricultural processing and information and communications technology (ICT) for local communities. The projects also provide technical training and energy efficiency awareness to ensure the technology is maintained locally and sustainably.

### ***Biomass***

Many communities will remain dependent on wood fuel and charcoal for their energy needs. Fuel wood usage can be made safer and more efficient through the use of improved woodstoves. Several initiatives by donors and NGOs are attempting to address the issue of indoor air pollution and fuel wood demand through business-based initiatives that focus on design and promotion of more efficient stoves and use of alternative fuel sources.<sup>39</sup>

Other forms of small-scale biomass sources for stoves also provide an attractive option. Briquettes can be produced locally from local waste products such as rice husks, coconut cairn/shells, wheat husks, sawdust and other products. A viable – and low-carbon – briquette industry would provide jobs and enterprise opportunities locally while meeting a high demand for domestic cooking fuel. In Cross River State, for example, local NGOs source waste wood chips from local timber companies and process them into fuel pellets for locally manufactured stoves.

There is further potential for integrated waste management that will benefit from local agricultural waste. For example, UNIDO is supporting a pilot IPP in Ebonyi State which will generate electricity from waste rice husks (Box 2.10).

<sup>36</sup> See: [http://unidorc.org/nigeria/n\\_nigcapacity.htm](http://unidorc.org/nigeria/n_nigcapacity.htm).

<sup>37</sup> See: <http://unidorc.org/nigeria>.

<sup>38</sup> For example, in Jos, Plateau State a local power company National Electricity Supply Company (NESCO) operates a number of small-scale schemes that generate up to 19MW.

<sup>39</sup> See: [www.icednigeria.org/ImprovedWoodstoves.htm](http://www.icednigeria.org/ImprovedWoodstoves.htm); [www.ashdenawards.org/winners/ceheen](http://www.ashdenawards.org/winners/ceheen) and [www.hedon.info/docs/BP47-11-Obueh.pdf](http://www.hedon.info/docs/BP47-11-Obueh.pdf).

### **Box 2.10. UNIDO/Ebonyi State rice husk IPP**

UNIDO and the Ebonyi State government have signed a memorandum of understanding to construct a 5MW power plant fuelled by locally sourced waste rice husks.<sup>40</sup> Power generated from the plant will benefit local rice millers, farmers, small industries and local residents. Currently the state spends USD 2 million annually to power a diesel plant for the local rice mill. The new plant will also generate over 9,000 tonnes of ash that could be used industrially and earn the state a further USD 480,000 annually.

#### ***Biofuels***

The Nigerian government is piloting large-scale biofuel production for use in automobiles and generators, and for bio-gas production. The Nigerian National Petroleum Corporation (NNPC) received a grant of 70,000 euros from the Renewable Energy and Energy Efficiency Partnership (REEEP)<sup>41</sup> to support a detailed feasibility study into high ethanol-yielding cassava varieties and other biofuel feedstock for production of two types of automotive fuel: ethanol fuel and palm oil diesel.

The government has signed a MoU with Brazil for technology transfer and supply of ethanol from sugar cane, including importing ethanol from Brazil until Nigeria is ready to start producing. There is a further agreement with Cuba on ethanol supply.<sup>42</sup> Ethanol will be used as an additive to petrol, constituting a proposed 10 per cent of the mix.<sup>43</sup>

Large-scale biofuel production continues to be controversial. Agricultural federations and international NGOs such as Oxfam oppose the plans on the grounds that they threaten the livelihoods of cassava producers and their ability to feed local populations.<sup>44</sup> However, Nigeria – like other African countries – is well positioned to produce biofuels that do not displace the production of essential foodstuffs or raise the price of food. *Jatropha* can be grown on marginal lands, producing 4 gallons of biofuel for every 1 gallon of gasoline used to produce it.

#### ***Methane capture***

Nigeria is one of the world's 10 largest emitters of methane with 38 per cent coming from landfills, oil and gas exploration and coal mining. Landfills in particular present a near-term opportunity for Nigeria. In addition to tapping into existing landfills in urban areas, a small-scale approach could be undertaken to support the development of local integrated waste management strategies. Such plans would incorporate recycling and landfill management and result in the production of landfill gas for energy and local fuel generation. The US EPA Methane to Markets partnership has recently funded a landfill inventory of Nigeria's five largest landfills. The inventory will assemble and report on information to examine opportunities for methane recovery and use.<sup>45</sup>

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<sup>40</sup> See: [www.unido.org/fileadmin/ext\\_media/Publications/Newsletters/Green\\_Industry\\_No1.pdf](http://www.unido.org/fileadmin/ext_media/Publications/Newsletters/Green_Industry_No1.pdf).

<sup>41</sup> REEEP is a global partnership that structures policy initiatives for clean energy markets and facilitates financing for sustainable energy projects ([www.reeep.org](http://www.reeep.org)).

<sup>42</sup> See: [www.biopact.com](http://www.biopact.com).

<sup>43</sup> However, this does not cover the black market where a large amount of petrol is sold.

<sup>44</sup> See: [http://citizenship.yara.com/en/shaping\\_issues/energy/added\\_knowledge/index.html](http://citizenship.yara.com/en/shaping_issues/energy/added_knowledge/index.html).

<sup>45</sup> Lessons could also be learned from the Clinton Foundation experience in Mexico City for example (see [www.clintonfoundation.org/what-we-do/clinton-climate-initiative/i/mexico-city-waste-management](http://www.clintonfoundation.org/what-we-do/clinton-climate-initiative/i/mexico-city-waste-management)).

**IOCs can play a role in stimulating development of the renewable energy sector with targeted social investment in renewable energy initiatives across the range of resources, from solar, to micro-hydro, to wind, to biomass.** To be most effective IOCs will need to develop partnerships with local and international NGOs, donors and governments. Initiatives should seek to address community development needs, both public, such as education, health and waste management, and private, such as small business development and household systems. Linkages could be made with development targets, including meeting the MDGs. These investments should be decoupled from core business goals. However, there might be some potential for such initiatives to create markets for IOCs' renewables branches. Further linkages can be made with renewables branches, for example through technology transfer and by bringing in experts to contribute expertise. This might be undertaken as a kind of 'immersion' exercise, where company employees are encouraged to engage in development work as part of their personal and professional development.<sup>46</sup> There may be opportunities to test proprietary technologies in developing markets. IOCs could collaborate together by bundling social investment funding as an industry group in the country.

In the following chapter we explore some of the challenges associated with developing and implementing community-oriented sustainable energy initiatives.

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<sup>46</sup> For more on the 'immersion' approach, see: [www.planotes.org/pla\\_backissues/57.html](http://www.planotes.org/pla_backissues/57.html).

### 3. TACKLING CHALLENGES TO SUSTAINABLE ENERGY SERVICE DELIVERY

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As we have seen, there have been a number of pilot projects in both renewable energy and gas use in Nigeria. However, so far very few initiatives have been scaled up or replicated. In this section we highlight some of the key challenges that practitioners have identified in facilitating local energy provision in low-income communities. Where possible we also discuss ways to address these challenges.<sup>47</sup>

#### 3.1. Aiming for broader sustainable development impact

To be more effective at addressing development issues in general, including energy poverty, IOCs need to focus on actual local needs, rather than responding primarily to political pressure. For this, the following issues should be addressed:

- encourage local ownership and involvement
- empower and build the capacity of communities
- support community-based models for energy service delivery
- conduct needs assessments and market research
- ensure disadvantaged communities are reached
- focus beyond host communities
- take a holistic view of development.

Below we discuss each of these points in turn.

##### ***Encourage local ownership and involvement***

It is important to involve local communities in a meaningful way in the design and implementation of interventions. This also has the benefit of reducing the potential for conflict and of ensuring long-term local commitment and fostering a sense of local ownership over initiatives.

Local ownership by entrepreneurs and local authorities is essential to ensure that a pilot initiative can be scaled up into a long-term sustainable business. The enterprise process needs to be aligned with people's own desires and aspirations; it needs to be something that they will be able to operate and manage themselves in the future. Many sustainable energy technologies are not widely available to communities and as a result they frequently do not understand the options available. Technical assistance by development partners to support promotion and adoption of appropriate technologies is crucial.

Some donors and IOCs insist on a community contribution to their projects, in the form of an in-kind contribution of labour, as a way to ensure community commitment and ownership. However, some sensitivity is required. It is too early to talk about a community contribution until relations and trust have been established with the community and they have been convinced that the project is not going to fail.

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<sup>47</sup> This section draws on insights from a workshop organised by the International Institute for Environment and Development and Practical Action on 18 July 2007: *NGOs, Business and the Challenges of Scaling Up* ([http://practicalactionpublishing.org/?id=workshop\\_18-07-2007](http://practicalactionpublishing.org/?id=workshop_18-07-2007)). It also draws on two recent reports that highlight key challenges associated with attempts by the United Nations Environment Programme (UNEP) (Krause and Nordstrom 2005) and the International Finance Corporation (IFC) (Magradze *et al.* 2007) to promote solar PV technology in Africa and globally.

### ***Empower and build the capacity of communities***

Local capacity building is essential for the long-term success of interventions. This ranges from training local communities in installation, maintenance and business skills; to establishing local financial services; to institutional capacity building within government and community institutions for strategic market development. In addition to technology transfer and maintenance, training is also needed to build capacity for local manufacture and assembly of equipment and spare parts. Entrepreneurial networks and associations can be useful for building and exchanging skills and experience. It is also important to prepare local consumers for using new types of technology, engaging in minor maintenance and overcoming financial challenges.

IOCs are already seeking to move beyond simple consultation and towards empowering communities to take an active part in decision-making around their social investment interventions. Companies see this as a way to maintain their social licence to operate. Efforts have been made to support the creation of community development councils in Nigeria (via the Global Memorandum of Understanding or GMOU),<sup>48</sup> although so far they have had limited success.

A more effective model would be Energy Development Councils comprised of representatives of existing organised groups, including women, youth, farmers, local traders and others. Experienced NGOs could work with the councils on needs assessments and capacity building. This could be financed by donations from the local and state government, IOCs and donors. Following the Africa Enterprise Challenge Fund model<sup>49</sup> this could be administered by an independent organisation. IOCs' social investment funds could be used to support capacity building of local NGOs (in partnership with experienced international NGOs) to provide support services to communities.<sup>50</sup> This would serve to create a local pool of expertise to benefit future projects.

IOCs could also partner with local/state government to deliver a package of sustainable energy programmes, combining capacity building, technology transfer, training, appropriate financing, costings of solutions, maintenance and repair.

### ***Support community-based models for energy service delivery***

Community-based models have great potential but require significant investment of time and skills development. A community-based enterprise might be started up as a partnership driven by the private sector with the community as the main beneficiary. Service delivery should be commercially viable but may require early subsidies or price controls. Such a model would be appropriate to meet the energy needs of the under-served in rural areas with no access to the grid. This approach is demand-driven. It encourages and builds on existing local institutions and supports the growth of new institutions that can manage and provide the energy services in the long term (Box 3.1). It is based on an energy supply option that is most appropriate to the community's current needs, identified by the community itself.

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<sup>48</sup> The Global Memorandum of Understanding (GMOU) is an approach that has been adopted by Shell and Chevron to manage relations with communities in the Niger Delta. The GMOU is a 5-year agreement between the company and a cluster of local communities to provide financial and institutional support for community development. The approach aims to create participatory development processes and address sustainability challenges for both the business and the communities. (See for example Chevron's web page on community relations in Nigeria at: [www.chevron.com/countries/nigeria/?view=3](http://www.chevron.com/countries/nigeria/?view=3) and Shell's baseline survey report for the Soku community in Rivers State at: <http://akulgaclusterfoundation.org/Downloads/sokureport.pdf>).

<sup>49</sup> For more about the Africa Enterprise Challenge Fund see: [www.aecfafrica.org](http://www.aecfafrica.org).

<sup>50</sup> In Azerbaijan, BP trained local NGOs to monitor the social impact of the Baku-Tbilisi-Ceyhan (BTC) pipeline project. In the course of this work, the local NGOs built up their capacity and experience, and are now able to offer similar services to other international organisations working in the region. See: [www.ipieca.org/activities/partnerships/downloads/casestudies/ngoazerbaijan.pdf](http://www.ipieca.org/activities/partnerships/downloads/casestudies/ngoazerbaijan.pdf).

### **Box 3.1. Bonny Utility Company**

Bonny Island, the location of the Bonny Export Terminal and Nigeria LNG (NLNG) has enjoyed 95-98 per cent electricity provision from the Bonny Utility Company (BUC).<sup>51</sup> The initiative is supported by Shell, Total and ENI – joint venture partners in NLNG – who provide electricity to the community generated from gas turbines. The power feeds into the distribution facilities of BUC who supplies the power to homes and businesses. Electricity consumers pay money into a local bank to receive credit, which they load into electricity meters. BUC has successfully connected over 7,800 households and has plans to expand to neighbouring towns. Access to affordable and reliable electricity has enabled businesses to prosper, with new businesses growing and local traders, artisans and other small businesses relocating from nearby cities such as Port Harcourt and Calabar.

#### ***Conduct needs assessments and market research***

It is critical to engage closely with local communities to assess their actual (not assumed) needs and develop culturally appropriate interventions to satisfy those needs in a long-term, sustainable way. Market development should focus on demand (meeting needs) rather than supply (pushing products). It should also take into consideration the available local resources.

The community needs-driven approach might take the form of a participatory needs and opportunities assessment, with a consideration of the potential for different energy options to satisfy local needs.<sup>52</sup> It is important to consider the potential economic opportunities that may be created by providing access to energy, and build support for such opportunities into the design of the initiative.

#### ***Ensure that disadvantaged communities are reached***

Most purely business-based development interventions – including so-called base of the pyramid approaches (see Section 1.3) – are unable to reach the poorest or most isolated communities, due to the nature of markets and the profit margins involved (see Wilson *et al.* 2008). As a result, these communities are often overlooked and remain dependent on unsustainable aid interventions, or on the government, which frequently fails to fulfil its social obligations. Partnering with local governments, donors, NGOs and social enterprises can provide opportunities to reach the poorer communities.

Social enterprises and NGOs fill a niche in energy provision and other development programmes, focusing not on profit margins, but on ensuring that interventions are economically self-sustaining in the long term. One example is the model developed by SolarAid in Malawi, Tanzania and Kenya (see Box 3.2). A similar approach could be piloted in Nigeria. IOCs can support such initiatives via targeted grants and small-scale loans.

<sup>51</sup> See: [www.nigerialng.com/NLNGnew/community/Bonny+Utility+Company.htm](http://www.nigerialng.com/NLNGnew/community/Bonny+Utility+Company.htm).

<sup>52</sup> See for example: [www.scn.org/cmp/modules/par-par.htm](http://www.scn.org/cmp/modules/par-par.htm).

### **Box 3.2. SolarAid**

SolarAid<sup>53</sup> supports development of micro solar businesses with small products such as 1 watt solar chargers and kerosene lamps converted to LED light. Local people are trained to become micro-solar engineers and entrepreneurs. Products are assembled in Africa and spare parts can be purchased locally. The solar chargers are tailored to the products that people already own (radios, phones). The micro-solar panels are small and portable. The most important aspect is the empowerment of people to do things themselves (particularly women and the disabled who are involved in the local enterprises). Local ownership is important, as are the local entrepreneurs who drive the initiatives locally. Market research is essential: people reported that health issues and cost were important, as were cultural factors, such as the status of having an electric light bulb. They identified an optimal price that they were prepared to pay for products and the seasons when they have money to pay, so payment schedules could be arranged. Charities such as Christian Aid and Traid have provided funding for market research, training and pilot initiatives. SolarAid is currently exploring carbon markets and other financial mechanisms for a new scale-up phase of development.

### ***Focus beyond host communities***

Donors have expressed frustration that IOCs focus their efforts almost exclusively on the communities located next to their operations, with the primary aim of securing a social licence to operate. Donors (and NGOs) are reluctant to collaborate on projects that are specific to an IOC's operational interest. This focus on host communities has been blamed for exacerbating inequalities in the Niger Delta. Development could be more equitable if the needs of communities located at some distance from oil and gas operations were also addressed. Similarly, it is important to consider the needs of both northern and southern regions of the country.<sup>54</sup>

The challenge for IOCs is to think beyond local political pressures and to direct social investment to other parts of the Niger Delta and across the country. The business case includes enhancing relations with the government by aligning social investment with targets for decentralised energy provision and helping to enhance stability and economic development in the country as a whole. This approach would also facilitate partnerships with donors and NGOs, by decoupling investments from strategic business interests.

Working in non-host communities has advantages, including lower community expectations, fewer benefit captors, and reduced levels of corruption. One option for pilot initiatives may be thus to focus on one host and one non-host community.

### ***Take a holistic view of development***

Access and management of energy supply is not the only consideration in community-based energy service provision. A holistic approach is required to support the broader socio-economic development of the community (Box 3.3). This requires attention to market creation for local goods and value added processing opportunities; broader community needs around energy service provision (e.g. water pumping, irrigation, health and education); and enterprise growth and development.

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<sup>53</sup> SolarAid is a registered charity established by the UK-based solar energy company Solarcentury. See: [www.solar-aid.org](http://www.solar-aid.org) and [www.solarcentury.co.uk](http://www.solarcentury.co.uk) respectively.

<sup>54</sup> In Nigeria oil and gas is primarily extracted in the south. However, exploration has already begun in the north, around Lake Chad basin, and exploitation is likely to begin soon.

### Box 3.3. Jigawa Alternative Energy Fund

The Jigawa Alternative Energy Fund,<sup>55</sup> a partnership between the solar technology NGO SELF, USAID and Jigawa State government, seeks to demonstrate how solar PV technology can be applied to address multiple energy challenges, affordably and sustainably.

**Access to water:** Solar powered pumps supply villages with clean, fresh water from deep wells. With proper maintenance they are expected to last eight to ten years. The pumps have also reduced the amount of time that villagers spend collecting water.

**Improved health clinics:** Village health clinics benefit from light for night-time treatment and have installed refrigerators to store vaccines and other medicines previously unavailable on a regular basis.

**Improved schools:** Primary schools have been installed with two illuminated classrooms and computers. The reliable light also allows the schools to provide adult education classes in the evenings.

**Improved security:** Street lights allow villagers to congregate and engage in activities such as water collection after dark; they have enabled increased trade and activity for local night markets.

**Improved business opportunities:** Micro-enterprise centres provide electricity to six small businesses offering less expensive and more reliable power for their tools of trade.

IOCs could consider the potential opportunities for business linkages that might be created as entrepreneurial activity in a community increases due to the availability of new energy services (see Jenkins *et al.* 2007). This might include small-scale manufacture of useful goods (e.g. safety clothing).<sup>56</sup> Economic clusters can be supported for local industry and creating markets for locally produced goods and services, including the potential for adding value to local production.

From the earliest stages of the project, in the phase of project design, the implementers need to take into consideration the broader potential development impacts, and incorporate these into monitoring and evaluation programmes.<sup>57</sup>

## 3.2. Building effective dialogue and partnerships

Nigeria is the focus of considerable amounts of donor assistance and NGO activities, yet there has been no significant progress in resolving critical environmental and social problems in the country. There is a need for greater collaboration among the various actors (Table 3.1).

<sup>55</sup> See: [www.self.org/nigeria.asp](http://www.self.org/nigeria.asp).

<sup>56</sup> See for example the work of BP Azerbaijan's Enterprise Centre ([www.ecbaku.com](http://www.ecbaku.com)).

<sup>57</sup> The World Business Council on Sustainable Development has developed a framework to assess the contribution of business to the economic and broader development goals of the society where it operates ([www.wbcasd.org/web/measuringimpact.htm](http://www.wbcasd.org/web/measuringimpact.htm)).

**Table 3.1. Key actors involved in Nigerian energy issues**

Category	Examples
Government	Federal, state and local government, Niger Delta Ministry, Energy Council of Nigeria
Parastatals	Nigeria National Petroleum Company (NNPC), Niger Delta Development Corporation (NDDC)
International oil companies <sup>58</sup>	BG Group, Chevron, Conoco Philips, ENI, ExxonMobil, Total, Shell, Statoil-Hydro
Development aid agencies	USAID, European Commission, UK Department for International Development (DFID), World Bank/ International Finance Corporation (IFC), UN agencies, Canadian International Development Agency (CIDA)
International NGOs	Oxfam, Save the Children, Christian Aid, Africare
National and local NGOs	Living Earth Foundation Nigeria, Social Action, Stakeholder Democracy Network, ERA/Friends of the Earth Nigeria, Niger Delta Wetlands Centre
Charitable foundations	Ford Foundation, MacArthur Foundation, Clinton Foundation
Communities	Mega cities (e.g. Lagos), urban, peri-urban, rural and isolated villages <sup>59</sup>

In most cases, IOCs cannot implement access to energy initiatives alone, and frequently other players and business models (including social enterprise) may be better placed to deliver energy services, notably to the poorer segments of markets (see above). Partnerships allow the full range of skills and capacities offered by governments, donors, private sector, SMEs, NGOs and communities to be used. Increasingly IOCs are looking towards partnerships to address issues in the Niger Delta (see Idemudia, 2006).

Successful partnerships and collaboration require high levels of understanding and trust, and an ability to engage in meaningful dialogue. This has long been a problem in Nigeria. In this section we explore how IOCs can work with:

- the government
- donors
- civil society organisations
- communities
- other IOCs.

***Engage and collaborate with the government***

Some of the most complex and difficult relations for IOCs are with host governments. IOCs do not generally talk about development issues with governments – discussions tend to be about the core business. To address the current conflict situation a more holistic development-focused approach is required.

<sup>58</sup> IOCs operate as joint ventures with NNPC.

<sup>59</sup> In the oil producing region a distinction is often made between host (i.e. those communities located where the oil production takes place) and non-host communities.

Sectoral reform may be required before investments can take place in a secure way. This is often the role of the World Bank or a similar organisation, but IOCs could (and do) also take part in dialogue around sectoral reform. IOCs could also take part in dialogues on energy efficiency, power transmission or the balance between renewable and hydrocarbon development in the country's overall energy mix.

IOCs could contribute skills such as scenario planning, project management training, information provision and strategic investment to these processes, as well as providing support for research and convening stakeholders. The business case for such engagement includes contributing to investment stability, creating new investment opportunities and facilitating more effective social investment in the energy sector.

Observers suggest that IOCs need to be bolder in addressing issues of transparency and accountability with different levels of government. The Nigerian Extractive Industries Transparency Initiative (NEITI) has made progress in ensuring transparency of revenues between companies and the national government (see Section 3.6). However, many feel that revenue distribution and financial management at the sub-national level should be addressed more effectively. Whether this is a role for the next generation of NEITI (which many would disagree with) or for separate multi-stakeholder initiatives, IOCs could become involved in a relatively neutral way, for example by offering local governments financial management training.

There is a great deal of anxiety on the part of multinationals over the degree to which they feel they can influence governments and public policy on issues of good governance (see Webb and Carstens 2008). Different departments of IOCs engage – often independently, at different times and without internal co-ordination – with different levels and functions of government for different purposes (e.g. to negotiate investment agreements, secure licences, address environmental impacts and respond to social investment demands). A certain level of sophistication in internal communications is necessary to ensure effectiveness of overall engagement (see IIED and BP Azerbaijan 2007).

IOCs are frequently criticised for their lack of awareness of the policy context. This also hampers their effectiveness in engaging with policy processes. IOCs, in turn, are concerned about the lack of qualified individuals within government with whom to engage. IOCs and other stakeholders observe the government's own inability to understand policy, their lack of capacity to manage budgets and revenue flows and a general lack of willingness to take tough decisions.

A major issue is how to ensure that governments act as accountable partners in development projects. This could be addressed through public-private partnerships involving a cost-sharing agreement. For example, a small gas-to-power pilot project could be a joint venture between an IOC and the state power authority with the company itself managed and run at the community level. Local governments will need to be convinced that an initiative is likely to succeed before they will buy into it, either financially or with in-kind or logistical support. This is why demonstration projects are particularly critical at this stage.

### ***Form strategic partnerships with donors***

IOCs' social investment programmes in Nigeria have not generally been managed by experienced development practitioners, and have been criticised for being reactive and lacking effectiveness. Strategic partnerships between donors and IOCs might ensure that social investment funds are used in a more focused manner. In a partnership arrangement, donors could offer development expertise and skills. In turn, donors could benefit from the additional investment and business skills (e.g. project and financial management) offered by a business partner. Because of the relatively short donor cycles, partnering with IOCs, who have longer-term investment plans, could ensure longer-term financing of projects.

Partnerships with donors can be developed for investing in local manufacture of renewable energy components; setting up supplier networks; training and accreditation of installation, marketing and maintenance skills. Nestlé, Coca Cola and Unilever already operate in a similar way. There are many opportunities for investment in solar power in Northern Nigeria, but there is very little investment. IOCs could partner with donors to address energy provision in regions outside the Niger Delta.

Donors are still wary of engaging too closely with oil companies for fear that any association will be seen as promoting business interests. As discussed above, donors are frustrated with the IOCs' focus on host communities. For their part, IOCs have expressed scepticism about the effectiveness of donor partnerships. In the past there have been less than favourable partnerships between IOCs and various donor agencies in Nigeria. An ongoing issue for IOCs is the transparency of donor spending; IOCs have also had no role in monitoring and evaluation of projects.

### ***Engage and collaborate with civil society organisations***

IOCs acknowledge that it is generally to their benefit to have a strong civil society. It helps to balance the power of the government and mitigate the risk of corruption and misuse of funds. As noted above, local NGOs can also provide valuable services to energy interventions, be it training, monitoring and evaluation, needs assessments, social surveys or community consultation. IOCs can provide financial support to build their capacity in these areas.

Within local civil society in Nigeria there is an emerging acknowledgement that oil companies do have a positive role to play, primarily through financial contributions. However, questions remain about how sincere the oil companies are and whether the current sense of urgency to address development issues effectively will pass if current levels of tension and violence in the Niger Delta region subside. Some local civil society groups retain an ideological resistance based on an anti-corporate stance. They refuse to consider working relationships with IOCs. International NGOs are open to new working relationships. However, they remain concerned about being involved in "greenwash".

Tri-sector partnerships (involving IOCs, NGOs and government) are frequently discussed as potential solutions to sustainable development issues. Such models may be effective where IOCs provide financial support, matching funding is provided by government, and NGOs offer assistance to community-based organisations in the implementation. For more ambitious partnerships (e.g. IPPs), donors and other investors with technical expertise can be brought into the mix.

### ***Engage and collaborate with communities***

Communities tend to have very little understanding of IOCs. This is compounded by a regular flow of misinformation from government, NGOs, disaffected youth and benefit captors. There is very little knowledge of the government's role in joint ventures. Despite being the majority shareholder in joint ventures, the government regularly deflects blame onto the IOCs for community grievances. Furthermore, the nature of contracting of social investment projects has created an interlinked patronage network that benefits those in the system, while undermining company policy and preventing efforts from benefiting the target beneficiaries.

IOCs need to invest time and effort in community assessments and meaningful community engagement (as noted above). Company-community agreements could be negotiated to provide a foundation of predictability and mutual understanding for the partnership. IOCs frequently argue that their lack of consultation is to avoid raising community expectations too high. There is a need to provide more guidance on this. Good practice involves understanding how to talk to people in a realistic way. The community needs to understand that they cannot have everything they want; they need to decide on their priorities and the first steps for

achieving them. IOCs and NGOs can work with communities to agree on actual development priorities and how to achieve them most effectively.

### ***Cross-industry collaboration***

There are many advantages of IOCs working with each other on these issues. Transaction costs can be reduced and knowledge, resources, experience and information pooled. But to date, progress in addressing the development needs of Nigerian communities has been hampered by the difficulties IOCs have had in working together.

National oil companies and private corporations from emerging markets, particularly from China, Russia and India, are increasingly powerful players on the scene. In many cases, they are changing the landscape and opportunities, and raising the bar for social investment. There is an increasing need for IOCs to collaborate with these players. Similarly, some major engineering contractors are also becoming significant players and could play a valuable role in collaboration with other oil and gas companies.

### **3.3. Ensuring the flow of information**

Both rural and urban communities have limited access to information on sustainable energy options that are economically feasible. There is a lack of knowledge of the market potential and the potential for providing services to customers, how to replicate projects, identifying financial partners, and the means for creating and maintaining renewable energy systems. There is also a lack of awareness in communities about options for energy provision. Consumers often prefer and expect connection to the electricity grid, because they have limited understanding of the benefits of off-grid systems.

It is difficult to find out what oil and gas companies are doing in this area. There is no central platform for getting information on ongoing projects, opportunities, what has worked and what has not. Emerging initiatives with good potential are not well broadcast and marketed. This is down to poor communication practice rather than competitive secrecy. No-one has the time to keep others updated, and it is not perceived as a priority. Basic monitoring and evaluation is also lacking (see Section 3.4). Many of these issues relate to capacity.

IOCs could support the following:

- Awareness-raising events to inform communities, local businesses, policy makers and the international private sector of the potential for renewable energy sector development. Advocacy support will be important in order to ensure government and professional bodies are engaged. Local experts will have to be trained for dissemination.
- Development and dissemination of information and educational materials on renewable energy. This needs to be done through a participatory process drawing on specific community contexts – in Nigeria this can vary from state to state.

### **3.4. Establishing monitoring and evaluation systems**

Good quality monitoring and evaluation are essential for all development projects, including energy service provision for low-income communities.<sup>60</sup> Clearly defined monitoring and evaluation methodologies are required to provide rigorous, systematic evidence of the impacts of business-based energy service delivery initiatives on the lives of local consumers, enterprises, and communities overall.

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<sup>60</sup> See for example Kasturi Rangan *et al.* (2007).

The environmental, social and economic implications of an initiative all need to be taken into consideration from the inception of the project. Assessments of needs/opportunities, impacts and risks need to be carried out.

Local communities and NGOs can be trained to take part in ongoing participatory monitoring of the implementation of social investment projects. This can also serve to empower communities and NGOs to hold their governments to account. IOCs can collaborate with donors on this, both to empower communities and to build up a pool of available expertise for monitoring.

Systematically analysed case studies are also required in order to draw lessons from both successful and less successful access-to-energy initiatives. This will provide information about potential future options. Analysts and companies currently lack a framework against which to evaluate case studies in a systematic way. This kind of framework can be developed with the input of experienced donors and NGOs.<sup>61</sup>

### **3.5. Ensuring financial sustainability**

Many of the technologies we discuss are still developing and are still expensive to produce and maintain. Without external support, governments and communities cannot afford to adopt them. For instance, the cost of solar PV modules, installation and battery replacement and maintenance is high, particularly in Africa. To succeed, products must be affordable for the target market. While many people may not be able to afford larger solar home systems (SHS), the micro-solar products promoted by SolarAid (see Box 3.2.) are affordable in the very low-income local markets in which they work.

Once take-up increases, economies of scale and availability of maintenance and parts (including local production) will help to reduce the costs. The private sector may not be ready to invest in renewable energy technologies because of the lack of a guarantee on return, but as a social investment they can begin priming the market for future business-driven opportunities.

Financing arrangements need to be flexible and appropriate. Frequently, small-scale business-based initiatives are dependent on grants and loans for their initial market research, pilot activities, training and awareness-raising, and establishment of supportive financial mechanisms (for entrepreneurs and consumers). Further investment may be required to replicate successful activities and grow an enterprise.

The challenge is how to use various available funds (from government, donors, NGOs and IOCs) to the best effect, avoiding long-term dependency on external financial support. Subsidies and grants without cost-recovery serve to undermine markets. However, wisely used, they can help to stimulate scale-up activities. Subsidies can be used to reduce the perception of risk and inspire confidence in a new approach. There is a place for subsidised or free services, but care needs to be taken with the application of such services.

Mobilising resources within Nigeria and local communities is important. There may be public and private funding opportunities and incentives. Affordable payment regimes for services are important. Community information centres, for example, could charge for solar-powered communication services. Some business support elements need to be funded on an ongoing basis from the business profits. Ongoing maintenance of energy systems needs a steady flow of finance from the business. Marketing and distribution are also ongoing considerations, as are monitoring and evaluation. Business planning needs to factor in the costs of these kinds of activity.

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<sup>61</sup> A range of guidance on participatory approaches can be found in the IIED online journal Participatory Learning and Action ([www.planotes.org](http://www.planotes.org)) and on the Action Research resources website ([www.scu.edu.au/schools/gcm/ar/arp/actlearn.html](http://www.scu.edu.au/schools/gcm/ar/arp/actlearn.html)).

### ***Micro-finance***

There is a range of possible micro-finance options, including micro-loans, leasing or lend-lease and franchise-type operations (see Box 4.1). Micro-finance is a specialised area: an IOC or NGO seeking to develop a micro-finance facility needs to partner with (or work via) a specialist micro-finance institution.<sup>62</sup> IOCs in Nigeria have supported micro-finance initiatives aimed at building up local small and medium-sized enterprises (in various sectors).

It is still too soon to comment on the long-term impact of these initiatives. However, reports from the communities involved indicate that success has been limited by corruption, free-riding, and stealing of funds. Observers note also that IOCs have been hampered by their lack of knowledge of the micro-finance sphere. The micro-finance sector in Nigeria is growing rapidly. However, promised government support has not materialised and the micro-finance institutions still need capacity-building support.

### ***Carbon finance***

The Clean Development Mechanism (CDM) under the Kyoto Protocol allows industrialised countries to invest in projects that reduce emissions in developing countries. Carbon credits generated by CDM projects are known as Certified Emissions Reductions (CERs). The Global Gas Flaring Reduction Initiative (see Section 2.4) includes the design of financial mechanisms related to carbon credits.

Projects must meet two criteria to qualify for CDM status: (1) the project must not be business as usual (i.e. it must be additional to standard exploration and production activities); and (2) it must contribute to sustainable development. Opportunities for funding small-scale renewable energy projects are limited under the CDM as they generate relatively small numbers of CERs and the transaction costs are high.

The World Bank's Community Development Carbon Fund (CDCF) established a model that covered the costs of developing CDM documentation, with the costs subsequently reimbursed via adjustment of CER levels. Programmatic CDM is another model: projects using the same technology are bundled together, thus sharing the costs. The voluntary carbon market also provides opportunities for funding emissions reduction projects that are not eligible under the CDM.

### ***Policy support***

A favourable policy framework is crucial for market growth of sustainable energy services. Such policies include the removal of import duties or tariffs on solar home system (SHS) components; incentives and targeted subsidies for decentralised and renewable electricity options or removal of subsidies for competing electricity sources; and legal enforcement of loan repayments.

## **3.6. Tackling corruption, funds management and security issues**

In January 2008 the Nigerian House of Representatives opened an investigation into allegations of financial misuse of power sector funds between 2000 and 2007. The figure in question ranges from USD 4 to USD 10 billion. The investigation claims that under the former President Olusegun Obasanjo, funds earmarked for improved capacity in the power sector were mismanaged and contracts were issued to non-existent companies for IPP projects. The former president had set a target of 10,000MW generating capacity by 2007, whereas the reality is that generating capacity had actually fallen to 3,500MW by the end of 2007.

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<sup>62</sup> Some examples include the Sakhalin Microfinance Programme supported by Exxon and run by ACIDI/VOCA ([http://russia.usaid.gov/about/partners/ACDI\\_VOCA/](http://russia.usaid.gov/about/partners/ACDI_VOCA/)); and BP and IFC's support to the Micro-finance Bank of Azerbaijan ([www.microfinancegateway.com/content/article/detail/45539](http://www.microfinancegateway.com/content/article/detail/45539)).

There is also concern about the use of oil and gas industry revenues. The Nigerian Extractive Industries Transparency Initiative (NEITI) has helped to bring stakeholders in Nigeria together around the issue of transparency of revenue distribution. This initiative and the related Publish What You Pay campaign call for oil and gas companies to publish the revenues that they provide to national governments, and for governments to publish what they receive. NEITI has galvanised civil society action around revenue management. However, NEITI does not extend to transparency of revenue distribution within the country. Civil society organisations have been calling for this and some initiatives are beginning to work on financial management capacity building for local governments.

### ***Transparency of social investment spending***

A major concern about both mandatory and voluntary social investment is that the spending is generally not transparent. Frequently, considerable mismanagement and corruption is involved in the spending. This includes the use of local contractors and their connections with local power holders and other political interests. NEITI does not apply to social investment funds. Robust funds management and contracting systems need to be established. Processes need to be transparent and contracts need to be properly managed. Effective monitoring needs to be in place.

Theft of equipment and security of company staff can be an issue in the Niger Delta. Local governments need to be encouraged to take responsibility for security of community projects – capacity building and collaborative efforts may be required here.

## **3.7. Stimulating innovation and creating markets**

Creating local markets in sustainable energy (including gas utilisation and renewable energy options) will require up-front investment to stimulate technological and commercial innovation. Social investment funds can usefully be targeted in these early stages of market creation, including targeted grants and low-interest loans.

Communities, governments and IOCs themselves frequently require convincing that something will work before scaling up and replication can take place effectively. Therefore the value of demonstration projects – with built in long-term financial self-sufficiency – cannot be underestimated. Demonstration projects can provide an important awareness-raising service, showing the viability of sustainable energy options and serving as training centres.

IOCs could support demonstration projects either as part of their core business projects (in collaboration with joint venture partners, the government and communities) or as social investment projects (in collaboration with government, NGOs, local companies and communities). It will be important from the outset to have a plan for scaling up pilot projects, and considering opportunities for broader learning and replication.

In the case of renewable energy markets, once economies of scale set in, the IOCs can benefit from a large renewable energy market to which they can supply materials, technology, innovation and training. In addition to addressing poverty, this approach would also offer a decisive step towards “de-carbonising” their business portfolios.

IOCs could subsequently pass on renewable energy business development opportunities to their renewable energy branches – or other renewable energy companies. Currently there is very little evidence of effective communication or collaboration between the hydrocarbon and renewable energy branches of IOCs, even within those who present themselves as energy companies with both hydrocarbon and renewable energy portfolios.

A multi-stakeholder approach is critical to the success of efforts to stimulate markets and innovation. Government can provide subsidies for the cost of materials and incentives for investment. IOCs can bring technology and technical and project management capabilities. IOCs can also partner with donors and NGOs to deliver training and outreach to communities. Ideally such a market creation exercise would be best supported by a cross-industry approach, pooling together interests, assets and innovation.

## 4. SOME SCENARIOS FOR IOCs IN PURSUING ACCESS TO ENERGY PROGRAMMES

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International oil and gas companies can – and do – address energy poverty in a variety of ways. In some cases these are core business activities, including investment in decentralised energy provision, using renewable energy or natural gas. There are further – more diverse – opportunities for corporations to address energy poverty via their social investment activities. These opportunities can be enhanced through policy dialogue.

In this section we summarise some of the options in terms of three scenarios (increasing in their level of commitment) for IOCs to deliver access to energy: (1) improved performance; (2) pushing the boundaries; and (3) radical change. This section relates primarily to the Nigeria case study, but the lessons could apply to many similar situations in oil-producing countries.

### 4.1. Improved performance

Current opportunities for both IOCs and communities – framed by government incentives and business goals – could be maximised if IOCs:

- Make a shift from reactive approaches (e.g. responding to political pressure) to proactive and integrated approaches that focus on addressing local needs and creating local opportunities.
- Ensure that they engage meaningfully with local communities and involve them in decision-making on issues that affect their environment, livelihoods and development opportunities.
- Increase transparency and information flow, including information on current projects and past experience.
- Tackle corruption.
- Undertake systematic monitoring and evaluation.
- Demonstrate greater willingness to provide flared gas for domestic use.
- Invest in increasing the efficiency of hydrocarbon development (e.g. through improved technology, carbon capture and storage), use of flared gas (including via independent power projects) and increasing local refining capacity.

Under this scenario, IOCs might consider core business initiatives or business-oriented social investment programmes designed to be self-sustaining in the long term. Given the concern to ensure a social licence to operate in the oil producing areas, initiatives are likely to be based in the host communities located close to project operations.

Such initiatives are likely to focus on gas use, as this is more closely related to IOCs' core operations, the available resources and current government incentives. These kinds of initiative require companies and governments to provide investment. One challenge is that where companies are willing to invest, it is frequently difficult to secure co-financing from the government.

Under this scenario, there are limited options for providing energy services to low-income markets as a core business activity, which may not be appropriate for the traditional IOC business model.

## 4.2. Pushing the boundaries

Further opportunities can be opened up if IOCs:

- Engage in innovative partnerships with government, donors, NGOs and communities focusing on integrated programmes of sustainable energy provision.
- Focus social investment on renewable energy projects, not only on gas-based projects. Micro-finance could be a key element of such projects (for consumers and entrepreneurs). Small-scale social investment can be used strategically to provide start-up support for energy initiatives (see Box 4.1).
- Increase co-ordination between mainstream and renewable branches of IOCs, to facilitate support via technology transfer and expert volunteers.
- Implement collaborative initiatives outside host communities, to greatly enhance overall impact regionally and country-wide.
- Explore opportunities via incentives such as use of carbon credits.
- Offer social investment to match funds put up by government and other development partners, and encourage governments to spend oil and gas revenues on sustainable energy provision in host communities, potentially with the support of donors.

These initiatives would require IOCs to take a more systematic approach to social investment, and to co-operate and share information with other IOCs operating in Nigeria. They would also require donors and IOCs to overcome their reluctance to work together, along with more proactive engagement with government on development priorities. Finally, public-private partnerships would be required for scalable projects.

### Box 4.1. Strategic social investment spending

**Start-up and scale-up grants:** These are only effective if provided to start up a business activity that already has a robust plan for ongoing sustainability. There is a danger that otherwise any grants will only create dependency not innovation or enterprise development. It will be more effective for IOCs to use an independent implementing organisation to administer the grants.

**Loans and micro-finance:** There is a range of micro-financing possibilities including straight micro-finance, leasing or lend-lease and franchise-type operations. Micro-finance is a specialised area; IOCs would need to partner with or work via a specialist micro-finance institution.<sup>63</sup>

**Business development training:** IOCs would need to partner with an NGO or development agency; they could offer business expertise in the form of courses, mentoring and staff volunteer programmes. IOCs could share techniques such as business planning; scenario planning; health, safety and environmental preparedness.<sup>64</sup>

*Cont over*

<sup>63</sup> See the examples of the Exxon and ACDI/VOCA partnership on Sakhalin Island, Russia ([http://russia.usaid.gov/about/partners/ACDI\\_VOCA/](http://russia.usaid.gov/about/partners/ACDI_VOCA/)); and BP/IFC support to the Micro-finance Bank of Azerbaijan ([www.microfinancegateway.com/content/article/detail/45539](http://www.microfinancegateway.com/content/article/detail/45539)).

<sup>64</sup> Statoil-Hydro for example has provided assistance for business development training in Murmansk, Northern Russia, through support for the Association of Suppliers to the Oil and Gas Industry (<http://eng.murmanshelf.ru/>).

**Technical training:** IOCs will have access to technical expertise via business partners and contractors. They can arrange for these partners to contribute to technical training or development of business partnerships.<sup>65</sup>

**Business linkages:** IOCs can provide opportunities for local enterprises to get access to their supply chains, in line with local content requirements (both for internal company policy and Nigerian laws). For example, a project may provide energy to a small manufacturing enterprise that makes safety clothing. The IOC could then work with the enterprise to reach international standards and then source these products.<sup>66</sup>

### 4.3. Radical change

More radical approaches for IOCs include:

- Establishing sustainable community-based energy companies for decentralised energy generation (based on renewable energy or flared gas). These would not be limited to host communities.
- Focusing social investment funds on creating markets for renewable energy, including local enterprise development using appropriate credit mechanisms. The renewable energy branches of IOCs might take pilot projects further, partnering with local businesses and government.
- Support could extend to related development opportunities arising out of the energy provision (cluster development).
- Taking a more decisive role in shaping policy, including energy efficiency dialogues and lobbying for greater incentives for investment in a range of energy sources, including renewables, to deliver decentralised as well as grid-based sustainable energy provision.
- Taking a more critical stance towards the government on issues of transparency, accountability and regulatory reform. This could help create a supportive policy framework for broad establishment of decentralised and community-based energy service delivery.

This scenario would not require more financing than the others, but would require IOCs to integrate business and development activities more systematically, explore challenging partnerships, and take a bolder stance in the policy arena. However this approach may yield greater benefits in the long term, both for business and for sustainable local development.

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<sup>65</sup> See some examples from East Timor and the Philippines on the website of Engineers Against Poverty ([www.engineersagainstopoverty.org](http://www.engineersagainstopoverty.org)).

<sup>66</sup> See BP Azerbaijan's approach to enterprise development ([www.ecbaku.com](http://www.ecbaku.com)).

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Development experts agree that ensuring access to sustainable modern energy services is critical to achieving the Millennium Development Goals. Some 2.4 billion people still use traditional biomass fuels for cooking, often facing the risk of indoor air pollution, while about 1.6 billion people have no access to electricity. In this report we explore how international oil and gas companies can contribute to tackling energy poverty in the regions where they operate. There is a growing business case for this, including the need to mitigate political and social risks, address community expectations and secure future investment opportunities with host governments. Oil and gas companies can – and do – address energy poverty in a variety of ways. These range from investment in decentralised energy systems, based on natural gas or renewable energy, to support for small-scale local energy enterprises, or building local awareness about sustainable energy technologies. These activities can be supported through policy dialogue with governments. This report focuses on Nigeria, a country with huge energy resources, yet suffering an ongoing energy crisis; a country that benefits from considerable oil and gas investment and revenues, as well as aid money, yet continues to face major environmental and poverty-related challenges.



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