RESOURCE EFFICIENCYAND THE CIRCULAR ECONOMY

1. ABOUT THIS E&S BRIEFING NOTE

This E&S Briefing Note is designed to help fund managers quickly familiarise themselves with the topic of resource efficiency as it relates to investment. It is not intended to be a detailed technical guidance document.

It is important to consider the linkage between resource efficiency and greenhouse gas (GHG) emissions. Efforts to tackle the reduction of GHG emissions resulting from business activities are inextricably linked to resource efficiency. Any improvements which a business can make in reducing the resources it uses will inevitably lead to a reduction in the GHG footprint of the business. Taking a macro-level sustainability approach, resource efficiency is also linked to the concept of the circular economy: the idea of moving away from a linear-based industrial economy to a circular-based economy which is restorative and resource efficient by design. Relevant aspects of the circular economy will also be addressed within this note.

The topic of GHG emissions and climate change is more specifically addressed in the CDC E&S Briefing Note: Climate Change.

Links to formal technical guidance are provided at the end of this Note and in Downloads & Reference Materials, including International Finance Corporation's (IFC's) 2012 Performance Standard 3: Resource Efficiency and Pollution Prevention.

This E&S Briefing Note provides an overview and general guidance. Fund managers should carefully consider each company based on its specific characteristics and circumstances including scale, location, technology, management capacity and commitment, and track record. Risks, impacts and opportunities relating to a particular company or sector can also change over time for a number of reasons (e.g. changes in the applicable laws and regulations or in the type of the company's activities or assets). Fund managers may need to engage external experts in some situations (see '4. Advice for fund managers' section below).

2. INTRODUCTION

All economic activity consumes finite resources (e.g. fossil fuels, minerals, water and timber) in a manner that may impact livelihoods and the environment at the local, regional and global levels. The consumption of raw materials generates pollution, depletes the world's natural stock of resources and is a principal source of GHG emissions associated with any business activity. Targeting greater efficiencies in the way resources are used can reduce a company's overall contribution to climate change and increase the sustainability and longevity of core business operations.

The cost of, and competition for, access to finite resources are growing; hence, this is increasingly material to business planning and strategy. Cost control and innovative approaches to securing sustainable and economically attractive supply are or will be a significant factor for many companies in the near and medium term. This will include the implementation of cleaner production/resource efficiency measures.

Resource efficiency means reducing the consumption and production of raw materials, goods and services over their full life cycle (i.e. ‘doing more with less’) and ultimately minimising waste/wastewater generation and reducing emissions on a per unit of output basis. Central to this is the way in which production and consumption systems are designed; from the choice of resource inputs, to the exchange of waste material becoming feedstock for another, to recovery of materials at the end of their life. The circular economy promotes the use of prolonging both technical and biological materials in the atmosphere to reduce the need for continual resource extraction and depletion of fossil fuels.

Resource efficiency and pollution prevention are closely related as more efficient use of the resources would typically reduce pollution risks and impacts. Please refer to the CDC E&S Briefing Note: Pollution Prevention.

3. WHY COMPANIES AND FUND MANAGERS SHOULD ADDRESS THIS TOPIC

3.1 Risks for the business

Failure to effectively manage resource consumption can result in risk/adverse impacts on companies, such as:

- Excessive expenditure on energy and water supply.
- Excessive expenditure on management of emissions, solid waste and wastewater.
- Interruption of the resource supply due to limited availability.
- Increased regulatory requirements and associated costs as national and international regulations become stricter.
- Competition with communities for non-renewable resources that impact on ecosystems and livelihoods and can generate feelings of opposition and grievance.
- Reputational damage caused through excessive resource extraction and subsequent pollution, which can be harmful for human, animal and plant ecosystems.

3.2 Opportunities for the business

Implementing resource efficiency measures can result in a range of business benefits over the short, medium and long term (particularly if the focus is on those most closely related to a company's core business activities). Opportunities include:

- Lower operating costs as a result of (i) lower consumption of resources and (ii) reduced generation of emissions, wastes and wastewater per unit of energy/output/product.
- Better preparedness for resource shortages.
- Preparedness for regulatory changes such as implementation of a carbon tax, and more stringent emissions standards.
- Enhanced corporate reputation and better stakeholder relations.

4. ADVICE FOR FUND MANAGERS

Companies and investors should understand the main risks linked to resource use, cost and availability and explore resource efficiency opportunities.

Sectors and activities with particularly significant energy, water and other natural resources consumption include:

- Mining.
- Oil and gas.
- Food and beverages.
- Power (particularly thermal power plants).
- Agriculture, aquaculture and forestry.
- Heavy manufacturing (e.g. cement, glass, pulp and paper mills, foundries).
- Logistics/transportation.
- Construction.

Fund managers should ensure that, at a minimum, companies have appropriate management systems in place and operate in compliance with applicable laws and regulations. In many cases, local regulations may not be fully aligned with good international industry practice (GIIP). Fund managers should assess companies' alignment with international standards and, where appropriate, develop action plans to ensure that any gaps are addressed within a reasonable timeframe.

Additional due diligence and monitoring should be done for companies that are considered intensive users of energy, water and other natural resources.

Specifically, companies and their investors should ensure the reduction of overall:

- Water use, by managing the water consumption associated with specific production processes and/or other business activities to avoid excess costs.
- Energy use, by managing the energy consumption associated with specific business processes and supporting utilities and investing in renewable energy sources, which would result in cost savings.
- Raw material use at the facility level, by managing resource consumption associated with specific processes to avoid solid waste generation and excess costs.

Companies should implement a management system which has defined procedures/mechanism to achieve the following:

- Identify opportunities to reduce water, energy and raw material usage levels over time – at each stage of the product or project life cycle.
- Record any initiatives that are enacted and track the efficiency savings that are subsequently realised.
- Overall, enable the company to move towards a more resource efficient business model.

It should be noted that the implementation of resource efficiency measures can mitigate not only environmental risks and impacts but also social ones (e.g. water efficiency measures in water-stressed areas will contribute to mitigating water-scarcity risks for local communities).

During the process to identify potential resource-efficiency improvements at an investee, consideration should be given to the following:

4.1 Process design

As indicated in the CDC Sector Profile: Project Design & Construction Guide, the feasibility and design phases of a project are key in terms of avoiding and mitigating risks and impacts, and maximising opportunities. The feasibility and design phases of a project are often the best point to identify resource efficiency opportunities to be implemented before they become too complex or costly to implement (e.g. changing a plant layout or replacing machinery once the plant is in operation can be very costly).

Using circular economy principles, developers may also want to consider conducting a lifecycle assessment on key project resources which would inform them about what resources are most effective to use in terms of the cost to human health, ecosystems and the environment. These types of assessments involve upfront costs but are often worthwhile to prevent future risks to the business and for ensuring that materials are sourced and chosen in the optimal manner. Exploring new methods of design for disassembly or modular based machinery would also increase the durability and efficiency of resources and materials.

Early engagement with project developers by fund managers around project design elements, technology and key business operations (e.g. raw material sourcing and transportation) are key to maximising resource efficiency.

4.2 Water use

Process water: Processes that typically use large quantities of water include washing machines, rinsing, water jets or sprays to keep conveyors clean or to cool product, and the use of tanks, which are refilled to control losses. Opportunities for reducing water use exist through water reuse, improved equipment maintenance and better process design.

Building facility operations: Consumption of building and sanitary water is typically less than that of industrial processes. Areas for reducing water use include repairing leakages and installing water-saving devices.

Cooling systems: Once-through cooling systems with cooling towers use large quantities of water and can be replaced by closed circuit cooling systems. Fresh water use can also be reduced by replacing it with treated water. Consideration should also be given to the feasibility of employing air cooling which can eliminate all water use associated with cooling systems.

Heating systems: Closed heating systems based on the circulation of low or medium pressure hot water may consume large quantities of water if they leak and are poorly maintained. In some cases, large quantities of water may be used by steam systems but water use can be reduced through steam recovery systems and improved systems operations.

Rainwater and grey-water harvesting: Rainwater and grey-water* harvesting use can offer substantial benefits by reducing demand from a municipal freshwater supply (which requires energy and chemical inputs to produce) or natural freshwater and groundwater resources, and also reduces the amount of water which needs to be transported in urban drainage systems and handled in energy-intensive water treatment infrastructure. Uses for rainwater and grey water can include irrigation, toilets, fire water and industrial cleaning, where high-quality water is not a strong requirement.

Irrigation: In agriculture, the use of drip-irrigation technology or alternative methods of crop cultivation – such as non-tillage methods – can also reduce water use.

** 'Grey water' is the relatively clean output from – for example – cleaning processes.*

4.3 Energy use

Process heating: This is vital to many manufacturing processes including heating for fluids, calcining, drying, heat treating, metal heating, melting, melting agglomeration, curing and forming. In many process heating systems, only a portion of the system's energy input provides true process heating while energy losses are caused by excessive parasitic loads, distribution or conversion losses. Energy losses can be reduced by identifying opportunities for improvement in a facility's process heating systems.

Process cooling: This is vital to many manufacturing processes and energy losses occur due to issues such as lack of insulation to reduce heat gains; overcooling; poor refrigeration system design; and refrigerant compressor and chiller efficiency. Energy losses can be reduced by identifying opportunities for improvement in a facility's process cooling systems.

Compressed air: This is the most commonly found utility service in industry, yet in many compressed air systems, the energy contained in compressed air delivered to the user is often 10% or less of the energy used in air compression. The production of compressed air creates a high energy demand and companies may find opportunities to use less of it and / or be vigilant in using and maintaining systems in order to prevent leaks and reduce the air pressures that are used (with lower pressures reducing energy use).

Renewable energy: This is particularly relevant within the built environment where the construction and operation of buildings can be energy intensive. The use of renewable energy – such as solar, hydro and wind – can significantly reduce reliance on fossil fuels.

For further information, please refer to CDC Sector Profile: Power.

4.4 Raw material use

Resource optimisation: Optimising the use of raw materials by companies is generally the most effective and efficient way to minimise the amount of waste produced. Consideration can be given to the following:

- Steps can be taken in the design of products so that off-cuts are minimised and waste volumes reduced.
- Remove waste from the value chain through cascade, exchange and valorisation of used materials.
- Stock replenishment processes should be optimised so that the amount of raw material in storage is minimised, especially where items are perishable, such as post-harvest losses in agriculture.
- Design products and processes for durability, conversion through upcycling or as modular units.
- Optimise the use of materials through sharing assets, logistics or transferring to a more service-based model.
- Leverage the use of technology to collect better data, remote sensing and materials tracking in order to minimise waste along the value chain.
- Extended producer or consumer responsbility where goods and materials can be collected at the end of their life for refurbishment and repair.

- Quality control techniques can be used to ensure that reject batches are kept to a minimum. This can be achieved by increasing the frequency of inspection and the number of points of inspection. Installing automated continuous monitoring equipment can help to identify production problems at an early stage.

Waste as a resource: Where the generation of waste is unavoidable, segregation of waste by type can be used to maximise the opportunities for reuse or recycling. At the facility level, the wider business community should be consulted to determine whether any waste streams have a secondary use and can act as a raw material to another business process. This is closely linked to the management of waste materials, as consideration needs to be given to how different waste streams are handled in order to avoid environmental contamination and regulatory enforcement action. Please refer to the CDC E&S Briefing Note: Pollution Prevention.

Food waste: Food waste is a large source of cost to businesses operating in the hospitality and agriculture sectors. Typically, food waste in hospitality is made up of spoilage, food preparation inefficiencies and plate waste. Measures can be taken at the facility level to identify food preparation processes and consumer habits, which could lead to modifications that reduce the amount of food waste that is generated. Through investing in technologies – such as anaerobic digestion – food waste can also become a source of bioenergy.

5. STANDARDS, GUDIELINES AND OTHER RESOURCES

5.1 Applicable international standards and guidance

- IFC 2012 Performance Standard 3: Resource Efficiency and Pollution Prevention.
- IFC 2012 Guidance Note 3: Resource Efficiency and Pollution Prevention.
- World Bank Group EHS Guidelines.
- United Nations Environment Programme: Resource Efficient and Cleaner Production.

5.2 Circular economy information and guidance

- Ellen MacArthur Foundation.
- The Circular Economy Portal.
- Circular Economy.

5.3 Resource efficiency-based certifications and standards

- IFC EDGE.
- LEED certification.
- Cradle2cradle certification.