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Urucu-Manaus, Brazil

Case Study 26

A section of the Urucu-Manaus gas pipeline in Brazil was constructed by a Skanska consortium, which worked to minimize the project's negative impacts in a socially and environmentally sensitive area of Amazon rainforest.

Aspects of Sustainability

This project highlights the following:

Social Aspects

Human Resources
Corporate Community Involvement
Business Ethics
Health and Safety

Environmental Aspects

Energy and Climate
Materials
Ecosystems
Local Impacts

Economic Aspects

Project Selection
Supply Chain
Value Added



Project Introduction

The 670km Urucu-Manaus gas pipeline in Amazonas state, northwest Brazil, was completed in August 2009. The pipeline daily transports 4.5 million m³ of natural gas from the Urucu gas fields to Manaus, the state capital and main commercial centre of Amazonas. The gas is used to generate approximately 950 MW of electricity for Manaus and the municipalities the pipeline passes through, which experienced chronic energy shortages prior to the project. The Urucu gas fields are the largest onshore natural gas fields in Brazil, with reserves of approximately 98 billion m³ and an estimated lifetime of up to 50 years.

The Skanska consortium, Consorcio Gasoducto Amazonia (CGA) was granted the US\$ 206 million contract to construct the section B2 with 186 km of the pipeline from Anamá to Manaus by Transportadora Urucu-Manaus, which is a

subsidiary of the state-owned Brazilian energy company Petrobras. Skanska shares an equal stake in CGA with the experienced Brazilian pipeline company Camargo Correa. The gas pipeline has a diameter of 50 cm and was buried at least 1 m underground. The project involved creating a 14 to 20 m wide clearing along the entire length of the pipeline. CGA were also responsible for mechanical and civil works at surface facilities, and environmental restoration work following the installation of the pipeline.

The pipeline passes through sensitive areas of rainforest that demanded extreme care to avoid permanent adverse social and environmental impacts. Approximately 25 rural communities and 1,200 families live in the vicinity of the pipeline and are characterized by below national average household income, life expectancy and educational achievement. The dense tropical rain forest is among the least ecologically disturbed in the

Amazon basin. A biodiversity baseline study identified 192 aquatic species, 56 species of large mammal, 11 species of primate, approximately 600 species of bird and 29 bat species, including 9 that are listed as endangered by the Brazilian environment agency. The route also traverses almost 250 lakes, rivers, streams and marshes and is subject to natural regional flooding, which has a water level seasonal variation of up to 13 m.

Contributing Towards Sustainable Development

The Urucu-Manaus project substitutes expensive oil with cheaper and cleaner domestic natural gas and stimulates the regional economy by providing cheaper fuel and electricity. CGA implemented a Sustainable Development Programme to maximize local socio-economic benefit and to ensure minimal social and environmental negative impacts throughout the lifespan of the pipeline. During construction, CGA strived to maximize social impacts by maintaining good relations with the affected communities, building regional capacity, preventing migration into the area, implementing comprehensive health and safety plans, conserving local cultures and supporting communities. The regional economy has benefited from prioritizing local employment and implementing vocational and educational training programmes, and the project provided royalty payments to the affected municipalities. Environmental impacts were mitigated by minimizing disturbance during construction, mitigating the impact of the pipeline clearing, rescuing animals found in the clearing, avoiding

pollution, managing waste, avoiding the disruption of watercourses and implementing various other environmental campaigns.

Social Aspects

Community communication and participation

CGA informed communities about the project's impacts and progress at all stages through meetings and presentations. Local people have been involved in the project as neighbours and employees and have participated directly in educational and health sessions facilitated by CGA.

Local capacity building

Local institutions, such as the Federal University of Amazonas, the Amazonas Research Institute and the Amazonas Institute of Technology, assessed and advised on the project's social and environmental impacts. Local institutions were partnered because of their extensive local knowledge but also to develop their capacity to carry out such impact assessments in the region. For example, the Piatam Project, a socio-environmental research programme managed by the Federal University of Amazonas and supported by Petrobras (www.piatam.ufam.edu.br), was enlarged to support the Urucu-Manaus project.

Occupational health and safety

Health and safety considerations included safety training, first aid education, vaccinations, cautious working practices and on-site medical resources. Safety training was provided to all workers and daily on-site discussions were held regarding





potentially dangerous activities. Specific training included how to avoid and deal with potentially dangerous animals, such as snakes and alligators. As part of the Health and Medical Emergency Programme all workers were provided with first aid and tropical disease training, and were vaccinated against endemic diseases, such as hepatitis and yellow fever. Practices such as only working during the day were established to reduce the risk of malaria from mosquitoes. Permanent on-site medical personnel and facilities included 2 doctors, a dentist, 14 nurses, 3 ambulances, a boat ambulance and a helicopter for emergency medical evacuations. 12 lost time accidents occurred during construction and the Lost Time Accident Rate for the project was 0.86.

Migration prevention

To prevent the pipeline route being used as a conduit for settlers and the extraction of forest resources, the construction of roads was avoided and access along the route is prevented. River barges transported pipeline sections and heavy equipment as close to the route as possible to avoid building permanent roads in the area and any access routes were reforested. 110 security staff controlled access onto and along the pipeline route during construction, and security barriers and felled trees were laid perpendicular to the pipeline clearing to prevent unauthorized access.

Cultural and social conservation

Contact between local communities and project workers was minimized to preserve cultures and social systems, and to avoid the transmission of diseases to isolated communities in the vicinity of the route. The pipeline route was planned to avoid indigenous communities and project workers abide by a code of conduct, which forbids them to make unauthorized contact with communities. Workers were also educated by anthropologists about local indigenous groups in order to promote understanding and respect.

Community Safety

In the interest of neighbouring community safety, CGA imposed 40 km/h speed restrictions around nearby communities for site traffic, and boats are required to reduce their speed when in the vicinity of river communities. Construction activities avoided local festivities, to reduce traffic congestion and the risk of accident. Safety workshops were also held with neighbouring communities to highlight the dangers of entering the construction site.

Community education

CGA organized community educational workshops concerning alcohol and drug use, family planning, sexually transmitted diseases, sanitation and the prevention of endemic diseases. Educational campaigns were also implemented to promote school attendance and literacy.

Community support

CGA supported local communities by helping to maintain fire brigade vehicles in Manacapuru town, donating 8 computers to the police, and offering surplus building materials to communities. Over 14,000 doses of vaccinations against endemic diseases were also provided free of charge to the workforce and local people.

Economic Aspects

Local construction employment

CGA worked with government employment agencies to ensure that approximately 70 percent of the project workforce was from Amazonas state. The project contract demanded that a minimum of 60 percent of the workforce was from Amazonas.

Vocational training

Prior to the project there were few skilled workers in the local workforce. Extensive training programmes have been implemented to train local people as carpenters and metal workers, and workers will be able to use their newly acquired skills in the future. Over 2.5 percent of work time was devoted to training and education.

Energy import substitution

The Urucu-Manaus project supports government plans to reduce Brazil's dependency on imported energy by substituting imported oil and gas with Brazilian natural gas. The government scaled up Brazil's domestic gas production from 23 million m³ in 2003 to around 40 million m³ by 2009. At least 10 percent of which is expected to come from the Urucu gas fields via the Urucu-Manaus pipeline.



Regional economic development

The Urucu-Manaus project provides cheaper and more reliable electricity, which contributes toward the creation of more efficient industries and the generation of jobs in towns along the pipeline route and in Manaus. Electricity generation costs in Manaus were among the highest in Brazil prior to the project but have decreased by around 60 percent following the construction of the pipeline. The electricity supply is also more reliable and has ended chronic energy shortages and blackouts. Businesses benefit from cheaper and more reliable electricity making them more productive and efficient. The project is estimated to have indirectly created approximately 10,000 local jobs by stimulating regional economic development. Approximately US\$ 10 million was also paid to the municipalities affected by the project through royalties and taxes during construction.

Environmental Aspects

Minimizing environmental impacts during construction

To minimize forest disturbance road building was avoided by transporting construction equipment by river barge. 130 transport vehicles and equipment with caterpillar tracks were used along the route to reduce soil compaction. All employees received environmental training on all aspects of their duties, including relocating animals found in the construction site into the surrounding forest. The CGA has a team of 20 professionals working with environmental preservation and the project complies with SIVAM, the Amazon Protection System (www.sivam.gov.br) to monitor environmental impacts.

Minimizing fauna disturbance

Ditches and holes on the construction site were secured to ensure that animals were not injured or trapped. To decrease the risk of introducing potentially destructive foreign species into the forest, sections of pipeline were visually inspected before being transported to the site. Noise and light pollution was minimized by respecting certain environments at specific times of day so as to not disturb nocturnal animals.

Fauna detection, rescue and treatment program

Species of fauna found in the pipeline clearing during construction were either relocated directly to the adjacent forest or were provided with any necessary veterinary treatment before being relocated. Animals were relocated adjacent to the clearing where they were found so as to not move them too far from their habitat. Any injured animals were transferred to a Veterinary Treatment Unit (VTU), which was equipped with comprehensive facilities to treat and rehabilitate animals before their reintroduction back into the wild. The VTU also weighed and measured each animal and documented the location and habitat in which they were found to assist relocation. All biologists and veterinary staff involved in the capture, veterinary treatment and relocation of animals were a part of the CGA team. The program also educated the workforce in the importance of local biodiversity and documented fauna in the area. 142 individual animals were directly relocated from the clearing and 33 received veterinary treatment, including species of boa constrictor, owl, parrot, sloth, cobra, heron, scorpion, serpent and spider.

Avoiding pollution

Water quality in nearby watercourses was routinely measured and strict procedures were established for workers to follow in the event of a spillage or leak. Plastic sheeting was placed under machinery and the washing of vehicles was prohibited on site to avoid oil and chemical runoff. Chemical substances were labelled and stored safely in accordance with the prevailing legislation.

Waste management

All waste was properly handled, stored and recycled where possible. Some effluent treatment was done on-site in portable handling stations and other substances were treated in special facilities in Manaus.

Avoiding the disruption of watercourses

Soil erosion, which can disturb aquatic biological systems and silt up watercourses, was minimized by constructing temporary bridges and dams, and by reforesting high-risk areas, such as slopes. A total area of approximately 150,000 m² was reforested with local plant species to stabilize soil and reduce erosion. Temporary bridges were constructed to avoid excessive disturbance to watercourses, which were dismantled when no longer required. Small streams were temporarily dammed during nearby construction activities to prevent sediment being washed downstream.

Environmental campaigns

Campaigns outside the terms of the project contract were launched to reduce the environmental impact of the project. Campaigns included reducing energy consumption, conserving water, promoting recycling, additional tree planting and an “environmental week” to raise awareness of specific issues.

More environmentally friendly electricity generation

The use of Urucu natural gas rather than oil to produce electricity will significantly reduce carbon dioxide emissions, and contribute toward a reduced greenhouse effect.



Learning From Good Practice

CGA incorporated social and environmental considerations into the project, which satisfied NGOs concerned with the potential negative impacts of the project. Consequently the project avoided strong opposition from NGOs that have resisted similar projects due to social and environmental concerns.