Belo Horizonte, Brazil

Waste-to-energy for productive landfill site management

A former landfill, turned into a waste-to-energy facility, captures methane gas released by solid organic waste and transforms it into electricity through combustion. Today, the international public-private partnership project produces 43,800 megawatt hours of energy per annum and considerably reduces greenhouse gas emissions.

Urban NEXUS Case Story 2014 - 02 **August 2014**

The project in brief

After reaching its full capacity in 2007, Belo Horizonte's major landfill was turned into a biogas plant and a site of 114 hectares for recycling and educational activities. The project was realized through a public-private partnership between the City's Department of Urban Cleaning (Superintendência de Limpeza Urbana (SLU), the Municipal Waste Treatment Centre (Centro de Tratamento de Resíduos Sólidos (CTRS) and Asja Ambiente Italia SpA, an international company, managing the biogas plant and the local energy utility, Companhia Energética de Minas Gerais (CEMIG). The plant collects methane gas emanating from the former landfill for energy production, thereby reducing greenhouse gas emissions by more than 80, 000 tons per year, allowing for the sale of carbon credits. With a power production of 43.800 MWh per annum the City addresses its rising energy demand, while lessening its dependency on energy generated from fossil fuels. Additionally, the project led to the creation of jobs for the construction and maintenance of the site.

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Date	2009-ongoing
NEXUS Sectors	Waste-Energy
NEXUS Innovations	Design + Technology; Deliver Models (PPP); Communications +User Behavior
Scale	City-wide
Budget	4.58 million EUR

What makes it "Urban NEXUS"?

The institutional Urban NEXUS for waste-to-energy and educational solutions to extend the lifespan of the landfill site, contributes to Belo Horizonte's integrated Solid Waste Management (SWM) strategy. The public-private partnership resulted in Asja Ambiente purchasing the generation, capturing system, transportation and purification needed to launch the project to receive rights in maintaining the onsite biogas power plant for 15 years. The City's Department of Urban Cleaning and the Municipal Waste Treatment Centre are responsible for the recycling activities and educational programs run on the site. This public-private institutional NEXUS ensures the successful reuse of the closed down landfill through scaled up delivery models and the integration of systems and scales. The biogas capturing facility constitutes as a Clean Development Mechanism (CDM) project under the United Nations Framework Convention on Climate Change's Kyoto Protocol and earns a portion of its revenues through Certified Emission Reductions (CERs). In addition to substantially reducing one of the City's largest GHG emitting sites, the carbon revenues the City receives from registered biogas capturing, equal 6% of the value of produced electricity sold to the state energy utility.

Urban NEXUS Definition

The Urban NEXUS is an approach to the design of sustainable urban development solutions. The approach guides stakeholders to identify and pursue possible synergies between sectors, jurisdictions, and technical domains, so as to increase institutional performance, optimize resource management, and service quality.

It counters traditional sectoral thinking, trade-offs, and divided responsibilities that often result in poorly coordinated investments, increased costs, and underutilized infrastructures and facilities. The ultimate goal of the Urban NEXUS approach is to accelerate access to services, and to increase service quality and the quality of life within our planetary boundaries.

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Further Reading

City of Belo Horizonte official website: http://portalpbh.pbh.gov.br/pbh/ecp/comunidade.do?evento=portlet&pIdPlc=ecpTaxonomiaMenuPortal&app=slu&tax=34914&lang=pt_BR&pg=5600&taxp=0&

ICLEI-IRENA Case Study, 2013, Belo Horizonte, Brazil, Waste to energy for more effective landfill site management: http://www.iclei.org/fileadmin/PUBLICATIONS/Case_Studies/3_Belo_Horizonte_-_ICLEI-IRENA_2012.pdf

GIZ and ICLEI, 2014, Operationalizing the Urban NEXUS: towards resource efficient and integrated cities and metropolitan regions, GIZ Study: www.iclei.org/urbannexus

Scope for improvement

Although this project represents a cascading of resources, turning waste to energy, while providing educational programs, using a former landfill as a resource, fails to provide a long-term solution to the continuous accumulation of urban waste from Belo Horizonte, which is stored temporarily within the city before its transportation to the Macaubas landfill in Sabará, located nearby. Therefore broadening the NEXUS to incorporate legal and institutional NEXUS integration to address structural challenges of waste via mandates and incentives could enhance metropolitan waste management challenges.

Replication

Landfill gas-to-energy is a replicable technology, although feasibility and profitability studies must consider local climatic and geographical circumstances, which can cause variations in the final electricity output. Methane collection is only profitable in medium and large landfills (i.e. cities with over 100,000 inhabitants) and also depending on the local composition of urban wastes (e.g. the proportion of organic wastes), it may not be the most appropriate solution. Additionally, combining a waste-energy scheme with education represents a low-cost and easily replicable attribute to further enhance SWM opportunities.

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