



Dar es Salaam Institute of Technology

Energy Projects

Background History:

Energy is the main source of Economic Development in any country. There are many sources of Energy production worldwide Tanzania has several sources of energy production while a lot of efforts are still undergoing to have enough energy for different purposes.. Sources of energy include:

- *Hydroelectric*
- *Gas*
- *Fuel (oil)*
- *Solar*

There are other expected sources of energy to contribute power generation in future. These include; Wind, Coal, Uranium, Bio. Researches are still undergoing

DIT has made some efforts to look for alternative sources of energy especially the use of renewable energies.

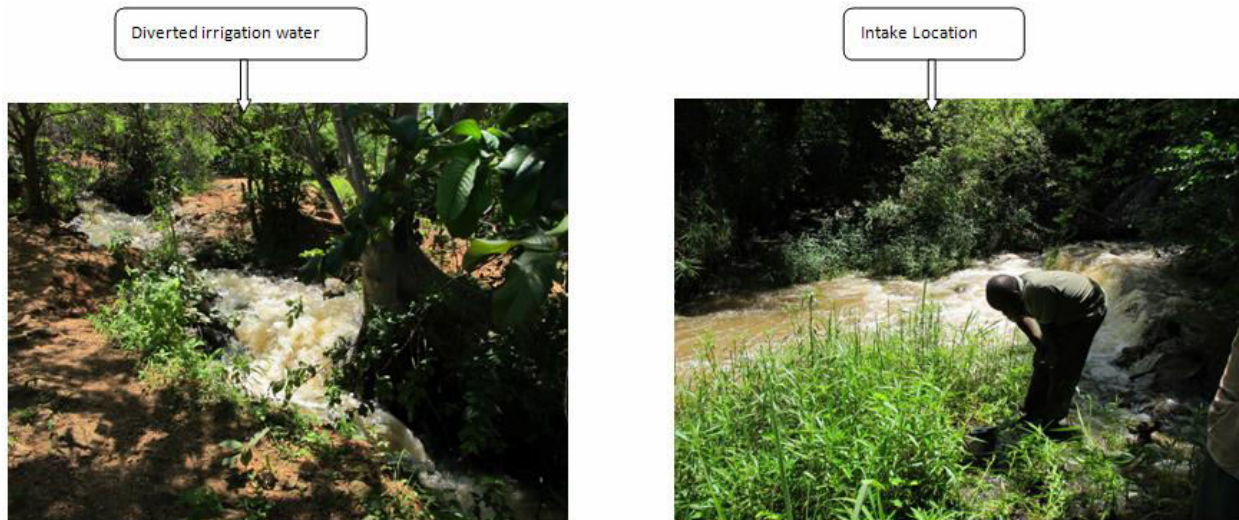
PROJECT 1: Hydro Electric Power

Project Description

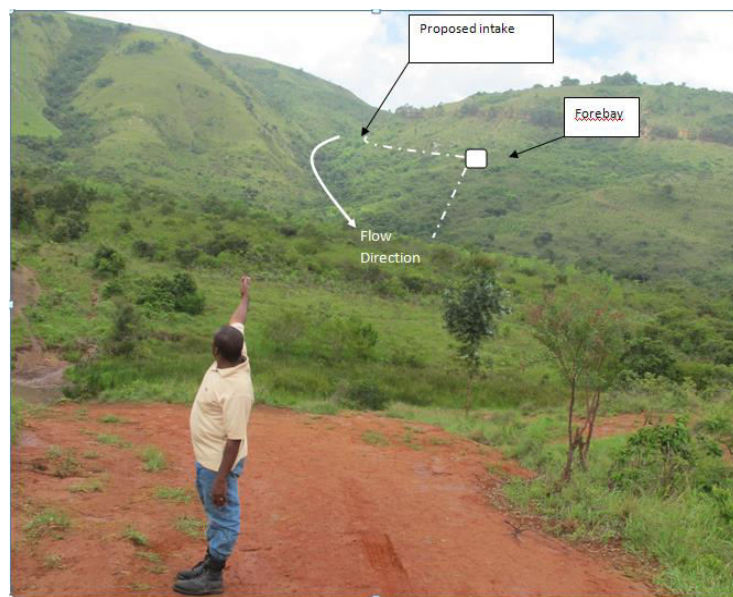
Hydroelectric power is a newable energy. The Main purpose of Renewable Energy project was a result of identifying alternative sources of energy as one of the solution to curb the power problems in the country and as one way of providing electricity to the rural (Rural electrification). This project started in June 2010 up to September 2011 in collaboration and support by Rural Electrification Agency (REA).

Researched Areas

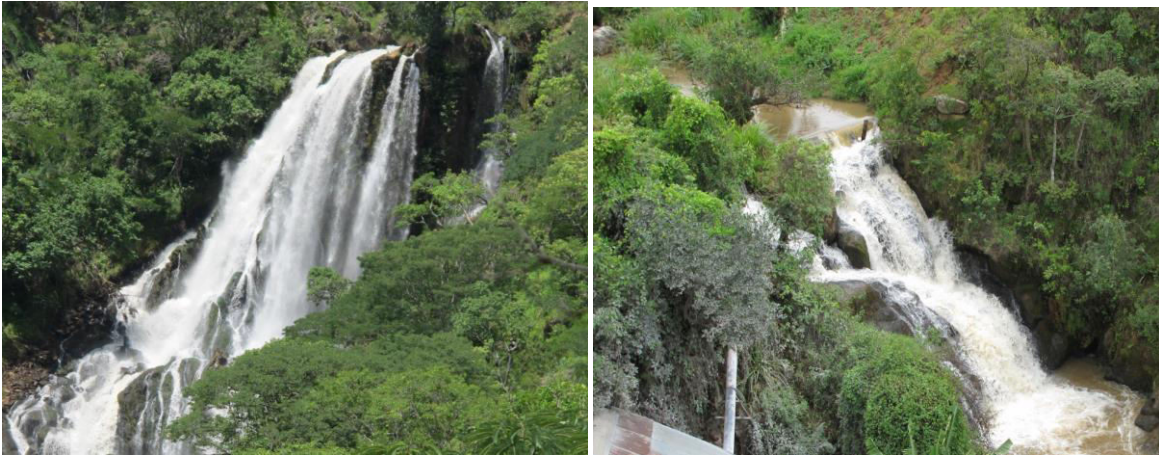
Many researches have been done to identify the best places for Mini-Hydro power generations. About thirty (30) researches were accomplished in Southern Highlands regions of Tanzania along the rivers to study their capacity in terms of waterfalls. Researches were Iringa, Ruvuma, Mbeya, Rukwa and Morogoro. Some places have been found to be potential places for mini-hydro power generation. **This includes:**



Investigation of Waterfalls as part of Researching for Mini-hydro power generation



Reasercher Pointing an identified potential waterfalls location



Ijangala River areas show potentiality of generating up to 250kW of electricity.

Advantages of Researched Renewable Energy projects to the Country

The renewable energy projects will contribute electricity to the national grids and rural electrification projects and hence spearhead economic development in the country. The ultimate results will be:

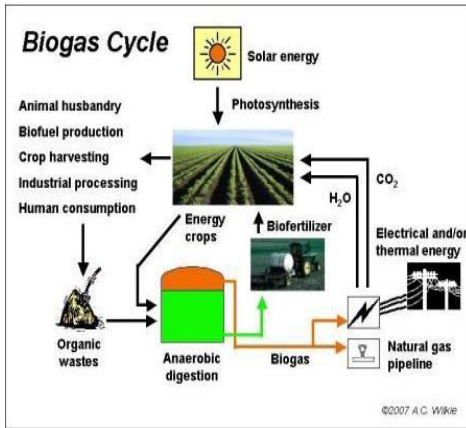
- To accelerate production in the industries and hence increased economic produce
- Speed up of small and medium industries in rural and urban areas
- Increase the number of manufacturing industries in the country.
- Lowering prices for electricity residential consumers
- Lowering prices for commercial businesses, especially small businesses since production costs will be cut down and inflation rate will be lowered.
- Increase jobs since many people will start small industries
- Benefit the environment by empowering electricity consumers to be smarter and reducing deforestation.

PROJECT 2: PORTABLE BIOGAS PLANT

Biogas Technology

Portable Biogas Plant

This research is aimed at having a portable biogas plant (PBP) that can be used to generate biogas for household activities as well as other economic activities which can use the biogas. The research work for quantifying and qualifying biogas utilization in selected regions in Tanzania it was observed that the plastic type biogas plant which are less expensive have the problem of durability. The research is now focusing on finding another alternative of biogas plant material that can be cheap as the same time reasonably durable.



A biogas plant using plastic containers.



PROJECT 3: Compressed Natural Gas [CNG]

Introduction

Fuel is the main source of running motor vehicles and industries in the world. There are other sources of Energy that can be used to run the same but CNG conversion is the current cheaper alternative fuel source. Tanzania has abundant of Natural Gas that can trim down fuel importation and therefore enhance the Tanzania currency.

CNG Project at DIT

CNG project was started in 2007 as one of the centers for testing and implementation of CNG in Tanzania. The institute has adequate technical know how with skilled engineers and technicians trained by world- known natural gas equipment manufacturer. The Institute has a reputable goodwill and service.

There is a filling station in Dar es Salaam but more will be extended to other cities and towns.



Ubungo Natural Gas filling station

Technological Description

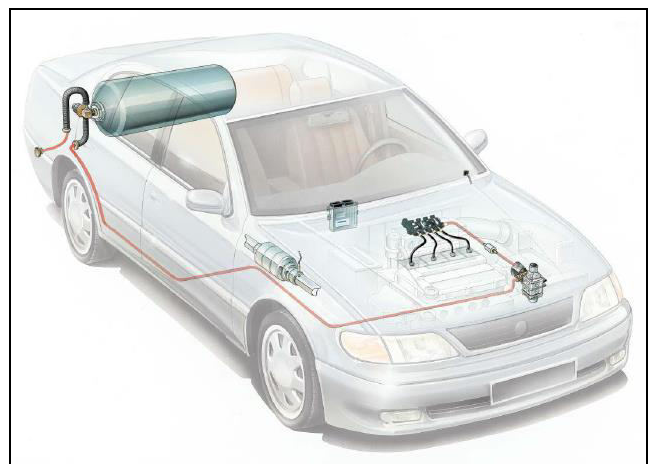
To reduce higher cost of fuel in transportation many countries have switched from traditional to alternative fuels such as natural gas. Due to its low energy density and for portability natural gas is compressed to a small volume by increasing its density. That is why the business is known as Compressed Natural Gas (CNG). Because of incentives provided by the government, buses and taxis in many cities are nowadays using CNG. Driving a Natural Gas vehicle (NGV) is similar to driving a petrol vehicle. The main additional item in the NGV is a switch, usually located by the gear lever or on the dashboard, which

enables the driver to select CNG or petrol operation. At present there is only one filling station in the city of Dar es Salaam along Morogoro Road at Ubungo Maziwa between Dar Brew and Twiga Cement Depot. Other three stations are expected to be opened soon.

More than ten (10) countries are using CNG technology for vehicles. This includes; Italy, Canada, USA, Iran, Pakistan, Brazil, India, Colombia, Peoples Republic of China, Uzbekistan, Argentina, Thailand and many others. This technology was not yet implemented in our country.



Position of Gas Containers



Connection of CNG kit to car engine

CASE STUDY

A case study on RAV4 vehicle shows a saving of Tzs.80.60 per km which is equivalent to 51% of petrol and recovering time of 10 months as can be seen on the table shown below. The cost of conversion can be recovered between six to fifteen months depending on the km covered by particular vehicle per day.

Case Study on RAV4		
Description	Petrol	CNG
Unit of quantity	litre	kg
Price (in November 2011)	Tzs.2,000.00	Tzs.1,450.00
Fuel Consumption	12 km/l	18 km/kg
Cost per km	Tzs.166.70	Tzs.80.60
Saving	Tzs.86.10/km	

Recovering time at an average travel of 60 km per day and at a conversion cost of Tzs.2,000,000.00	$\frac{(conversion\ cost) \div (Saving\ cost\ of\ fuel\ per\ month)}{Tzs.2,000,000}$ $= \frac{Tzs.2,000,000}{Tzs80.60 / km \times 30days / month \times 50km / day}$ $= 10\ months$
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Advantages of CNG

The CNG will have impact to the country's' economy due to many advances it offers to users of the technology. The following are the advantages of CNG:

- The converted vehicle can also be operated on petrol
- CNG is economical, it saves 40%-60% the cost of other conventional fuels
- CNG prolongs engine life (ie. No carbon disposed)
- It is environmentally friendly (it produce fewer or no emission)
- CNG is sulphur & Lead free
- It saves the country in foreign exchange
- Reduces operational/maintenance costs
 - interval between engine oil change extended
 - CNG does not corrode metals so pipes and mufflers last longer
- CNG safer than other conventional fuels:
 - it is filled in simless cylinders
 - has higher ignition temperature
 - has lower inflammability
 - in case of leakages it dissipates to the atmosphere
- Natural Gas is locally available in Tanzania (Songosomgo). The Filling ststion is at Ubungo Maziwa off Morogoro road, TPDC Upanga along Ali Hassan Mwinyi Road and TPDC Estate Mikocheni in Dar es Salaam. Other filling stations will be constructed in near future throughout the country.
- Increase the number of manufacturing industries in the country.
- Lowering prices for electricity residential consumers

- Lowering prices for commercial businesses, especially small businesses since production costs will be cut down and inflation rate will be lowered.
- Increase jobs since many people will start small industries
- Benefit the environment by empowering electricity consumers to be smarter and reducing deforestation.