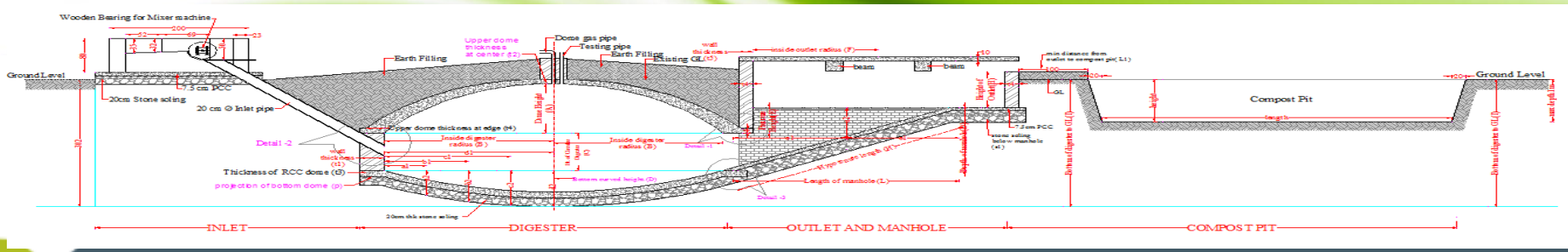


Promotion of Large Biogas in Nepal: Renewable Energy Confederation of Nepal (RECON)

Sushim Man Amatya, Senior Technical Expert, Biogas and Waste to Energy

Alternative Energy Promotion Center

June 8, 2020

NOT SO LONG AGO …Remember the “Nakabandi”

Photo Source: Kantipur Daily

Context:

- Background
- Current Government Policy
- Status of Large Biogas in Nepal
- Success Stories in Nepal
- Key challenges faced by the sector

Current Subsidy Policy:

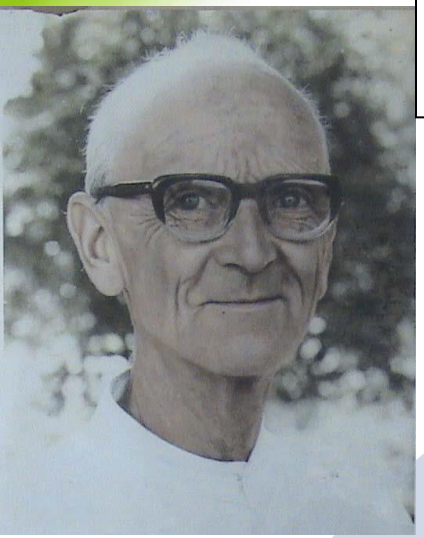
Region	Subsidy Amount (Rs)		
	2 cum	4 cum	6 cum and above
Mountain Districts as specified by GoN	25,000	30,000	35,000
Hill Districts as specified by GoN	20,000	25,000	30,000
Terai Districts as specified by GoN	16,000	20,000	24,000

Biogas Plants	Subsidy Amount in Rs.						
	Thermal Application per CuM of Biogas Produced Per day at Normal Temperature & Pressure						Additional Subsidy for Electricity Generation per kW (Baseload for 24 hrs)
	Terai			Hills			
Commercial Biogas Plants	Small	Medium	Large	Small	Medium	Large	65,000
	20,000	25,000	30,000	24,000	30,000	36,000	
Institutional Biogas Plants for Public Institutions	57,000			68,000			185,000
Community Biogas Plants	45,000			54,000			150,000
Municipal Scale Waste to Biogas Energy Systems	40% of the total cost but not exceeding Rs. 200,000.			40% of the total cost but not exceeding Rs. 240,000.			40% of total electrification cost but not exceeding Rs. 400,000.

Waste to Energy is a Priority Sector!

- Waste to Energy is Already in GoN's Policy and Program
- Special Focus on 15th Plan (2018/19-2022/23): 500 plants
- Reflected in MoEWRI's white paper
- Prime Minister 's Office has formed task force for formulation of modality for cooperative owned large biogas plants
- Dedicated budget for biogas pipeline for community based systems
- New avenues for international resource mobilization: GCF and IRENA/ADFD

Biogas Country Background: Nepal



1st Plant , **1955**

Established by Father Saubolle in St. Xavier's School.

GGC Established - 1977

First Government Biogas Program,

1974 – Oil Crisis

Up to 1985 – 300 per year

7th Five Year Plan (85/86 to 89/90) – 4000 targets with subsidy of 25% and credit support through ADB/N-

Biogas Support Program (BSP)- **1992**

- SNV and KfW Support- Phase I, II, III

- Annual target reached up to 10,000 – 15,000

NRREP 2012, domestic biogas 30,000 per year

PREIP Supported by KfW

Introduction of Medium to Large Biogas through Program NRREP 2012 and SREP/ WB 2014

The Choice is Ours: What do we want to promote ?

Imported Fossil Fuel

Renewable Energy
Produced in Nepal

SREP Extended Biogas Project : Introduction

- SREP Supported Extended Biogas Project, one of the SREP components
  - aims **to promote large off-grid biogas energy generation** in the country where sponsors are **commercial enterprises or municipalities.**
- SREP seeks to deliver two primary categories of benefits from the use of its financial support:
  - (i) **increased access to renewable energy** and
  - (ii) **increased production of renewable energy**.
- The project consists of two components;
  - Technical Assistance and
  - Financing of Investments.
- Project Period: Initially 5 Years (2015-2019)

  Extended till August 2021

- **Primary Approval on 14 Nov 2014**
- **Approved after restructuring: June 2016**

A Few Success Stories:

Pic: Envipower Phase 1, Photo source: CIF and Evnipower Energy and Fertilizer Pvt Ltd

Envipower Nepal Energy & Fertilizer company, Bhairahawa
3700 m3 biogas Plant for Bio-CNG Bottling and sale (Recently commissioned)

1.3 million USD investment, 0.4 million subsidy, 0.6 million loan from Himalayan bank,rest equity, 21.66% IRR, payback : 6.5 overall

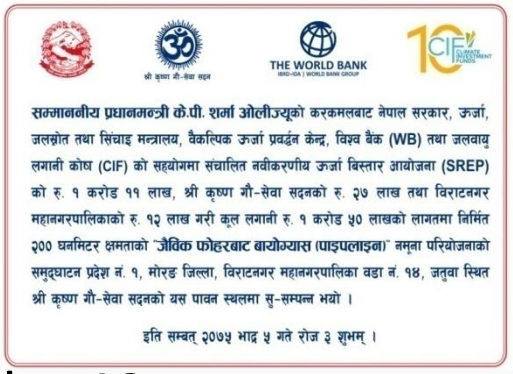

grow pure

Biratnagar Pipeline Project from Biogas

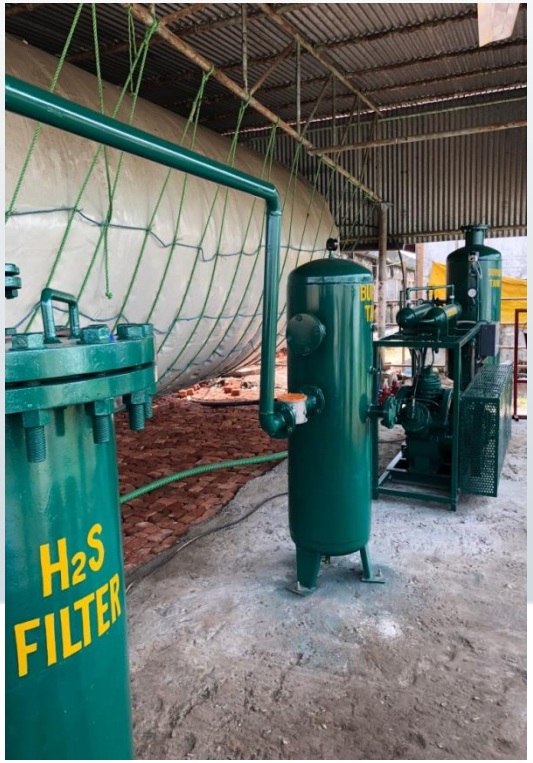
Biogas plant utilizing cow dung

This plant supplies gas to 32 households in the neighboring periphery

Biratnagar Pipeline pilot project



- No of cows: 205
- Size : 200 m3
- Gas Output : 99 m3
- HHs served : 32; additional HHs planned to reach : 48
- Total Investment : NPR 15 Million
- SREP support : 6.5 million



Distribution to Individual Households

Gas up gradation and compression prior to supply

Metering system used in households


H-32
H-31
H-30
H-29
H-28
H-27
H-25
H-19
H-26
H-16
H-15
H-7
H-22
H-23
H-24
H-17
H-12
H-14
H-6
H-8
H-13
H-9
H-10
H-3
H-4
H-5
H-11
H-1
H-2
Jatuwa Community Biogas Plant

Rt. Hon. Prime-minister Inaugurating the Project

Success Story of Biogas in Poultry Industry

Khilung Kalika Poultry:

- 200,000 birds in cage system
- Produces more than 180,000 eggs a day
- One of the largest poultry of the country.
- Produces 25 tons of poultry litter every day.
- Waste management was a huge problem.

Khilung Kalika Biogas Plant

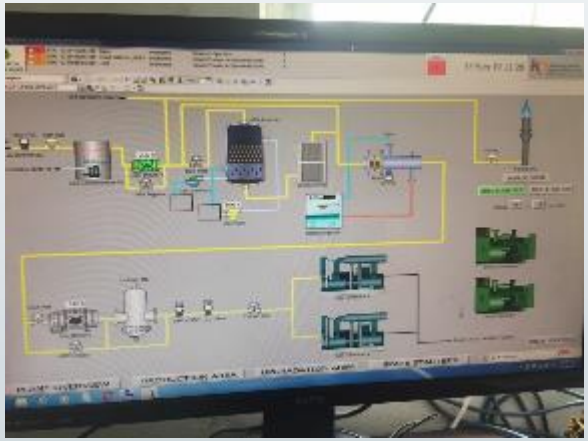
Daily Gas Output: **3510 m3 per day**
Substrate Used: Chicken manure and cow dung
End Use: Electrification (354 kW)
Total Project Investment: NPR 139 million
Total plant cost: NPR 119 million
Subsidy : NPR 47.6 million million
Organic Manure production: 5 tons per day (Dry)
Status : In commercial operation

Organic Fertilizer:

- They produce 4.5-5 tons of packaged granular organic fertilizer everyday.
-
-
-

Electrification from Biogas

- Installed Capacity – **354 kW** (Two 177 kWe biogas generators installed)
- Daily Usage – Average **8 hours a day**.
- Operation days per annum: **300 days/ yr**
- Total energy generated: **849,600 kWh / yr**
- Total money saved per annum: **NPR. 7,221,600./yr**



Municipal Waste to Energy in Dharan


n Y93
al camera

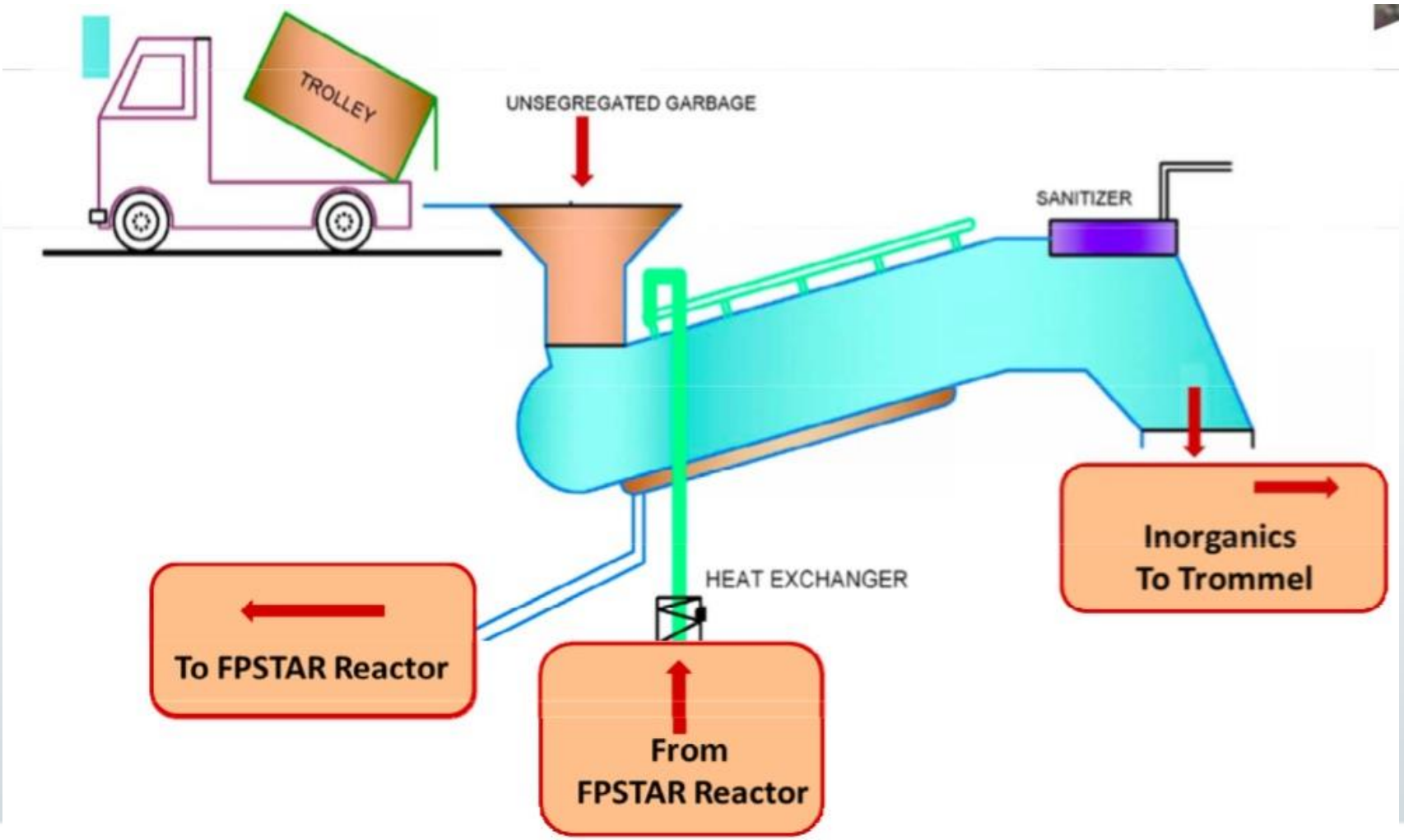

n Y93
al camera

First Municipal Project of Nepal – Dharan SMC Waste to Energy (30 TPD plant)

PLANT CAPACITY	: 30 TPD [Organic Waste]
EXPECTED QUANTITY OF CRUDE GAS PER DAY.	:1800 M3/day
ESTIMATED NATURAL GAS PER DAY	:1170 M3/day [Refined Gas]

VENTURE
WASTE 2 ENERGY

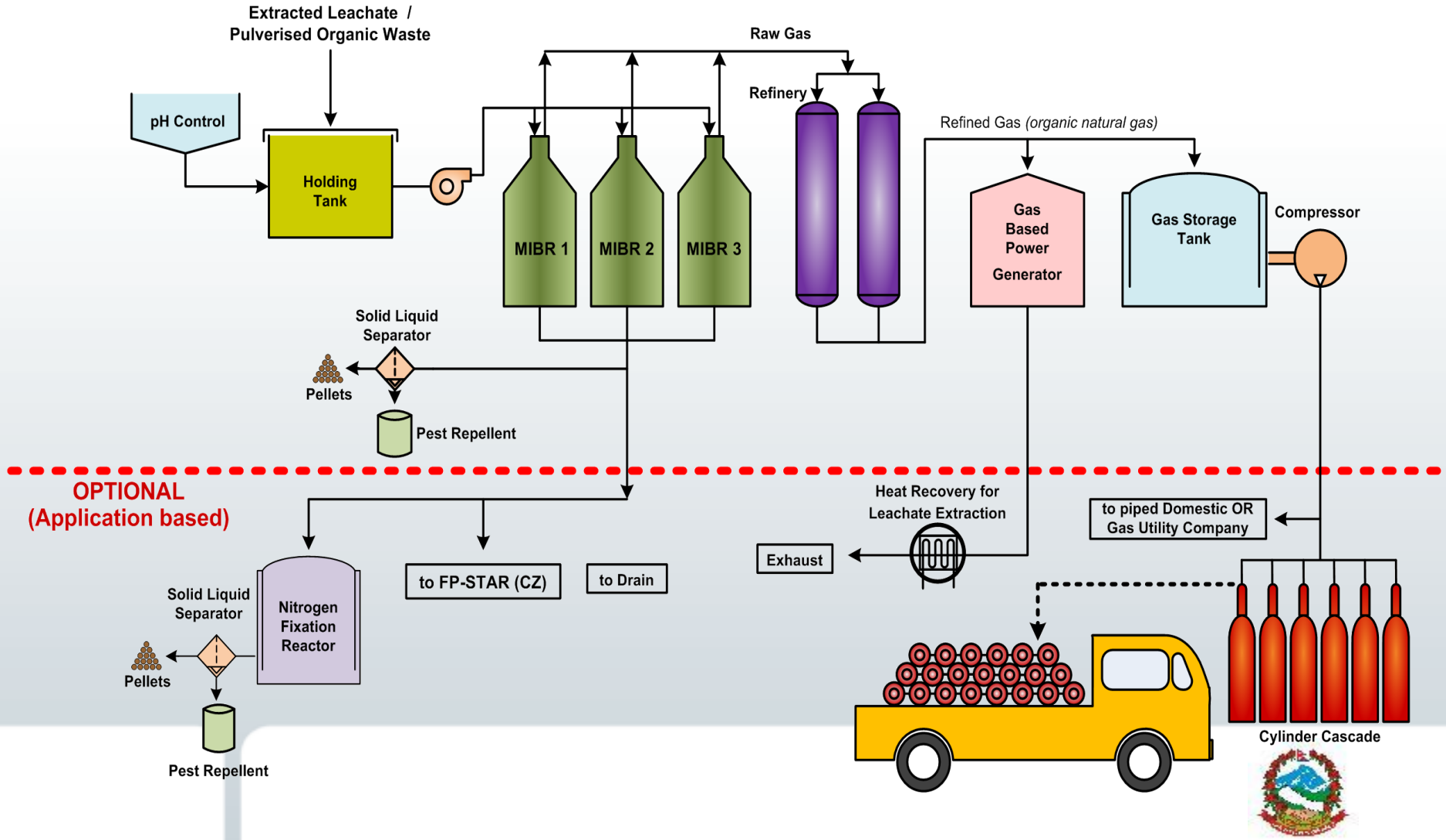
Segregation using heat and pressure



VENTURE
WASTE 2 ENERGY

EN-STAR (PZ)

Bio-Methanization Process



Gandaki Urja Pvt. Ltd, Kotre

Gandaki Urja Pvt. Ltd, Kotre, Gandaki

Photo source: Gandaki Urja Pvt Ltd

Key information

- **Location:** Majuwa, Pokhara-32
- **Plant size**: 4000 m3
- **Technology**: Continuous Stir Tank Reacter (CSTR), Anaeorbic Digestion
- **Raw material**: 45 tonnes per day
- **Output**: 200 cylinders bio-CNG; 15 tonnes bio-fertilizer
- **Human resources**: 40
- **Construction period**: 15 months, feeding started- Dec 2018
- **Operation started**: July 2019, 40 cylinders/day, 3 tons/day
- **Cost**: ~Rs 220 million

Raw material collection- Poultry

Photo source: Gandaki Urja Pvt Ltd

Photo source: Gandaki Urja Pvt Ltd

Fertilizer

Photo source: Gandaki Urja Pvt Ltd

Control room- SCADA, Lab

Photo source: Gandaki Urja Pvt Ltd

Lumbini Agro Products and Research Center, Tikuligadh Rupandehi

- 1500 m3 biogas /day
- Cow dung is the primary substrate
- Electrification and thermal use of gas in corn flakes industry

Major Impacts of SREP Supported Extended Biogas Project

2/4/6/8 m^3

5500 m^3

Technology Scale-Up

Cooking

Bottling, Electrification, Commercial scale Fertilizer

End Use Diversification

Domestic

Commercial ‘ Industrial

Creation of Business Opportunities

Major Impacts of SREP Supported Extended Biogas Project

Replaced 42500 MT Organic Compost

Productivity Enhancement through Bio-Fertilizer

222,582 cylinders of LPG replaced till date

Import Substitution

Employment/Entrepreneurship Creation in Local Level

Biogas Technologies currently being promoted by AEPC

GGC 2047

Modified GGC 2047

Floating Drum

Continuously Stirred Tank Reactor (CSTR)

Key Challenges faced by Developers

- New sector in Nepal. Market infancy.
- Lack of local technical experts
- Banks unaware of the sector hence reluctance to provide loans.
- High interest rates for those who have secured loans
- Technology supply chain still being developed
- Longer payback periods due to high interest rates from banks.

Status of co-financing

- The World Bank recently extended the SREP extended biogas project till Aug 2021.
- More than 10 million USD already invested in the large biogas from the private sector.
- The Government of Nepal also has contributed over 5 million USD in grants/ subsidies.
- Keen interest from the government to promote large biogas in Nepal

Summary of Pipeline Projects

Summary of Pipeline Projects Awaiting ADFD/IRENA Credit

S.N	Project	Location	Size (m3/day)	Waste (ton/day)	Waste type	Status	ADFD Loan Requested?
1	Dhangadhi MSW	Danghadhi	2000	30	MSW	Under const.	Yes
2	Dharan MSW	Dharan	1800	30	MSW	Under const.	Yes
3	Dumkibas poultry	Chitwan	3750	40	Agri	Under const.	Yes
4	Envipower	Nawalparasi	3750	40	Agri	Commissioned	Yes
5	Envipower - 2	Bhairawa	1500	17	Agri	Commissioned	Yes
6	Gandaki Urja	Pokhara	4000	45	Agri	Under const.	Yes
7	Ghorahi MSW	Ghorahi	1800	30	MSW	Under const.	Yes
8	Janakpur Agro farm pvt ltd	Janakpur	10000	100	Agri	DPR under preparation	Yes

Summary of Pipeline Projects Awaiting ADFD/IRENA Credit

S.N	Project	Location	Size (m3/day)	Waste (ton/day)	Waste type	Status	ADFD Loan Requested ?
9	Jiban bikas bio-gas and fertilizer	Biratnagar	3000	34	Agri	Under const.	Yes
10	Kalash capital farming	Birgunj	1000	20	Agri	Under const.	Yes
11	Kamdhenu bio-gas and fertilizer	Sarlahi	4000	48	Agri	Under const.	Yes
12	Kankai/ Birtamod/ Arjundhara MSW	Jhapa	4000	40	MSW	Under const.	Yes
13	Khilung kalika	Syangja	3500	36	Agri	Commissioned	Yes
14	National waste management pvt ltd	Chitwan	5000	60	Agri	DPR under preparation	Yes
16	Damak MSW	Damak, Jhapa	1800	30	MSW	Under const.	Yes
17	Itahari MSW	Itahari	1200	20	MSW	Under const.	Yes

Summary of Pipeline Projects Awaiting ADFD/IRENA Credit

S.N	Project	Location	Size (m3/day)	Waste (ton/day)	Waste type	Status	ADFD Loan Requested ?
18	Hetauda MSW	Hetauda	1200	20	MSW	Developer selected. DPR ongoing	Yes
19	Birendranagar	Surkhet	2000	30	MSW	Under const.	Yes
20	Dhulikhel MSW	Kavre	1200	20	MSW	Under const.	Yes
21	Birgunj MSW	Birgunj	4200	69	MSW	RFQ Floated	Yes
22	Janakpur MSW	Janakpur	2400	40	MSW	DPR ongoing	Yes
23	Butwal MSW	Butwal	2400	40	MSW	DPR ongoing	Yes
24	Suryabinayak MSW	Bhaktapur	2200	37	MSW	DPR completed and under review	Yes
25	Tansen MSW	Palpa	900	15	MSW	RFQ Floated	Yes

Why IRENA/ADFD Funds Matter

ADFD Funding for Large Biogas Loan

- Access to commercial credit for large biogas developers still cumbersome.
- High interest rate compared to housing/ car loans.
- Banks/ Financial institutions still unaware about the business viability of large biogas.
- Many developers waiting for credit facility to start the large biogas business.

Thank You !!!

Sushim Man Amatya
Senior Technical Officer
Biogas Sub-Component AEPC
sushim.amatya@aepc.gov.np