



Uzzala Bio Energy Solutions



CBG (Compressed Biogas) Production from Napier Grass Using Plug Flow Technology



www.uzzalanbioenergy.com
www.plugflowdigester.com
www.napierbiogasplant.com



Introduction to **Napier Grass**

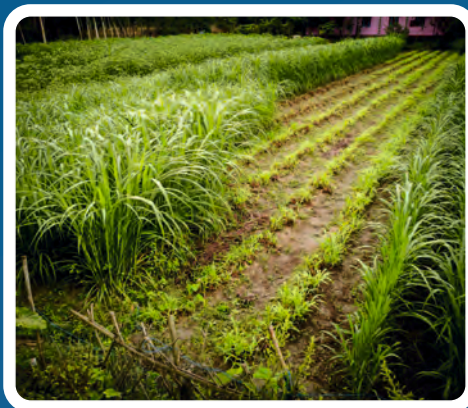


Napier Grass (*Pennisetum purpureum*) is a high-yielding, perennial energy crop capable of producing approximately 200–250 tonnes of biomass per acre annually.

Due to its rapid growth, drought tolerance, and ability to thrive even in low-fertility soils, Napier Grass has emerged as an ideal feedstock for the production of biofuels, including biogas, bioethanol, and biomass pellets, without competing with food crops.

The crop is widely cultivated across India and many tropical and subtropical regions worldwide. Its high biomass productivity, consistent yields, and suitability for renewable energy generation make it one of the most promising energy crops for Compressed Biogas (CBG) production.

Traditionally, Napier Grass has been used as a highly nutritious green fodder for dairy livestock. However, owing to its exceptional biomass yield, adaptability to marginal lands, and low cultivation cost, it is now rapidly gaining recognition as a preferred energy crop for the sustainable production of Compressed Biogas (CBG).



www.uzzalanbioenergy.com
www.plugflowdigester.com
www.napierbiogasplant.com



Napier Grass: From Fodder Crop to a Renewable Energy Powerhouse

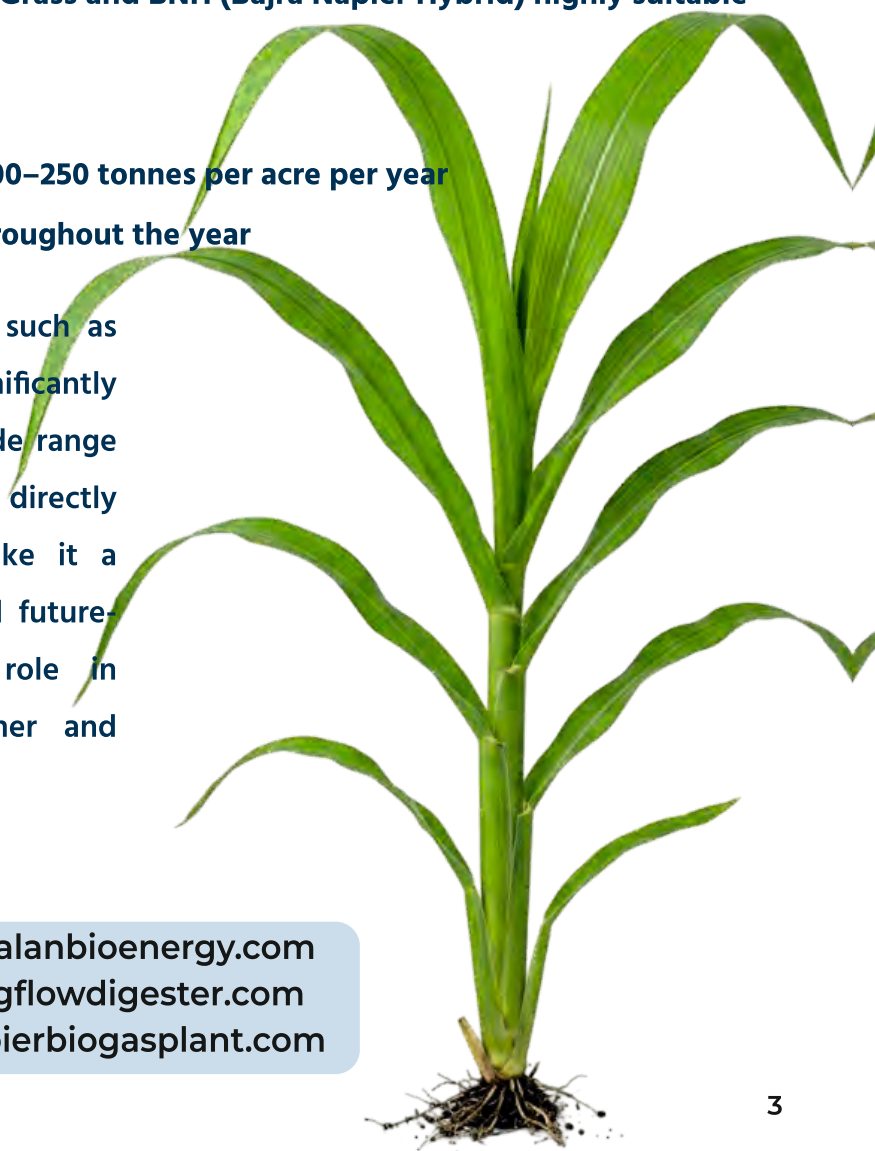


Hybrid Napier Grass has traditionally been recognized as one of the best green fodder crops for dairy livestock. However, in recent years, its significance has expanded far beyond the dairy sector, emerging as a promising feedstock for the renewable energy industry. With the support of the Government of India's National Bio-Energy Mission and initiatives promoting decentralized renewable energy, Napier grass is increasingly being utilized as a sustainable biomass feedstock for the production of biogas and Compressed Biogas (CBG). Its high biomass yield, rapid growth, and year-round availability make it an ideal energy crop, contributing to cleaner energy generation, reduced dependence on fossil fuels, and a more sustainable circular economy.

The following characteristics make Napier Grass and BNH (Bajra Napier Hybrid) highly suitable for Energy Plantations:

- **Rapid growth and quick regeneration**
- **High biomass yield of approximately 200–250 tonnes per acre per year**
- **Ability to support multiple harvests throughout the year**

Compared to conventional energy crops such as sugarcane and maize, Napier grass is significantly more water-efficient, adapts well to a wide range of soil conditions, and does not compete directly with food crops. These advantages make it a sustainable, environmentally friendly, and future-ready energy crop, playing a vital role in supporting the transition toward cleaner and renewable sources of energy.



www.uzzalanbioenergy.com
www.plugflowdigester.com
www.napierbiogasplant.com

Key Features and Benefits of Napier Grass:-



01

High Biomass Yield:

A single plantation supports multiple harvests, ensuring a continuous supply of feedstock throughout the year. This enables an annual biomass production of approximately 40–80 tonnes per acre, making Napier grass a reliable and sustainable energy crop.



02

Rapid Regrowth:

It is ready for harvesting every 60–75 days, enabling multiple harvests and a consistent biomass supply throughout the year.



03

Carbon Sequestration:

It improves soil health and fertility while playing a significant role in reducing net carbon emissions through effective carbon sequestration.



04

High Cellulose Content:

Its high cellulose content makes it an ideal feedstock for the production of biogas, biomethane, and other renewable biofuels.



05

Low Input Requirement:

It grows vigorously even in marginal soils with minimal fertilizer and input requirements, making it a cost-effective and sustainable energy crop.



Napier Grass Cultivation and Plantation

Planting and Growing Napier Grass



1. Prepare the Soil



2. Plant Napier Grass Cuttings



3. Regular Watering & Fertilizing



4. Harvest Mature Grass





Step-by-Step Guide to Napier Grass Plantation and Cultivation

Land Preparation

Plough the field and apply organic manure to enrich the soil.

Planting by Stem Cuttings

Plant healthy Napier stem cuttings in rows.

Irrigation

Provide regular irrigation for healthy growth.

01

02

03

04

Weed Management

Remove weeds regularly to promote healthy growth.

05

Fertilizer Application

Apply the required nutrients to promote high biomass growth.

06

Harvesting

Harvest the grass for fodder or Bio-CBG production.



www.uzzalanbioenergy.com
www.plugflowdigester.com
www.napierbiogasplant.com





www.uzzalanbioenergy.com
www.plugflowdigester.com
www.napierbiogasplant.com



Drip Irrigation Method

Importance of Drip Irrigation in Napier Grass Cultivation

Drip irrigation is one of the most efficient and water-saving irrigation methods for Napier grass cultivation, enabling higher biomass yields while promoting sustainable agriculture. It plays a vital role in optimizing water use and enhancing overall crop productivity.

In this system, water and nutrients are delivered directly to the plant root zone in the required quantity, minimizing water wastage and maximizing fertilizer-use efficiency. As a result, the plants grow faster, remain healthier, and produce a higher quantity of high-quality biomass.

Superior-quality biomass leads to increased biogas production and higher methane content, making Bio-CBG production more efficient, reliable, and economically viable.

In addition, drip irrigation helps suppress weed growth, reduces maintenance costs, improves water-use efficiency, and supports sustainable farming practices. By ensuring optimum moisture and nutrient availability throughout the crop cycle, drip irrigation contributes significantly to consistent biomass production and the long-term success of Napier-based Bio-CBG projects.



Feedstock Preparation:- **Why is Napier Grass the Ideal Feedstock for Plug Flow Technology?**



1

Napier grass is one of the most suitable feedstocks for Plug Flow Digestion Technology due to its high biomass yield, optimum dry matter content, and excellent biodegradability. Its fibrous structure and consistent composition enable smooth movement through the plug flow digester, ensuring stable anaerobic digestion and efficient biogas production.

2

When harvested at the appropriate growth stage, Napier grass provides an ideal balance of moisture and organic solids, resulting in higher methane yield and improved process stability. Its year-round availability, rapid regrowth, and predictable biomass production make it a reliable and sustainable feedstock for continuous Bio-CBG generation.

3

With proper feedstock preparation, including chopping and uniform size reduction, Napier grass ensures efficient material flow, reduced operational issues, and maximum energy recovery, making it the preferred choice for Plug Flow Technology.



Biogas yield depends on the harvesting stage of Napier grass. For maximum methane production and efficient anaerobic digestion, Napier grass should be harvested between 70–90 days, when it offers the ideal balance of moisture and digestible biomass.

From Napier to Bio-CNG

SUSTAINABLE FEEDSTOCK.
ADVANCED TECHNOLOGY.
CLEAN ENERGY.



Turning Nature into Clean Mobility



NAPIER GRASS
High yield, fast growing
& sustainable



FEED PREPARATION
Chopping, sizing &
optimized feed



ANAEROBIC DIGESTION
Advanced Plug Flow / CSTR
Technology



BIOGAS UPGRADING
High purity > 90%
Methane (Bio-CNG)



CLEAN FUEL FOR FUTURE
Powering Mobility.
Protecting Planet.

- Renewable & Sustainable
- Lower Emissions
Better Tomorrow
- Circular
Economy
- Better Planet
Better Future



Sustainable
Feedstock



Advanced
Technology



Efficient
Operations



Clean Energy
Solutions



www.uzzalabioenergy.com

Why is Drip Irrigation the Best Choice for Napier Grass Cultivation?

Drip irrigation delivers water and nutrients directly to the root zone, improving water-use efficiency, reducing fertilizer losses, and promoting healthy plant growth. It ensures higher biomass yield, making it the ideal irrigation method for Napier grass cultivation.



Feedstock We Utilize:-



**NAPIER
GRASS**



**COW
DUNG**



**POULTRY
WASTE**



PRESSMUD



**SPENT
WASH**



**ORGANIC
WASTE**



**PADDY
STRAW**



**PAPER MILL
WASTE**



Benefits of Napier Grass for Farmers and Sustainable Agriculture

Napier grass provides high biomass yields, ensures a steady source of income for farmers, and supports sustainable agriculture through efficient land and water use. It also contributes to renewable energy production by serving as an ideal feedstock for Bio-CBG plants.



Napier grass-based biogas systems provide farmers with more than just renewable energy. They also generate valuable by-products:

- 1. Bio-CBG / Biogas** – A clean renewable fuel for power generation, heating, and transportation.
- 2. Digestate** – A nutrient-rich organic fertilizer that improves soil health, enhances soil fertility, and supports higher crop productivity.

Unlike chemical fertilizers, digestate replenishes organic carbon in the soil, improving soil aeration, water retention, and long-term fertility. Regular application enhances soil health and can significantly increase crop productivity within 2–3 years.



Napier Grass Silage: Ensuring Continuous Feedstock During the Monsoon



During India's 2–3 month monsoon season, harvesting fresh Napier grass becomes difficult. Converting Napier into silage ensures a continuous feedstock supply, allowing uninterrupted Bio-CBG production.

The ensiling process promotes natural fermentation, improving biomass quality and increasing methane yield by 5–10%. Silage is an ideal solution for decentralized Bio-CBG plants, ensuring stable digester operation and consistent biogas production throughout the rainy season.

**Silage allows farmers to ensure a continuous year-round
feedstock supply for biogas production, enabling
uninterrupted operations and greater control over production.**





Reduction in Greenhouse Gas Emissions



Napier grass-based Compressed Biogas (CBG) is a carbon-neutral renewable fuel that helps reduce CO₂ and methane emissions by replacing fossil fuels. The CO₂ released during its use is largely offset by the carbon absorbed during the growth of Napier grass, supporting a cleaner environment and a sustainable energy future.

Converting Napier grass into biogas also helps eliminate open burning of agricultural biomass, reducing air pollution and greenhouse gas emissions while contributing to a cleaner and more sustainable environment.

Napier grass does not require highly fertile agricultural land, allowing it to be cultivated without competing with food crops. It efficiently utilizes marginal land, making it a sustainable feedstock for renewable energy while supporting long-term agricultural development.





Uzzala Bio Energy Solutions

Powering a Sustainable Future with Bio-CBG Technology



Waste Management:

Converts organic waste into renewable Bio-CBG and nutrient-rich organic fertilizer.



Energy Independence:

A renewable alternative to LPG and fossil fuels.



Cost Savings:

Reduces fuel expenses and improves operational efficiency.



Rural Empowerment:

Creates income and employment opportunities for farmers.



Environmental Benefits:

Reduces carbon footprint and supports a cleaner environment.

**Transforming Waste into Wealth:
Harnessing the power of cow dung to build a clean,
green, and sustainable future.**



Local Energy Production & Energy Security:

CBG produced from Napier grass serves as a clean fuel for cooking, industrial heating, and transportation, helping rural and urban areas transition towards sustainable and circular energy systems.

Napier Grass-Based Bio-CNG Plant Using Dry Digestion Technology

માનવમિત્ર પ્રાદેશિક સમાચાર manavmitra.com

અમરેલીના શેડુભાર ગામે ડ્રાય ડાયજેસ્ટર ટેકનોલોજી આધારિત ગોપીનાથ બાયો CNG પ્લાન્ટ બનશે : જતીન પટેલ

અમરેલીના શેડુભાર ગામે ડ્રાય ડાયજેસ્ટર ટેકનોલોજી આધારિત ગોપીનાથ બાયો CNG પ્લાન્ટ બનશે. આ પ્લાન્ટના ઉદ્ઘાટન કાર્યક્રમમાં ગામના સરપંચ, સ્થાનિક નેતાઓ અને ગ્રામજનો હાજર રહ્યા હતા. ગોપીનાથ બાયો CNG પ્લાન્ટના માલિક જતીન પટેલે જણાવ્યું હતું કે, આ પ્લાન્ટના ઉદ્ઘાટન સાથે ગામમાં સ્થાનિક ઊર્જા ઉત્પાદન શરૂ થશે, જે ગ્રામજનોને શુદ્ધ અને સસ્તી ઊર્જા પૂરી પાડશે. આ પ્લાન્ટના ઉદ્ઘાટન કાર્યક્રમમાં ગામના સરપંચ, સ્થાનિક નેતાઓ અને ગ્રામજનો હાજર રહ્યા હતા.

ગોપીનાથ બાયો CNG પ્લાન્ટ

ગોપીનાથ બાયો CNG પ્લાન્ટના માલિક જતીન પટેલે જણાવ્યું હતું કે, આ પ્લાન્ટના ઉદ્ઘાટન સાથે ગામમાં સ્થાનિક ઊર્જા ઉત્પાદન શરૂ થશે, જે ગ્રામજનોને શુદ્ધ અને સસ્તી ઊર્જા પૂરી પાડશે. આ પ્લાન્ટના ઉદ્ઘાટન કાર્યક્રમમાં ગામના સરપંચ, સ્થાનિક નેતાઓ અને ગ્રામજનો હાજર રહ્યા હતા.

અંત્યોદય ANTODYODA NEWS

શેડુભાર ગામે ગોપીનાથ બાયો CNG પ્લાન્ટનું ઉદ્ઘાટન

શેડુભાર ગામે ગોપીનાથ બાયો CNG પ્લાન્ટનું ઉદ્ઘાટન કરવામાં આવ્યું હતું. આ પ્લાન્ટના ઉદ્ઘાટન કાર્યક્રમમાં ગામના સરપંચ, સ્થાનિક નેતાઓ અને ગ્રામજનો હાજર રહ્યા હતા. ગોપીનાથ બાયો CNG પ્લાન્ટના માલિક જતીન પટેલે જણાવ્યું હતું કે, આ પ્લાન્ટના ઉદ્ઘાટન સાથે ગામમાં સ્થાનિક ઊર્જા ઉત્પાદન શરૂ થશે, જે ગ્રામજનોને શુદ્ધ અને સસ્તી ઊર્જા પૂરી પાડશે. આ પ્લાન્ટના ઉદ્ઘાટન કાર્યક્રમમાં ગામના સરપંચ, સ્થાનિક નેતાઓ અને ગ્રામજનો હાજર રહ્યા હતા.

ગોપીનાથ બાયો CNG પ્લાન્ટ

ગોપીનાથ બાયો CNG પ્લાન્ટના માલિક જતીન પટેલે જણાવ્યું હતું કે, આ પ્લાન્ટના ઉદ્ઘાટન સાથે ગામમાં સ્થાનિક ઊર્જા ઉત્પાદન શરૂ થશે, જે ગ્રામજનોને શુદ્ધ અને સસ્તી ઊર્જા પૂરી પાડશે. આ પ્લાન્ટના ઉદ્ઘાટન કાર્યક્રમમાં ગામના સરપંચ, સ્થાનિક નેતાઓ અને ગ્રામજનો હાજર રહ્યા હતા.

શેડુભારમાં ગોપીનાથ બાયો સીએનજ પ્લાન્ટ ખાતે ઊર્જા મંત્રી કૌશિક વેકરિયાના હસ્તે વૃક્ષારોપણ

અમરેલીના શેડુભાર ગામે ગોપીનાથ બાયો સીએનજ પ્લાન્ટના ઉદ્ઘાટન કાર્યક્રમમાં ઊર્જા મંત્રી કૌશિક વેકરિયાના હસ્તે વૃક્ષારોપણ કરવામાં આવ્યું હતું. આ વૃક્ષારોપણ કાર્યક્રમમાં ગામના સરપંચ, સ્થાનિક નેતાઓ અને ગ્રામજનો હાજર રહ્યા હતા. ગોપીનાથ બાયો સીએનજ પ્લાન્ટના માલિક જતીન પટેલે જણાવ્યું હતું કે, આ પ્લાન્ટના ઉદ્ઘાટન સાથે ગામમાં સ્થાનિક ઊર્જા ઉત્પાદન શરૂ થશે, જે ગ્રામજનોને શુદ્ધ અને સસ્તી ઊર્જા પૂરી પાડશે. આ પ્લાન્ટના ઉદ્ઘાટન કાર્યક્રમમાં ગામના સરપંચ, સ્થાનિક નેતાઓ અને ગ્રામજનો હાજર રહ્યા હતા.

ગોપીનાથ બાયો સીએનજ પ્લાન્ટ

ગોપીનાથ બાયો સીએનજ પ્લાન્ટના માલિક જતીન પટેલે જણાવ્યું હતું કે, આ પ્લાન્ટના ઉદ્ઘાટન સાથે ગામમાં સ્થાનિક ઊર્જા ઉત્પાદન શરૂ થશે, જે ગ્રામજનોને શુદ્ધ અને સસ્તી ઊર્જા પૂરી પાડશે. આ પ્લાન્ટના ઉદ્ઘાટન કાર્યક્રમમાં ગામના સરપંચ, સ્થાનિક નેતાઓ અને ગ્રામજનો હાજર રહ્યા હતા.

Sustainable solutions for biogas



Napier Grass-Based Bio-CBG Plant Using Plug Flow Digester Technology





Uzzala Bio Energy Solutions

Office Address: 401 & 402, Smart Walls, Nr Science City Circle, SP Ring Road, Ahmedabad-380060, Gujarat (INDIA)

Phone: +91 82006 18329, +91-98250 17181, +91-97569 62526

E-mail: uzzalabio@gmail.com **Web:** www.uzzalabioenergy.com

Web: www.plugflowdigester.com, www.napierbiogasplant.com

Note: Images are for visual representation purposes only. Actual plant design, equipment, and specifications may vary based on project requirements.

DESIGN PRINT:
ADS AHMEDABAD
+91-9998842900