

Topic: A significant portion of carbon emissions come from food production, and food distribution often results in waste

Persona 1

Location: Urban, West Coast
Income: Middle-class
Education: Master's degree in environmental science
Occupation: Environmental researcher
Make more sustainable food choices & minimize food waste in her household
Support local farmers and sustainable food distribution systems

Eco-conscious consumer

Sita , 32(F)

Persona 2

Location: Rural, Midwest
Income: Farm income
Education: Bachelor's in agriculture
Occupation: Organic farmer
Implement sustainable farming techniques
Explore eco-friendly distribution options
Minimize post-harvest losses

Sustainable Food Producer

Ram, 45(M)

Persona 3

Location: Urban, Northeast
Income: Upper-middle class
Education: Bachelor's in logistics and supply chain management
Occupation: Food distribution manager
Optimize delivery routes for reduced emissions
Implement sustainable packaging
Explore eco-friendly transportation options

Food Distribution Manager

Bharti, 38(F)

Persona 4

Location: Urban, Midwest
Income: Nonprofit salary
Education: Bachelor's in environmental studies
Occupation: Environmental activist
Raise awareness about food waste
Collaborate with local businesses to rescue excess food
Advocate for policy changes to reduce food waste and carbon emissions

Food waste Activist

Lakhman, 28(M)

Survey Questions

1. What are the major crops that you grow ?
2. What are the various stages involved before harvesting a crop ?
3. Are you aware of negative impacts of various processes involved in agriculture ?
 1. Are you aware of GHG emission ?
 2. What are the major activities that lead to GHG emissions ?
 3. What is the major crop that leads to GHG emissions ?
 4. Are there any initiatives taken to tackle the issue of crop burning ?

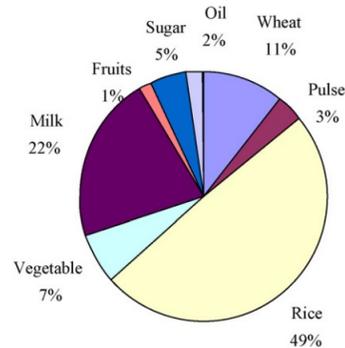
8. Were this initiatives effective ?
9. What are the reasons you are still indulging in crop burning ?
10. On a scale of 1 to 5, how common is crop burning in your area , 5 being too common ?
11. Has the community collectively taken any step for crop burning ?
12. Are you aware of other alternatives for crop burning ?
12. What is the major reason for crop burning rather than trying other alternatives ?
13. Are you interested if we provide solution to crop burning ?
14. Are you willing to pay price to get rid of the crop residuals ?

After conducting primary and secondary research, the project scope can be narrowed down to one key problem

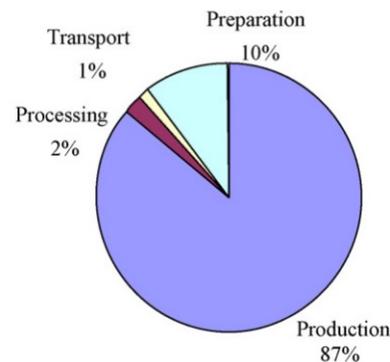
Secondary Research Insights

Agricultural production is a major emitter of GHGs, currently accounting for 18% of total GHG emissions in India

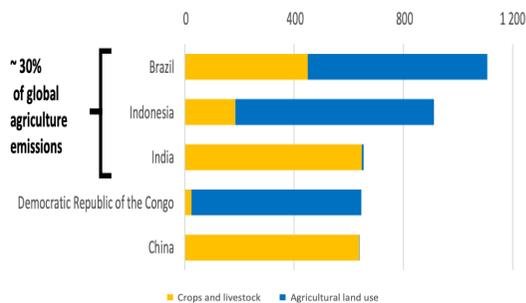
In India, the majority of agricultural GHG emissions occur at the primary production stage, and are generated through the production and use of agricultural inputs, farm machinery, soil disturbance, residue management and irrigation



Relative contribution of various food items to greenhouse gas emission in balanced diets



Relative contribution of various stages of life cycle of Indian food items towards global warming



Sources:

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5268357/#bib0175>

<https://www.fao.org/3/cb3808en/cb3808en.pdf>

Primary Research Insights

(Based on Personal Interviews)

Highest GHG emissions among crops are associated with paddy (rice) production

There are three main steps during production which involve carbon emissions

These involve:
Use of Fertilisers | Water Management | Paddy Burning

A Quote from the Interview

“In India, the highest proportion of carbon emissions come from northern states like Punjab and Haryana. Although emissions due to fertilizers and poor water management are on a decline, this isn’t the case with crop burning”

Based on Primary and Secondary Insights, some things became very clear:

- Production stage is the biggest contributor to carbon emissions
- Rice production leads to highest proportion of greenhouse gas emissions
- Out of the 3 major carbon emission stages, Paddy Burning is the stage which contributes the most to carbon emissions

Refined Problem Statement:

“During the food production stage, crop burning is the root cause of carbon emissions. Although there are other emission factors as well, the project will focus upon emissions due to crop burning, majorly paddy burning. The aim of the project is to provide a solution that leads to reduction in paddy burning”

More About the Problem

As established, the key problem is paddy straw burning. Generally, what happens is that the paddy straws are put to multiple uses like animal feed, mulching, composting etc. All the remaining straws are burned.

Initiatives to Prevent Paddy Burning

1. Subsidies for Machinery
2. Awareness Campaigns
3. Promotion of Alternatives
4. Penalties and Fines
5. Mechanized Solutions

Although there've been many initiatives by the government, the initiatives haven't been proven very effective over the years. The farmers don't have enough motivation to not burn the paddy straws. They want the land to be cleared as quickly as possible as they need to prepare the next harvest.

The most effective solution has been the usage of paddy straws for renewable natural gas (RNG) plants.

Value Chain of Companies producing RNG using Paddy Straw

RNG: Renewable Natural Gas

Harvesting

Paddy sown in fields is harvested in the month of October or November.
The field is cleared off to prepare the field for next crop.

Procurement

Paddy straw is procured as biomass by RNG-producing companies during months of October-November.

Processing

Biomass is broken down in processing plants to produce biogas.

Distribution

Biogas is then treated to generate electricity which is distributed to the nearest national grid.

Current Problems

1. **Crop Preparation:** Farmers' lack of expertise in crop production.
2. **Collection Methods:** Low penetration of straw collecting tools like balers.
3. **Transportation:** Lack of Availability of Tractors

Proposed Idea:

Currently, the procurement model is very flawed. There needs to be a solution where all the stakeholders can come together, to a single platform, so that everyone gets what everyone needs. **We propose an app** where we'll bring together all the stakeholders. It'll be a common platform serving all needs.

Stakeholders: Medium and Big Farmers | RNG Producing Companies | Leasing Companies for Farm Tools and Vehicles | Distributors

Prototype

Procurement and Lease

Procurement

Name: Suresh
Contact: 81420-xxxxx
Paddy Available: 20 Kg
Quoted Price: 50 Rs/Kg

Lease

Name: Suresh
Contact: 81420-xxxxx
Requirement: 2 Balers

Profile Button

This contains information regarding the farmers. It includes list of farmers, amount of paddy straw they have, tools they need or any other requirement.

Filter on basis of:
Location | Paddy
Quantity | Price
etc.

While signing up, user needs to tell, whether he's from procurement/lease side or he's a farmer

Farmers

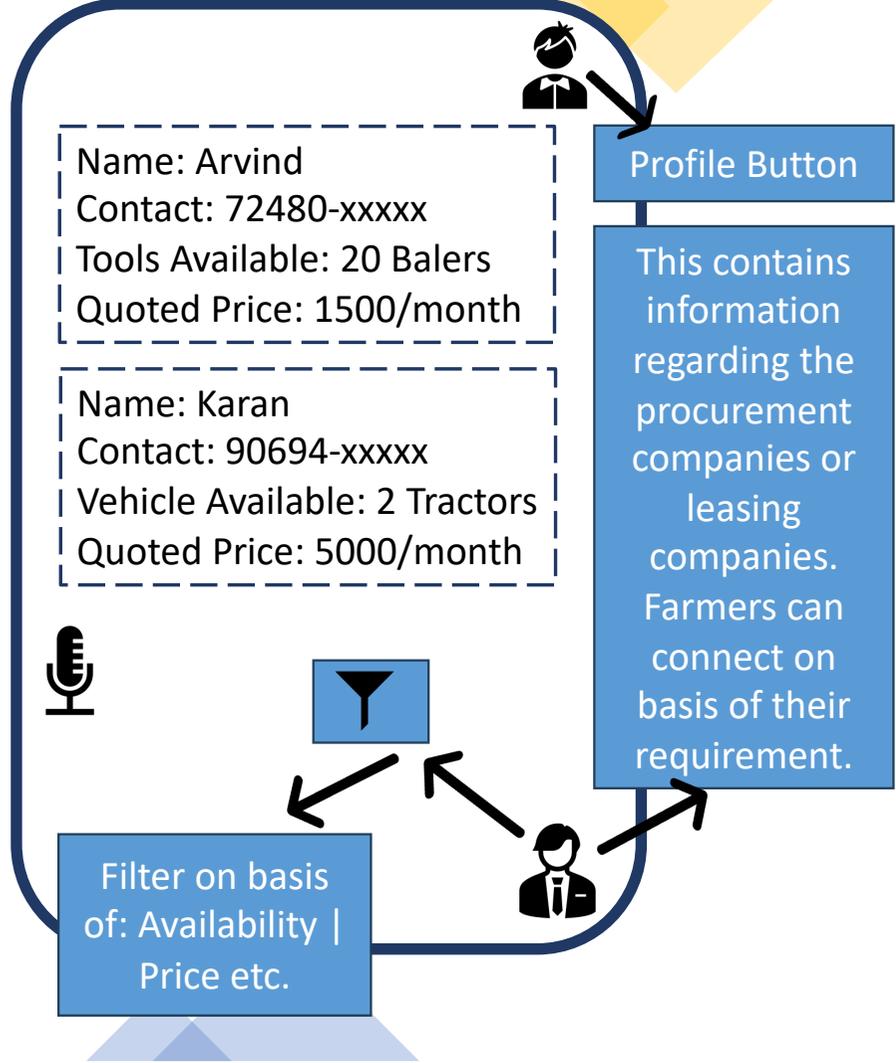
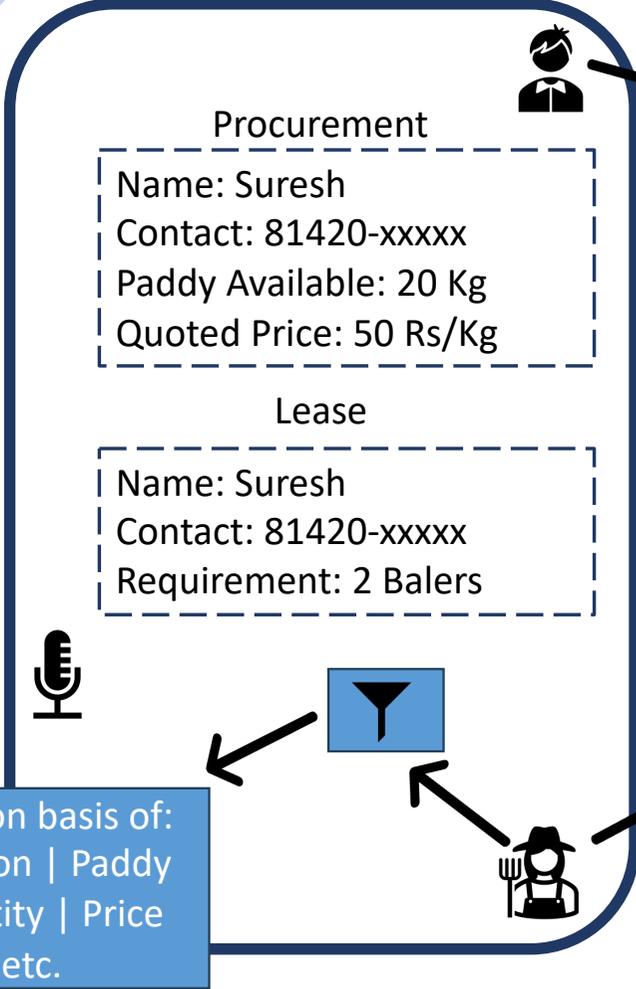
Name: Arvind
Contact: 72480-xxxxx
Tools Available: 20 Balers
Quoted Price: 1500/month

Name: Karan
Contact: 90694-xxxxx
Vehicle Available: 2 Tractors
Quoted Price: 5000/month

Profile Button

This contains information regarding the procurement companies or leasing companies. Farmers can connect on basis of their requirement.

Filter on basis of:
Availability |
Price etc.

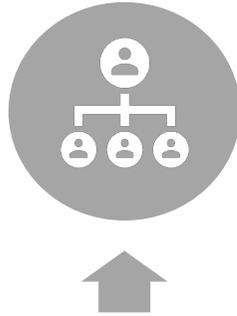


LEAN PRODUCT CANVAS

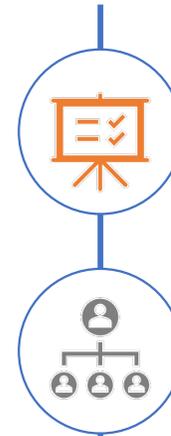
<p>Key Partners </p> <ul style="list-style-type: none"> • Medium and Big Farmers • RNG Producing Companies • Leasing Companies for Farm Tools and Vehicles • Distributors 	<p>Key Activities </p> <ul style="list-style-type: none"> • Data for information of procurement • Insights for Carbon emission 	<p>Value Propositions </p> <ul style="list-style-type: none"> • All stakeholders on one app and one place for easy procurement • Information of farmers, distributors easily accessible for all stakeholders • Vernacular platform and ease of access 	<p>Customer Relationships </p> <ul style="list-style-type: none"> • On ground team reaching out to different stakeholders • Trust based relationship 	<p>Customer Segments </p> <ul style="list-style-type: none"> • Medium and Big Farmers • RNG Producing Companies • Leasing Companies for Farm Tools and Vehicles • Distributors
<p>Key Resources </p> <ul style="list-style-type: none"> • Onboarding of maximum stakeholders on the platform • AI & live tracking availability 			<p>Channels </p> <ul style="list-style-type: none"> • Digital application & Website • Social Media presence 	
<p>Cost Structure </p> <ul style="list-style-type: none"> • Application Development • Advertising & Promotional Cost • Onboarding Cost & One-time Cost incurred 		<p>Revenue Streams </p> <ul style="list-style-type: none"> • Commission on purchases • Advertising Revenue • Premium Model for Stakeholders 		

Competitor Analysis

Bargaining power of farmers is low, as there are few buyers. Selling paddy would result in an additional source of income for farmers, which would help them improve their living standards.



Threat from new entrants is medium, as there are many government incentives. Also, barriers to entry are low, so quite a number of firms are considering setting up businesses. It also will add to a less carbon-intensive source of energy.



Competitive Rivalry

Biggest competitor in paddy procurement from rabi crops is the Government itself. It also provides incentives to set up procurement facilities and plants. Apart from that there are many small players in this segment. So, Competitive rivalry is Medium till now, which increase in future.

Potential New Entry

Setting up biogas plants & implementing measures to reduce food wastage may require significant capital investment. However, the Indian government's initiatives, subsidies, or support for renewable energy & sustainable agriculture could attract new entrants, reducing the barrier to entry.

Buyers

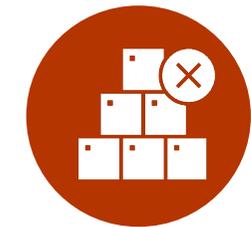
Biogas plant operators and food production companies. The buyer power could be influenced by the number of buyers in the market, the demand for paddy, and the availability of alternative sources of paddy. Since the supply of paddy is inconsistent and demand is rising, it is safe to assume low.

Suppliers

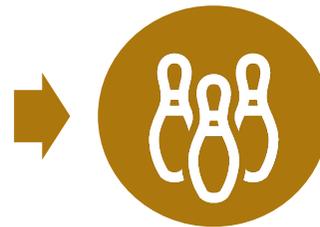
There aren't many crop waste procurers, & farmers don't get anything from burning the paddy in the field. Also, they don't have any collective bargaining power, & alternatives to paddy are also there, like wheat. factors such as government policies, subsidies, & support to farmers can influence their power.

Substitutes

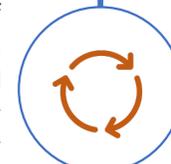
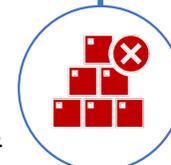
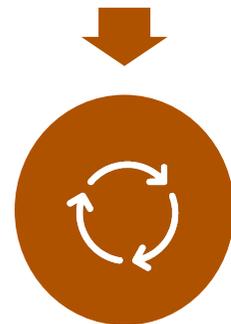
Paddy may have limited substitutes for certain uses in biogas production and food processing. Being available in abundance makes it easy to procure once the procurement channels are set up.



Threat from substitutes is negligible, as for producing biogas, raw materials come from agricultural produce, mainly waste like paddy, wheat straws, and other crop waste, which is generally burned.



Bargaining power of customers is low, as they don't have a reliable source of procurement and face problem of an inconsistent supply of paddy. BioGas can be converted to electricity and transferred to the grid system. India has a huge electricity demand, and there are many incentives from govt. for producing energy from renewable sources.





Thank you