INDEX

Executive Summary ................................................................. 4
Industry Overview ................................................................. 5
Market Survey ................................................................. 7
  Survey Findings ................................................................. 8
Product Design ................................................................. 9
Value Proposition ............................................................. 10
Manufacturing ................................................................. 11
Marketing Strategy ............................................................ 12
Assumption & Risks ............................................................ 13
The Business Model ........................................................... 13
  Cost ................................................................. 14
  Revenue ................................................................. 14
Social & Environmental Impact ............................................... 14
Key Resources ............................................................... 15
  Team Composition .......................................................... 15
  Key Partnerships ........................................................... 15
Executive Summary

An idea worth considering should have a social component attached to it. The social impact of the idea should be such that it has considerable output which can change the face of existing system. India faces myriad of problems such as poverty, exponentially rising inflation and slow agricultural growth though past decades has seen few improvements.

"Slow agricultural growth is a concern for policymakers as some two-thirds of India’s people depend on rural employment for a living. Current agricultural practices are neither economically nor environmentally sustainable and India's yields for many agricultural commodities are low. Poorly maintained irrigation systems and almost universal lack of good extension services are among the factors responsible. Farmers' access to markets is hampered by poor roads, rudimentary market infrastructure, and excessive regulation. Adoption of modern agricultural practices and use of technology is inadequate, hampered by ignorance of such practices, high costs and impracticality in the case of small land holdings."

—World Bank: "India Country Overview 2008"

The traditional methods of agriculture may not be called as a problem but it is time for much needed intervention in terms of technology and efficiency to explore the darker areas.

Our idea of Vidyut is a novel one which is targeted towards farmers who cultivates two cash crops viz. red chilies and turmeric. It makes the post harvesting process of these two commodities extremely fast and efficient. This treatment will help the farmers to speed up their supply chain, reduce the losses which they incur due to unpredictable weather conditions and tedious process of making the product ready for market. The best part of our product is that it is environment friendly as it works on solar energy. In addition to this basic objective the product finds its use in various other purposes which would be discussed subsequently.

Vidyut is a state of art product that speeds up the time lag between harvest of both red chilies and turmeric and final stage of selling them in market. The value proposition of the product is its lightweight design which aids ease of mobility, multifaceted usage and non-dependency on conventional forms of energy. The product runs on energy of sun which is cheap, readily available especially in market where we are aiming to sell our product. The product features an additional advantage that it can be custom designed according to customers need and applications.

The management of this venture will be spearheaded by three management graduates pursuing rural management at Xavier Institute and Management, Bhubaneswar.

The product is aimed at rural markets where red chilies and turmeric are the two main spices produced. The product can find its customer base in cooperatives, self help groups (SHGs), gram panchayats and medium size farmers. It can be used as additional equipment in flour mills where
people can opt for drying wheat, potato chips etc. to preserve them for the following year. The product can be breakthrough revolution in mid-day meal schemes where it can be used to cook hygienic and healthy meals without the use of natural gas, wood or kerosene stoves etc.

We would hire 4-5 people from amongst the villagers for the sales and marketing team whom would be made aware of technical aspects and working of the model. We intend to achieve the break even sales in short span through excessive advertising and demonstration of the product.

**Industry Overview**
The above map shows that chilies and turmeric are produced in large quantities throughout the country. The major producers are **Maharashtra, AP, Karnataka, Tamil Nadu, Kerala, Odisha, Bihar and Chattisgarh**. Though 80 percent of production of these spices comes from above mentioned states, the consumption is equally distributed in whole of the country and even the avenues in foreign market are no less.

Turmeric goes through two step post harvest process viz. boiling and drying. The turmeric rhizomes are boiled to prevent germination by conventional way using wood, natural gas etc. in a large container post which it is dried in the sun for a period of 20-25 days to make sure that the crop is moisture free before it is pulverized into powder form. Red chili requires only drying. Chili crop is usually planted in **kharif** months of August- September. The plants start bearing fruit in month of November. The produce is collected every seven days till the month of April and kept for drying in sun simultaneously to make the crop moisture free. As with turmeric, chilies also require 20-25 days of drying in sun.

We saw some of the disadvantages in the above process. First being the dependency on solar heat for drying. With so much of chilies produced every week it becomes cumbersome for farmers to garner the chilies spread under the sun during the day each night and spread them again next day. We found that farmers let the chilies once spread as it is for 25 days. This means the produce is affected by moisture in night and dust which can form a thin layer on the produce. For drying, space is required which in this case is used up for 25 days. The post harvest process of boiling turmeric makes the crop lose its nutrients, the use of firewood for boiling depletes natural resources and the smoke that is produced harms the environment.

We axed the conventional method of boiling the turmeric rhizomes and applied the process of steaming. Steaming is better because it helps the product retain its qualities and consumes less energy. For drying we use solar cooker which is based on principle of focusing solar energy on particular area thereby increasing heat which makes the produce 100% moisture free within time span of few hours.

As discussed earlier, **Vidyut** can replace the traditional way of cooking food in mid-day meal schemes by using steam to cook food. The Mid-Day Meal Scheme is the popular name for school meal program in India which started in the 1960s. It involves provision of lunch free of cost to school-children on all working days. The key objectives of the program are: protecting children from classroom hunger, increasing school enrolment and attendance, improved socialization among children belonging to all castes, addressing malnutrition, and social empowerment through provision of employment to women. This way of cooking will be hygienic, inexpensive, fast and energy efficient. Use of solar energy helps to conserve conventional energy sources such as fossil fuels, fuel wood and electric energy to a large extent. The school education department has suggested a variety of cooked food derived from rice i.e. **Khichdi, Dal Rice, Idli Sambar, Rice Kheer, Tomato Rice, Vegetable Rice** etc. These items can be easily and conveniently prepared by steaming which keep the nutrition of the food intact.
Vidyut will also be marketed in southern states of India viz. AP, Karnataka, Tamil Nadu, Kerala and specific areas in Odisha where demand for parboiled rice is huge. Parboiled rice is prepared using method that resembles the post harvest process of turmeric viz. boiling and drying. The paddy is boiled using conventional fuels which makes the grain inside the husk to expand which breaks the outer covering and keeps the nutrient intact within the grains. The breakage of grains is significantly reduced during milling. Steaming with Vidyut will improve the quality and taste while keeping the advantages of parboiling unaffected.

**Market Survey**

We initially focused on perception of limited no. of people in our state Maharashtra. We knew that some of the main crops produced in Maharashtra were paddy, chili, turmeric, wheat, soya bean etc. The tehsil Bhiwapur in Nagpur district (the place we belong to) is known for chilies, Sangli district in west is called Turmeric city while the eastern part is famous for different qualities of paddy although the demand for parboiled rice is practically non-existent in the state. We were aware that farmers depend on sun for drying of their produce before finally packing it to be sold in market. The mid-day meal schemes had been a roaring success throughout the state.

The informal survey was carried in village Bhiisi of Chandrapur district which is a part of turmeric producing belts in the state. The focused group discussion (FGDs) was carried with ‘Bhiisi Halad Utpadak Mahasang’ which is a co-operative formed by 15 turmeric growing farmers in the village. The co-operative directly talks with the government about funds for farming, research and marketing of turmeric. The members also sell the turmeric rhizomes to the government at pre-decided rates which are then sold in other markets. The members also contribute ₹1000 every month as a safety deposit that can be used during emergency or to purchase equipments, seeds etc. The farmers mutually agreed that the post harvest process of boiling turmeric is tedious which exacerbate the task of cost and time management.

One of the respondents Mr. Ishwar Deshkar, aged 55 yrs said that his family had been cultivating turmeric since 1960. His mother owned 100 mango trees which she purchased from another villager at ₹1200 in 1960. Every year for boiling turmeric he had been cutting two trees for wood which were used in the furnace to boil water and now he is left with no more than five trees in his orchard. He was also getting supply of coal for the same but due to untimely supply and high cost he was left with no other option than to cut down his trees.

The idea of Vidyut was confusing to the farmers because they found it difficult to believe that solar energy can be used for steaming and drying albeit many nodded in favor of using the product if properly priced.

Further we arranged a one on one meet with the teacher Mrs. Venutai Rewatkar at Adarsh Janta Vidyalaya, Bhiisi, a school imparting education from std. 1st to 12th. Our focus was to collect
details on feasibility of *Vidyut* in mid-day meal schemes run by the govt. to provide free afternoon meals for children studying in std. 1st to 4th.

The *panchayats* and other local governing bodies are responsible for organizing and monitoring the transportation of grains and regular provision of cooked meals in the government schools. Local governments may choose to have the cooked meals provided through NGOs, as long as coverage is limited to government, local body, and aided schools. The central and state governments share the cost of converting the food grains into meals (cooks’ salaries, additional food ingredients, dishes and utensils, etc.). Kitchen utensils, gas connection or stove/chullah have been provided to all the cooking agencies for cooking food. If the food is cooked in the schools, these facilities are provided to the cooks in the school. The gas connection has not been provided in all the schools in *Maharashtra*. In some schools the meals were prepared over wood fire while in other schools the meal was prepared on the gas *chullahs* or kerosene stoves.

The self help groups (SHGs) women in the village prepare at their own place and cooked food is brought to the school. Cooks reported that it took them about three to four hours to prepare the school meals depending on the number of children enrolled in primary sections. They were also expected to provide their own cooking fuel if the food is cooked with firewood. The cooks reported that the remunerations may be increased considering the time they spend for cooking and washing utensils.

**Survey Findings**

<table>
<thead>
<tr>
<th>Sr. no.</th>
<th>Parameter</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Time</td>
<td>Not a key deciding factor as people are habituated to time taken by conventional methods but will entertain a system where time is reduced.</td>
</tr>
<tr>
<td>2</td>
<td>Fuel</td>
<td>Most important factor, huge expenses incurred to procure firewood, coal for boiling turmeric, soaring bills of using gas, kerosene for mid-day meal programs.</td>
</tr>
<tr>
<td>3</td>
<td>Weather</td>
<td>Cloudy weather affects drying thereby increasing time duration for drying.</td>
</tr>
<tr>
<td>4</td>
<td>Cost</td>
<td>Labor cost on higher side to manage large stocks of chilies and turmeric, opportunity cost of using land for drying.</td>
</tr>
<tr>
<td>5</td>
<td>Quality</td>
<td>Quality not a matter of concern but increased quality means better returns.</td>
</tr>
<tr>
<td>6</td>
<td>Pollution</td>
<td>Parameter of least concern proves apathy towards nature.</td>
</tr>
</tbody>
</table>
First part of the Vidyut is a solar steamer which is modified solar water heating system for providing continuous thrust of steam at the output. This water heater is called Agni manufactured by Electrotherm (India) Pvt. Ltd. for application in extremely cold weather of Jammu & Kashmir State. It is designed to provide hot water at 65°C in region where temperature usually stands below freezing point. It uses specially designed copper tubes and a chemical liquid (actual design of Agni not disclosed by Electrotherm (India)) to heat water. The product is not intended to sell to households in market other than J & K because it is found impractical owing to high temperature in the other regions although it is sold in industries as a part of boiler operation. The standard design consists of insulated storage tank in 100/200/300 liter capacity, specially designed copper tubes in which flow of water is maintained and remaining module consisting of attachments, pipes at inlet and outlet. The working is identical to typical solar water heating system wherein the cold water is heated in the tubes which then rises up in the tube to be collected in insulated storage tank from where it is taken out via outlet. Vidyut uses Agni as a steaming system because of its efficiency in providing continuous steam in our target region where the average temperature is around 40°C.
The steam is then passed through insulated pipes into the two layer cylinder made up of unbreakable toughened polycarbonate fiber glass. The lightweight cylinder of 50 kg capacity which weighs no more than 5 kg is two layered which are transparent. The inner layer is perforated in which the product to be steamed will be placed while outer layer has two valves-one at the top to maintain pressure in the cylinder, other at the bottom to remove water accumulated due to condensation. The cylinder is placed on a stand through two hinges which allow free movement of cylinder across the horizontal axis.

Once steaming process is over, the top of the cylinder is opened and the cylinder is rotated along the hinges to empty the produce into solar dryer. Solar dryer is a typical solar cooker box which is custom designed to accumulate 50 kg of the produce in its 2ft*3ft dimensions. The sun rays are trapped into the box by principles of reflections through mirrors which increase the temperature of the box up to 150°C. The inner surface is coated black to increase heat retention within the box. The produce becomes 100% moisture free in a short span of 2-3 hrs after which it can be stored for further processing. We may add an attachment to the box to mix the product at specific intervals for uniform heating or it can be done manually.

The setup is completely detachable into Agni steaming system, fiber glass cylinder, solar dryer box and connecting pipes thus making it easy to transport to and from farms and homes. The steaming and drying process may require 2-3 hrs which makes the process extremely fast and efficient. The time duration, may be increased depending on weather conditions, which is small fraction of what is required in traditional methods.

**Value Proposition**

**Time**

*Vidyut* reduces the duration of the post harvest treatment of turmeric and red chilies substantially from 30 days to a day or two. The produce becomes 100% dry and ready to be packed and sold in market. The process is independent of change in weather conditions like untimely rain to considerable extent. In addition the model eliminates the conventional rubbing process of turmeric after boiling to ensure that the shoots does not bend as the produce is instantly dried after steaming thereby reducing time and labor.

**Fuel**

*Vidyut* uses renewable source of energy viz. solar energy for process of steaming as well as drying. It not only makes the process efficient and environment friendly but also reduces the operating cost. Dependency on conventional and non-renewable fuels like wood, gas and coal is eliminated. Pollution of environment controlled.
**Quality**

Hygiene taken care of as the process of drying in open space is omitted and hence the produce is protected from dust and insects. Steaming helps retain nutritional value of the turmeric or food to be cooked in mid-day meal schemes. Quality of the product improved which might fetch better prices to the farmers.

**Design**

The model’s compact design replaces the need for minimum space of 5000 sq. ft. for purpose of drying. The detachable and lightweight design ensures ease of mobility, the parts are easy to assemble and the process is simplified.

**Maintenance**

The material used for the product is of high quality, maintenance free and resistant to corrosion. The after sales servicing cost is practically non-existent as the design does not have moving parts. But the glass tubes in the steaming system and the mirrors in the solar dryer box are breakable which can cost ₹500 per tube in case of breakage.

Hence we named this superfast machine as Vidyut which means ‘electrically fast’.

**Manufacturing**

The final design as described consists of steaming system, fiber glass cylinder and solar dryer box. Electrotherm (India) manufactures Agni in standard capacity of 100/200/300 liters which we are using as our steaming system. We require the system of 100 liters capacity which is adequate for continuous operation. Similarly the solar cooker is available in standard size of 5 liters and 7 liters. Vidyut will require solar dryer box that can contain and dry 50 kg of the produce in one go.

We plan to enter in partnership with Suryamaan enterprises which is a solar stop shop based out of Nagpur that sells solar products like solar water heater, solar cooker, solar torch, and solar inverter etc. It also houses a small scale manufacturing unit for boilers that are supplied to power plants in the region. The shop is key distributor for Electrotherm (India) to sell its models across Vidarbha region of Maharashtra state.

We plan to modify solar dryer box according to our needs. We need a solar box of 2*3 sq. ft. that can contain 50 kg of produce at one time. The box would be manufactured at the shop itself once the prototype is designed and tested. The material used in the box would be aluminium or stainless steel which would be decided at later stage. Designing a fiber glass cylinder and connecting high quality plastic pipes is not an issue as they are available in many industries in
and around Nagpur. We have selected Plasto Polymers Pvt. Ltd. based out of MIDC, Nagpur for the same. The stands, wheels etc. will be designed and manufactured at Suryamaan enterprises.

**Marketing Strategy**

The first part of execution would be to locate the dealers who deal in selling parts for rice mills and dal mills. These dealers will publicize our product in the rural community. Penetration of the idea and concept is essential and at the same time taxing especially in rural masses which will be addressed by training the sales team that includes village youths. Being a novel idea the concept and subsequent product can be publicized through ‘Aakashwani’ and ‘Krishi Darshan’ program of Doordarshan. The product can also be supplied to large groups within the cooperatives or NGOs so that they can generate extra income for themselves by renting the machine to village ceremonies, marriage, festivals etc where the food can be easily cooked using steam. The dryer can be used for quick drying of the products like potato chips, papads etc. which are popular among self help groups.

For such kind of products to penetrate in mass market, demonstration of the product plays a vital role. This will be aptly done by promoting the product in technological exhibitions and fairs. The network of dealers and sub dealers will form the backbone for the distribution of the product.

The detailed proposal of the model and its uses would be submitted to the govt. through collector, zilla parishads and panchayat samiti. The aim is to take the advantage of its application in mid-day meal schemes and other government welfare schemes. The steamer and the solar dry box are already subsidized as a part of govt. promotion for use of solar appliances. Vidyut will be a standard model of pre-decided size and dimensions to ensure fast and systematic manufacturing and delivery. However we can supply additional parts like solar dryer box according to the customers’ need and demands.
The head office will be located in *Nagpur* city while the products will be initially displayed and sold through solar shop located in the city. We will rent a separate shop in *Umrer*, a taluka in *Nagpur* district which has easy connectivity to many turmeric and chili growing areas like *Bhiwapur*, 30 km from *Umrer* and famous for chilies. We would gradually expand our operation according to the need and revenue generated. The final step of delivery would be through local transport agency in the city however the transport charges will be borne by customers.

### Assumption and Risks

1. The target group will readily perceive the product as light years ahead of the traditional method. To ensure this marketing of the product required on large scale.

2. Need active R&D department to make changes in product through proper feedback system.

3. Model can be copied very easily. Will face cut throat competition from duplicates that will throng the market in near future.

4. Farmers can be reluctant towards technological change. We tackle this by advertising the USP of the product as one time investment as the additional cost will be incurred in case of breakage of glass tubes and mirrors in solar steaming system and dryer box respectively.

5. The product, in case of post harvest of chilies and turmeric, finds its use in months of November to just before the onset of monsoon. Hence we focus on other uses like post harvest process of parboiled rice, renting the machine to wedding ceremonies, caterers, mid-day meal schemes, village festivals and self help groups. The self help groups can produce papads, potato chips even in the months of monsoon and winter with *Vidyut* replacing traditional electric boiler and dryer.

6. The model can face rather weak competition from the conventional heavy boilers that uses coal, wood etc. as fuel. Mass awareness needed to tackle this.

### The Business Model

The venture is aimed at building a brand rather than just a product through mass awareness of its breakthrough novel concept that uses non-conventional energy and value proposition to the farmers and others. *Vidyut* should be perceived as a milestone in the field of agriculture when it comes to supply chain management. The cost of building up the model, pricing and revenue is discussed below.
Cost

The primary cost incurred in manufacturing one unit depends on cost of a cylinder, Agni solar steaming system and the solar dryer box. The ex factory cost will include the cost of assembling, the labor cost and testing. The cost addition to the product will be done by transportation of the As this unit has less number of moving parts, there is less possibility of wear and tear which will help us to reduce servicing cost. The main advantage of the product in terms of pricing is that it can be priced at premium owing to its novel concept. This means high profit margin once fixed cost is recovered.

The retail price of Agni steaming system is ₹28500 after govt. subsidy.

Similarly the standard solar dryer box retails at ₹5000 after govt. subsidy. We are custom designing the solar box at Suryamaan enterprises in 2ft*3ft dimension so as to accommodate the produce of 50 kg at one time. The retail cost of the box is roughly around ₹13500.

The high quality fiber glass two layered cylinder along with connecting plastic tubes from Plasto Polymers or any other polymer company can cost ₹3000-4000.

The accessories that includes wheel stands, exhaust valves, hinges etc. that will be designed and manufactured at Suryamaan will cost ₹1000.

Thus the total cost of Vidyut comes around ₹47000. The bulk orders may further reduce the cost by 10%. The govt. grants subsidy on solar products as a part of promotion of non-conventional energy which can be anywhere between 22-30%. Since Vidyut already consists of subsidized products we may aim for meager 5% subsidy on total setup.

Revenue

Vidyut will retail at the price of ₹58500. The margin we aim is ₹16200 which is roughly around 25% of the retail price after bulk orders to the manufacturer.

Social and Environmental Impact

Vidyut has outcomes that can have concrete positive social and environmental impact. First, it helps reducing carbon footprints albeit on lesser magnitude thus helping in preserving valuable natural resources. Pollution of the atmosphere is controlled. Apart from reducing post harvest treatment time of turmeric and red chilies, Vidyut find its use in social welfare schemes, village festivals and ceremonies. So this business model in the long run will be perceived as an intervention that changed the present agriculture practices when it comes to ensuring quick supply chain management.
Key resources

Team composition

Manolk Manohar Mungale
- He is currently pursuing MBA (Rural Management) at Xavier Institute of Management, Bhubaneswar.
- He is from village Bhisi in Maharashtra. His family background of agriculture proved valuable in garnering requisite and important details for the project. His father’s basic question whether we can do something technical to solve the tedious boiling process of turmeric laid the foundation for Vidyut.

Manu Bansal
- He is currently pursuing MBA (Rural Management) at Xavier Institute of Management, Bhubaneswar.
- He had graduated in Electronics and Communication engineering from Graphic Era Institute of Technology, Dehradun and has deep interest in finance and accounting.

Mithilesh D. Kandalkar
- He is currently pursuing MBA (Rural Management) at Xavier Institute of Management, Bhubaneswar.
- He has worked for a year with Make a Difference (MAD) NGO based out of Nagpur. He is a Computer Science engineering graduate from MIT, Pune.

Key Partnerships

We plan to enter into partnership with Suryamaan enterprises that would help in procuring Agni steaming system from Electrotherm (India) till the time we are capable of negotiating directly with the manufacturer. The solar dryer box would be manufactured at the shop itself.

1. Suryamaan Enterprises
   ‘Ankush-2’ 3rd floor, 405, Model Mill Square, Colonelbaugh Road, Nagpur- 440 032 (M.S.)

2. Plasto Polymers
   MIDC, Butibori, Nagpur.