



Projects

Natural Innovation incubates innovators whose ideas are scalable and have the potential for high impact on basic needs such as energy, water, sanitation, food and health in developing countries. At any time, Natural Innovations is working with a number of innovators on ideas with high potential impact in developing countries.

Natural Innovation also works on infra-structure projects, that change the eco-system in which innovation occurs.

== Current Projects Include ==

MinVayu – distributed wind

MinVayu will meet the need for power in Indian villages by training, supplying and supporting village mechanics to build, install and maintain a low cost, low-wind turbine.



Natural Innovation is helping MinVayu with business planning, and introducing them to potential investors or donors.



Wherever the Need - sanitation

Over 2.5 billion people lack access to sanitation, more than twice the number lacking power or water. Wherever The Need is looking for commercially viable models for slum sanitation. Natural Innovation is exploring ways to help reduce the cost and increase the safety in their materials safety.

Caktilika – Pay as You Go Inverter

Natural Innovation is developing an integrated inverter / charge-controller to enable small renewable systems in off-grid rural areas to reduce costs & improve reliability. It will build in support for pay-as you go pricing, and will address the gap between unreliable and expensive inverters, and significantly reduce the cost of a key component of most renewable energy solutions.

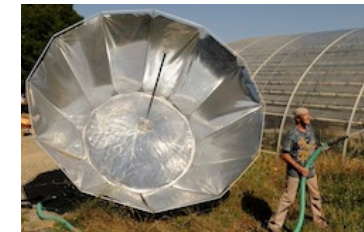
Humanitarian License

Natural Innovation has been developing a standardised license to allow humanitarian licensing of technologies, from for-profits to non-profits and social ventures.

== Completed projects ==

Sunvention – solar thermal

Sunvention have developed a number of solar thermal technologies, including an integrated solar thermal water pump, a similar electricity generator and a collection system that is built into greenhouses.



CleanStar Biofuels

Cleanstar Energy is developing a business model to grow the use of sustainable bio-fuels in India. It combines oil-seed growth as a complement to existing farm activity, with waste oil processing into an economically viable vertically integrated business with benefits to rural farmers; urban waste management and energy sustainability. Natural Innovation mentored CleanStar through their business planning as part of Villgro's Pre Incubation Program.

Further Information

An online list with some photos and more information on some of these innovations is also kept at

<http://www.naturalinnovation.org/index.php/projects>



MinVayu – small wind

MinVayu will meet the need for power in Indian villages by training, supplying and supporting rural mechanics to build, install and maintain a low cost wind turbine.



MinVayu consists of affordable small wind turbines, and a training program for village mechanics, that allows access to wind-powered electricity to be scaled to a significant proportion of India's 98

million rural dwellers that have wind, but don't have reliable electricity.

Need

Small wind systems are typically too expensive for rural India. With high prices, high import duties, and a requirement for skilled personnel to install & maintain them, they are typically only used for high-value situations such as cell phone towers.

Solution

MinVayu will initially use an existing open-source wind turbine that can be locally manufactured, and will cost about US\$ 470, which will cost the customer about US\$ 1,310 in a typical installation, compared to about US\$ 1,810 for competitors systems.

After about a year it will replace this with a design optimised for small scale and low winds and costing around \$1,150 and delivering 50% more power. (see picture, top left)

Village mechanics will be trained to identify suitable sites, build turbines, and install and maintain them. MinVayu will

provide the marketing and other support that helps village entrepreneurs build a business.

Even in northern Tamil Nadu, which has poor wind and lots of sun, MinVayu wind turbines will be cheaper than solar photovoltaic (PV) panels. In many cases PV and Wind are complementary as some seasons are windy, and others sunny.



Market

About 1/3 of India's 600,000, mostly un-powered villages have suitable wind speeds, for small wind power to be effective. About 98 million people live in these villages.

MinVayu believes that breaking the cost barrier, and focusing on a market so poorly met by existing technology, will enable it to scale to become the largest supplier of small wind turbines worldwide in year 3, while still only meeting a fraction of market demand.

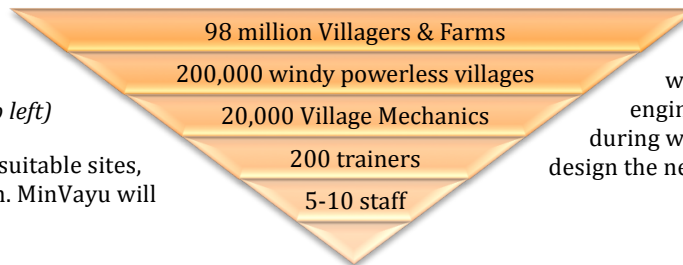
Assistance

Jorge Ayarza, MinVayu's founder, has experience building the Latin America dealer network for Southwest wind power, and worked with UNDP in China on the largest rural electrification project in the world.

Natural Innovation is helping Jorge with business planning; access to pro-bono engineers; and raising finance.

Status

MinVayu is looking to raise US\$ 310,000 which along with US\$ 100,000 in pro-bono engineering will take it through the first year – during which it will train around 200 mechanics, and design the new turbine.





Wherever the Need – slum sanitation

Over 2.5 billion people lack access to sanitation, more than twice the number lacking power or water. Wherever The Need is looking for commercially viable models for slum sanitation. Natural Innovation is exploring ways to help reduce the cost and increase the safety in their materials safety.

Need

Over 2.5 billion people lack access to sanitation, more than twice the number lacking power or water. Neither municipalities nor aid dollars are likely to address more than a tiny portion of this need in the foreseeable future.

Solution

Wherever The Need is trying to create a viable business model for sanitation so that micro-enterprises could run slum toilets in areas that neither municipalities nor Aid dollars are likely to reach for a long time.

In India, poor people will not spend money to use a toilet so the models adopted by other organisations, such as Sanergy in Kenya are less likely to work.

By separating solids and liquids, composting the solids, and turning the liquid into fertiliser they hope to generate sufficient revenue from the sale of compost and fertilizer to cover the construction and operating costs of slum toilets. In this case micro-entrepreneurs will be able to purchase and operate toilets, and the solution should scale.

Status

Wherever the Need have carried out trials, mostly in the southern India city of Cuddalore, the cultural challenges, from poverty, cast, unclear land ownership etc are huge, and often lead to sub-optimum solutions

such as individual stalls spaced out around an area rather than a single block.

At this point, the business model does not quite work and improvements to both costs and revenue are needed.

Our Role

Natural Innovation will help WTN through it's collaboration with ReAllocate to source engineering talent to solve two specific problems.

The solids are gathered in shallow trays, and transported to a central composting facility. Since the trays are expensive they need emptying into lower cost piles. Assistance from a mechanical engineer is needed to automate the process to avoid the risk of contaminating workers.

The liquids have value as a fertiliser, however they are more valid if converted to a solid "struvite". A chemical engineer is needed to help develop an economical non-toxic process to convert small quantities.

WTN are also looking for an engineer to spend time with WTN in India to work on reducing the construction costs through selection of appropriate, locally available materials, and construction methods.





Caktilika - Inverter

Natural Innovation is developing an integrated inverter to enable small renewable systems in off-grid rural areas to reduce costs & improve reliability. **More information is available on request.**

Challenge

Over 1 billion people lack access to reliable electricity. Projects to meet this in a decentralised fashion typically incorporate solar and/or wind, batteries, and a charge controller & inverter.

Small Inverters, in the 150W-2kW range, are available cheap (about US\$0.10/Watt retail) but have very poor reliability. Reliable inverters are available but cost around US\$ 0.40/watt. To this a charge controller needs to be added – varying from around US\$ 0.04 – 0.12/Watt.

Poor people rarely have the capital to purchase renewable systems outright, and loans through MFIs carry a high interest rate unsuited to paying for the equipment over its lifetime. Several companies are developing pay-as-you-go systems, however they are typically built into specific solutions, rather than being available to any solution developer.

Solution

After discussions with a number of projects that need such a device, Natural Innovation, and its partners, in particular Meridian Design is developing a low-cost, reliable inverter. The inverter will be designed so that it can be easily manufactured regionally with readily available components.

This inverter will be licensed on very favourable terms to humanitarian projects & social ventures, and we will actively seek partners to integrate it into their own technology.

Features

The device will incorporate the following features.

Inputs – any or all of	Outputs
<ul style="list-style-type: none">• Solar including MPPT• Wind including braking control 200W-2kW, 12-220V• Intermittent/unclean grid• Generators (including starting)	<ul style="list-style-type: none">• 110V/240V AC• 12V DC• 5V DC (USB or small jack)• Data logging or remote monitoring

We anticipate a power range of 500W with a single 12V battery, or up to 2kW with 48V batteries. A lower cost 200W version will be produced if there is demand and sufficient cost savings.

The device will incorporate a pay-as-you go mechanism allowing top-up with mechanisms similar to mobile phone minutes (e.g. scratch-cards).

An analysis will be done to determine which of these features to incorporate into the core design, and which to make available on optional daughter-boards, attached through i2C connectors.

Team

Natural Innovation will work with a number of partners on this project, including:

- Meridian Design – experts in product & electronics design for the BoP
- ReAllocate – sourcing additional pro-bono engineering talent
- Harita Resources – India based manufacturing consultants
- Comar Law – Licensing
- MinVayu – field testing in small wind systems

Finance

Caktilika is raising \$750,000 to design and bring to manufacture. A business plan is available to potential investors or donors.

If this money is raised philanthropically, then it will enable the retail