



INDIA

2021

# CLIMATE SOLVER 2020 AWARDEE

## GHG REDUCTION: RAPID CHARGING BATTERY TECHNOLOGY

Developed by: Log 9 Materials Scientific Private Limited

### INNOVATION

The transportation sector is one of the largest contributors to climate change, accounting for 24% of global energy-related greenhouse gas (GHG) emissions. In India, the 2-wheelers (2Ws) and 3-wheelers (3Ws) account for more than 70% of the country's total vehicle share. Therefore, electrification of 2Ws and 3Ws will play a crucial role in curbing oil-use, transport-related emissions, and mitigating climate change. However, the current Electric Vehicle (EV) battery technologies are marred by challenges, including limited life and long charging times that impede the EV scale-up.

Log 9 has developed a unique battery technology that charges electric 2Ws and 3Ws in 15 minutes and 30 minutes, respectively. Log9's battery is a

hybrid supercapacitor-based technology which uses high-power nanostructured electrodes.

These battery packs have a longer cycle life, eliminating the need for costly battery replacements that are a common feature of electric vehicles currently in the market.

Battery packs for 2 and 3-Wheelers



3W powered by Log9 battery pack being charged at a public charging station

### BENEFITS

1. Log 9's battery packs have quick charging characteristics and a life of more than 10 years.
2. They can operate within the temperature range of -30°C to over 60°C and have more than 15,000 charge cycles.
3. Features like faster acceleration, higher top speed, and low degradation of battery life, make them ideal for fleet operators and use in the urban environment.
4. The global adoption of this technology has the potential to reduce 4.6 million tonnes of GHG emissions annually by 2030.

### ABOUT THE COMPANY

Log 9 Materials Scientific Pvt. Ltd. is a cleantech company focused on making advanced battery solutions for electric vehicles and stationary energy storage applications. Log 9 specializes in nanotechnology to create cutting-edge technology products with applications in clean energy and filtration. The company's key objective is to constantly innovate and pioneer alternative energy solutions that eliminate GHG emissions and their resulting impact on the environment.

**LOG 9**

# CLIMATE SOLVER 2020 AWARDEE

## GHG REDUCTION: INNOVATIVE SOLAR DRYER CUM SPACE HEATING SYSTEM

Developed by: Neochlorus Energy Solutions Private Limited

### INNOVATION

More than 30% of the fruits and vegetables produced in India are rendered unfit for consumption due to spoilage after harvest, owing to a lack of proper food processing units and inadequate cold storage facilities. These post-harvest losses lead farmers into distress selling. Food drying is a reliable solution that prevents losses and reduces the dependence on energy-intensive cold storage units. Additionally, the local communities in the Indian Himalayas resort to fuel wood and kerosene to meet their space heating needs. This results in an increase in emissions and indoor pollution, leading to the degradation of natural resources and adversely impacting the health of the communities.

Neochlorus Energy Solutions Pvt. Ltd. has developed an innovative decentralized solar dryer-cum-space

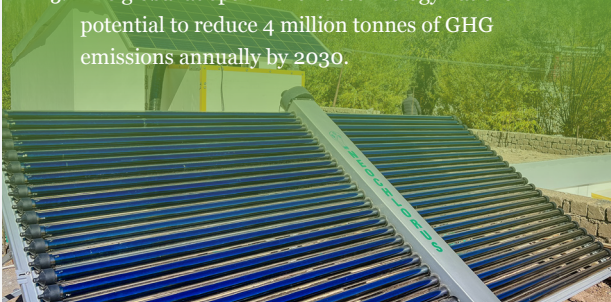
heating system with thermal energy storage to efficiently dry agricultural products and provide space heating in the Himalayan region. The patented innovation consists of double-walled evacuated tubes directly connected with dual jacketed header for supplying hot air to the drying chamber. The thermal energy storage material inside the chamber stores excess heat during solar hours and dissipates it for continuous drying of food produce during non-solar hours. These systems are also modified to cater to the space heating requirements during the harsh winter season.



Drying chamber connected to the solar hot air generator

### BENEFITS

1. Solar dryer-cum-space heating system helps farmers to dry their food produce faster than conventional open sun drying, cutting down the time by upto 90%.
2. It also prevents the food from dust and unwanted moisture by providing continuous drying and deterring any fungal growth.
3. The technology minimises food wastage and allows the farmer to sell the produce in the market at right prices and prevent distress selling.
4. This innovation eliminates the use of firewood and diesel generator for space heating during winters, and avoids indoor and outdoor pollution.
5. The global adoption of this technology has the potential to reduce 4 million tonnes of GHG emissions annually by 2030.



### ABOUT THE COMPANY

Neochlorus Energy Solutions Pvt. Ltd. is a leading manufacturer of solar thermal components and an EPC company providing turnkey solar energy solutions. The company manufactures solar thermal products, including solar water heaters, solar air heaters, and solar dryers.



**NEOCHLORUS**



# CLIMATE SOLVER 2020 AWARDEE

## HYBRIDIZATION OF FREEZERS AND COOLERS WITH THERMAL ENERGY STORAGE MATERIALS

Developed by: Pluss Advanced Technologies Private Limited (PLUSS®)

### INNOVATION

Increasing urbanisation, a rise in retail food processing, and the need for pharmaceuticals have pushed up the demand for cold storage facilities. Cold storage units like freezers and coolers, for which temperature maintenance is critical, have high energy consumption and play a crucial role in connecting the supply chain from farms to households. Moreover, in rural areas and regions facing power outages, storage of temperature-sensitive products such as medicines, vaccines, frozen food products, and ice-creams is a challenge. Phase Change Materials (PCM) have the ability to store and release a large amount of thermal energy. PCM and its application in freezers and coolers as a thermal battery to extend the cooling during power outages is an innovative approach to tackle the challenge of preserving temperature-sensitive products.



Freezer integrated with PLUS's PCM

PLUS Advanced Technologies Pvt. Ltd. has developed innovative PCMs for various thermal storage applications. These PCMs comprise of inorganic salts that change their phase at a specific temperature and store or release a large amount of energy in the form of latent energy during phase change.



PLUS's PCMs packed in Pouches

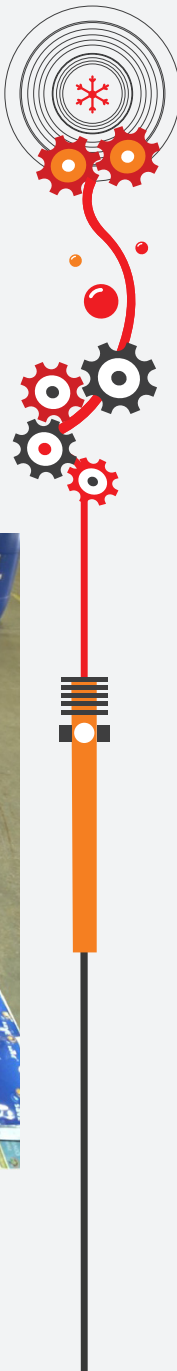
### BENEFITS

1. The technology enables energy-efficient storage and transportation of chilled and frozen products.
2. These PCMs increase the temperature retention ability of freezers/coolers by up to 16 hours during power outages.
3. The technology lowers dependence on electricity and prevents food wastage due to unavailability of power.
4. Due to reduction in compressor's swith-ON and OFF frequency, it increases energy efficiency by 18-25%, thus improving the life and minimising the maintenance/replacement cost of the machine.
5. The global adoption of this technology has the potential to reduce 1.3 million tonnes of GHG emissions annually by 2030.

### ABOUT THE COMPANY

Pluss Advanced Technologies Pvt. Ltd. (PLUS®) is engaged in R&D and manufacturing of specialized polymers and Phase Change Materials (PCMs). It is presently the only company in India with a wide range of indigenously manufactured PCMs with several patents. With its innovative products, the company is making its presence felt across the globe.

**PLUS®**  
TECHNOLOGY FOR  
A BETTER WORLD





# CLIMATE SOLVER 2020 AWARDEE

## SABJIKOTHI- MICROCLIMATE STORAGE AND TRANSPORTATION SOLUTION FOR FRUITS AND VEGETABLES

Developed by: Saptkrishi Scientific Private Limited

### INNOVATION

India is the second-largest producer of fruits and vegetables in the world. However, more than 30 percent of horticultural produce is wasted due to inadequate logistical support, lack of refrigerated storage, supply chain bottlenecks, poor transport, and underdeveloped marketing channels. Moreover, the open transportation of horticulture produce increases the pathogenic load and reduces the water content, resulting in a direct economic loss to farmers/vendors and adding up to the waste. The current cold chain solutions are expensive and cause damage to the environment due to significant energy consumption and the refrigerants used.

SaptKrishi Scientific Pvt. Ltd. has developed an innovative solution- Sabjikothi – a microclimate-based storage and transportation solution for fruits and vegetables. The innovation is a portable, wheel-mountable, cost-effective solution that extends the shelf-life of fruits and vegetables for 3 to 30 days while preserving their freshness. Sabjikothi constructs a high-humid and near-sterile, ethylene oxidizing isolated microclimate, thus delaying browning and ripening and regulating the activity of the antioxidant enzyme. The technology consumes only 20 watts of power. It has a battery backup of a day with an option of solar charging, making it completely grid-free. The microclimate conditions inside the Sabjikothi can be monitored and controlled through a mobile app. The Sabjikothi can be assembled on any suitable means of transportation (E-rickshaw, mini-trucks, pushcart/thelas, etc.) to transport contamination-free and pathogen-free fruits and vegetables from the field to the market without any water loss or decay.



Solar-powered Sabjikothi rickshaw



Battery operated Sabjikothi on a pushcart

### BENEFITS

1. Sabjikothi is a non-chemical and green technology.
2. It reduces energy consumption by more than 80% as compared to conventional cold-storage solutions.
3. The technology extends the shelf-life of perishable horticulture products allowing farmers/vendors to sell them at fair prices, thus avoiding distress selling and food wastage.
4. The global adoption of this technology has the potential to reduce 3 million tonnes of GHG emissions annually by 2030.

### ABOUT THE COMPANY

SaptKrishi is an agri-tech start-up initially incubated at IIT-Patna and accelerated at IIT Kanpur. Currently, it is being incubated at ABI SKUAST-J, and has received support from Government of India's Rashtriya Krishi Vikas Yojana - Remunerative Approaches for Agriculture and Allied Sectors Rejuvenation (RKVY-RAFTAAR). As a social enterprise, the company focuses on the development of low-cost storage and transportation solution for farmers/traders engaged with horticulture and floriculture.

