

# LIFEWAY SOLAR





KNOWLEDGE  
BUILDS THE FUTURE

...With the ground-breaking explanation of the photoelectric effect based on light being made up of photons, Albert Einstein laid the foundation for the theoretical understanding of photovoltaic solar energy as early as in 1905. Modern concepts are based on semiconductors. Einstein himself formulated the effect of metals responding to light with the formation of electric currents. In 1921, Einstein was awarded the Nobel prize for physics in recognition of his contribution to science...

*100 years after publication of his first studies, the year 2005 was declared Einstein Year.*

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*sun driven*

## **CERTIFICATE**

*This is to certify that the research team  
has completed Lifeway's Mini  
solar poultry Egg Incubator  
Market research/Survey report  
according to the direction from IIT  
Chennai, ( L-Ramp ) letter dated  
16<sup>th</sup> Jan 2007.*

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**Member - Kerala Renewable Energy Entrepreneurs Promoters Association, International Solar Energy Society**

# abstract



The Solar Poultry Egg Incubator is a device, which is capable of hatching 50 hens / 120 quail / 24 goose eggs in every 21 days using Solar Energy. A solar module connected to the battery through charge controller assures 24-hour uninterrupted power supply for providing warm air inside the incubator. The temperature of the incubator, is maintained between 36-38 degrees Celsius by thermostat controlled heater. Incubator can be alternatively energized from grid power supply in the absence of sunlight during monsoon or rainy season. This solar incubator is ideal tool for rural women and unemployed persons to begin a self-employment venture. This solar poultry incubator using non-conventional energy also creating awareness among rural people about this valuable renewable energy operated equipments.



# introduction

Since hundreds of years, Poultry egg hatching was a livelihood for rural population in India. Villagers are using brooded chicken for egg hatching in natural way. But this method is uneasy and requires more hardship and time. Hence artificial incubators are recommended for egg hatching process in the modern world. Now modern artificial incubators achieved good hatchability rates and economically viable too.

Most of the hatcheries in India depend on main grid power to hatch chickens and light their sheds. These hatcheries are situated in isolated villagers. This hatchery unit spends thousands of rupees for main grid power to run their business. Seeking a viable alternative energy source in this industry has been the center of attention since many years. Particularly agricultural sector mostly situated and operating in villages can harness solar energy for meeting their energy requirement. Continuous power supply is required to regions affected with frequent electricity failure. Recently solar energy has becoming a driving source in to provide energy to villages for their daily needs.

Today poultry egg hatching becomes commercialized due to demand for chicken, fowl, quail etc in market, hotels, hospitals and guesthouses. Even small catteries along highways are cooking Non.Veg for the tourists as well as for travelers. Now-a-days Indian household also included Non.Veg food as a main item in their menu.

Recent bird flew was an eye opened to the people in the trade which need to upgrade their facilities for good sanitation and hygiene to prevent such epidemic. Hundreds and thousands of birds died due to the flue in India and abroad. In small scale poultry unit can successfully maintain good and clean environment.

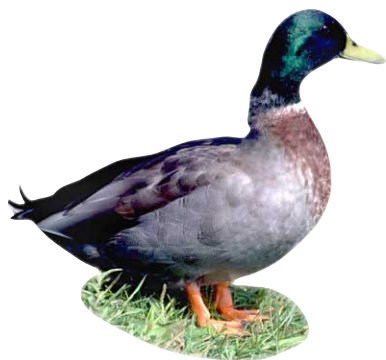
Poultry egg incubation and hatching in a small scale can be conventiely carried out using solar powered incubators. Constant power supply is nessessary for all incubators especially when the eggs are to be hatched. If there is any breakdown in the power supply then the eggs loose there hatching value and have to be destroyed. The solar incubator on the other hand does not face this problem. This solar incubator is light in weight and handy for carrying. Silent and power saving incubator is an innovative machine for rural poultry farming. It cannot only creates employment for rural women but also improve their lifestyle with free green energy.

# poultry



“Poultry” includes a number of avian species such as chicken, turkey, geese, guinea fowl, peafowl etc domesticated for economic purposes. These species perform well under a variety of agro-climatic conditions, which help in raising them successfully almost anywhere provided certain minimum management, and nutritional requirements are met with. These birds are efficient converters of feed into animal protein of high biological value compared to other livestock species. While chicken and ducks are raised for commercial egg and meat production, turkeys, guinea fowl, geese etc are maintained only for meat production.

In India poultry keeping is as old as its civilization. Poultry farming remained a disorganized “backyard venture” only to be patronized by poor and weaker sections of the society. Our poultry industry is primarily chicken oriented which accounts for more than 90% of the total poultry available in the country. Ducks are next to chicken in the order of preference and account for about 6% of poultry production. The quail egg and meat have recently become popular and commercial quail farms are being set up throughout the country, both in the government and private sectors.



Indigenous poultry breeds, which are hardy but poor in productivity, continue to dominate Indian poultry scenario. These were strong prejudices against rising of poultry and consumption of poultry egg and meat by higher stratum of the society. Low productivity of indigenous birds, low prices for egg and meat, inadequate knowledge of poultry raising and lack of appreciation of poultry’s special role in alleviating poverty raising and lack of appreciation of poultry’s special role in alleviating poverty and improving malnutrition through protein were the major drawbacks in development of poultry. However, during the last four decades, the entire scenario of poultry farming has changed Poultry is recognized as an organized and agro based industry with tremendous employment potential. Both large and small farmers have come up all over the



country with highly specialized hybrid layers and broilers. At present more than 500 hatcheries have been established throughout the length and breath of the country to produce and supply commercial hybrid chicks.

The policy of government to achieve self-reliance has favored the establishment of pure line breeding programmes both in public and private sectors for development of genetically improved layers and broilers. Our country has also achieved a respectable measure of self-sufficiency in manufacture of compounded poultry feeds, equipment and machines, pharmaceuticals etc. There is now greater emphasis on poultry related research and human resources development. Major emphasis is being given on processing of poultry egg and meat and manufacture of value added egg and meat products. In India the traditional system of poultry keeping although loosing its importance from day to day under the impact of modernization and industrialization, is still prevalent in rural and tribal areas of country. Near about one lakh poultry farms with flock size ranging from 25-250 birds exist in rural areas most of which follow backyard open range system of poultry keeping.

### **Rural Family Poultry**

Rural family poultry, which is primarily an income generating activity, is an integral part of any poverty alleviation programme in the rural context in India. The purpose of any development plan including RFP should be to bring about a holistic enrichment of the entire village itself. RFPs are reared on a small scale within a limited area in the backyards of village households, with a number of birds ranging from 1 to 10. All the improved technologies reached the urban populace and seeing this as a lucrative option, even the educated urbanites developed commercial poultry into a successful agri business. On the contrary, those in the rural areas rearing traditional poultry in small flocks (i.e. 1-10 birds per household) for ages remained more or less with minimal or no development. RFP for the tribal families is like a 'reserve bank' to fall back upon in emergencies.





# poultry incubation and hatching



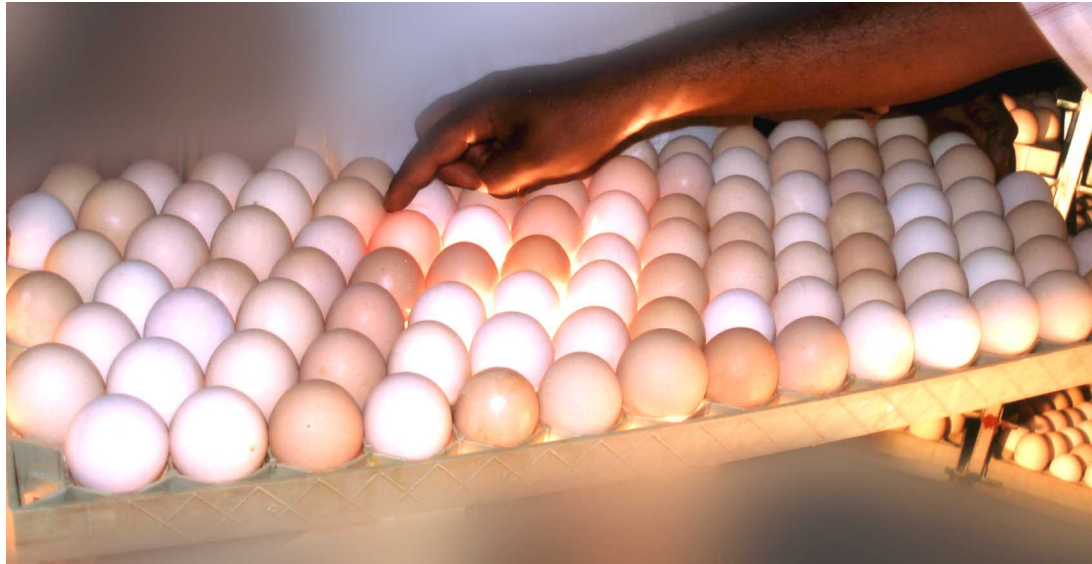
## Incubation

Incubation is a process of providing specific ambient condition for a period prior to hatching of eggs. A newly laid egg needs to be incubated (kept warm) at a constant temperature of about 37.3°C during the gestation period. The hen will do this naturally if she has gone 'broody', or a specially made incubator artificially. Some incubators are fan assisted both to even out the air temperature and facilitate the entry of oxygen.

Turning eggs when they are incubating is vital. It has been proven that more turning equals better hatching. This can be carried out automatically, but a minimum of 3 times a day is recommended if turning by hand. Positioning of the incubator in a room where the temperature does not fluctuate either up (sun through a window) or down too greatly will help the machine maintain accuracy on temperature. Eggs will tolerate short periods of low temperature, but are quickly killed by high temperatures. In the case of solar incubator only solar panel is placed in the sunny location where as the incubator and the battery system kept inside a properly ventilated room.

Candling is the technique of observing the egg development through the shell. It is a simple matter of shining a bright light through a hole in front of which an egg is placed.





## Hatching

Hatching is a process of bringing out the chicks from already incubated eggs. This is by no means a speedy process and can take up to three days. The first stage is known as the internal pip. This is when the chick breaks through the inner membrane into the air space inside the egg. It will take the chick a day to pip out that is breaking the first hole in the shell. After this, being able to breath easily, it will rest for one or two days before hatching out completely.

Sanitation is very important after incubation, as the bacteria produced at hatching can infect eggs, which are not ready to hatch. It is better to either have an all in, all out system or use two incubators, one as a setter and the other as a hatcher which can then be sterilized before the next hatch. A mixture of potassium permanganate and formalin is a suitable disinfectant for cleaning incubators as it controls all the known families of bacteria and viruses, but is not toxic either to the operator or the eggs. Incubators should be cleaned between each hatch.

# traditional method of egg hatching



The best way for anyone with a backyard flock to hatch chickens is using a broody hen. You can tell when a hen is broody because she sits continually in the nest-box. She will ruffle her feathers when you come close and will squawk loudly, warning you away.

It's important that any hen raising chicks in an extensive or 'natural' system has a clean dry quiet sheltered spot for her nest. Note that eggs for hatching need to be clean, and if they are not they could be scuffed clean with a rough clean dry pad. Dirty eggs will not hatch well.

If the eggs have to be stored before they are put under the broody hen, they can be stored in a cool place (45-55°F or 7-10°C). Don't put them in the fridge because the cold will kill the embryos. During the first few days of storage, turning isn't important, but after that you should turn or tilt them twice a day to prevent the microscopic embryo from sticking to the shell.

If the broody hen is sitting on eggs other than those you wish to hatch, leave her for several days until she is sitting tight then remove the eggs from under her and replace with fertile eggs.

The number of eggs that a hen will sit on depends on her size and the type of egg. For example, a bantam may cover 10 bantam eggs, but only three turkey eggs. It's important not to put too many eggs under the hen, because she has to be able to cover them all effectively. Also, she moves them around in the nest so that each egg takes its turn on the outside, and if there are too many eggs, the ones on the outside will become cold and the embryos will die. It is better to have too few eggs than too many.

For small-scale farmers and the rural poor in India, backyard poultry is an important livelihood activity



providing valuable potential for improving income and nutrition. However, many backyard small-scale producers face production problems and there has been relatively little research on local technologies suited to small-scale poultry keeping. In the semi-arid districts of Udaipur and Tamil Nadu between 20 and 30 per cent of eggs fail to hatch during the winter period. During the summer, when temperatures often exceed 40 degrees Celsius, hatching rates are even lower. However, the development and introduction of simple technologies to improve storage and to monitor eggs during the crucial stages of embryonic development have yielded some interesting results.

Most small-scale poultry farmers do not have the appropriate means or knowledge to monitor embryonic development. Generally all eggs are incubated, with farmers assuming that the majority of eggs will hatch. But during excessive summer temperatures, there are a number of factors that may contribute to hatching failure: eggs may not be fertilized, the embryo may have died during embryonic development or the egg may be contaminated with bacteria. None of these conditions are detectable just by looking at the egg so they are all left for the full incubation period, which means that eggs that don't hatch are wasted, instead of eaten or sold.



## Incubation and Hatching periods

The incubation periods from the time the hen starts to sit to hatching are different for different species as given below:

- Hens 18-21 days
- Bantams 17-19 days.
- Ducks 26-28 days
- Muscovy ducks 33-35 days
- Geese 30-33 days
- Guinea fowl and turkeys 26-28 days

### Advantages

- As it is a natural method, no additional investment for hatching.
- This method can be adopted, for few numbers of eggs.

### Disadvantages

- Hatching percentage is lower and is of the order of 60% because of wide variation of temperature is possible during total hatching period.
- Since hens are used for hatching, the production of useful eggs is reduced from the hens. It is preferable to use hens for egg production than hatching.
- There is no control over the frequency of hatching in a year, as the brooding is not regulated properly with a result of lower number of hatching.
- There is more chance of infection to the newly hatched chicks because of unhygiene nature of traditional hatching using hens.

# large scale power operated incubators

## Typical Model - I

Description of a Large Scale Power Operated Incubator:

Capacity	15000 Eggs
Dimension	Hight:2460mm Width:2460mm Length: 3360mm Appendage Height: 230mm
2 Trolleys	Hight: 1760mm
90 Trays	45 trays/trolley 168eggs/tray
Power	Fan Motor: 1500W
Heating	Electric Heating; Water Heating (optional)
Cooling	Wind Cooling; Water Cooling (optional)
Humidification	Disc Humidifier
Ventilation	Automatic

This model has to be used when any type of Tunnel-Style Setter (XF-90, XF-75, XF-60, or XF-45) is chosen. Embryos have to be transferred into a Hatcher after eighteen days incubation in a setter. This machine contains two trolleys, with 45 trays for each trolley, and 168 eggs for each tray. The total capacity is 15,120.

Two kinds of trolleys made of different materials can be chosen according to the customer's will. The normal kind is constituted by Hot-dip Galvanized parts. Its anti-erosion capacity is much higher than Electro-galvanized material or lacquered material. For higher anti-erosion demand, customers can choose stainless steel trolleys.

Customer can choose different kinds of hatching trays, respectively made of plastic, galvanized steel plate, or stainless steel plate can be used. This machine utilizes automatic ventilation and wind cooling. Disc humidifier realizes humidification. Customers can choose water heating or electric heating according to their local condition. Customers in Torrid Zone can have water-cooling system installed for the good performance of the machine. Accurate temperature and



humidity sensors are used in the control system ensuring the control accuracy.

## **SITE VISIT REPORT**

### ***Poultry Hatching Center at Cochin***

#### **Introduction**

We visited Selvom broilers for collecting data for our researching purposes. Selvom Broilers is a unit, producing broiler chicks. They use electric power for maintaining the temperature required for hatching for a period of 21 days. At present the power is taken from electricity board line with standby and backup generators. This unit is situated at Kerala near Cochin.

Their hatchery capacity is around 5 lakhs (16 x 33,000) in every 21 days. Hatchery area is hygienic



and maintains clean everyday. Power supply is required continuously for 24 hours a day. The power requirements are around 160 KW with a load factor 75%.

#### **Process**

Selected eggs are subjected to disinfect ion process by fuming with a compound of potassium permanganate and formaline before placing in the incubators. Eggs are carefully fixed on the trays inside the incubator chamber .The chamber is closed and the power is switched on to warm up the ambient temperature incubator to the level of 37.3° C. A heating coil is controlled by thermostat to get the required temperature range 37+1°C. The humidity is also an important aspect for proper condition of the shells for a period of 21 days. Humidity is maintained by wet bulb thermometer controlling devices. The desired optimum humidity is

in the range of 85-87% for large-scale incubators. In order to get uniform temperature for the eggs in different places inside the chamber the trays are tilted 30 degrees forward and backward in every 1 hour with automatic controller. The process is continued for 10 days. Then each tray is scanned using incandescent lamp in order to ascertain whether the eggs are in hatching process or inactive (fertile or infertile). Inactive eggs are orange in colour when scanning is carried out. These are removed at the end of the process. The warming up process is continued for another 8 days. Then they are transferred to simple

trays in separate hatching compartments.

Normally at the end of the 2 days, all the eggs must have hatched out. As a practical consideration 2% of the eggs may be damaged during the whole process. The chicks are taken to a vaccination room



for vaccination of the chicks for onward delivery to the clients. Usually 1 day is taken for vaccination process and the chicks are sold out immediately after vaccination.

### **Advantages**

- Hatching capacity is high.
- Hatching percentage is high.
- Power consumption per egg is very low.

### **Disadvantages**

- Initial investment is high.
- More manpower is required.
- If any power failure occurs, all eggs will be damaged.
- Sanitation and care is very critical.
- High voltage back up systems is required.



# small scale power operated incubator

Typical Model II:

## Features

- Low capacity, high hatchability.
- High quality combined incubator model with separated setter and hatcher parts.
- Flexible usage with special designed egg trays for chicken, turkey, quail, pheasant, partridge, duck, goose etc.
- 50 chicken egg capacity, (40 +10)
- Perfect laminar flow forced ventilation with unique fan
- Adjustable air inlet-outlet vent for controlling of air current
- Electronic temperature sensor, digital temperature display,
- Fully automatic egg turning system tilling the eggs exact 90.
- Movable water trays for humidity control
- Setter tray choices for all type of poultry and games
- Plastic hatchery basket with wire cover
- Electrical safety in all systems
- 2 Door at backside for easy cleaning and service.
- Double-glazed window in door with full sight
- Inside light with on- off button in control panel

## Typical Model:III

This dual-purpose machine designed for zoo and small farmer has advantages of practicality, beautiful appearance and premium properties. The 95% zoo in the country has use this kind of machine to incubate and protect all kinds of rare birds and aves. The control system is a computer system to assure the accuracy of incubation temperature and enhance the hatch rate of fertilized egg.





### Main Model and Specification

Model	Incubation Capacity	Hatching Capacity	Max. Power	Power Supply
9WF-200	200	96	0.8kw	220V/ 50HZ
9WF-280	280	96	0.9kw	220V/ 50HZ
9WF-380	380	96	1.1kw	220V/ 50HZ
9WF-552	552	150	1.3kw	220V/ 50HZ

### Advantages

- Good hatchability rate.
- Initial investment is low compare to Large scale Incubator.
- Manpower requirement is low.
- Sanitation and hygiene can be easily maintained.

### Disadvantages

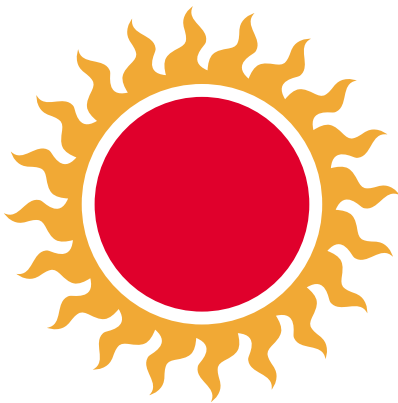
- Power consumption per egg is high.
- Low capacity
- Back up system required.

# renewable energy for incubator (solar)

The term solar energy is used to describe an energy resource that can be utilized to generate heat or electricity. Solar energy is the most readily available source of energy. It does not belong to anybody and is, therefore, free. It is also the most important of the non-conventional sources of energy because it is non-polluting and, therefore, helps in lessening the greenhouse effect. India receives solar energy equivalent to over 5000 trillion kWh/day, which is far more than the total energy consumption of the country in a year.

Solar energy has been used since prehistoric times, but in a most primitive manner. Before 1970, some research and development was carried out in a few countries to exploit solar energy more efficiently, but most of this work remained mainly academic. After the dramatic rise in oil prices in the 1970s, several countries began to formulate extensive research and development programmes to exploit solar energy.

When we hang out our clothes to dry in the sun, we use the energy of the sun. In the same way, solar panels absorb the energy of the sun to provide heat for cooking and for heating water. Such systems are available in the market and are being used in homes and factories.



In the next few years it is expected that millions of households in the world will be using solar energy as the trends in developed countries. In India too, the Indian Renewable Energy Development Agency and the Ministry of Non-Conventional Energy Sources are formulating a programme to have solar energy in more than a million households in the next few years. However, the people's initiative is essential if the programme is to be successful.

India is one of the few countries with long days and plenty of sunshine, especially in the Thar Desert region. This zone, having abundant solar energy available, is suitable for harnessing solar energy for a number of applications. In areas with similar intensity of solar radiation, solar energy could be easily harnessed. Solar thermal energy is being used in India for heating water for both industrial and domestic purposes. A 140 MW integrated solar power plant is being set up in Jodhpur but the initial expense incurred is still very high. Solar energy can also be used to meet our electricity requirements. Through Solar Photovoltaic (SPV) cells, solar radiation gets converted into DC electricity directly. This electricity can either be used as it is or can be stored in the battery. This stored electrical energy then can be used at night.

**SPV can be used for a number of applications such as:**

- Domestic lighting ■ Street lighting
- Village electrification ■ Water pumping
- Desalination of salty water ■ Railway signals
- Powering of remote telecommunication repeater stations

If the means to make more efficient use of solar energy could be developed, it would reduce our dependence on non-renewable sources of energy and make our environment cleaner.

**Solar Thermal Energy Applications are listed below:**

- Solar cooker ■ Flat plate solar cookers ■ Concentrating collectors
- Solar hot water systems (Domestic and Industrial) ■ Solar pond
- Solar hot air systems ■ Solar Dryers
- Solar timber kilns ■ Solar stills
- Concentrating collectors ■ Power Tower
- Air conditioning. ■ Solar Home Lighting

# solar photovoltaic modules



Solar module is a device for direct conversion of sunlight into electricity. Some materials exhibit a property, known as the photoelectric effect, when causes them to absorb photons of light and release electrons. When these free electrons are captured, electric current results that can be used as electricity.

## Solar Cells

Solar cells are made of the same semiconductor materials (usually Silicon) used in the microelectronics industry. For solar cells, a thin semi conductor wafer is specially treated to form an electric field, positive on one side and negative on the other. When light energy strikes the solar cell, electrons are knocked loose from the atoms in the semiconductor material. If electrical conductors are attached to the positive and negative sides to form an electrical circuit, these electrons can be captured in the form of an electric current-that is electricity. This electricity can then be used to power a load, such as a light bulb or a water pump. A typical four Inch silicon solar cell produces about one-and-a-half watts of electricity in bright noontime sunshine.

## Photovoltaic Modules and Arrays

A Photo Voltaic module consists of a number of solar cells electrically connected to each other and mounted in a support structure or frame. Modules are designed to supply electricity at a certain voltage (commonly 12 volts).The current produced is directly dependent on how much sunlight strikes the module. Photovoltaic modules have proven to be very durable and reliable. They typically have 25-year lifetime.

Although one module is often sufficient for the power needs of our incubator system or a basic solar home system, two or more modules may be wired together to form an array. In general,"the larger the area of a module or the array, the more electricity will be produced". Photovoltaic modules and arrays produce direct current

(dc) electricity. They can be connected in series and parallel electrical arrangements to produce any required voltage and current combination.

Solar panels come in thin-film (amorphous) and crystalline (single and multi). There are advantages and tradeoffs with the various types. The crystalline solar panels are generally more efficient, so they take up less area for the same watts. Thin film panels also lose less power in high temperature areas, such as the desert southwest. Solar panels range in size from 5 watts up to 165 watts. Most high-powered solar panels are available only in 24 volt. We have stock available on most panels. A few special purpose panels are usually available within 2-5 days

#### **Advantages of Photovoltaic systems**

- Cost-effective
- Reliability
- Low Maintenance
- Environmentally Friendly
- Free and abundant
- Locally Generated Power
- Flexible Size
- Transportability

#### **Limitations**

- High Initial Cost
- Sun Dependent



## Comparative Data on Different Photovoltaic Modules

Supplier Name	Country of Origin	Module Name	Nominal Power	Module Efficiency	Cell Type	Voltage	Weight
Schott	Germany	ASE -165-GT_FT/MC(160W)	160 W	12.2%	Multi	35.9 V	16 Kg
		ASE -165-GT_FT/MC(165W)	165 W	12.6%	Multi	36.0 V	16 Kg
		ASE -165-GT_FT/MC(170W)	170 W	13.0%	Multi	36.0 V	16 Kg
		ASE -260-DG- FT(250W )	250 W	11.7%	EFG	57.1 V	41 Kg
		ASE -260-DG- FT(260W )	260 W	12.1%	EFG	57.1 V	41 Kg
		ASE -260-DG- FT(268W )	268 W	12.5%	EFG	57.2 V	41 Kg
EniPower	Italy	MN16/140	140 W	-	Mono	34.2 V	17 Kg
		MN16/155	155 W	-	Mono	35.3 V	17 Kg
		MN16/165	165 W	-	Mono	35.4 V	17 Kg
		PN16/150	150 W	-	Multi	35.0 V	17 Kg
		PN16/160	160 W	-	Multi	35.5 V	17 Kg
		PN16/170	170 W	-	Multi	36.2 V	17 Kg
		PN5D/100	100 W	11.1%	Multi	17.2 V	12 Kg
Sun Power	Canada	SPR-200-BLK-I	200 W	16.1%	mono	40.0 V	16 Kg
		SPR-205-BLK-I	205 W	16.5%	mono	40.0 V	15 Kg
		SPR-210-BLK-I	210 W	16.9%	mono	40.0 V	16 Kg
		SPR-210-WHT-I	210 W	16.9%	mono	40.0 V	15 Kg
		SPR-215-BLK-I	215 W	17.3%	mono	39.8 V	15 Kg
		SPR-220-WHT-I	220 W	17.7%	mono	39.8 V	15 Kg
Photowatt	France	PW 1000,100 W	100 W	11.1%	Multi	34.4 V	11 Kg
		PW 1000,105 W	105 W	11.7%	Multi	34.6 V	11 Kg
		PW 1000,110 W	110 W	12.2%	Multi	34.8 V	11 Kg
		PW 1400-140 W	140 W	10.5%	Multi	33.6 V	18 Kg
Sunset	Germany	As140	140 W	10.6%	Mono	33.3 V	15 Kg
		As150	150 W	11.4%	Mono	34.0 V	15 Kg
		As160	160 W	12.1%	Mono	34.0 V	15 Kg
		As170	170 W	11.8%	Mono	25.0 V	18 Kg
GE Energy	U.S	GEPVp-130-M	130 W	13.1%	Multi	17.5 V	12 Kg
		GEPVp-185-M	185 W	12.7%	Multi	25.6 V	18 Kg
		GEPVp-200-M	200 W	13.7%	Multi	26.3 V	18 Kg

Heizmann	Belgium	HSE-ES-110W-12 HSE-ES-115W-12 HSE-ES-120W-12 HSE-ES-125W-12	110 W 115 W 120 W 125 W	11.0% 11.5% 12.0% 12.5%	Multi Multi Multi Multi	16.7 V 16.7 V 16.6 V 16.7 V	12 Kg 12 Kg 12 Kg 12 Kg
GB-Sol	Great Britian	GB-Sol 120 GB-Sol 125	120 W 125 W	14.1% 14.6%	Mono Mono	20.0 V 20.0 V	15 Kg 15 Kg
Sharp	Japan	ND-123UJF ND-162E1F ND-167U1F ND-187U1F	123 W 162 W 167 W 187W	12.4% 12.4% 12.7% 12.6%	Multi Multi Multi Multi	17.2 V 22.8 V 23.0 V 25.8 V	14 Kg 16 Kg 17 Kg 18 Kg
Solartec	Chec Republic	SG72-110/12(104W) SG72-110/12(106W) SG72-110/12(110W) SG72-110/12(113W)	104 W 106 W 110 W 113 W	12.0% 12.3% 12.7% 13.1%	Mono Mono Mono Mono	17.4 V 17.4 V 17.4 V 17.4 V	10 Kg 10 Kg 10 Kg 10 Kg
BHEL	India	L24150	160 W	12.7%	Mono	35.0 V	15 Kg

### Three Ranges of Solar Light spectrum

Wavelength Range	Fraction of Energy	Energy(W/m <sup>2</sup> )
0.00-0.38 $\mu$ m	0.07	95
0.38-0.78 $\mu$ m	0.4729	646
0.78-8 $\mu$ m	0.4571	625



## Solar Application Potential

It is estimated that over two thirds of the 140 million rural households in India do not have access to grid electricity. Nearly 60,000 villages in India are still not connected and about a fourth of them are unlikely to be connected ever. These statistics mark a significant market for Solar Power Systems that use photovoltaic. Cells to harness electricity from sunlight and deliver it at the household level.

## Solar Installations at a Glance in India

Details of solar installations (as on 31 March 2006) are given below:

Source/System	Estimated	Cumulative installed Potential Capacity. (as on 31 March 2006)
<b>Solar Photovoltaic Systems</b>		
	20 MW/km <sup>2</sup>	54 795 nos
a. Solar street lighting	—	342 607 nos
b. Home lighting systems	—	560 295 nos
c. Solar lanterns	—	1566.00 kWp
d. SPV power plants	—	
Solar water heating systems	140 million m <sup>2</sup> collector area	1.5 million m <sup>2</sup> collector area
<b>Solar Cooking Systems</b>		
	—	600 00 nos.
a. Box-type solar cooker	—	
b. Concentrating-type community cookers	—	12 nos
c. Scheffler/dish type solar cookers	—	2000 nos
	—	6818 nos
<b>Solar PV Pumps</b>		

## Forth Coming Solar Applications

- Solar Sprayer for agricultural enhancement
- Solar Vaccine Refrigerator
- Solar LED Lighting
- Solar Incubators for Rural Poultry Farm

# energy back up systems



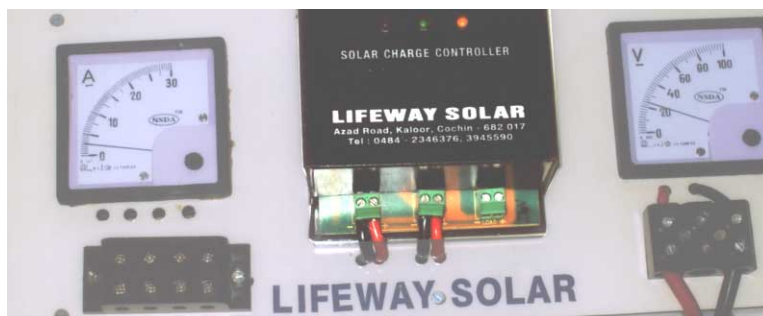
## Battery

An electrochemical storage battery is used to store the electricity converted by the solar module. During the day, electricity from the module charges the storage battery. During the evening, the battery is discharged to power lights and other applications. Batteries are typically 12-volt lead-acid batteries, ranging in capacity from 20-100 Amp-Hours (Ah).

Batteries are typically sized to provide several days of electricity or “autonomy”, in the event that overcast weather prevents recharging. Deep-cycle batteries will store solar electricity for use in the evenings; it’s designed to operate over larger ranges of charge levels. While car batteries are only designed to be discharged 15% of their maximum charge, deep-cycle batteries can be discharged to 70-80% without incurring damage. Both deep-cycle and automotive batteries are typically used, as they are readily available throughout the developing world. Car batteries have a 3-5 year lifetime; deep-cycle, both sealed and unsealed, can last 7-10 years.

## Charge Controller

A charge controller is utilized to control the flow of electricity between the module, battery, and the loads. It prevents battery damage by ensuring that the battery is operating within its normal charge levels. If the charge level in the battery falls below a certain level, a “low voltage disconnect (LVD) will cut the current to the loads, to prevent further discharge. Likewise, it will also cut the current from the module in cases of overcharging. Indicator lights on the controller display the relative state of charge of the battery.



## Indian Scenario

Installed Power Generation Capacity (in MW) as on 31.05.2006

State Region	Thermal Power			Hydro	Nuclear	RES	Grand Total
	Coal	Gas	Diesel				
Northern Region	17592.50	3213.19	14.99	11061.88	1180.00	694.59	33757.15
Western Region	20941.50	5080.72	17.48	6681.33	1300.00	1098.83	35119.86
Southern Region	15962.50	3449.30	939.32	10967.71	880.00	4233.49	36432.32
Eastern Region	13662.38	190.00	17.20	2496.53	0.00	111.67	16477.78
North-Eastern Region	330.00	771.50	142.74	1113.07	0.00	46.86	2404.17
Islands	0.00	0.00	70.02	5.25	0.00	5.42	80.69
All India Total	68488.88	12704.71	1201.75	32325.77	3360.00	6190.86	124271.97



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## **lifeway's solar poultry egg incubator**



We are proud to introduce our new product "SOLAR POULTRY EGG INCUBATOR". This is designed and developed in our R&D department of our company. Lifeway profile is given below.

We, Lifeway Marketing Pvt. Ltd a Manufacturing and Marketing Company of Solar Photo Voltaic Modules, Solar Vacuum Tube Water Heaters, Solar Lanterns, Solar Home Lighting Systems, Solar AC Generators, Solar Security Fencing, LED Torches, LED Table Lamps, LED Hanging Lamps etc.

### **Our Vision**

As our Country is facing acute shortage of Energy, we strive to "make every home a power house" within 10 years in order to face the challenge of Energy Shortage in future.

### **Our Commitments**

- To promote renewable Energy and alleviate poverty in rural India
- To alleviate Energy shortage problems faced by our country
- To offer new job opportunities to the unemployed persons.
- To prevent the Ecological imbalance of the Nature & protect Earth from Pollution.

We do promote Energy Conservation Movement by conducting Energy Awareness Programme with, Kerala Renewable Energy Entrepreneurs & Promoters Association (KREEPA), Rotary Clubs, Green Peace and Other Social Organizations in Kerala.



We are providing training to the unemployed women in rural Kerala for manufacturing and servicing various Solar Lanterns through “ **Kudumbashree** ”-a Poverty Alleviation Scheme of Kerala Government, which is successful story in Kerala. It has been observed that many unemployed women folks approaching Lifeway Solar for similar training and want to set up such units in their respective villages. Hence we request your support to create employment through renewable energy and eradicate poverty.

We are also an authorized Distributor of M/s. Photon Energy Systems Ltd., Hyderabad, an ISO 9001-2000 Certified Company, and one of the leading Manufacturers of Solar Photo Voltaic Modules & Solar Water Heaters since 1995. The Quality Systems has been accredited by ISO 9001: 2000 certification by TUV Germany and approved by MNES/BIS Govt. of India.

Lifeway Solar Marketing Pvt Ltd offers new age Products and Technologies for the new millennium. Our Energy solutions are affordable and reliable, that transcends the limitations inherent in traditional energy systems like shortages, pollution and inconsistent quality. Lifeway Solar would like to create awareness among common man for the need of Green Energy. Lifeway Solar’s Photovoltaic products and systems like lanterns, lighting systems for homes and workplaces, water pumping systems, streetlights, power plants, Solar Power Sprayers, Street Lights etc. are available through our Dealer Network in Kerala.



# Our products



Solar Water Heater



Solar Home Lighting



Wind Generator

## Solar Vacuum Tube Water Heater

Photon energy system manufactures world's latest Solar Water Heater "MIRACLE", scientifically designed Vacuum Glass Tube Solar Water Heater in technical collaboration with ASE Germany. This is a pollution free and Eco-friendly product with electrical back up, available in various capacity 100,200,500 liter per day, which can be used for domestic as well as industrial applications. During Monsoons also unlike other Solar Water Heaters, 'Miracle' provides real hot water. These Solar geysers have high efficiency of 73 % as compared to Flat Plate Solar Water Heater's (50 %) efficiency. This lightweight system occupying lesser space. This "Miracle" Solar Water Heater has been tested at Regional Solar Centre, Madurai (A BIS & Govt. Of India approved Test Centre): Warranty 7 Years

## Solar Home Lighting System & Solar AC Generators

The 'SUN' is a source of 'inexhaustible' & Eco friendly Energy, gifted by nature. Our Country will have enough Electricity to light our homes, if we harness it properly. Solar Home Lighting System, a popular device helps us to transform sunlight into Electricity, using highly efficient Solar Photo Voltaic Cells. The Electricity can use directly or stored in Batteries and reused for the purpose whenever required. Our products are useful for Domestic, Commercial and Industrial Lighting Applications. The SPV Modules have useful applications in Hotels and Hospitals locate in rural areas. Moreover Apartments, Shops and Corporate Offices can reduce their electricity bill by installing this solar system.

## Lifeway Wind Electric Generators

Primarily unequal heating of land and water causes winds on earth by the sun. The differences in temperature induce circulation of air from one zone to another. This air in motion is called wind. Wind has been recognized as a force of nature, ever since the planet came into existence. Human civilization has been harnessing the force of wind from time immemorial. However, the harnessing of wind energy for power generation



Solar Lanterns

commercially started only in the early 1970s and has continued to grow since then. Wind energy is now recognized as one of the low investment high-yield sources of power generation. Fortunately, India has abundantly been blessed by Mother Nature in this respect Wind Electric Generators are normally installed in areas where the wind speed averages around 20 km and above. The power generated by the Wind Electric Generators cannot be directly connected to the end use load like that of a diesel generator set. It is available from 200 W capacity onwards.

### Solar CFL (Compact Florescent Light) and LED Lanterns

Lifeway Solar manufactures and markets high quality, cost effective and durable Solar Lanterns in Kerala. Bijali 6 V/3 W, Diana 6 V/5W, Sobha 12V/10 W Solar Lanterns are available in various models.

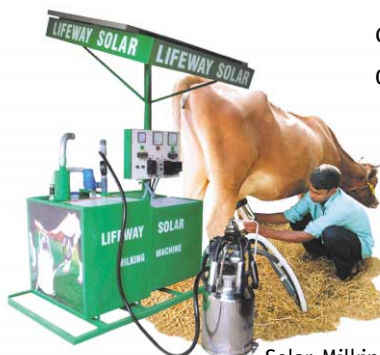
### Light Emitting Diode (LED) Torches and Domes

LED Torches are an outcome of our R & D. We have made for finding an economic way for portable lighting system. Our LED torches give you 100 lumens per watt and a life of 12 Years. There are 2 Models available for sale- Single LED and 5 LED torches. We are also manufacturing LED Hanging Lights and Table Lamps. LED Domes takes only 150 mille Ampere Current.



### Solar Street Lights

Lifeway Solar powered Street Lights are ideal outdoor lighting options that are reliable and alternative to conventional lighting to provide lighting from dusk to dawn.



Solar Milking Machine



LED Zero Bulbs 220V/2W

All the above-mentioned Solar Products are well accepted and widely used across the Country. As you are aware, Solar Products are Eco-friendly, maintenance free and cost effective.



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### **The Advantages of Solar Products are**

- An Independent conventional Power for lighting
- Maintenance Free
- Long Life up to 30 years
- High reliability
- Non polluting
- Renewable and free source of energy

### **WHY USE SOLAR ENERGY?**

- A free and abundant source of power
- Safe to use and requires no fuel
- Creates no pollution
- A quiet source of power
- Requires little maintenance
- Freedom from the grid





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## **lifeway's mini solar poultry egg incubator**



### **Introduction**

Lifeways mini poultry egg incubator is ideal for rural and tribal women's employment potential. It is a portable fiberglass double skinned box with puff insulation further improving temperature stability and operational efficiency. It consists of heat control and excellent thermal properties of the fiberglass cabinet ensure best conditions for egg incubation. Precise and consistent control of temperature is essential for good hatching results. The electronic proportional thermostat is well protected against power variation and also a battery is provided for power stability. Solar panel connected to the battery with charge controller hence 24-hour supply is assured.

### **Description**

It has the capacity to hatch about 50 chicken, 120 quail and 25 goose eggs. Energy is stored in a battery and distributed inside a chamber by heat in warm air. The temperature of the incubator, made of fiberglass, with insulation, is maintained at about 37 degrees Celsius. The entire unit is automatically heat controlled cabinet ensures that no damage is done to the eggs due to over heating.

The indicator shows whether the unit is warming up, stable or cool. The electronic proportional thermostat is well protected against power variations. A solar panel connected to the battery with charge controller assures 24-hour power supply for the incubator.

Egg turning can be done manually by turning each egg once 12 hour. There are no internal moving parts inside the device and there is little danger for the emerging chicks. A mini fan provides fresh airflow and air circulation throughout the incubator. Humidity is provided manually by placing a water bowl inside the incubator base.

The important feature in solar incubator is that unlike electrical incubators the eggs need not have to be

disinfected before placing them inside and after every hatching the entire device can be washed and cleaned easily.

Priced at about Rs.30,000 for solar back up and Rs. 10,000 for grid power back up system. The solar incubator may be ideal for rural women and unemployed persons who seek self-employment opportunities. They can earn about Rs.600 per month from the sale of these hatched eggs.

Features of Lifeway's Mini Solar Poultry Egg Incubator:

- Power Consumption per egg is low by compact and thermal insulation.
- Good Hatchability rate.
- It doesn't create any pollution.
- It is easy to carry anywhere.
- It is safe and easy to use.
- Egg candling facility available.
- Light weight and Portable.
- Temperature is automatically controlled.
- If any power failure occurs, all eggs will not be damaged.
- Sanitation and care can be maintained easily.
- Less man power requirement .





## Precautions

1. Place your incubator at about eye level. Don't place your incubator on the floor.
  - **NEAR A GAS HEATER:** Carbon dioxide from gas will kill an embryo.
  - **IN A DRAFT:** An embryo develops pneumonia easily. Avoid a spot where wind will blow directly on the Chick Hatcher.
  - **NEAR A HEATER:** Too much heat can kill an embryo.
  - **IN A COLD ROOM:** The Chick Hatcher is built to maintain proper incubation temperature in a moderately heated room (72° is ideal). The heating unit cannot provide sufficient warmth in a freezing room.
2. While chick is resting and gaining strength, you should put it in a carbon box approximately 2 feet square. Lift the chick very gently from the incubator-Don't SQUEEZE- and put it into the box.
3. The desired temperature for incubation is 37.3 degrees, but a range between 36 and 38 degrees acceptable.
4. Egg must be turned regularly to prevent the yolk from setting to one side and also get exercise the egg embryo. But stop turning 3 days before eggs are due to hatch.
5. Chicks need moisture, heat tends to dry the air, which in turn dries the egg. Put water into the tray provided in the incubator regularly.

## Technical Specification

### *Incubator Dimensions*

- Length - 380 mm
- Width - 300 mm
- Height - 350 mm

**DC option:**

Solar Photovoltaic panel 12V / 30Wp (Mono Crystalline)	-	2 Amps
Efficiency	-	15-18%
SMF Exide Battery (12V x 7.5Ah x 2)	-	12V / 15 AH

**AC option:**

■ 220-240 V 12 - 0 - 12	-	2 Amps
■ Fan 12 V DC - 2.3 W	-	200 mA
■ Heater Coil	-	1.5 Amps
■ Charge Control Unit	-	10 Amps
■ Over range	-	38 ° C
■ Under range	-	36 ° C
■ To reach (37 ° C) celsius - duration -	-	8 minutes
■ 2 mm Square Cable from Panel to Battery		

**LED Indicator for**

1. Yellow - Solar Charging.
2. Red - AC Charging.
3. Green - Normal Temperature (36°-38°).
4. Yellow - Heater & Fan Working.
5. Red - Low Battery
6. Green - Power ON



# Our proposal for community Poultry farming

## A Dream project

10 Numbers of village women forms a self help group (SHG) and L-Ramp provides 10 Numbers of solar poultry incubator to them. SHG can avail loan from banks @5% interest per annum according to Ministry of renewal Energy (MNRE)

They will also get 30% subsidy out of the total cost of the project from Khadi Board under the head "New Woman Entrepreneurs."

Cost Factor solar Incubator Cost	Rs. 30,000.00
Subsidy 30%	Rs. 9,000.00

## Production in every 21 Days



Loan from Bank at 5% interest annual. Money to be deposited in the bank 15% of the Total cost 21000-15% =3150.00 If L- Ramp can provide this amount to each SHG members they can start this project with the help of Khadi Board + L-Ramp+Nationalized Banks.

Selling rate depends on various factors like the location, weather, and market demand. Average Rs 10/- for a one day Chick. After 45 days Rs 50 /-80 per Kg. An average Chicken weight after 45 days is about 2-2.5 Kg.

# Our Village visits to find potential beneficiaries



It has been observed that most of the women living in villages are housewives looking after their children and families. Some of them find job in nearby cities but most of them are staying back at home. When we revealed our solar community poultry farming project most of them shown their interest to participate. However to begin this project we have to mobilize either fund or the solar poultry incubators and distribute among them.

Such surveys can be conducted in Tamil Nadu, Andhra Pradesh etc to find out the beneficiaries and execute these projects to empower women in rural India.

Now a days press media giving lots of importance for poultry farming. 2007-2008 Budget proposed by P.Chidambaram, India's Finance Minister giving lots of importance to Agriculture and related industry. Hence this is the right time to implement this innovative project.

# CONCLUSIONS

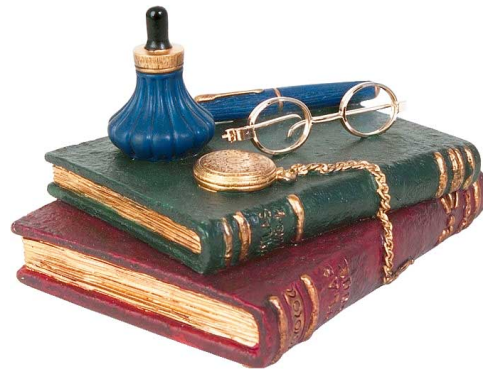
## CONCLUSIONS

The world is witnessing a trend towards renewable sources of Energy. Discussions on renewable energy in India are often to its Technical aspects and public incentives. Viewing it as a business opportunity, implies a complete turn around towards markets and entrepreneurial capacities and much less on the governments role. The only sustainable option is to promote first generation entrepreneurship in a competitive environment through motivation training and support services.

Our new innovated solar egg incubator mainly operated by using solar energy. This product will create more opportunities for rural women employment in India. It also motivates them to open a poultry community farming like Dr.Vergheese Kurian's AMUL in Anand Community Diary Farming.

Empowering women in rural India and creating more jobs in renewable energy sector are our slogan by introducing this innovative solar poultry incubator.

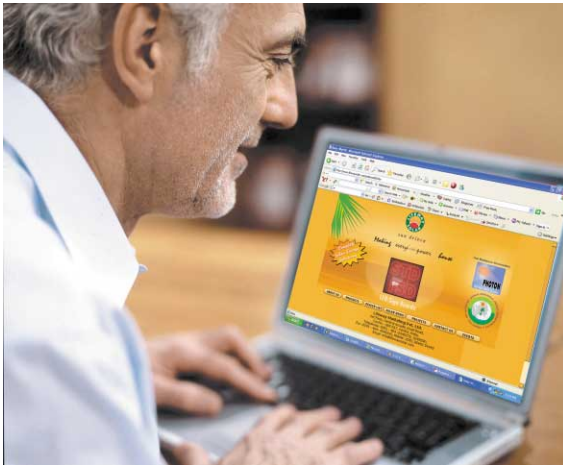
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