



## Generation of Electricity Using Sand

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### ABSTRACT

*Conserving energy has become the biggest issue in present scenario. This paper proposes a economical and affordable method for design and manufacturing of sand power generation. Due to the development and modernization the electricity demand is increasing at high extent. To overcome this demand globally effectively without any destructive effect on environment is possible by using sand power generation. The sand is available abundantly on the surface of the earth. The basic concept of Sand power generation is, sand Power generator is a simple technology, more economical, more effortless can meet from domestic (house hold) to average power requirements. In this process ordinary sand placed in the main funnel is allowed to fall on the blades of a sand wheel through conveyor belts which leads to rotate the turbine, which is used to generate power and stored in a DC battery. The concept of sand power generation is simple. when a sand moves down from higher altitude to lower one its potential energy is converted into kinetic energy. This motion is converted into rotational motion and that rotational motion is converted into electricity by using a Mini DC generator.*

**Keywords:** Conserving energy, Dynamo, Power generator.

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### 1. INTRODUCTION

Now a day due to the effects of pollution and global warming there is a need for generating power from renewable sources. Due to the availability of sand all over the earth, abundant and consistent it is very appropriate way of generating power by using sand. Energy demand is getting enhanced day by day with rapid growth in industrialization as well as modernization. But the energy resources are eventually coming down due to scarcity of fuels at high extent. Within a few years the energy resources will be exhausted and hence there will be lack of fuel (coal, water, etc.) for power generation. The other renewable sources such as solar, wind, biomass are available only for a particular duration of time during the day and night. Therefore the Reusable sand power generation is one of the method to generate power which fulfil energy demands and requirements of present time.

In this process ordinary sand placed in the main funnel is allowed to fall on the blades of a sand wheel, through conveyor blades the rotation of turbine which is used to generate power and stored in a DC battery The collided and scattered sand particles are collected by a box which have a small vent, through which the sand collected is and then poured in to the boxes of conveyor. The DC motor, which consume small quantity of power generated by the dynamo. The buckets of the conveyor (bucket elevator) carries the sand to certain height which is 1/3 rd higher than funnel stock point From this the sand will reach to the main funnel which is the storing point Thus the reusing of sand starts and continues for a certain period till it creep out as minute particles The process is unique and could be enhanced from small requirements to any extent of power needs. That effect makes it possible to extract energy from the sand power generator, which makes the sand power generation technologically feasible.

Sand powered electric power plant has advantages over the hydro-electric plant, thermal power plants such as avoiding usage of fuel and not polluting the environment. However, the sand Powered electric plant would be much

smaller than other power plants. The location of that plant would not be restricted to suitable water resources. If the sand power electric generation comes under operation and working then it can replace all existing nuclear and fossil fuel plants and it would essentially solve the problem of global warming to the extent it is caused by fossil fuel used.

The utilization of energy is an indication of the growth of a nation. For example, the per capita energy consumption in USA is 9000 KWh (Kilo Watt hour) per year, whereas the consumption in India is 1200 KWh (Kilo Watt hour). One might conclude that to be materially rich and prosperous, a human being needs to consume more and more energy. A recent survey on the energy consumption in India had published a pathetic report that 85,000 villages in India do not still have electricity. Supply of power in most part of the country is poor Hence more research and development and commercialization of technologies are needed in this field. India, unlike the top developed countries has very advanced technologies are available for power generation. By just placing a unit like the “Reusable Sand power generator”, so much of energy can be tapped. This energy can be used for commercial as well as industrial usages.

## 2. ECONOMIC CRITERIA

The per capita power consumption in India is 733.54KWh/yr, which is very minimal as compared to global average of 2340KWh/yr. Electricity losses in India during transmission and distribution are extremely high, about 28.44%(2008-09). Due to shortage of electricity, power cuts are common throughout India and this has adversely to 1.5% of India’s GDP. The condition of utilities are not good either, cumulative loss of 110 power utilities are estimated as Rs 86,136 crore which is expected to rise to Rs 1,16,089 crore by 2014-15. Despite an ambitious rural electrification program, some 400 million Indians lose electricity access during blackouts. While 84.9% of Indian villages have at least an electricity line, just 46 percent of rural households have access to electricity



Figure1. Power Demand in India

Sand is a naturally occurring granular material composed of finely divided rock and mineral particles. the sand is used as a source for rotating the sand wheel to generate electricity.

## 3. DESIGN METHODOLOGY

### 3.1 Bucket elevator

A bucket elevator can elevate a variety of bulk materials from light to heavy and from fine to large lumps.

### 3.2 Belt type Bucket Elevator

The belt bucket elevator type are equipped with specially developed steel-rope belts permitting a long lifespan and heat resistance up to 130° Celsius. In the bucket elevator boot a bar drum ensures guided return of the belt. An exact parallel guidance is achieved with a parallel tensioning device.

### 3.3 Functions & Features

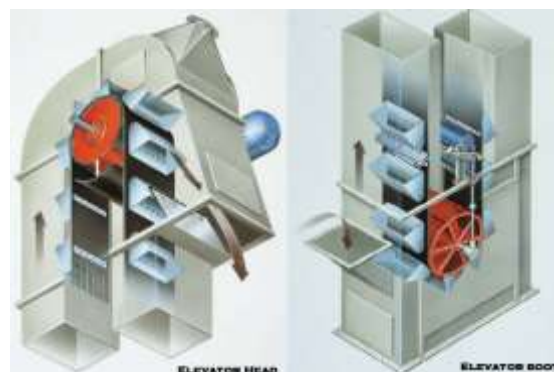
Safe belt-joining by clamping in a cast compound box



**Figure 2 Belt type bucket elevator**

### 3.4 Chain type Bucket Elevator

1. The Chain bucket elevator casings are self-supporting, but they require horizontal guides at least every 15 meters and below the elevator head.
2. The bucket elevator head comprises a lower section with doors to access the adjustable discharge plate, for the pedestal bearings which support the drive shaft, the shaft exit points use grease filled radial shaft seals.
3. The upper sections comprise a multipart removable hood with an inspection flap.
4. A drive platform is mounted on the side of the lower part of the head for supporting a wide variety of commercially available devices.
5. An elevator drive normally consists of a geared motor unit, which is normally connected to a frequency controller for maintenance purposes.



**Figure 3 Design Methodology**

The Properly designed Sand Power generator for any Particular application should satisfy of at least five criteria simultaneously

1. The criterion, which specifies the minimum noise reduction, required from the sand power generator as a function of frequency. The Operating conditions must be known because large steady-flow velocities or large alternating velocities may alter its acoustic performance.
2. The geometrical criterion which specifies the maximum allowable volume and restrictions on shape.
3. The mechanical criterion, which may specify materials from which it is durable and requires little maintains.
4. The Environmental Criterion, which specifies the zero or minimal the pollution rate.
5. The Economical criterion is vital in the marketplace.

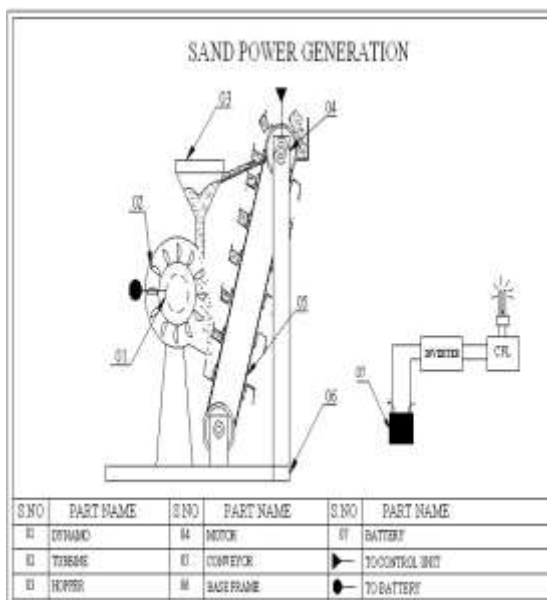


Figure 4. Assembly drawing

1. The frame is made of mild steel.
2. The length required for the steel pipe is cut out from the steel pipe and it is placed horizontally.
3. By using arc welding or gas welding the pipes are welded mutually perpendicular to each other.
4. The vertical side of the frame is welded by means of another connecting links.
5. By using bolts and nuts the belt type bucket elevator is placed in the frame by the appropriate position.
6. The sand slider is also fitted in the suitable inclination. By using this Sand slider the flowing sand from bucket elevator will strike the hopper and again it will strike the sand wheel (turbine).
7. The Generator is coupled with the sand wheel (turbine) therefore the power will be generated.
8. The developed power is stored in the DC battery and it will be used for household and other requirements.
9. Finally the finishing is carried out by surface grinding operation.
10. Bearing all above in mind, a physical prototype is made in such a way the model is working properly.



Figure 5 Fabricated Model

#### 4. CONCLUSION

This is the unique form of electricity generation which could be very well harnessed if proper action plan is laid out to use this source of energy. Once this process starts to generate electricity it may leave behind all the conventional sources of generating energy available in the market & that too without any hazardous effects on the environment. By the use of sand again & again there is no problem of procuring the raw material continuously

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