

PEMPHIS

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Environmental Newsletter
Ministry of Environment and Energy



ENERGY EDITION

Editor's Note

Alhamdulillah,

Environment Department gratefully acknowledges the valuable contribution and support of all staff of the Energy Department in providing the content of the Energy Edition of Pemphis.

Like we said earlier, your comments and feedbacks are more than welcome. :)
Hope you would enjoy this issue of Pemphis.

Feedbacks, Comments, Articles, Photos, etc
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For a **SUSTAINABLE ECONOMY** it is essential to utilize **RENEWABLE** means of energy production.
Minister Thoriq Ibrahim

Electricity is the major energy demand in Maldives; with a share of 30-40%



Maldives Energy Balance 2010-2012

Carbon emissions from electricity production in Maldives: **411,595.16 tCO₂**



Maldives Energy Outlook for inhabited islands 2013

Electricity generation for the capital Male' (Male', Villingili and Hulhumale') accounts for **57.65%** of the total electricity generation of all the inhabited islands of the Maldives.

Maldives Energy Outlook for inhabited islands 2013

57.65%

"Although it is impossible to predict the future, extrapolating present trends ... leads to 'The Perfect Storm' sometime in the next decade. At the tipping point, **oil prices exceed the pain tolerance** of a sufficient number of global consumers, causing economies to roll over into severe recession."

Dave Cohen 2007

MALDIVES ENERGY SECTOR OVERVIEW

Energy sector plays a critical role in ensuring seamless operation of many economic activities, and is key to maintaining international competitiveness and securing economic and social well-being. **Maldives is one of the few countries in the South Asia region that has achieved universal, 24 hour electricity access country wide.** Significant investments have been made in the past by government owned utility companies, community power houses and individual industrial operators to ensure consistent supply of electricity.

Most of the energy generation is still based on fossil fuel imports (each island, inhabited, industrial and resort islands) and has its own separate power generation facility. At the population centers, energy generation and distribution in the past year has been consolidated to three government owned utility companies (STELCO, FENAKA, MWSC) while energy generation in industrial islands still remains under the domain of private owners. In line with country's low carbon economy goal to transform the energy sector, an ambitious renewable energy scaling up program was endorsed by the government in October 2012

The electricity demand growth rate is 8.5% annually nationwide and 11% in the Greater Male' Region.



The Household Income and Expenditure Survey 2012 reveal that the **richest consume more than double electricity units per month than the poorest.**



Maldives has the highest cost of electricity generation in the region. The cost per kWh is 30-70 cents.

The installed capacity from **renewable energy is 2.8 MW** as of October 2014.



Transport sector: A worrying trend of growth and an increasing impact on land use.

Transport sector is responsible for a large share of the total emission of air pollutants in urban areas.

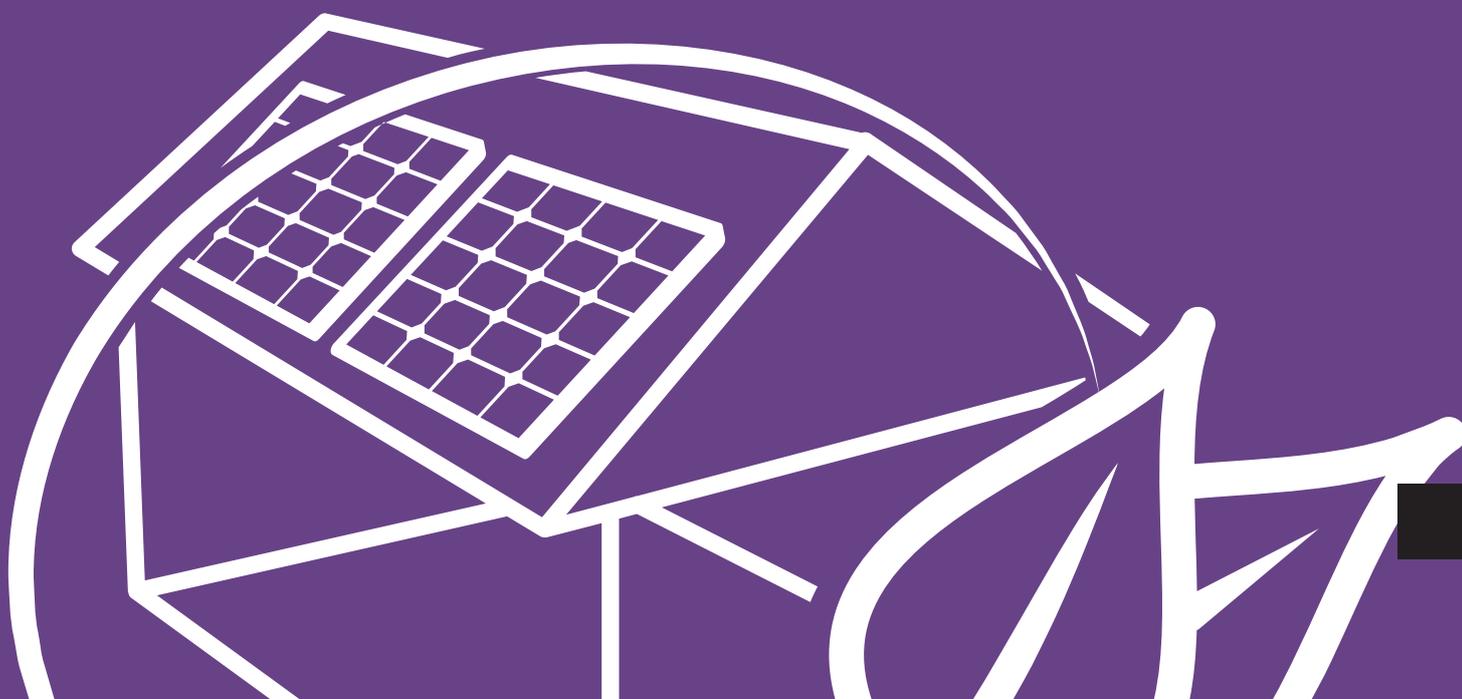
A better transport system can reduce the national dependency on oil imports and can result in more balanced national resources allocation.

The transport system is also great 'space eater'. An innovative design of an integrated transport strategy can effectively address the crucial land scarcity issues.

A motorcycle needs 2 m² of ground surface plus 2 m² for movement.

A car needs 10 m² of ground surface plus 2 m² for movement.

Electricity is highly subsidized and this has imposed a significant burden on the Government's budget: in **2013, USD 50 million was spent on electricity subsidy.**





Symbolic handover of LED harbor lights to Dh. Kudahuvadhoo



Inauguration of "It's Cool at 25" campaign



"It's Cool at 25" campaign was endorsed by the Dh. Kudahuvadhoo Council on 22nd October 2014.



Handover and inauguration of Dh. Kudahuvadhoo PV systems



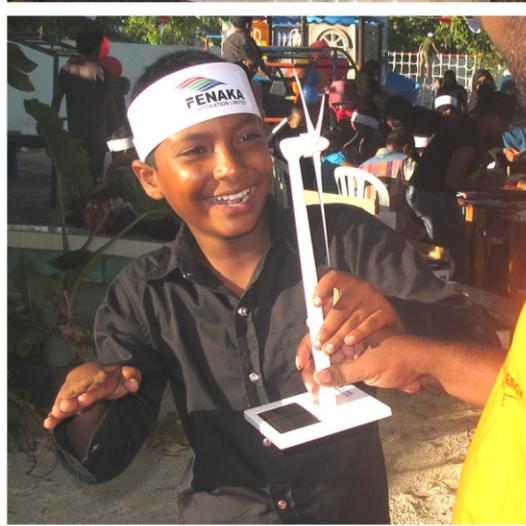
Endorsement of "It's Cool at 25" ceremony by STD



Providing information through mass media



Energy Fair
 As part of World Energy Day activities an Energy Fair was held on 22nd October 2014. During the fair renewable energy and energy efficient equipment were exhibited and the use and advantages were explained to the visitors. Also, energy conservation awareness leaflets were distributed.



PEMPHIS TALK.



Ajwad Musthafa

Permanent Secretary
Ministry of Environment and Energy (MEE)
Energy Economist

Ministry of Environment and
Energy 2005 - Present

Masters' degree in Energy
Economics and policy from
University of Surrey, United
Kingdom.

Vision in expanding the use of information technology in environmental awareness and decision making:

Ambition is to make MEE the very first automated and paperless office in the Maldives. Archives of our history, past research and findings are not well documented. MEE website can be an archive or portal for the public to access the history of environmental research literature in the Maldives.

Most surprising thing learnt:

Environmental laws, regulations and guidelines and even the passion for environmental protection of this ministry staff sometimes gets labeled as a barrier for development. People often forget that our natural environment is all that we have. Sustainable development is the key to preserve our tourism and fishing industry. I am happy even with these challenges the staff of this ministry remained strong as ever to protect and preserve the environment of this country.

Will never do:

As someone responsible for nearly 300 staff, I sometimes have to deal with employees who do not give their full contribution to office. **But I would never pinpoint and say these people are incompetent.** I have never complained about any staff. I don't see people as incompetent. I honestly believe we are all gifted in some way. I believe given the right opportunities and incentives people would perform.

Turning point in career:

"The point I became a parent"

Plan of enhancing the role of the civil society and communities in environmental decision making:

The role of civil society is important to facilitate participation of all stakeholders in the environmental decision making. The EIA regulation already makes it mandatory for the project Proponent and EIA consultants to conduct stakeholder consultations. In addition to our Environmental Protection Agency (EPA), civil society organizations can also play the role of watchdog in safeguarding the environment. In our context, many infrastructure development projects, Government is the project Proponent as well as the regulator. So it is important to have active civil society organizations to play a proactive role making sure our fragile environment is protected.

Balance between work and family life:

"Not balanced. I have two kids and a wife. Most of my time is spent in office. **Blessed to have a supportive partner**"

"We are blessed with plenty of SUNSHINE , we are blessed with a vast OCEAN..These are all renewable sources of ENERGY. There is hope we will be SELF-SUSTAINABLE in future. With right technology, policy and regulatory instruments we will achieve this target"

With respect to some projections, fossil fuel reserves are to run empty around the midst of this century; Concerns regarding the issue:

The issue concerns me a lot. 23% GDP of Maldives is being spent on fossil fuels. Our modern way of life is completely dependent on fossil fuels. We must understand that It is a finite resource that will run out.. Question is, are we prepared for that day?... my wish is to see consumer produce their own energy at least during day time when there is sun.. We are blessed with plenty of SUNSHINE , we are blessed with a vast OCEAN..These are all renewable sources of ENERGY. There is hope we will be SELF-SUSTAINABLE in future. With right technology, policy and regulatory instruments we will achieve this target.

Advice to the Maldivian community:

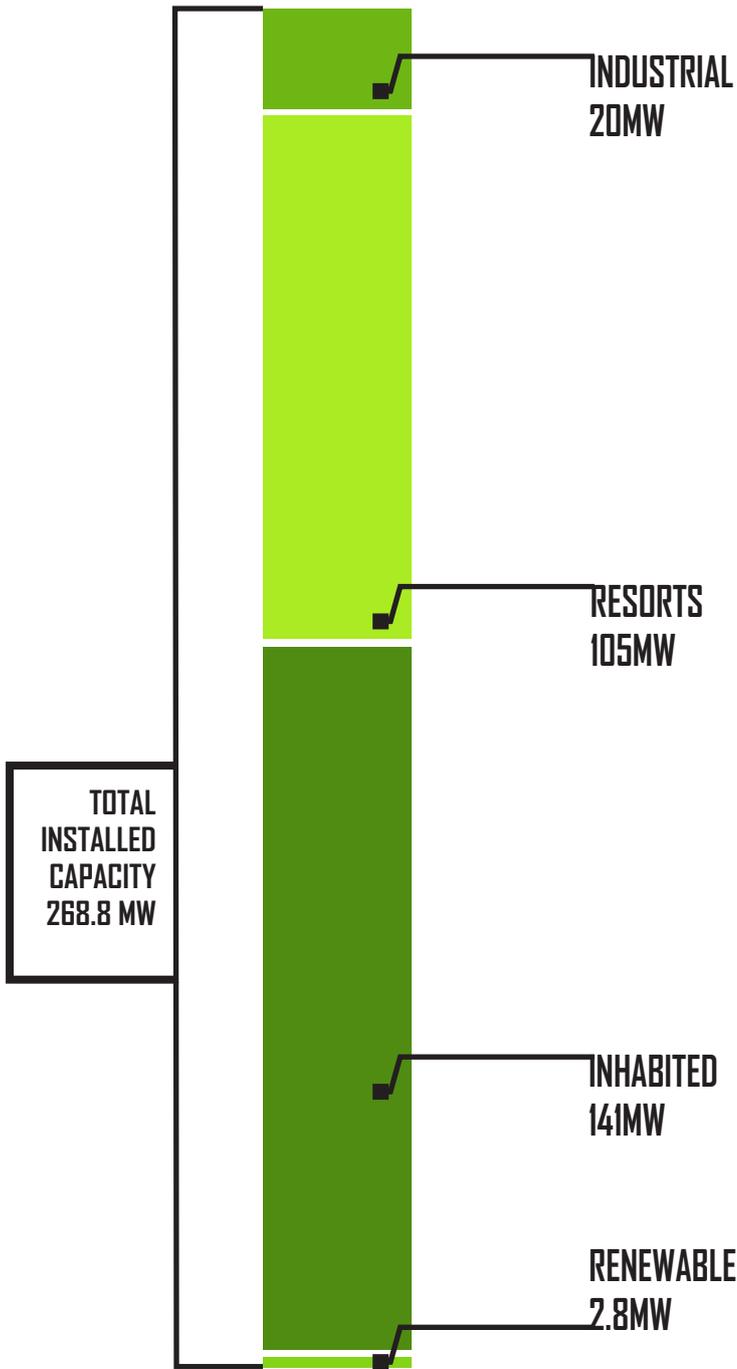
The developments we have achieved are related to our environment. It is Important for us to preserve our environment for future generations. Please do not see the sea walls, tall high rise buildings, narrow roads and congested streets as the sign of progress. We must all learn to coexist with nature. For a tourism based country like Maldives blessed with natural beauty, sustainable development is the only option.

Hobby:

It is for people with leisure time. I enjoy going out with family and friends. Read about new technologies and keep myself up to date on the current affairs.



ELECTRICITY INSTALLED CAPACITY



The project for “Clean Energy Promotion in Male”

740 kWp solar PV systems were installed in 12 public buildings in Male' and Hulhumale'.

Phase 1 – 395 kWp

President's Office	20 kWp
Hiriya School	100 kWp
STELCO	45 kWp
Maldives Centre for Social Education	100 kWp
Thaajuddin School	130 kWp

Phase 2 – 280 kWp

Central Administrative Building (MNU)	40 kWp
Kalaafaanu School	85 kWp
Faculty of Health Science (MNU)	35 kWp
Ghiyaasuddin School	80 kWp
Velaanaage Building	40 kWp

Phase 3 – 65 kWp

Ministry of Finance and Treasury	20 kWp
Hulhumale' Hospital	45 kWp



Clean Energy for Climate Mitigation

Solar PV systems of the capacity 308 kWp were installed and connected to the grid in January 2014. The systems were installed in 3 public buildings in GDh. Thinadhoo Island.

Installation of additional 250 kWp and control system is underway. With these, the island will have about 45% of its daily peak demand from solar. The work is expected to be completed by November 2014.

Phase 1 – 308 kWp (Completed)

Aboobakuru School	129 kWp
Thinadhoo School	136 kWp
Power House	43 kWp
Pre School	17 kWp

Phase 2 – 250 kWp (On-going)

Masjidhul Ikhlaas	60 kWp
Dr. Abudl Samad Memorial Hospital	190 kWp



Maldives Scaling Up Renewable Energy Program (SREP)

The program aims to scale up renewable energy installations from the present ~2.8 MW to over 40 MW in the next 5 years. It is expected to install systems which can cover up to 30% of day-time peak demand in all inhabited islands of the Maldives.

Maldives SREP IP - Benefits

- Minimize Fuel Consumption: USD 16 Million per year can be avoided from fuel bill
- Maximize Subsidy Savings: USD 9 Million per year can be saved from fuel surcharge
- Optimum Level of Renewable Energy Penetration: Minimizes Cost of Energy
- Financially & Economically sustainable projects
- Minimize CO2 Emissions
- Optimize Land Use
- Avoid or Minimize Environmental Impact

This program has two sub projects namely ASPIRE and POISED.

Support for the Climate Neutrality Strategy of the Maldives

Under the project 203 kWp system in Dh. Kudahuvadho and 124 kWp systems in R. Ugoofaaru have been installed. The system in Kudahuvadho was connected to FENAKA grid on 22 October 2014.

R. Ugoofaaru – 124 kWp

Sewerage Plant	82 kWp
Power House	24 kWp
Ugoofaaru School	18 kWp

Dh. Kudahuvadho – 203 kWp

Residential Building (Dhanaal)	68 kWp
Dhaal Atoll Education Centre	101 kWp
Power House	17 kWp
Pre School	17 kWp



Dhiffushi Solar Ice Project - 40 kWp

This project features the installation of a 40 kW grid-connected photovoltaic (PV) system and a 5kW ice-making machine in K.Dhiffushi. The key objective of this project is to Promote the use of local renewable energy sources and to provide a model for solar energy project replication in other Maldivian Islands.

Solar PV in Government Buildings

Green Building - 25 kWp
Muleeaaage' - 11 kWp

Accelerating Sustainable Private Investments in Renewable Energy (ASPIRE)

Key focus of this program is to create project structure conducive for private sector participation, which includes design of an appropriate project framework and agreements that result in making the project bankable and attractive to private sector.

Initial projects of 4 MW will be awarded in the Phase I. Considering the scale of the capacity targeted under the initial phase, Male' and Hulhumale' islands were selected.

Subsequent phases will involve projects at the outer islands.

Preparing Outer Islands for Sustainable Energy Development (POISED)

This project aims to reduce diesel dependence in the Maldives, improve the electricity sector, and address key macroeconomic issues through tapping into indigenous and cheaper sources of electricity.

Under this project solar-diesel hybrid grids will be installed in nearly 160 islands in four phases. In the first phase a total of 2.5 MW will be installed in Addu, B.Goidhoo, Th. Buruni, Ga. Vilingili, and Lh. Khurendhoo.

Key elements to consider before buying an air conditioner

For a tropical country like Maldives, air conditioning need is unavoidable. Air conditioning is the single biggest energy consumer in the building sector. Air conditioning accounts for about 40 to 60% of energy consumption of a building.

Today, most of our homes are equipped with air conditioners in one or more rooms. This article explains important points to consider before buying a new air conditioner or replacing an old one.

AC Parameter	Window AC	Tower AC	Split AC	Cassette AC
				
Design	To be fitted in windowsills. single unit which houses all the necessary components	Floor-standing	Two units- internal external. The indoor unit takes warm air and throws in cold air	To be installed on ceilings
Suitable for	Small rooms with a window sill	Suitable for very large rooms and offices	Suitable for any room with or without a window	Large indoor spaces
Noise	Relatively on the higher side		Minimal noise	Silent operation
Interference with home decor	Slight possibility to interfere with window curtains and drapes	Does not require wall for installation but occupies some space on the floor	Designer indoor units blend well with wall decor	Blends with décor
Ease of installation	Easy to install and maintain		Indoor and outdoor units need some amount of effort for installation	Needs specialized false ceiling
Capacity range	0.75 ton to 2 ton		0.8 to 2 ton	1 ton to 4 ton
Advanced features	Humidity control, dust filter		Humidity control, dust filter, bacteria filter	Humidity control, dust filter, bacteria filter
Advantages	Cost less compared to other varieties	Higher cooling capacity		Saves space. Able to cool large areas where other ACs don't reach

Step 1: Get the right size of air conditioner for your need

The right size of the air conditioner can be chosen by measuring the area of the room. Other factors that need to be considered include: number of windows, number of people in the room, insulation of the room, direction of the room, ceiling height etc. Following chart helps to identify the right size of air conditioner

Step 2: Choose energy efficient air conditioners

Surveys conducted in Maldives show that around 65% of the air conditioners being used in Maldives are not energy efficient. To reduce the energy consumption and to take the benefit of latest technology, it is suggested to replace the existing ACs with energy efficient ones. Such air conditioners are 10% more efficient than standard models.

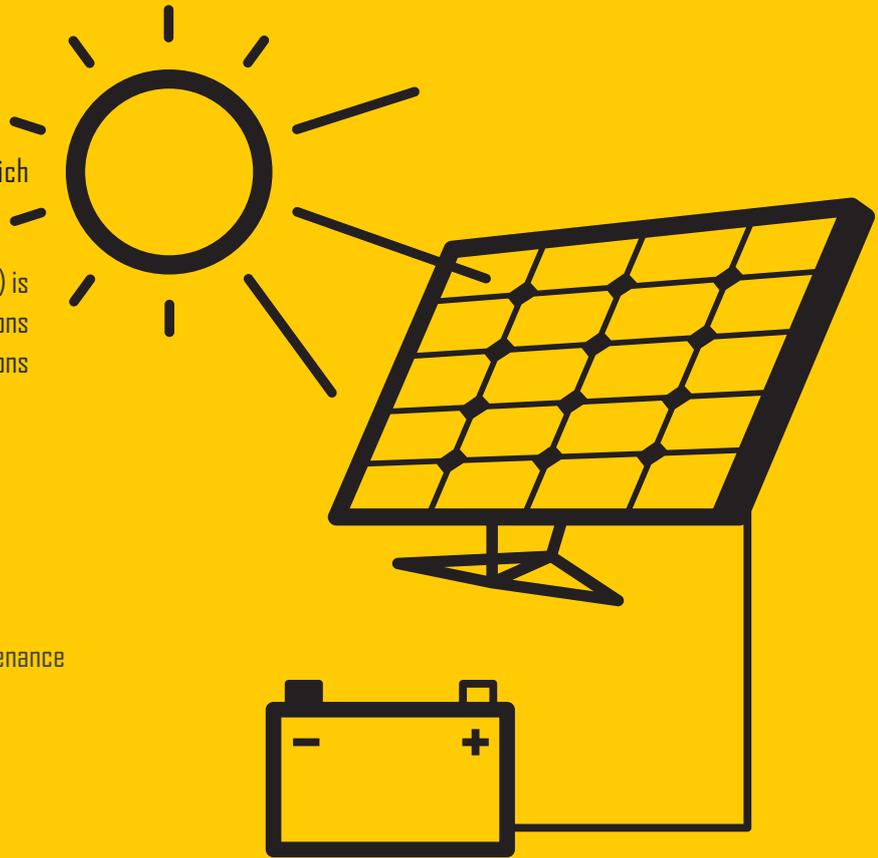
Area to be cooled (sq feet)	Capacity needed (btu/hr)
100 to 150	5000
150 to 200	6000
200 to 250	7000
250 to 300	8000
350 to 400	9000
400 to 450	10000
450 to 500	12000
500 to 700	14000
700 to 1000	18000
1000 to 1200	21,000
1200 to 1400	23,000
1400 to 1500	24,000

Solar Energy

Solar Photovoltaic Cells:

Photovoltaic (PV) cell: a semiconductor cell which converts solar energy into electrical energy.

When light strikes the cell, the energy of the light (photon) is transferred to the semiconductor which causes electrons loose, allowing them to be dynamic. This flow of electrons creates electricity.

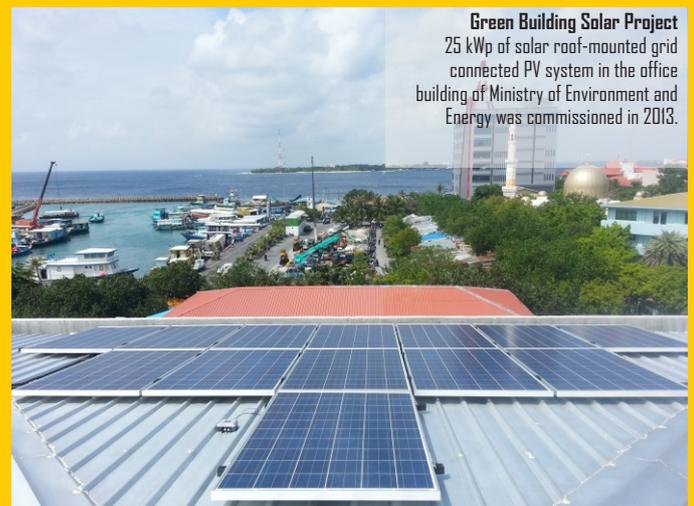
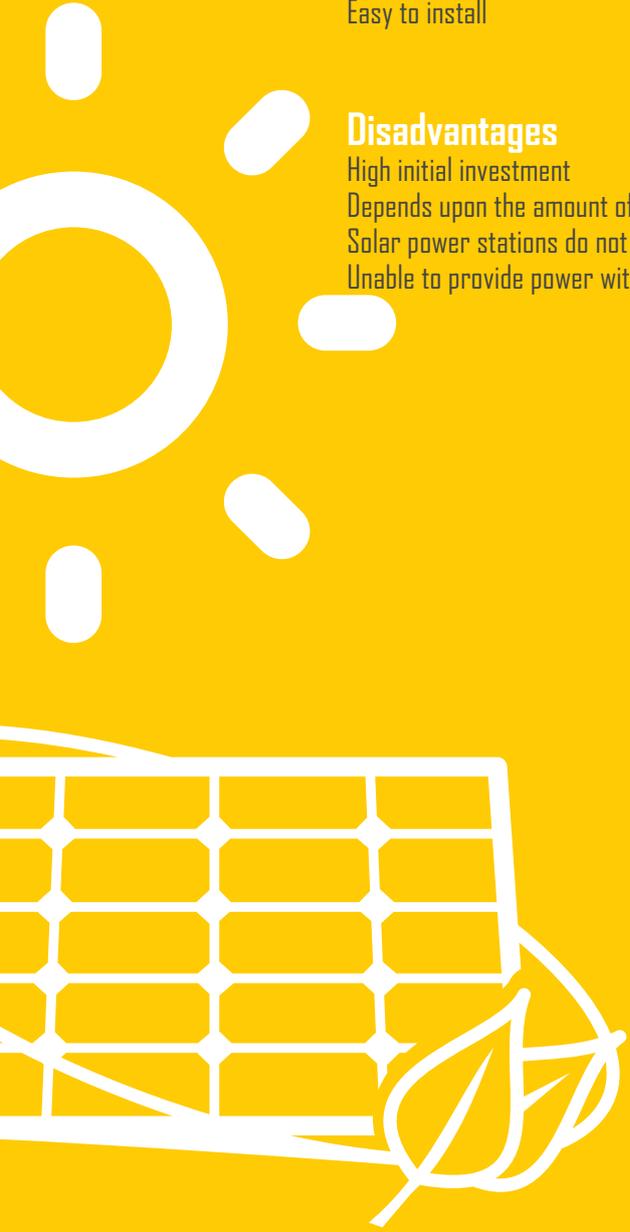


Advantages

- Clean and renewable
- No running cost apart from maintenance
- Low maintenance
- No pollution
- No noise pollution
- High return on the investment
- Easy to install

Disadvantages

- High initial investment
- Depends upon the amount of sunlight available
- Solar power stations do not match the power output of similar sized conventional power stations
- Unable to provide power with the absence of solar radiance



Green Building Solar Project
25 kWp of solar roof-mounted grid connected PV system in the office building of Ministry of Environment and Energy was commissioned in 2013.

“All the energy stored in Earth’s reserves of coal, oil, and natural gas is matched by the energy from just 20 days of sunshine.”



Wind Turbines

Wind Turbines, Simplified

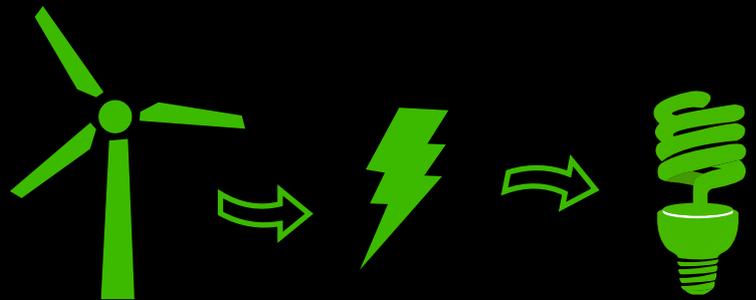
Electric wind turbines: converts the kinetic energy in the wind to electrical power.

Turbine blades are designed to capture kinetic energy in the wind.

Wind turns the blades of the turbine which spins a **shaft**.

This rotational energy is then passed on to a **generator**.

The generator then converts this mechanical energy into electrical energy through electromagnetic induction.



Advantages:

Renewable with no global warming potential

The wind is free, and we are able to cash in on this free source of energy.

No or negligible environmental impacts.

Disadvantages:

Depends on the weather.

Wind turbines generally produce allot less electricity than the average fossil fuelled power station, requiring multiple wind turbines to be built in order to make an impact.

Wind turbine construction can be very expensive and costly to surrounding wildlife during the build process.

Noise pollution.

Large land area required if to be commercialized.

At its essence, generating electricity from the wind is all about transferring energy from one medium to another. Wind is air in motion. It is produced by the uneven heating of the earth's surface by the sun.

Meet this month's Writers & Contributors

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