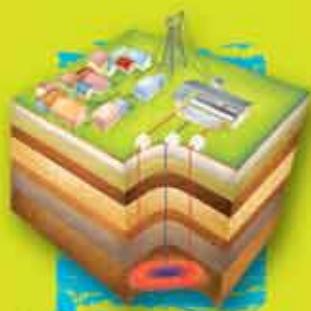


# 101 Questions & Answers

# Clean, Green TECHNOLOGY

The quickest way to increase your Green Quotient





An imprint of The Energy and Resources Institute

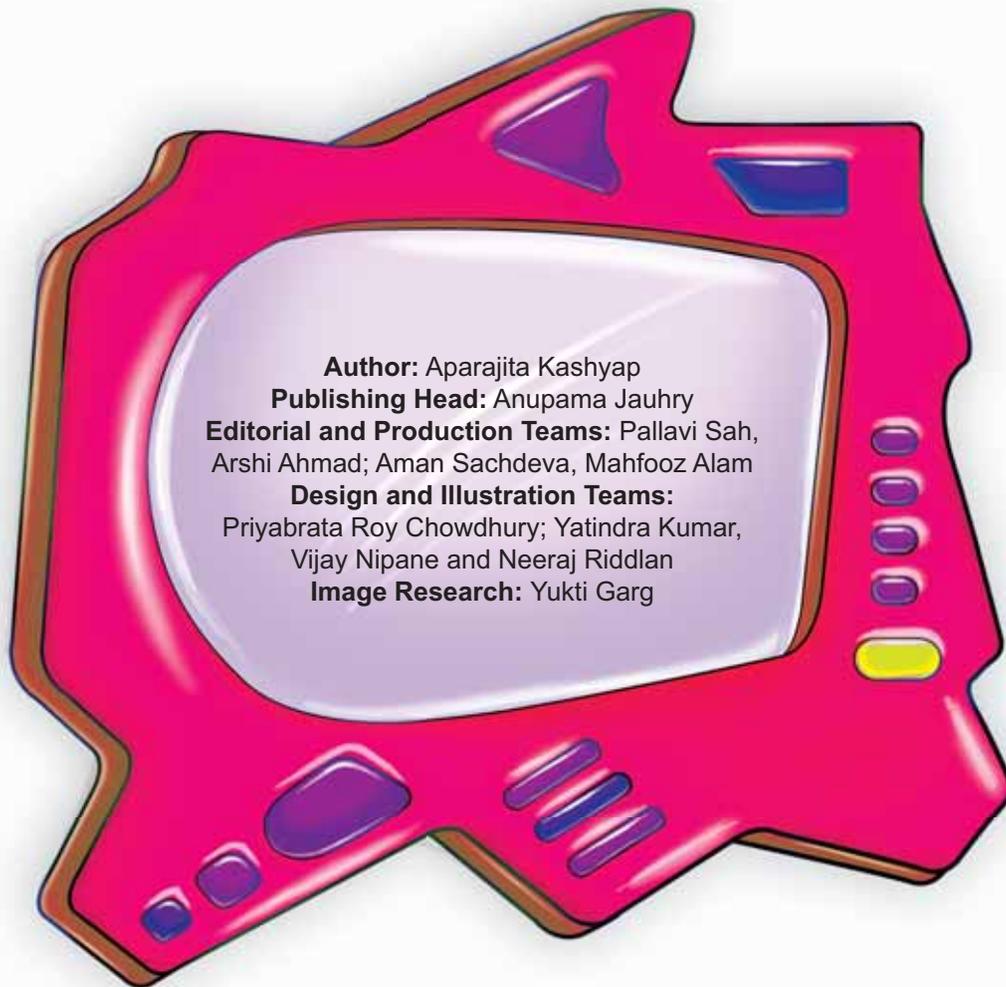
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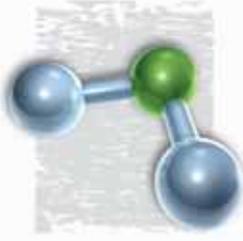
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The Energy and Resources Institute

## A note from Dr R K Pachauri

Human society has reached a stage of prosperity, which was not expected several decades ago. Yet, a large number of people live in poverty and are barely able to keep alive. It appears that they have not been touched by human progress at all. At the same time, what we regard as progress has resulted in damage and destruction of our natural resources and caused serious problems such as human-induced climate change, which threaten all forms of life in different parts of the world in the form of sea-level rise, heatwaves, floods, droughts, and melting of glaciers.

All of this provides a strong reason for us to re-examine what we have mistakenly believed as human progress and change the way we have been pursuing human activities. For instance, we must now use renewable sources of energy and eco-friendly methods of production and consumption, make efficient use of water in every activity, and protect biodiversity.

It is in the hands of the children to try to change their own lives towards greater protection of the environment and all our natural resources. They can also take active part in changing the thinking of adults. Children can take the lead in organizing actions, which support conservation of resources, recycling of waste water, and greater use of renewable sources of energy, at the community level.

This series of children's books is aimed at providing children with knowledge on what needs to be done in all these areas. I hope those who read these books will not only enjoy them greatly but also feel inspired to implement actions that are described in these pages, so that we create a beautiful, peaceful, and healthy future for the human race.



R K Pachauri

Director-General, TERI

Chairman, Intergovernmental Panel on Climate Change

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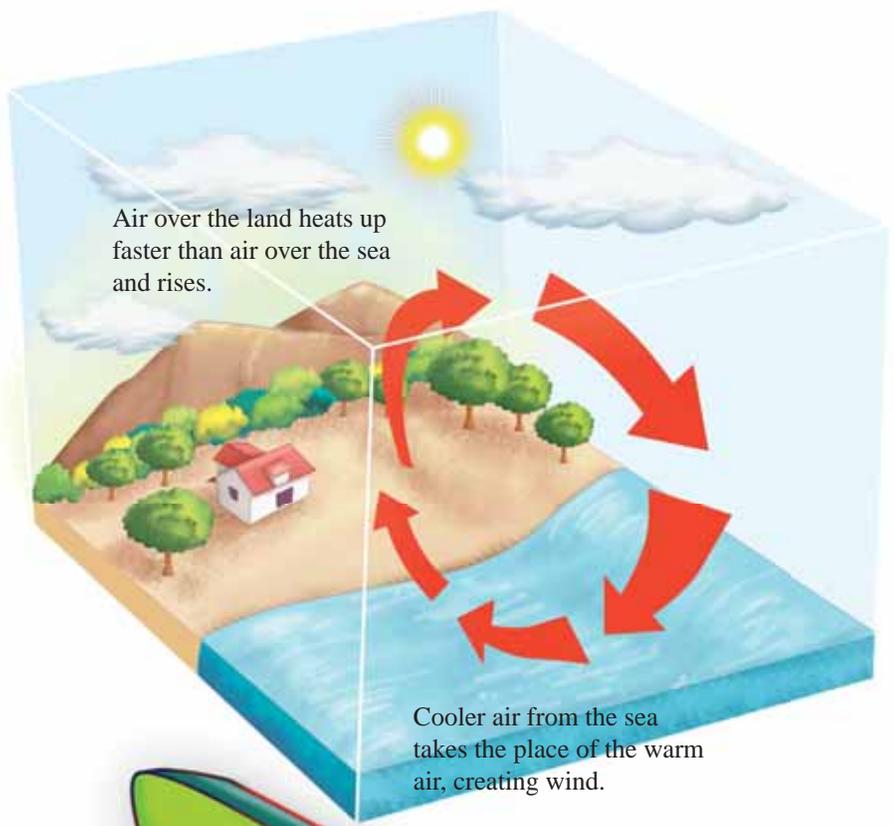
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## What causes wind?



The sun warms the air over land and water, but not equally. The air over land heats up faster, whereas the air over water takes longer. The warm air over the land, being light, rises and leaves behind a low-pressure area. Cool air from high-pressure areas, or places with more air, such as the sea rushes in to fill this space. This rush of air is called wind.



### Why is wind energy renewable?

If there were no sun to heat the air over land and water, there would be no wind! So, wind will continue to blow as long as the sun shines. Since we will not run out of wind, as we might of fossil fuels, wind is called a renewable source of energy.

2

## When was wind energy first used?

The force and energy of wind has been harnessed since ancient times. As early as 200 BC in China, simple windmills were being used to pump water. While in Persia and the Middle East, windmills were used for grain grinding. The first documented design of a windmill is also that of a Persian windmill.

# 3

This turned the windmill.

In a Persian windmill, the opening in the wall allowed wind to enter only from one side.



## How did the Dutch reclaim land from the sea?

Holland is a low-lying country. The Dutch have reclaimed land from the sea by building dykes. Once dykes are constructed, the land is drained using canals and pumps and is kept dry.

# 4



## Which country is well known for using wind energy?

Holland has been using wind energy since the fourteenth century. Windmills ground grain, pumped water, and later produced electricity. They also conveyed messages. Most windmills had canvas sails that could be turned to face the wind. By tilting the sails, the miller could send signals to people. He could tell them if it was time for celebration, mourning, and so on. During the Second World War, new codes warned of raids!

# 5



## Where in the world would you celebrate National Windmill Days?

Yes, you guessed it right! Holland celebrates National Windmill Days every year on 14 and 15 May. The windmills of Holland on those two days are decorated with blue ribbons and open their doors to visitors for free. Over 600 windmills fluttering a blue pennant each is quite a sight to behold!



### Which was the first windmill to be set up for electricity?

The first windmill for electricity production was set up in Cleveland, United States, in 1888. It was installed by Charles F Brush and was called the 'Giant Brush Windmill'. The turbine ran for twenty years and generated 12 kW of electricity with the help of its 17 m (diameter) rotor pales.

What is a wind farm?

8

A wind farm is a collection of several wind turbines. The first wind farm was built in 1980 by US Windpower on Crotched Mountain. It had twenty wind turbines that could produce thirty kilowatts of power each. The wind farm failed because of miscalculations in design as well as frequent mechanical faults.



9

Where is the largest wind farm?

In 2011, the Internet search giant Google invested \$100 million in the world's largest wind farm at Arlington, Oregon. Once completed, the Shepherds Flat Wind Farm will produce 845 MW of energy that is sufficient to power more than 235,000 households.



10

Which country is the largest producer of wind power?

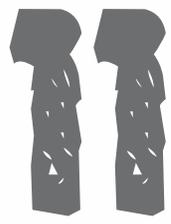
In 2010, China became the world's top-ranked nation in terms of total windpower capacity (44.7 MW). It was followed by the USA (40.18 MW), Germany (27.21 MW), Spain (20.67 MW), and India (13.06 MW). The highest shares of wind power were seen in Denmark (81 per cent), Portugal (18 per cent), and Spain (16 per cent).





### Which is the tallest windmill in the world?

The tallest windmill in the world is the De Noord windmill in Schiedam, Holland, which has a height of 33.3 metres. The blades of its fans are forty-four-and-a-half metres long. Imagine how small one would feel standing next to it!



### Does using wind energy actually make a big difference?

Coal, petrol, and diesel release harmful greenhouse gases when they are burned. A typical wind turbine provides sufficient power for 328 non-electric heating homes. All wind turbines installed worldwide, till the end of 2010, can produce enough electricity that is more than the total annual electricity demand of the United Kingdom.

# Green Genius's 101 Questions and Answers : Clean, Green Technology



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