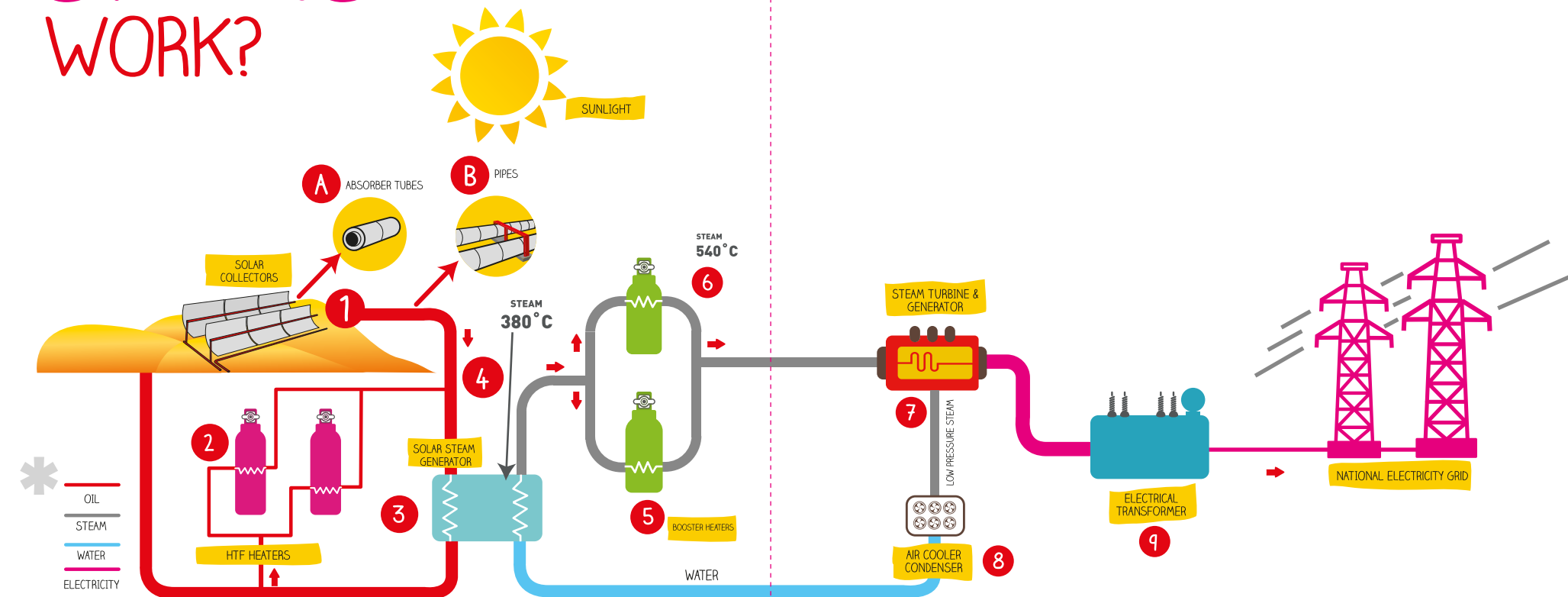
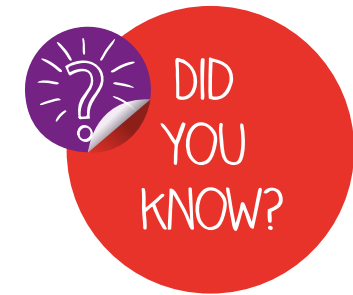


HOW DOES SHAMS 1 WORK?



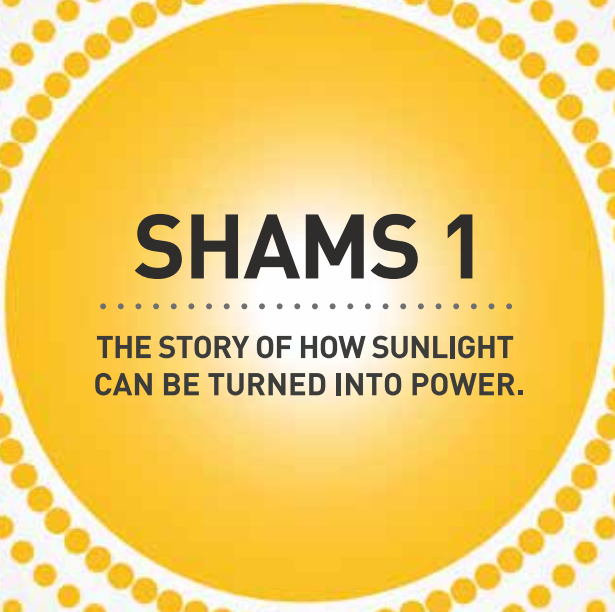
- 1 Rows of parabolic shaped mirrors concentrate solar radiation onto a central tube where a special oil is heated.
- A Specially engineered absorber tubes convert solar radiation to heat.
- B 130 km of closed loop pipes transport the Heat Transfer Fluid (a high performance thermal oil).
- 2 Heat Transfer Fluid (HTF) heaters provide the required thermal energy during cloud cover or low-solar radiation.
- 3 A heat exchanger transfers the heat from oil to water, creating high pressure steam that drives the steam turbine.
- 4 Steam at 380°C.
- 5 Purpose-built booster heaters enhance the efficiency of the steam turbine.
- 6 Steam at 540°C.
- 7 A 220-ton steam turbine, drives the 100 MW generator.
- 8 The air-cooled condenser reduces the temperature of the exhaust steam from the turbine. The condensed water is then returned to the heat exchanger.
- 9 The transformer changes the voltage of the electrical power from the generator so it flows into the main electrical cables of the UAE grid.



- The 5 main types of renewable energy are: Wind, Solar, Sea energy, Geothermal and Hydropower.
- 1 day of sunlight=27 years of worldwide electricity consumption.
- By 2050, solar energy could make up 11% of worldwide electricity production.
- Abu Dhabi is home to 8% of proven global crude oil reserves. The Abu Dhabi National Oil Company (ADNOC) is one of the 10 largest oil companies in the world.
- The sun is an amazing source of energy as it will keep shining for 5 billion years.

SHAMS 1 FACTS:

- Shams 1 is built over 2.5 km². That space is large enough to accommodate 285 football fields or 100 Sheikh Zayed Grand Mosques.
- Shams 1 produces 100 MW, enough to supply 20,000 UAE homes.
- Shams 1 will save 175,000 tons of CO₂ per year, equivalent to planting 1.5 million trees or taking 15,000 cars off the road.
- Shams 1 has 258,048 parabolic mirrors that can move to follow the sunlight.
- Shams 1 has 27,648 specially engineered absorber tubes to convert solar radiation to heat.
- Shams 1 has purpose built booster heaters that increase the steam temperature from 380 degrees Celsius to 540 degrees Celsius, enhancing the efficiency of the steam turbine.
- Shams 1 has a 220 tons steam turbine that drives the 100 MW generator.



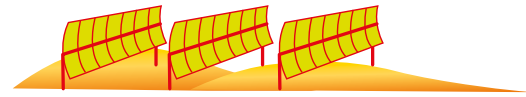


ABOUT SUNLIGHT

Sunlight travels through space, at 1,079,252.848 km/h and takes 8 min 19 sec to reach our planet. The sunlight makes us feel warm and gives us light during the day. In the UAE, we get a lot of direct sunlight. Lots of things affect how much sunlight reaches us on the ground, including clouds and dust in the air.

WHAT IS ENERGY?

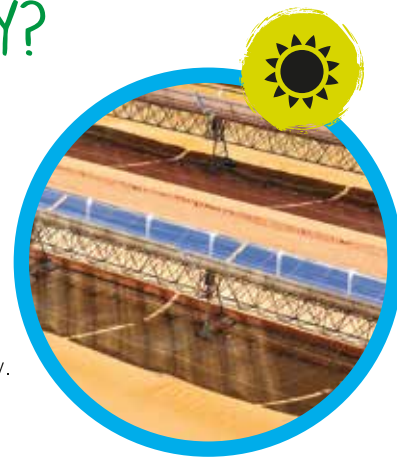
Energy comes in many forms, one of which is transmitted by the light. Electrical energy allows us to have light to see in the dark, to have heat to cook our food and to cool our homes. Today we also use energy to go from one place to another and run our computers, video games and internet. For a long time nearly all energy came from burning wood and coal. We began to get energy from burning oil 100 years ago.



HOW TO TURN SUNLIGHT INTO ENERGY?

Currently, the two main ways to turn sunlight into electrical energy are:

- Photovoltaic (PV) panels use computer chip like cells to generate electricity.
- Concentrating Solar Power (CSP) where the energy from the light is first transformed into heat (high temperature and high pressure steam). The steam then turns a turbine which is like a fan with many blades, which then generates electricity.



WHAT IS RENEWABLE ENERGY?

Have you ever felt hot in the sun? That feeling is caused by the sun's energy. Have you found it hard to walk along a windy street? That feeling of the wind blowing against your body is the wind's energy. Scientists figured out that this energy can be collected and used for lighting our homes or making our homes cool or warm.

Renewable energy never runs out. There will always be wind, sun, rivers and waves so we will always be able to get energy from them. Renewable energy is also more special because it is clean and does not hurt the environment.

WHY DO WE NEED RENEWABLE ENERGY?

Because coal and oil (fossil fuels) were so plentiful, people have used more and more of them. The problem is that the existing reserves of fossil fuels will eventually run out, since they cannot be renewed! With a growing world population, demand for energy is rising fast. Also, non-renewable energy sources are responsible for the greenhouse effect, causing global warming, which endangers our planet and future generations. Finding alternative energy sources, ideally from renewable sources, will decrease our dependency on fossil fuels, reduce our carbon footprint and help save our planet.



ABU DHABI 2030

Abu Dhabi has a long term vision of progress: the Abu Dhabi Economic vision 2030. This means that by 2030, Abu Dhabi's economy will be transformed to depend less on natural resources and more on innovation, knowledge and export of cutting-edge technologies. This transformation also emphasizes on renewable energy and sustainable technologies.

MAKING THE CHANGE

The way the world is thinking about energy is changing. Oil producers are being responsible by creating a balance between hydrocarbons and renewable energy. They understand it is crucial to show our environment the respect it deserves. The Abu Dhabi leadership aspires to be an international hub for renewable energy. Masdar was launched in 2006. It aims to be a global leader in commercially-viable clean energy, sustainable technologies and to secure the Emirate's continued leadership in the evolving global energy market.

"I'd put my money on the sun and solar energy. What a source of power! I hope we don't have to wait until oil and coal run out before we tackle that."

-Thomas Edison



HOW DID SHAMS 1 PROJECT START?

Masdar partnered with Total and Abengoa Solar to build Shams 1 Concentrated Solar Power plant.

Total is one of the largest integrated oil and gas companies in the world. Total is striving to diversify its supply to help meet growing energy demand in the long term. The Group, which holds a 20% stake in Shams Power Company and a 66% stake in SunPower, is a world leader in solar energy. Additionally, Total is actively engaged in a number of renewable R&D projects, such as solar and biomass.

Abengoa Solar is an international company that applies innovative technology solutions for sustainability in the energy and environment sectors, generating energy from the sun, producing biofuels, desalinating sea water and recycling industrial waste.



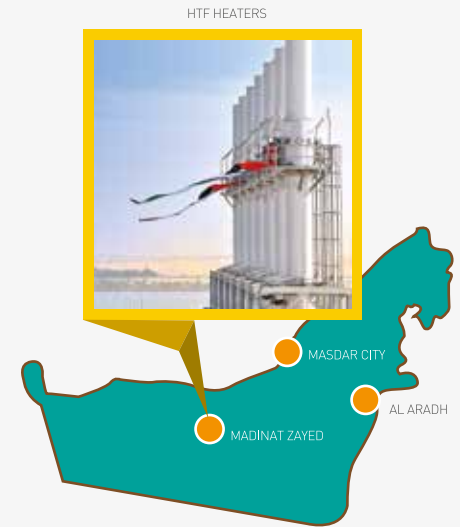
DID YOU KNOW?

Five millions cubic meters of sand were moved to level the desert to accommodate Shams 1. That is equivalent to 2 times the Cheops pyramids.

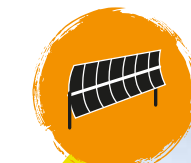
Shams 1 is one of the most efficient and largest CSP plants in the world. It is also the first of its kind in the Middle East and North Africa.

WHERE IS SHAMS 1?

Shams 1 is located in the Western Region of the Abu Dhabi Emirate, approximately 120 km southwest of Abu Dhabi and 6 km from the town of Madinat Zayed. This location was selected because it offers sufficient space, a high level of direct solar radiation and a close-by connection to an existing power grid infrastructure.



WHAT IS CONCENTRATING SOLAR POWER (CSP)?



CSP uses mirrors to aim lots of sunlight onto a tube. This makes the synthetic oil inside the tube heat up to 393 degrees Celsius. This oil then boils water and transforms it to steam. The steam then turns a turbine which generates electricity.