



Benha University

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Renewable Energy Systems



By



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Lecture (2)



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What about Renewable Energies?

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History of Renewable Energy

- Prior to the development of coal in the mid 19th century nearly all energy was renewable.
- By 1873, concerns of running out of coal promoted experiments using **Solar Energy**.
- Development of solar energies continued until the outbreak of the 1st world war.
- In the 1970 environmentalist promoted the development of renewable energy for replacement of oil and decreasing dependence on oil leading to the first electricity generating wind turbine.

Why is Renewable Energy needed?

- The world is dependent on fossil fuels for its energy supply. Currently, fossil fuels account for 80% of the world's energy consumption.
- Fossil fuels take millions of years to form and our reserves are depleting rapidly. This means that fossil fuels are non-renewable resources and society needs to find an alternative energy supply.

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- There are many reasons for the society to switch to renewable forms of energy:

1. **Fossil Fuels Are Limited**

2. **Renewable Energy is Better for the Environment**

Fossil fuels not only cause climate change, but also are damaging the environment through land, water and air pollution.

3. **Fossil Fuels Contribute to Climate Change**

burning fossil fuels releasing so much carbon dioxide into the earth's atmosphere causing severe weather problems.



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4. **Renewable Energy is the Future**

The non-renewable energy sources will run out and there won't be any other option. Renewable energy will never run out.

5. **Renewable Energy can be Self-Sufficient**

People does not have any control on their energy supply and they have no means of creating their own energy supply. With renewable energy systems, people can have complete control.



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6. **Economic Stability**

In many cases, energy produced from renewable sources is already cheaper than that produced by non-renewable means.

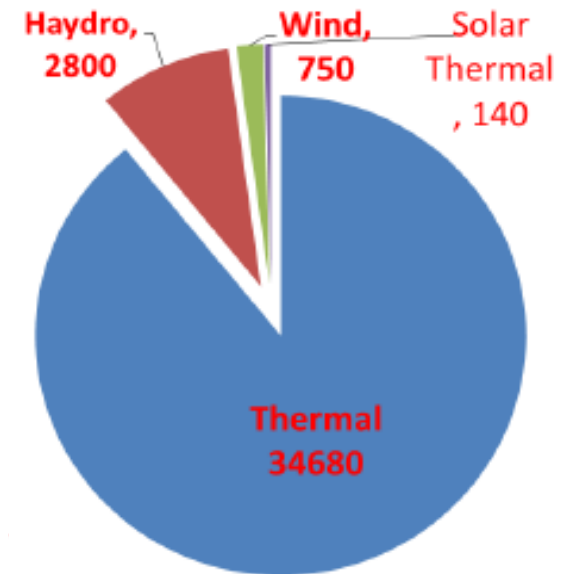
7. **Public Health**

Few renewables are entirely emission-free, but their output is much lower than conventional fossil fuel acquisition and processing.

Renewable Energy Current & Future in Egypt

- **Total installed capacity about 38 GW**

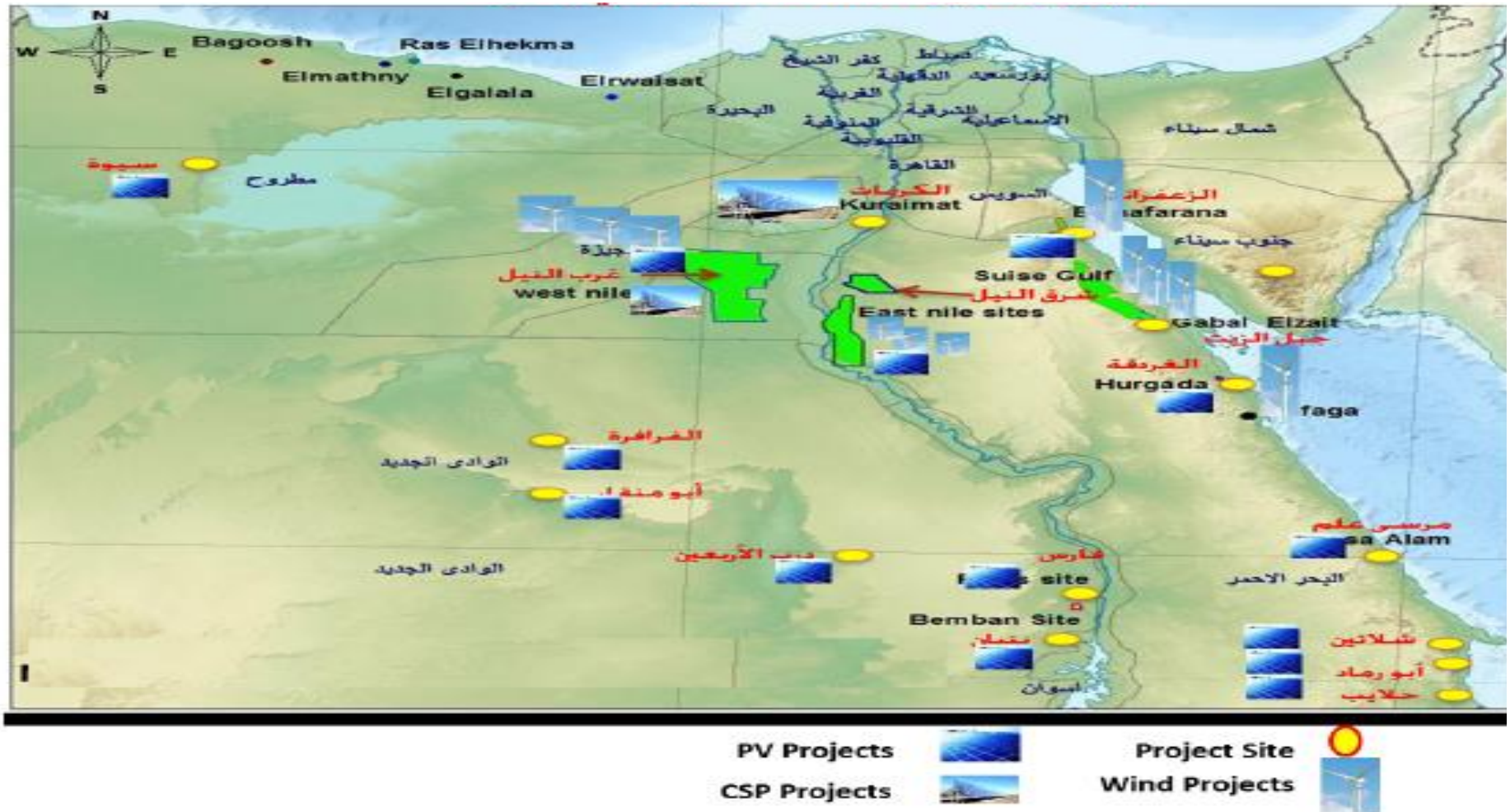
- **34.7 thermal,**
- **2.8 hydro,**
- **0.75 wind,**
- **0.14 CSP,**
- **0.03 PV**



- **Renewable Energy (Wind & solar) represent about 2.5% from the capacity & 0.8% from the electric energy.**

- **Targeting to reach 20% of the electricity generation by year 2022.**

Possible Sites for Renewable Energy projects in Egypt



Egyptian National Strategy up to 2022

The Egyptian National Strategy targets to reach 20% of the electricity generation by year 2022 as follows:

Renewable Energy Source	Capacity (MW)	Energy (TWh) & %
Wind	6810	30.6 (12%)
Solar	2879	2.2 (2%)
Hydro	2800	14 (6%)

What are The Renewable Energy Types?

- Renewables are by definition unlimited, but it is important to note that not all forms are environmentally friendly. So, we will look at some of the most common types of renewable energy and discuss their advantages and disadvantages.

Solar Energy



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What is the solar energy?

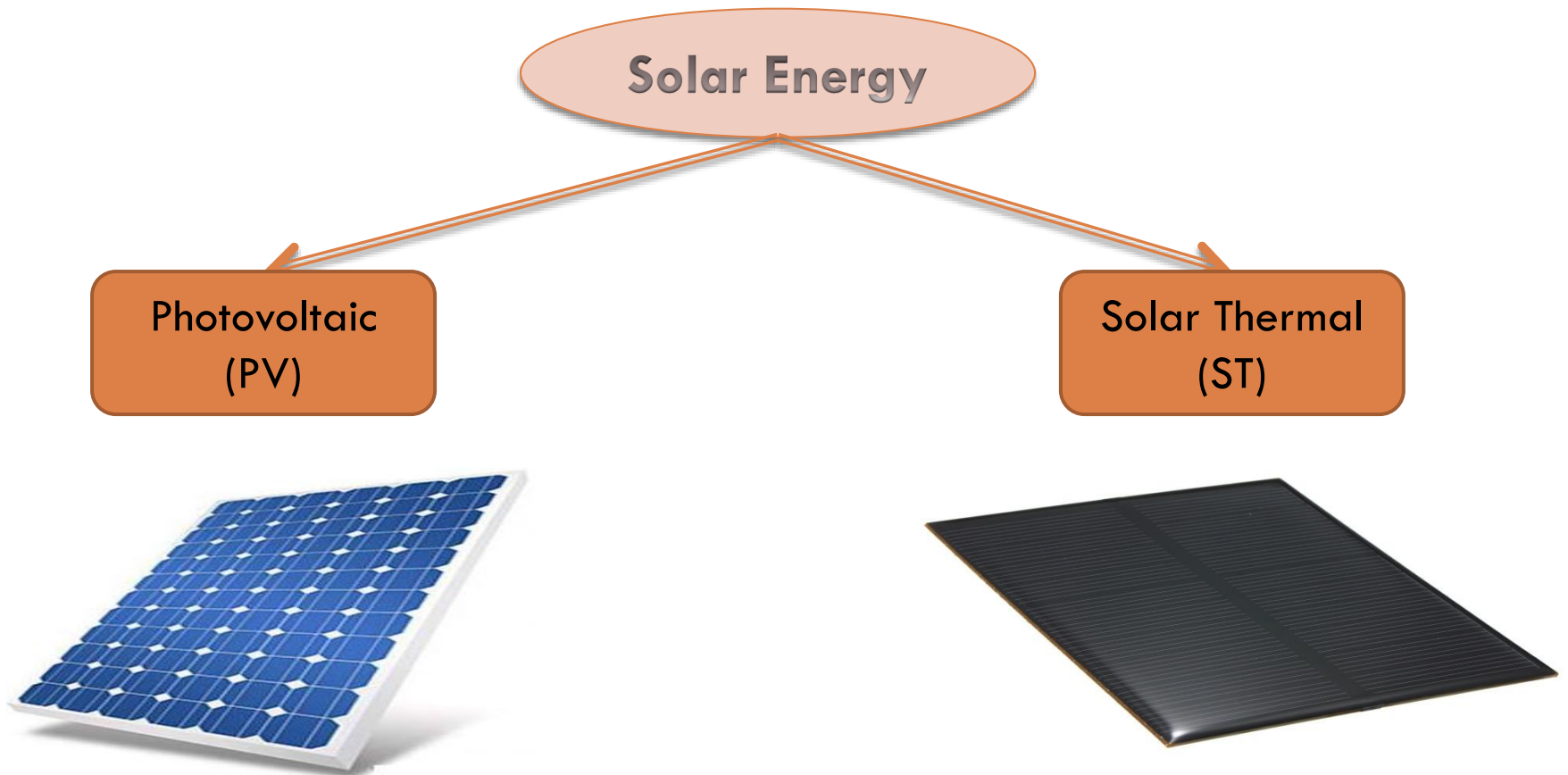
- Most renewable energy comes either directly or indirectly from the sun.
- Sunlight, or solar energy, can be used directly for heating and lighting homes and other buildings, for generating electricity, and for hot water heating, solar cooling, and a variety of commercial and industrial uses.



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- **There are two basic technologies of solar energy**



Photovoltaic (PV)

- These are the most common form and have always been, and now increasingly common on top of our homes, each cell converts the light of the sun into electrical energy, which can then be used to power electrical devices.
- Solar cell often made from semiconductors material such as silicon materials.

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Advantages of PV

1. During electricity generation with PV panels there is no harmful greenhouse gas emissions thus solar PV is environmentally friendly.
2. PV panels have no mechanically moving parts, except in cases of sun tracking mechanical bases.
3. PV panels are totally silent, producing no noise at all.
4. Photovoltaic panels produce electricity in a direct electricity generation way.
5. Operating and maintenance costs for PV panels are considered to be low compared to other renewable energies.

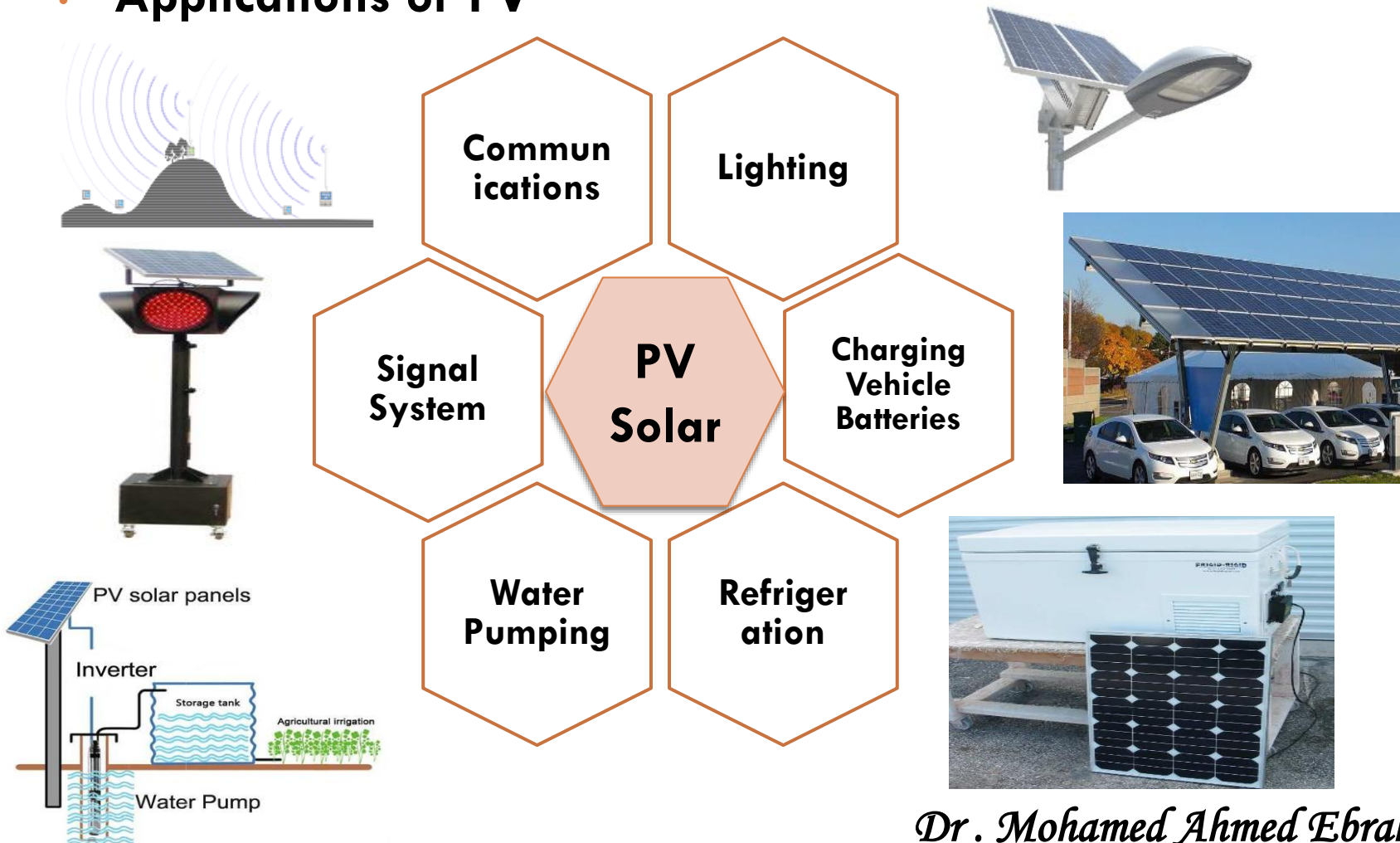
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Disadvantages of PV

1. Not shining at night but also during daytime there may be cloudy or rainy weather.
2. Solar energy panels require additional equipment i.e (inverters, chargers, and batteries).
3. They are fragile and can be damaged relatively easily.

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- **Applications of PV**



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How Solar Energy Work?

1. Photovoltaic (PV) cells convert sunlight to direct current (DC) electricity.
2. The inverter converts DC into alternating current (AC) electricity.
3. The electrical panel sends power to your lights and appliances.
4. The utility meter measures the energy you draw and feed back to the grid.

Activity

1. What are the expected Targets for 2020 Egyptian Plan ?
2. Can these be achieved?
3. What forms of renewable energy will deliver these targets?