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# CREATING THE FUTURE

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- *Architecture*
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Faculty of Architecture and Engineering

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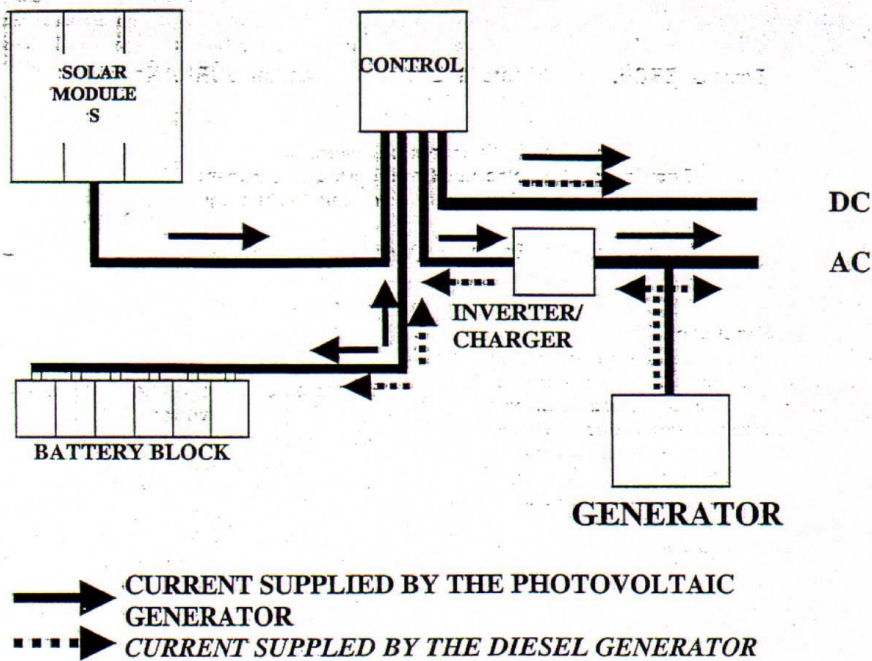


Fig. 1 Block Diagram of a typical PV System

**The Impact of Thermal Stations on the Environment**

During the 20<sup>th</sup> century, greatest developments in the history were recorded and population of the world increased dramatically. As a result, the use of fossil-based energy resources increased dramatically. The heavy use of these energy resources caused a dramatic impact on the environment where much of the forest was destroyed and environmental disasters were caused. The amount of CO<sub>2</sub> and other toxic gases accumulated through the years started to cause an effect known as global warming. Because of this global

warming, big ice masses in the North and South poles are melting down and as a result the sea level is increasing every year. This forms a potential danger to coast cities such as New York, London and Sydney. These cities are under more danger year after year. Electrical energy production is the major energy production in the planet and thermal power stations produce most of the energy demands. These stations have side effects, which can be listed as the following. These energies also produce and emit very toxic materials such as SOX and NOX gases

# RENEWABLE ENERGY RESOURCES and ENVIRONMENT

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## Introduction

The use of renewable energy sources is becoming more important every year. Because of the environmental problems encountered in the 20<sup>th</sup> century, scientist started to look for alternative forms of energy sources, which decrease the level of pollution caused by the traditional energy resources such as petrol. Main renewable energy resources can be classified as follows:

- Hydro-electric Power Stations
- Wind Turbines
- Photovoltaic Systems
- Hydrogen Fuel Cells
- Biomass
- Geo-thermal Power Stations

All of the renewable energy resources listed above are environmentally friendly and there are no pollutants emitted to the environment. Fuel, coal and similar fossil based energy resources are limited resources and the level of pollution caused by them in the 20<sup>th</sup> century is catastrophic. Therefore it is very important to start considering other energy resources which will replace the traditional energy resources. When considering alternative energy resources, most important point is the protection of the environment.

Considering North Cyprus, some of the above renewable energy resources are not applicable. Solar energy applications are more advantages than other sources since Cyprus has a very good solar radiation. North Cyprus has a relatively clean environment due to the absence of heavy industries and this forms a good tourism potential to tourists from polluted countries where a clean environment is always desired.

In order to keep our relatively clean environment, it is necessary to replace the power stations with solar energy systems such as photovoltaic systems. It is also possible to utilize wind energy potential at a lesser extend.

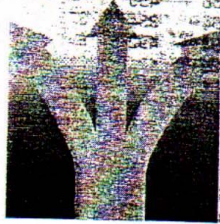
## Examples of photovoltaic systems in the world:

- Germany: There are about 30,000 photovoltaic systems
- Netherlands: There are about 3,000 houses with PV systems and this number is expected to reach 100,000 by 2010, and 500,000 by 2020
- Greece: A photovoltaic power station will be completed in 2005 where electrical energy needs of 100,000 people will be supplied.
- Japan: There are a total of 400 MW Photovoltaic systems consisting of 70,000 houses. 4600MW system expected to be reached by 2010.
- Australia: 15,000 capacities Olympic village for the 2000 Sydney Olympics was supplied by PV systems. PV systems were also extensively used in the lighting of stadiums and other sport grounds. It should be noted that the most important reason for deciding Sydney to host the Olympics was the extensive use of renewable energy sources at the Olympic site.

## How PV systems work

Photovoltaic is the conversion of sunlight into electrical energy with the use of solar cells. Photovoltaic (PV) modules can be produced from different materials where single-crystal silicon is used the most. PV cells are usually square or circle shaped thin water enclosed in protective materials. when the sunlight hit the surface of the PV modules, electrons in the silicon atoms will be made free to move. This effect is known as the PV effect. With the use of other PV system elements a DC current is produced by the PV systems.

CO<sub>2</sub> NO<sub>x</sub> SO<sub>x</sub>



3. The increased level of acids in the ground

- Global warming
- Acid rains
- Damage in the Ozone layers
- Damages on the human health
- Damages on vegetation

1. Almost half of half of the Ozone layer loss in the stratosphere is caused by direct activities involving NO<sub>x</sub> gases. The dangers in the Ozone layer caused a greater amount of UV lights to enter through the atmosphere. This is causing the number of skin and related cancer diseases to increase. The damage in the Ozone layer is also affecting the spread of solar radiation around the world, which means dramatic changes in the climates.
2. SO<sub>x</sub> and NO<sub>x</sub> gases affect the respiration on the plants leaves and reduce the photosynthesis effect. If plants are subjected to these gases for a long time, their growing up processes will be affected and the effect known as 'Acid Rains' will happen.

causes the wash away of nutrients in the soil into the underground waters and this in turn causes irregularities in the growing of plants. These irregularities affect the parts of the plants in various ways such as lost of leaves, which decreases their protection against fogs and insects.

4. The increased level of acids in the lakes and rivers cause a great damage to the water life. In the last 20 years, much of the water life in Norway and Sweden deceased because of acid rains
5. Acid compounds form because of the burning petroleum product that cause damages on the historical building and monuments

Table 1 World Carbon Dioxide Emissions by Region, Reference Case, 1990-2020 (Million Metric Tons Carbon Equivalent)

REGION/COUNTRY	1990	1998	1999	2005	2010	2015	2020	Avg. Annual Chng, 1999-2020
<b>Industrialized Countries</b>								
<b>North America</b>								
United States a	1,556	1,742	1,761	1,972	2,119	2,271	2,423	1.5
Canada	1,345	1,495	1,511	1,690	1,809	1,928	2,041	1.4
Mexico	126	146	150	158	165	173	180	0.9
<b>Western Europe</b>	84	101	101	124	145	170	203	3.4
United Kingdom	930	947	940	1,005	1,040	1,076	1,123	0.9
France	164	154	151	168	177	184	192	1.1
Germany	102	110	109	116	120	126	135	1.0
Italy	271	237	230	246	252	258	267	0.7
Netherlands	112	122	121	131	137	141	146	0.9
Other Western Europe	58	66	64	66	67	69	71	0.4
<b>Industrialized Asia</b>	223	260	264	277	287	297	313	0.8
Japan	357	412	422	447	461	479	497	0.8
Australasia	269	300	307	324	330	342	353	0.7
<b>Total Industrialized EE/FSU</b>	88	112	115	123	130	137	144	1.1
Former Soviet Union	2,842	3,101	3,122	3,425	3,619	3,825	4,043	1.2
Eastern Europe	1,036	599	607	665	712	795	857	1.7
<b>Total EE/FSU</b>	301	217	203	221	227	233	237	0.8
<b>Developing Countries</b>	1,337	816	810	886	940	1,028	1,094	1.4
<b>Developing Asia</b>								
China	1,053	1,435	1,361	1,751	2,137	2,563	3,013	3.9
India	617	765	669	889	1,131	1,398	1,683	4.5
	153	231	242	300	351	411	475	3.3

South Korea	61	101	107	128	144	159	175	2.4
Other Asia	223	338	343	434	511	595	679	3.3
Middle East	231	325	330	378	451	531	627	3.1
Turkey	35	50	50	57	66	75	85	2.6
Other Middle East	196	275	280	320	386	456	542	3.2
Africa	179	215	218	262	294	334	373	2.6
Central and South America	178	246	249	312	394	492	611	4.4
Brazil	62	87	88	108	139	171	212	4.3
Other Central/South America	116	159	162	204	255	321	399	4.4
Total Developing	1,641	2,222	2,158	2,703	3,276	3,920	4,624	3.7
Total World	5,821	6,139	6,091	7,015	7,835	8,773	9,762	2.3
Annex I								
Industrialized	2,758	3,001	3,022	3,301	3,475	3,656	3,841	1.1
EE/FSU	1,132	704	700	761	802	876	930	1.4
Total Annex I	3,890	3,704	3,722	4,062	4,276	4,531	4,771	1.2

a Includes the 50 States and the District of Columbia. U.S. Territories are included in Australasia.

Notes: EE/FSU = Eastern Europe/Former Soviet Union. The U.S. numbers include carbon dioxide emissions attributable to renewable energy sources. Sources: History: Energy Information Administration (EIA), International Energy Annual 1999, DOE/EIA-0219(99) (Washington, DC, January 2001). Projections: EIA, Annual Energy Outlook 2001, DOE/EIA-0383(2001) (Washington, DC, December 2000).

### Economic feasibility of Renewable energy Resources

The importance of renewable energy resources in the supply of world energy demand is increasing every year. It is expected that renewable energy resources will supply 50% of the world energy demand. The decrease in prices of PV and wind energy systems will play a very important role in this. Fig. 2 shows the electricity production prices of renewable energy resources through the years.

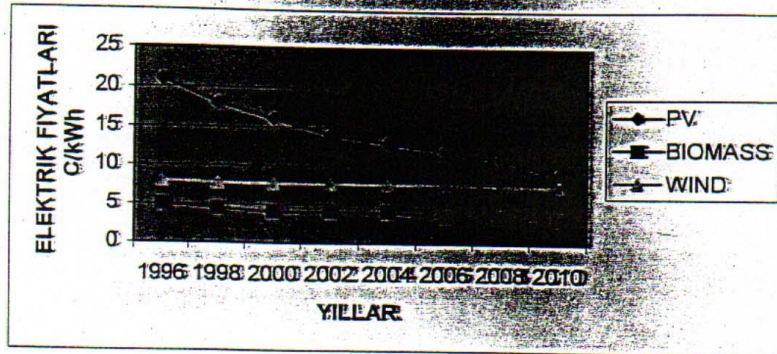


Fig.2 Decreasing prices of main renewable energy resources.

### Renewable Energy Resources and Environment

Renewable energy resources produce clean energy where no pollutants are emitted to the environment. This makes them the most suitable energy resources for a clean environment. Although there are no heavy industries in North Cyprus, the effects of small-scale industries on the environment should be considered.

The biggest industrial site in North Cyprus is the technical power station and its negative impact on the environment should be immediately considered now and solutions should be found to decrease the level of pollution in the area. In the near future the use of renewable energy systems should be encouraged.