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FCCI

Research & Development Center

Worldwide Electricity Production

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Worldwide Electricity Production

- **Total Worldwide Electricity Production is 27,044 TWh as shown in Figure 1**
  - 36.7% Coal
  - 23.5% Gas
  - 16.0% Hydro
  - 10.3% Nuclear
  - 8.2% Solar, Wind Geothermal & Tidal
  - 2.8% Oil
  - 2.6 % Other

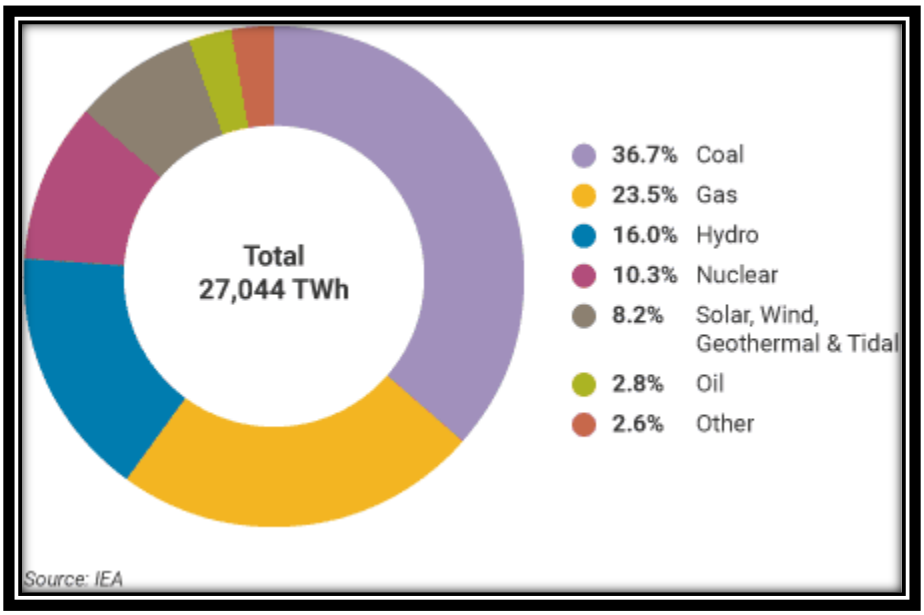

Figure 1 Worldwide Electricity Production

Top 10 Countries

- **Top 10 Countries electricity Production as shown in Figure 2**
  - Australia 2%
  - Spain 1%
  - France 2%
  - United Kingdom 3%
  - India 5%
  - Italy 5%
  - Germany 10%
  - Japan 12%
  - United States 13%
  - China 33%
  - Rest of the world 14%

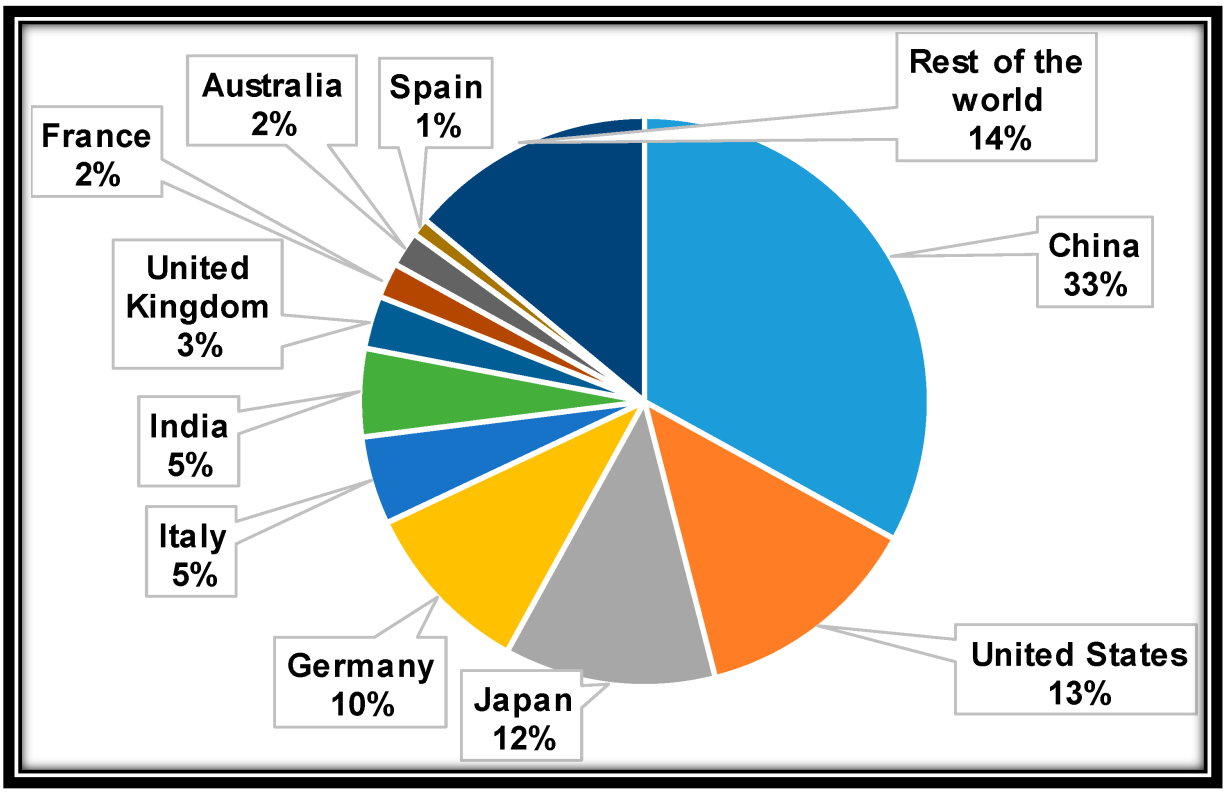

Figure 2 Top 10 Countries

Table 1

Country	Installed capacity, megawatts	Watts* per capita	% of world total
China	254,355	147	35.6%
U.S.	75,572	231	10.6%
Japan	67,000	498	9.4%
Germany	53,783	593	7.5%
India	39,211	32	5.5%
Italy	21,600	345	3.0%
Australia	17,627	637	2.5%
Vietnam	16,504	60	2.3%
South Korea	14,575	217	2.0%
Spain	14,089	186	2.0%
World total	**713,970**	**83**	**100.0%**
Pakistan	737	6	0.1%

Table 2 Adv/Dis Adv of Solar Energy

Advantages of Solar Energy	Disadvantages of Solar Energy
Renewable Energy Source	Cost
Reduces Electricity Bills	Weather Dependent
Diverse Applications	Solar Energy Storage is Expensive
Low Maintenance Costs	Uses a Lot of Space
Technology Development	Associated with Pollution

What is the average increase in global energy demand?

Global energy consumption continues to grow, but it does seem to be slowing – averaging around **1% to 2% per year**.

Net Electricity Consumption Worldwide in select Years from 1980 to 2019

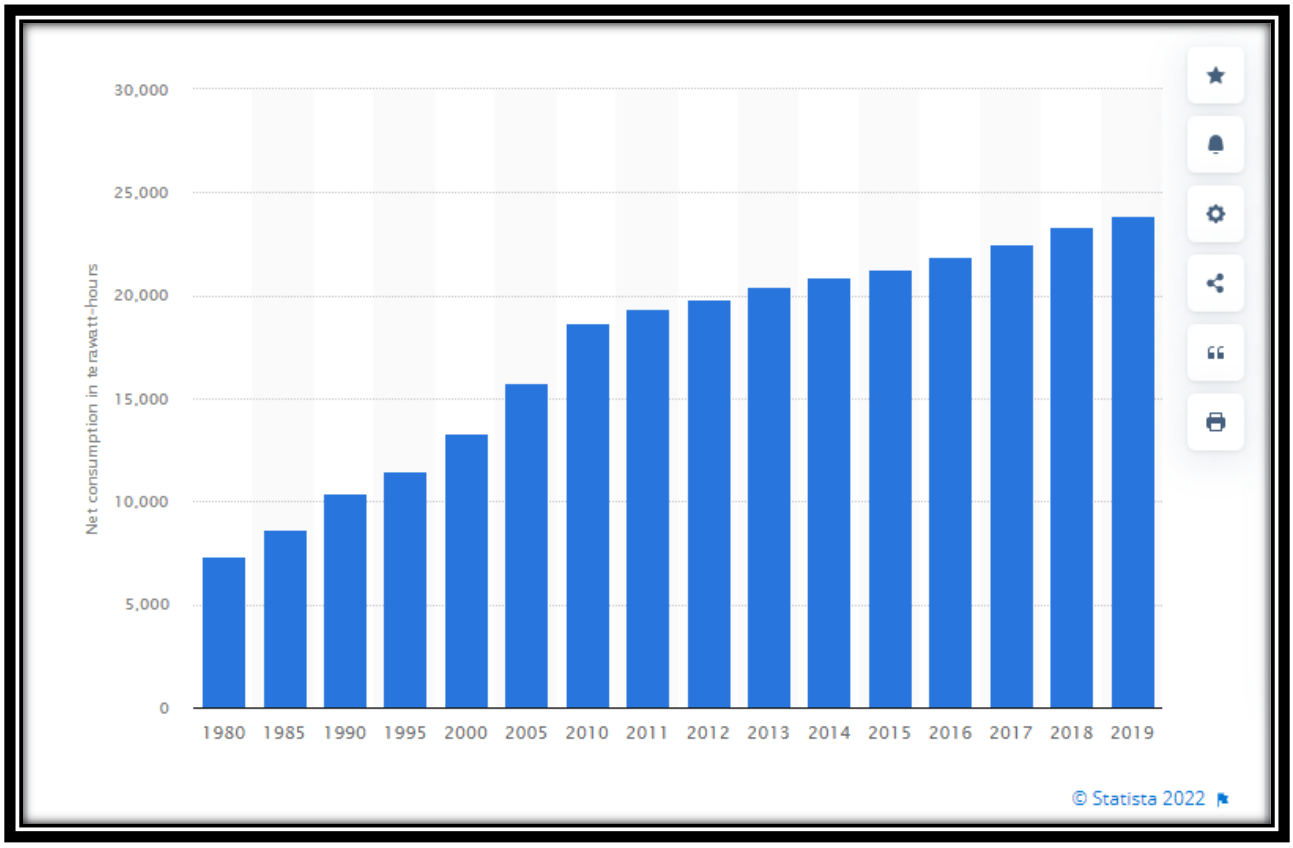

Table 3 Net Electricity Consumption Worldwide in select Years from 1980 to 2019

Upcoming Change in Solar Technology

- The trend of utilizing solar power will continue toward incorporating solar panels placed upon the **roof of many buildings.**
- Innovations in terms of solar energy or power will be coming including the solar **orb, solar cars, solar balloons, nanowires**, and working with the infrared spectrum.
- The average solar panel is around **15% to 21% effective**. Much research is still being carried out to raise these figures considerably.
- More investment and funding in the solar industry reduces barriers to entry, which increases competition and drives down prices.
- The goal is to make solar energy as **efficient and affordable as fossil fuels**.

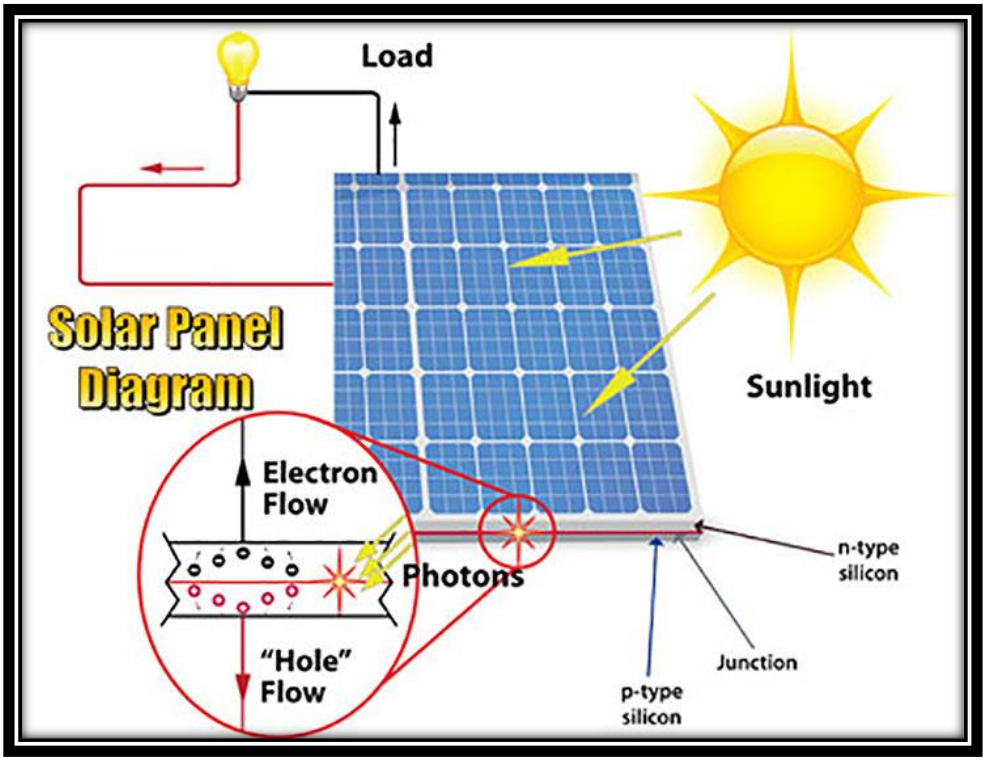

Figure 3 Solar Cells

Renewable Energy in Pakistan

- **Renewable Energy in Pakistan as shown in Figure 5**
  - Solar 1%
  - Wind 3.98%
  - Bagasse 1%
  - Nuclear 3.98%
  - Imported Coal 7.97%
  - Local Coal 0.4 %
  - RLNG (Regasified Liquefied Natural Gas) 21.91%
  - Oil 17.93%
  - Gas 12.95%
  - Hydro 28.88%

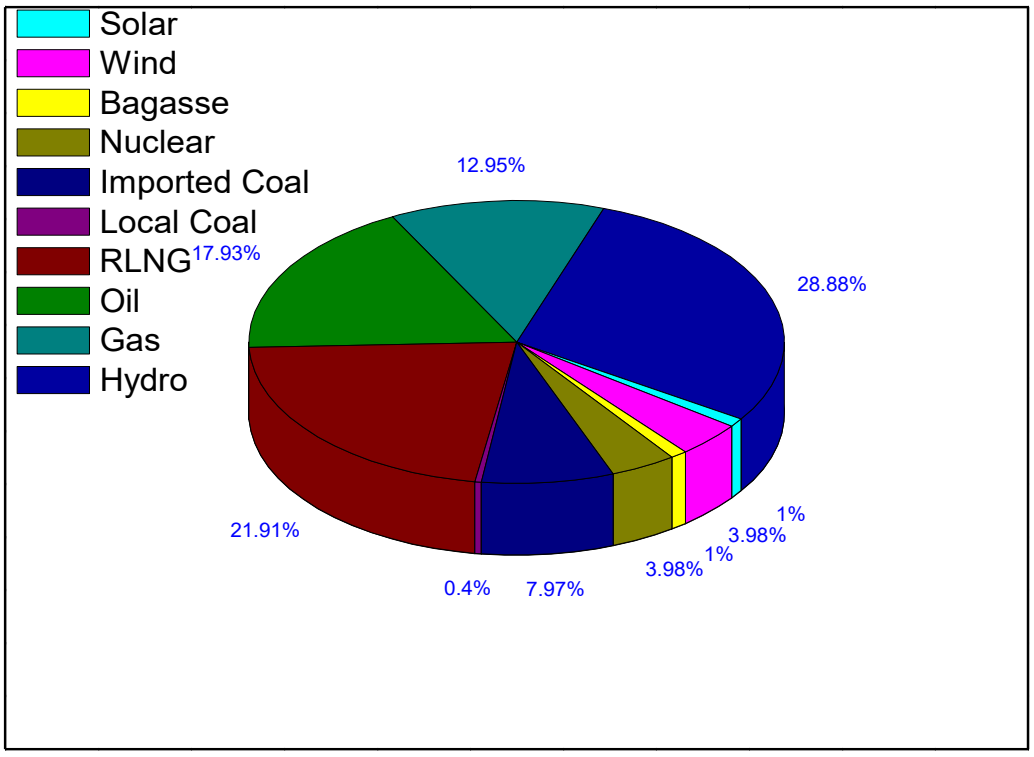

Figure 4 Renewable Energy in Pakistan

11-05-2022

Floating solar project: World Bank invites Pakistan to hold talks on $341.5m loan

Figure 5

ISLAMABAD: The World Bank (WB) has invited Pakistani authorities for negotiation of $341.5 million loan to set up 300-MW floating solar project at Tarbela - Ghazi Barotha complex, official sources told *Business Recorder*.

The cost of the Project is $346-5 million, of which $341.5 is proposed for financing by the World Bank and $5 million will be financed by WAPDA, as the Project Implementing Entity.

World Bank, Wapda holding talks on setting up of 300MW floating solar project

As part of the negotiations, the following documents will be discussed:

(i) Draft Project Appraisal Document (PAD)
(ii) Draft IBRD Loan Agreement.
(iii) Draft IDA Financing Agreement.
(iv) Draft Project Agreement
(v) Draft Disbursement and Financial Information Letters (DFILS), Interim Financial Reports (IFR) and Environment templates.
(vi) Social Commitment Plan (ESCP); and
(vii) Procurement Plan.

- The project **will not acquire land**, and **FSPs will be deployed** in the built-up areas of the Complex.
- Environmental impacts are **minimal, localized, and manageable or reversible**.
- The Bank maintains that investments for **power generation in hydropower, solar PV, and wind,** as well as, in transmission infrastructure in Pakistan are often considerably delayed due to difficulty in acquiring privately-owned land.
- Land acquisition in Pakistan is **expensive and complicated.**
- The **reservoirs, ponds, and canals** used for publicly owned hydropower and irrigation infrastructure are therefore, great sites for development of solar generation.

- The **additional cost of floating systems** can be equivalent to savings in cost and delays in land acquisition. Solar panels also operate more efficiently on water bodies.

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