INTEGRATION OF RENEWABLE ENERGY INTO FOSSIL FUEL – AN OVERVIEW

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ABSTRACT

In The GRAND TRANSITION, Disrupetive Trends Are Emerging That Will Create Fundamentally New World For The Energy Industry characterised By High Energy Demand Mainly Satisfied By Fossil Fuels,Created By New Technologies,Greater Envirnmental Challenges And More Stringent Energy Policies . Present Energy Scenario In India As Well As Whole World Is Looking For Alternative Sources Of Energy. that Must Give An Edge To The World In The Concern Areas Presently The World Is Facing.Meeting This Demand With Cleaner Energy Sources Will Require Substantial Infrastructure Investments And Systems Integration To Deliver Benefits To All Consumers.with an Efficient System Meeting Stringent Norms .Use or Integration of renewable energy will result in saving natural resources reducing emission,saving money & providing energy security to the country with contribution of the range of 30 % total installed capacity

Keywords : Alternative Energy Sorces; Present Energy Concerns

1.INTRODUCTION

In The Existing Environment,Options In The Form Of Renewable Energy Can Be Utilized Which Is Having Capability As Well As Potential To Meet The Need Of The Hour. Alternatives Must Give An Option For Reduced Pollution,Cater with The Depleting Natural Resources And Higher Demand For Energy.Renewable energy technologies can be divided into two categories: dispatchable (i.e. biomass, concentrated solar power with storage, geothermal power and hydro) and non-dispatchable, also known as Variable Renewable Energy or VRE (i.e. ocean power, solar photovoltaics and wind). VRE has four characteristics that require specific measures to integrate these technologies into current power systems: 1) variability due to the temporal availability of resources; 2) uncertainty due to unexpected changes in resource availability; 3) location-specific properties due to the geographical availability of resources; and 4) low marginal costs since the resources are freely available.

THE PHENOMENAL RISE OF SOLAR AND WIND ENERGY WILL CONTINUE AT AN UNPRECEDENTED RATE AND CREATE BOTH NEW OPPORTUNITIES AND CHALLENGES FOR ENERGY SYSTEMS

Renewable Sources Promote Greener Energy,Reduced Reliance On Coventional Energy Sources And Most Importantly Reduced C02 Emmissions.In All The Available Alternate Options,Wind Energy Is Considered To Be The Largest Growing Followed By Solar Energy.

WIND energy growth figures can be seen in fig 1(a) by 2015

New Installed capacity of WIND by country in 2015 (M

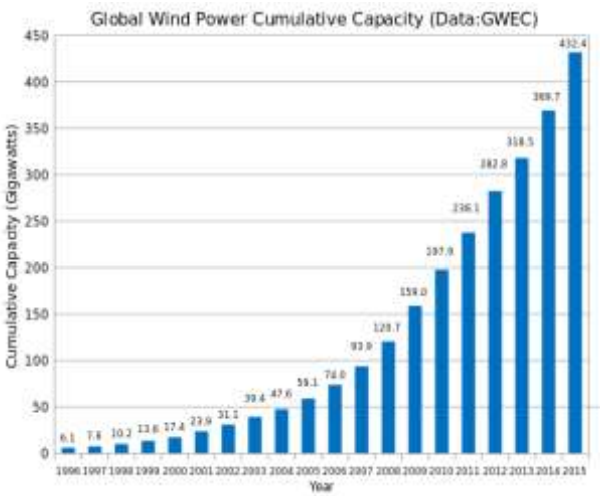
China: 30,753 MW (48.5%)

United States: 8,598 MW (13.5%)

Germany: 6,013 MW (9.5%)

Brazil: 2,754 MW (4.3%)

India: 2,623 MW (4.1%)



1.(a)

2.SOLAR AND WIND ENERGY

Solar and wind energy account for only 4% of power generation in 2014, but by 2060 it will account for 20% to 39% of power generation supported by battery innovation, and grid integration .For both resources (solar and wind), the largest additions will be seen in China, India, Europe, and North America. There are several technological options that can help to integrate VRE into the power system grid: system-friendly VREs, flexible generation, grid extension, smart grid technologies, and storage technologies. Smart grid technologies can act as an enabler for VRE integration, given their ability to reduce the variability in the system by allowing the integration of renewables into diverse electricity resources, including load control (e.g. Demand Side Management (DSM), Advanced Metering Infrastructure (AMI), and enhancing the grid operation and therefore helping to efficiently manage the system's variability by implementing advanced technologies (e.g. smart inverters, Phasor Measurement Unit (PMU) and Fault Ride Through (FRT) capabilities). Energy storage technologies can alleviate short-term variability .

INDIA is provided with huge soalr potential due to its geagraphical advantage .NTPC has drafted its business plan of capacity addition of about 1,000 MW through renewable resources by 2017. In this endeavour, NTPC has already commissioned 310 MW Solar PV Projects. integration of its thermal power plant with solar energy would help to fulfill its vision and would also help in surviving the competitive market with higher efficiency , decreased heat rate and with environmental norms becoming stringent solar hybrid plant will emerge as a solution.

3.INTEGRATION OF ALTERNATIVES

LIMITING GLOBAL WARMING to no more than a 2°C increase will require an exceptional and enduring effort, far beyond already pledged commitments, and with very high carbon prices. The integration of a significant amount of variable renewables into power grids requires substantial transformations to increase the flexibility of the existing grids: a) to allow electricity flow, not only from centralised power plants to users, but also from small users/producers to the grid, which is aimed to ensure grid stability when installing distributed generation; b) to establish intelligent grid and demand management mechanisms aimed at increasing flexibility and responsiveness and reducing peak-loads in order to deal with increased variability; c) to improve grid interconnection at the regional and international level aimed at increasing balancing capabilities, flexibility, stability and security of supply; and d) to introduce energy storage capacity to store electricity (energy) from variable renewables generation when production exceeds demand.

Renewables Integration into Power Grids – The integration of a significant share of variable renewables into power grids requires a substantial transformation of the existing networks .

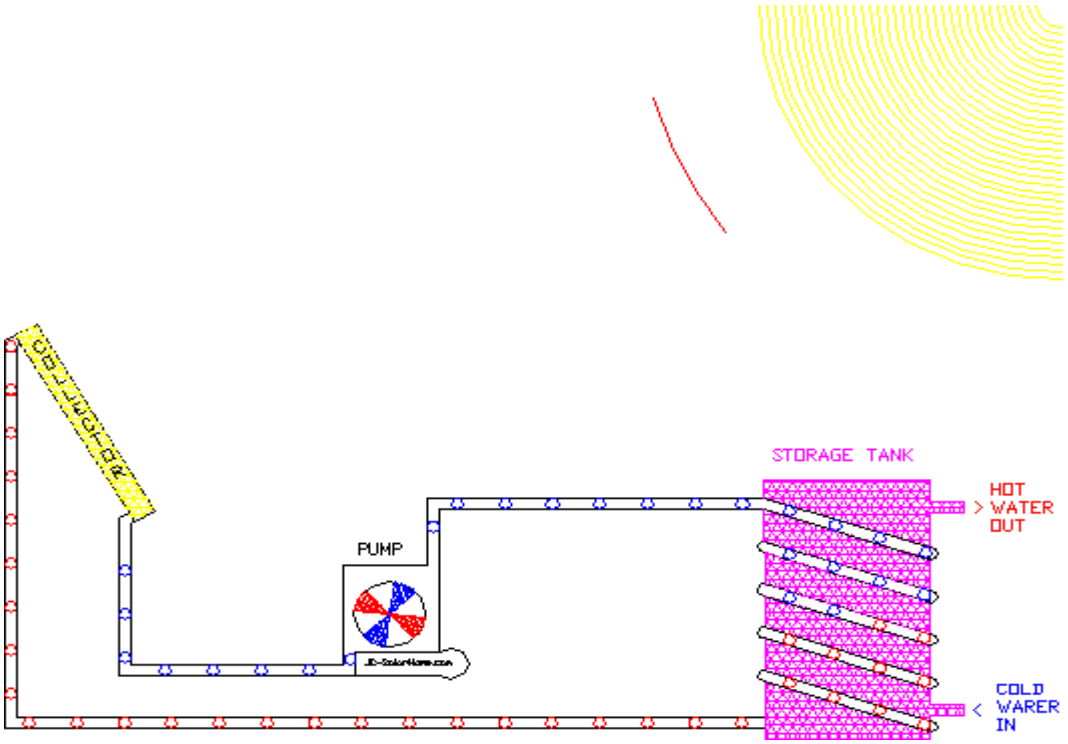
There are following options to utilize the energy of the solar power like

Using the PV technology colony, auxiliary etc.

Solar heat to power the conventional steam power cycle

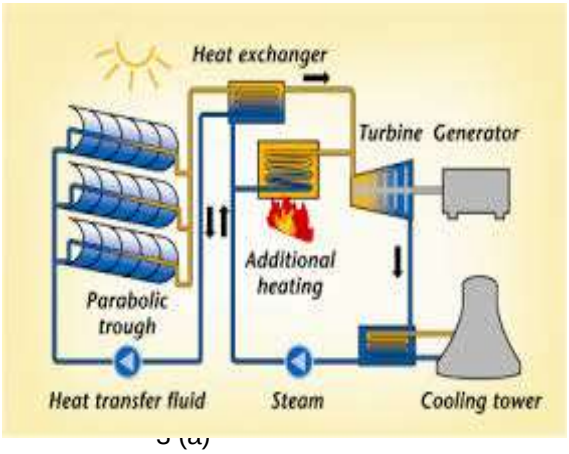
Using low grade power cycle like kalina cycle

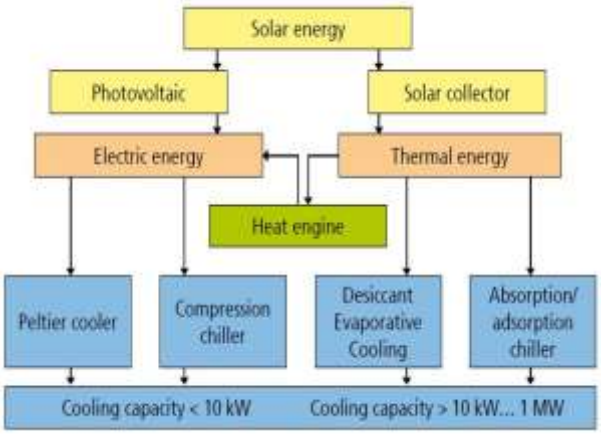
Solar energy process is shown in animation in fig 2 (a)



2 (a)

Solar energy application can be viewed in various ways like heating fig 3 (a) or cooling applications (as shown in fig 3 (b)) in a industry. Energy harness from sun can be applied to feed water heating in a power plant and hence integration with the fossil fuels or same can be used to generate steam for some auxillary in same industry





The power of the wind is proportional to

The cube of wind speed (proportional to tower height)

Size of the rotor (swept area)

The air density (affected by temperature, location)

wind power integration into the grid consideres to be a big challenge with the requirements arising in form of -

VARIABLE AND INTERMITTENT OUTPUT

VERY LITTLE CONTROLLABILITY

NEED FOR ENERGY BALANCE

CAPABILITIES SIMILAR TO SYNCHRONOUS MACHINES NEEDED

ABILITY TO RESPOND VOLTAGE & FREQUENCY VARIATIONS

CONCLUSION

WITH NEW TECHNOLOGIES AND CONTROL PHILOSOPHIES,MAJOR CONTRIBUTION OF RENEWABLE SOURCES CANNOT BE DENIED IN TOTAL POWER GENERATION.

Region	% RE (2012) %	RE (REmap 2030)
OECD Americas (excl. USA)	49	66
USA	17	49
Latin America (non-OECD)	62	80
European Union	38	55
Eastern Europe (excl. EU, incl. Russia/Turkey)	25	41
OECD Asia	21	53
China	28	42
India	28	57
Non-OECD Asia (excl. China/India)	22	43
Middle East	5	41
Africa	16	36

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