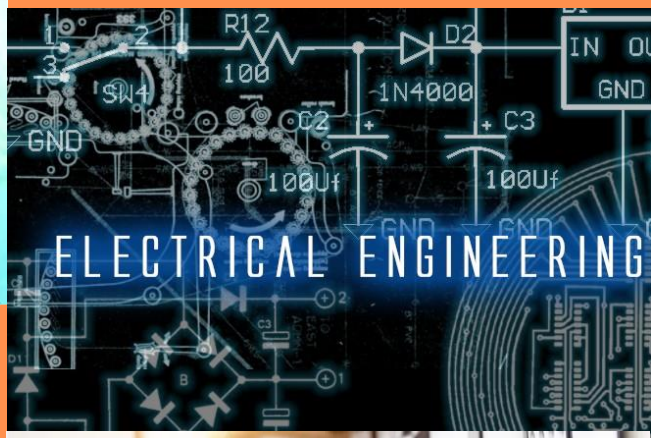
ANAND INSTITUTE OF HIGHER TECHNOLOGY

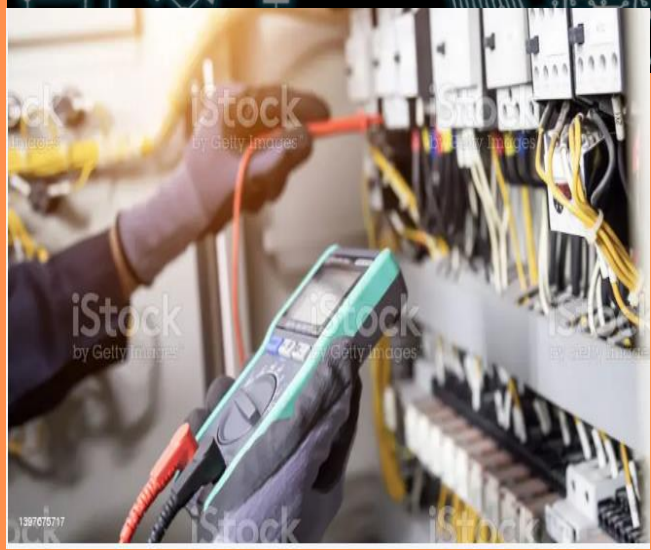
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

ACADEMIC YEAR 2018-2019

Tech-EEE

Empower students to achieve academic Excellence and Innovation.





TECH-EEE

WHERE GREAT MINDS SHARE AND GROW

Knowledge is Power

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A reader lives a thousand lives before he dies . . . The man who never reads lives only one.

George R.R. Martin

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Solar Energy

INTRODUCTION

Solar power is the conversion of energy from sunlight into electricity, either directly using photovoltaics (PV), indirectly using concentrated solar power, or a combination. Photovoltaic solar panels absorb sunlight as a source of energy to generate electricity. Concentrating solar power (CSP) plants use mirrors to concentrate the energy from the sun to drive traditional steam turbines or engines that create electricity.

The solar panels thrive in hot, sunny weather, but too much heat can actually reduce solar panel output 10 25 %. So, very hot weather isn-t the best condition for them. --The problem is, most solar panels- power outputs start to degrade if the temperature of the panel goes over about 25°C. This is why, if you look at the specification label on a solar panel, most manufacturers quote the solar power output at a panel temperature of 25°C.

Bacteria-powered solar cell can produce electricity on cloudy days

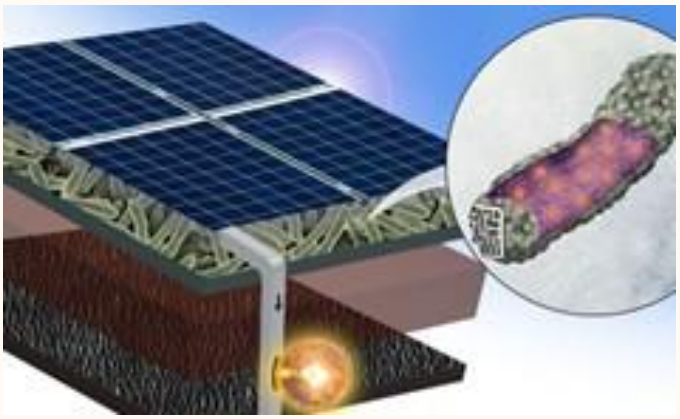
Solar cell using bacteria that convert light to energy. Various media outlets reported that UBC researchers developed a low-cost and sustainable way to build a solar cell using bacteria that can harvest energy on cloudy days.

Vikramaditya Yadav, a professor in UBC-s department of chemical and biological and project lead, said the new cells --could perform at comparable efficiencies as conventional solar cells.-- Their cell generated a current stronger than any previously recorded from such a device, and worked as efficiently in dim light as in bright light. This innovation could be a step toward wider adoption of solar power in places like British Columbia and parts of northern Europe where overcast skies are common. With further development, these solar cells called biogenic -- because they are made of living organisms could become as efficient as the synthetic cells used in conventional solar panels.

The other potential applications for these biogenic materials in mining, deep-sea exploration and other low-light environments. Solar cells are the building blocks of solar panels. They do the work

Edison failed 10000 times before he invented electric light don't be discouraged if you fail a few times.

of converting light into electrical current. Previous efforts to build biogenic solar cells have focused on extracting the natural dye that bacteria use for photosynthesis. It-s a costly and complex process that involves toxic solvents and can cause the dye to degrade.

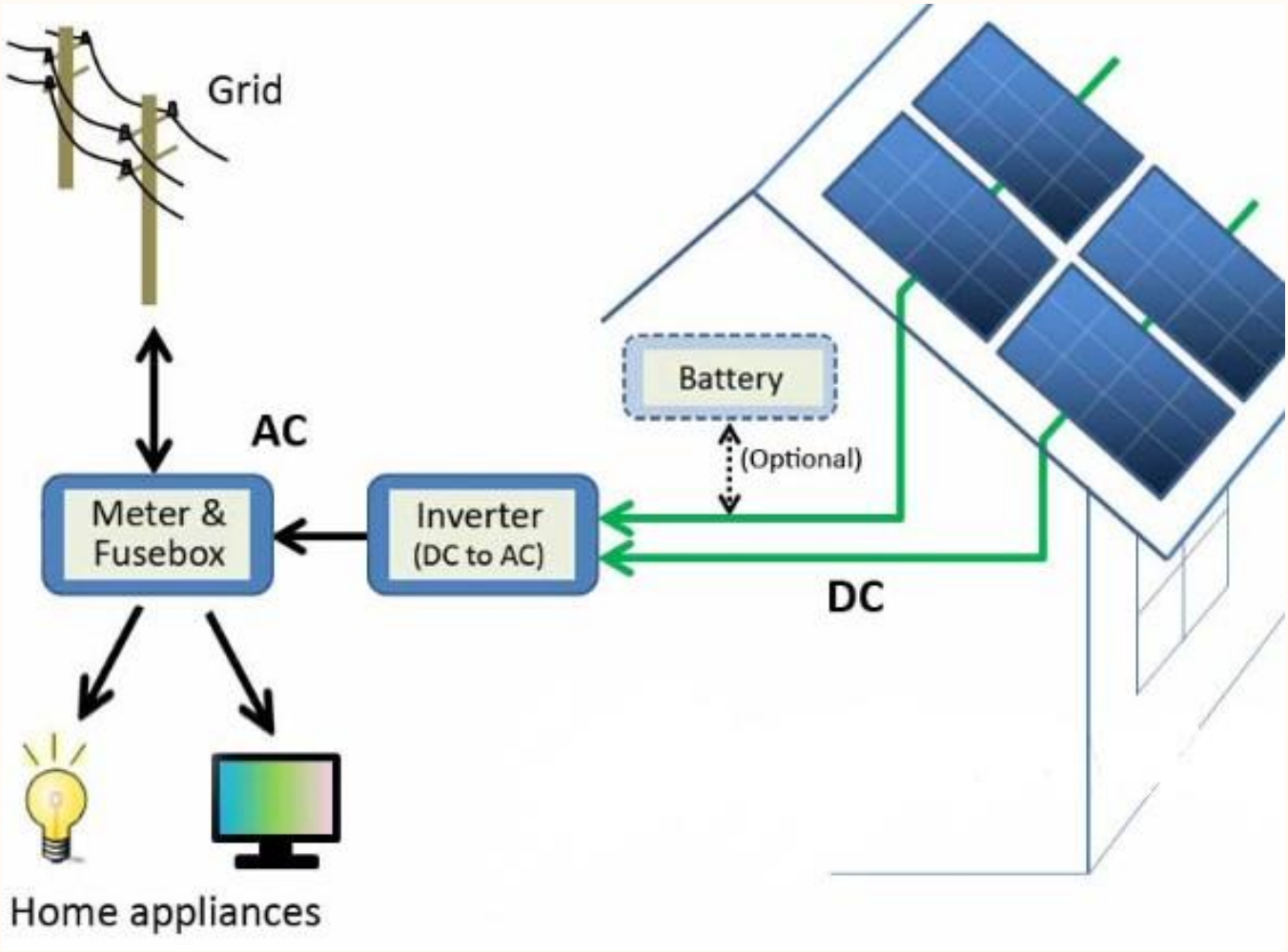


The UBC researchers- solution was to leave the dye in the bacteria. They genetically engineered E. coli to produce large amounts of lycopene a dye that gives tomatoes their red-orange colour and is particularly effective at harvesting light for conversion to energy. The researchers coated the bacteria with a mineral that could act as a semiconductor,

large amounts of lycopene a dye that gives tomatoes their red-orange colour and is particularly effective at harvesting light for conversion to energy. The researchers coated the bacteria with a mineral that could act as a semiconductor, and applied the mixture to a glass surface.

With the coated glass acting as an anode at one end of their cell, they generated a current density of 0.686 milliamps per square centimetre an improvement on the 0.362 achieved by others in the field. --We recorded the highest current density for a biogenic solar cell,-- said Yadav.

The cost savings are difficult to estimate, but Yadav believes the process reduces the cost of dye production to about one-tenth of what it would be otherwise. The holy grail, Yadav said, would be finding a process that doesn-t kill the bacteria, so they can produce dye indefinitely.



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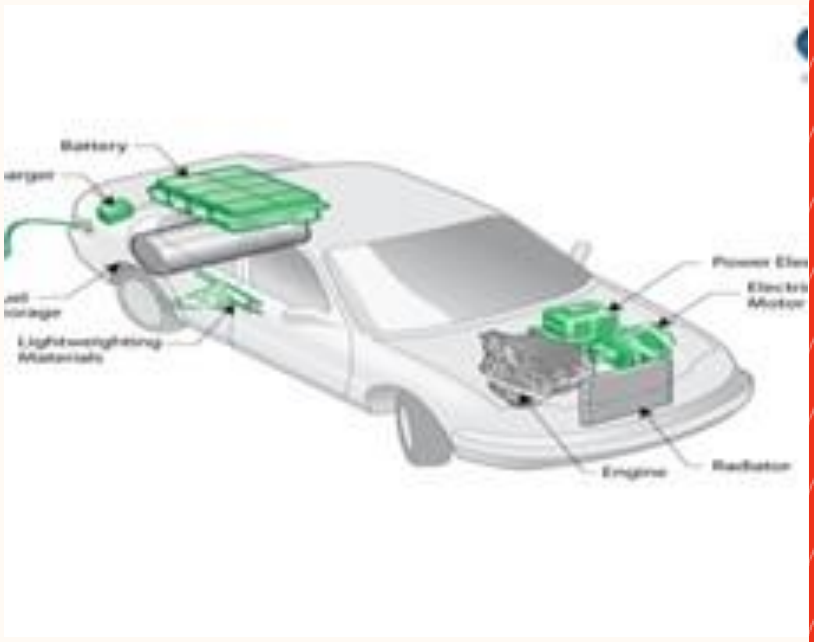
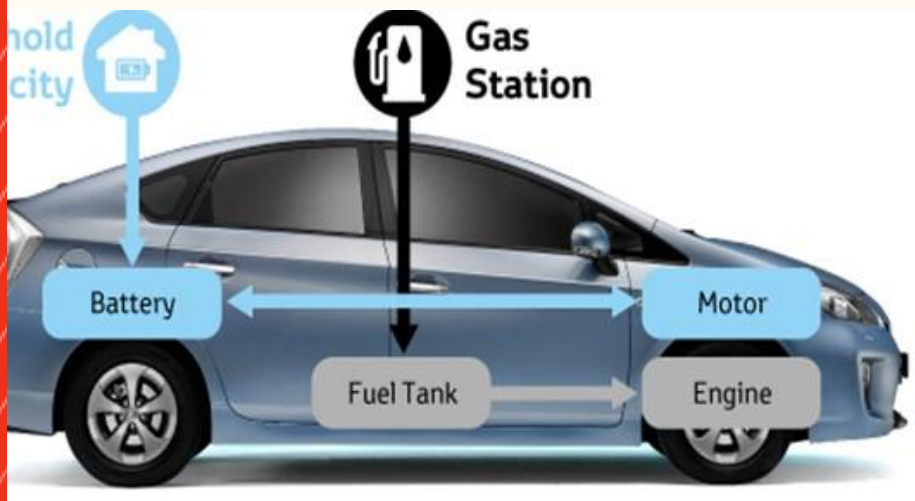
Plug-in hybrid electric vehicles (PHEV)

Plug-in hybrid electric vehicles (PHEVs) offer a choice of fuels. PHEVs have both an internal combustion engine and electric motor. These vehicles are powered by an alternative fuel or a conventional fuel, such as gasoline (petrol), and a battery, which is charged up with electricity by plugging into an electrical outlet or charging station.



Plug-in hybrid electric vehicles (PHEVs) typically use batteries to power an electric motor and use another fuel, such as gasoline, to power an internal combustion engine (ICE). PHEV batteries can be charged using a wall outlet or charging station, by the ICE, or through regenerative braking. The vehicle typically runs on electric power until the battery is depleted.



<u>Less Greenhouse Gas (GHG) Emissions:</u>

PHEVs are expected to emit less GHG emissions than conventional vehicles, but the amount generated Less Greenhouse Gas (GHG) Emissions PHEVs are expected to emit less GHG emissions

but the amount generated partly depends on the fuel used at the power plants that generate the electricity used to recharge the car·s battery. A PHEV will lead to less GHGs if its electricity comes from nuclear and hydroelectric plants rather than coal-fired power plants. Electricity powered by renewable energy sources such as solar or wind is optimal.

Charging the battery typically takes several hours, but a "quick charge" to 80% capacity may take as little as 30 minutes. However, PHEVs can be driven without being plugged in. They can be fueled solely with gasoline but will not achieve maximum range or fuel economy without charging.

Higher Vehicle Costs, Lower Fuel Costs:

PHEVs will likely cost $1,000 to $7,000 (USD) more than comparable non-plug-in hybrids. Fueling a PHEV will cost less because the cost of electricity is much lower than the cost of gasoline per mile, but fuel savings will not entirely offset the increased vehicle cost.

Concept of Smart Grid

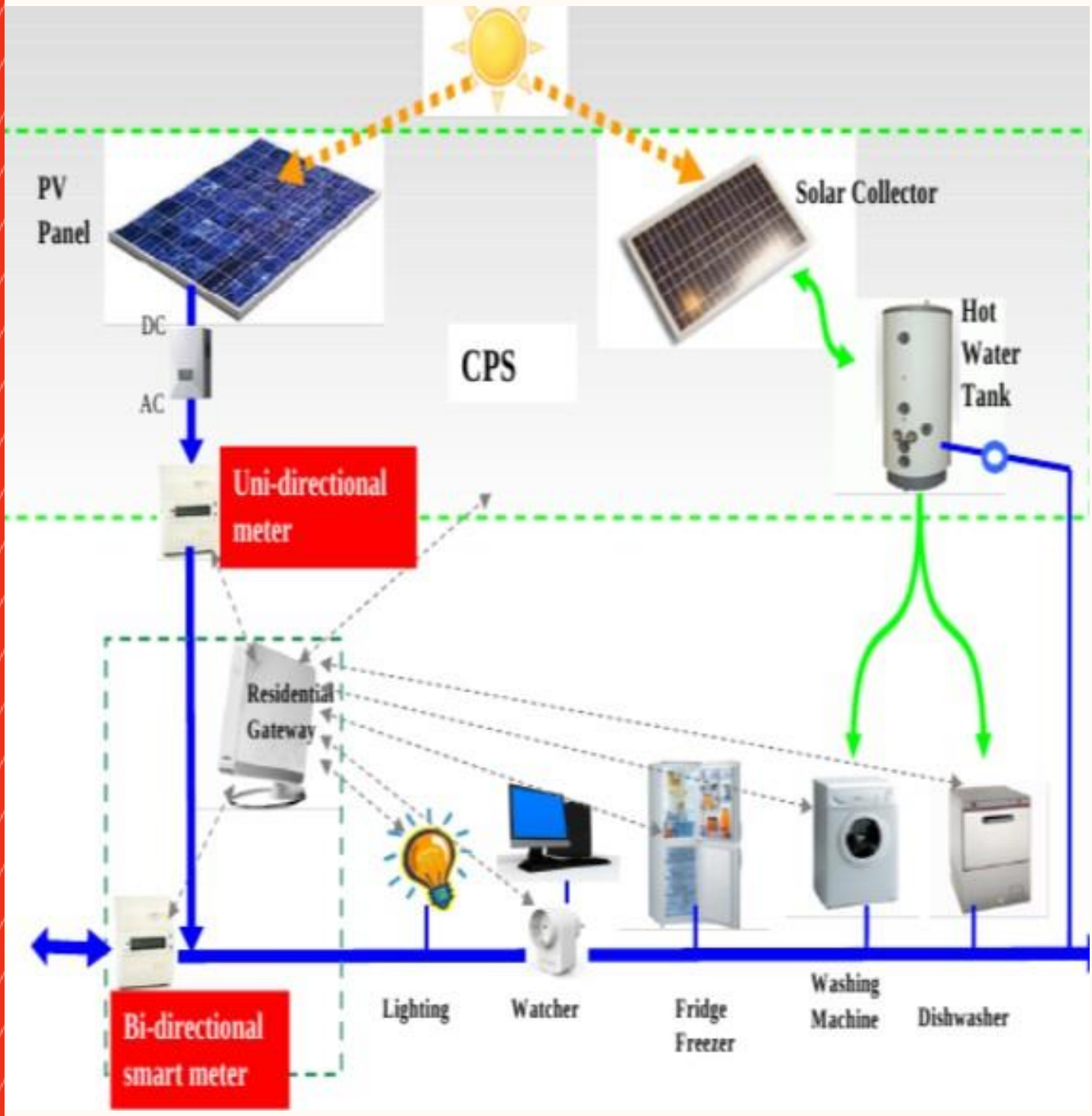
The term --grid-- is traditionally used for electricity generation, electricity transmission, electricity distribution, and electricity control. A --smart grid-- is an enhancement of the traditional electric power grid. It is the modernization of the power delivery system. It is a transformation of the legacy unidirectional electric grid into automatic intelligent system of bidirectional exchange of electric power and information.

Existing Grid	Smart Grid
Electromechanical	Digital
One-way communication	Two-way communication
Centralized generation	Distributed generation
Few sensors	Advanced sensors throughout
Manual monitoring	Self-monitoring
Manual restoration	Self-healing
Failures and blackouts	Adaptive and islanding
Limited control	Pervasive control
Few customer choices	Many customer choices

A smart grid may be defined as any combination of enabling technologies, hardware, software, or practices that collectively make the delivery infrastructure more reliable, more versatile, more secure, more accommodating, more resilient, and ultimately more useful to consumers. A smart grid basically consists of overlaying the physical power system with the information system. A conceptual model of smart grid developed by the National Institute of Standards and Technology (NIST)

The table shows comparison between traditional power grid and the smart grid is as folows: smart grids improve energy efficiency by reducing transmission losses. As electricity is supplied from generators to consumers, smart grids ensure the optimal amount of electricity is dispatched, while also minimizing the distance electricity must travel to arrive to its end consumer

Illustration of smart grid

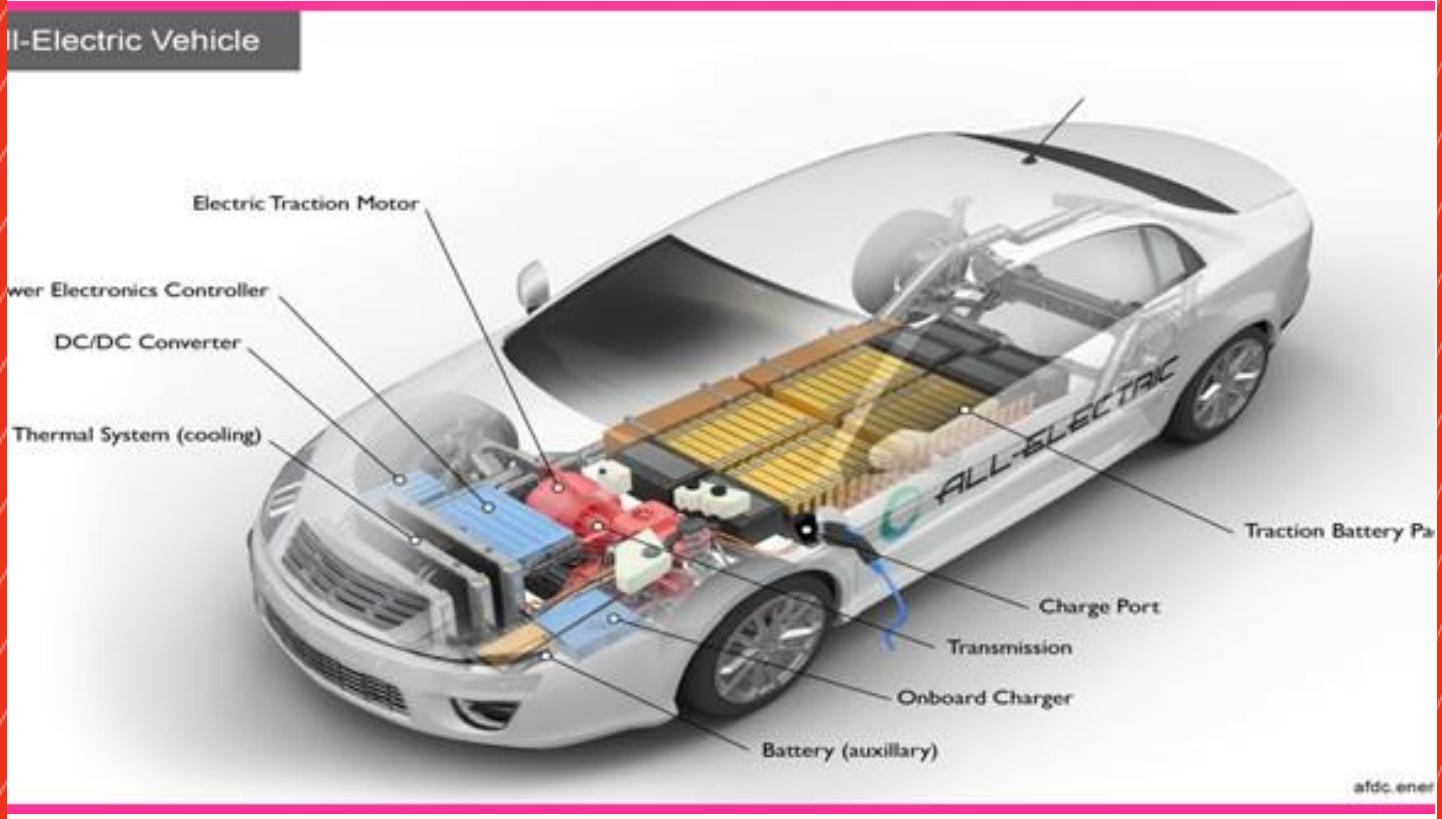


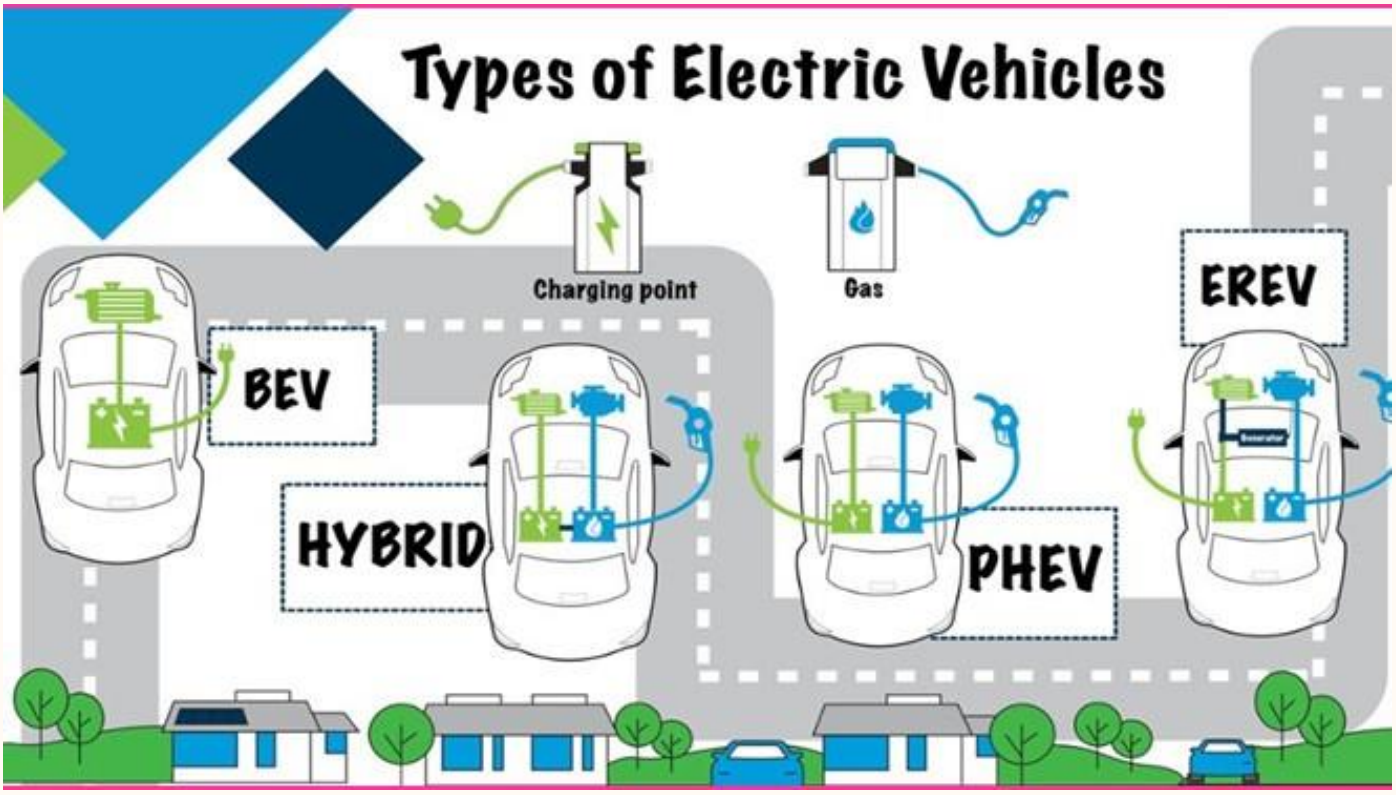
Electric vehicle

An electric car is an alternative fuel automobile that uses electric motors and motor controllers for propulsion, in place of more common propulsion methods such as the internal combustion engine (ICE). Electricity can be used as a transportation fuel to power battery electric vehicles (EVs).

Hybrid electric vehicle (HEV)

Hybrid electric vehicle (HEV) is a type of vehicle that uses both an electric battery and a conventional internal combustion engine. This type of vehicle is considered to have better performance and fuel economy compared to a conventional one.





PLUG-IN HYBRID ELECTRIC VEHICLE (PHEV)

A plug-in hybrid electric vehicle (PHEV) is a type of hybrid electric vehicle that combines a gasoline or diesel engine with an electric motor and a large battery that can be recharged by plugging into an electrical outlet or electric vehicle charging station. Conventional hybrid automobiles have an electric motor and battery, but derive all their power from gasoline or diesel.

capacitor high-energy density and thus, produces extreme power. This combination allows the battery to provide both long-term, steady power production and bursts of energy.

Insulator

The overhead line conductors should be supported on the poles or towers in such a way that currents from conductors do not flow to earth through supports i.e., line conductors must be properly insulated from supports. This is achieved by securing line conductors to supports with the help of insulators. The insulators provide necessary insulation between line conductors and supports and thus prevent any leakage current from conductors to earth

Properties of Insulators

High mechanical strength in order to withstand conductor load, wind load etc. High electrical resistance of insulator material in order to avoid leakage currents to earth. High relative permittivity of insulator material in order that dielectric strength is high. The insulator material should be non-porous, free from impurities and cracks otherwise the permittivity will be lowered. High ratio of puncture strength to flashover.

Insulator Materials

- Porcelain
- Glass
- Synthetic resin

Types of Insulators

- PIN type insulators
- Suspension type insulators
- Strain insulators
- Shackle insulators
- Stay insulators

Pin Type Insulator:

Pin type insulators are used for transmission and distribution of electric power at voltages upto 33 kV. Beyond operating voltage of 33 kV, the pin type insulators become too bulky and hence uneconomical. The cost of pin type insulator increases rapidly as the working voltage is increased. Therefore, this type of insulator is not economical beyond 33 kV. For high voltages (>33 kV), it is a usual practice to use suspension type insulators.

Strain Insulator:

When there is a dead end of the line or there is corner or sharp curve, the line is subjected to greater tension. In order to relieve the line of excessive tension, strain insulators are used.

Shackle or Spool Insulator:

In early days, the shackle insulators were used as strain insulators. But now a days, they are frequently used for low voltage distribution lines. Such insulators can be used either in a horizontal position

Stay or Egg Insulator:

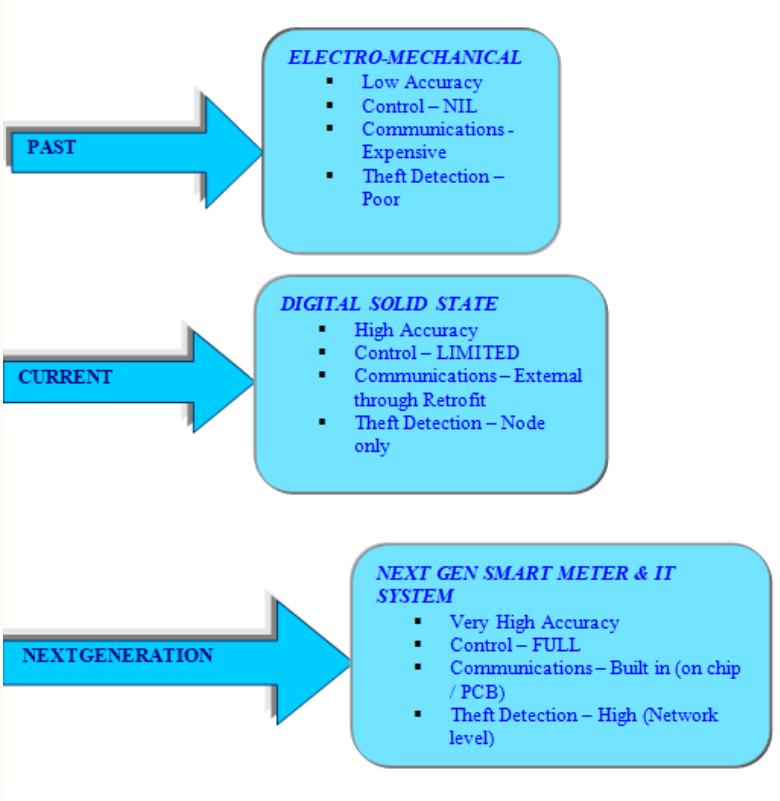
In case of low voltage lines, it is necessary that the stays are to be insulated at a height of not less than 3 meters from ground. The stay insulators are used on stay wire to create insulation between pole and the stay clamp. It is usually made of porcelain. It has two holes for stay wiresand the design is such that in case the insulator breaks then the stay wirewill not fall on the ground.

AUTOMATED METER READING

Introduction:

A technology which automatically collects metering data and transfers that data to a central database for analysis and billing purposes. This also called as --SMART TERING--.This meter could also measure Gas,Water (or) Electrical flow

Metering System:



Working:

The key to the system is a device called an ERT (Encoder-Receiver-Transmitter). This device is connected directly to a special electronic register on the energy meter. Normally, the ERT does nothing - it "sleeps," waiting for the meter reader to approach. Themeter reading sends the device(ERT) a continuous "wake up" signal.

When an ERT receives the signal, it checks the reading on the meter register, encodes it into a digital signal, and begins transmitting its identification number and the current reading. After sending the signal, the ERT stops transmitting and goes back "to sleep," waiting for the next time meter reading.

Older US residential electric meter location, retrofitted with a 1-phase digital smart meter. The meter communicates to its collection point using 900 MHz mesh network topology.

The First Commercially Available Remote Meter Reading and Load Management System - Metretek, Inc. (1978)

Components:

Basic components required to make an AMR system,

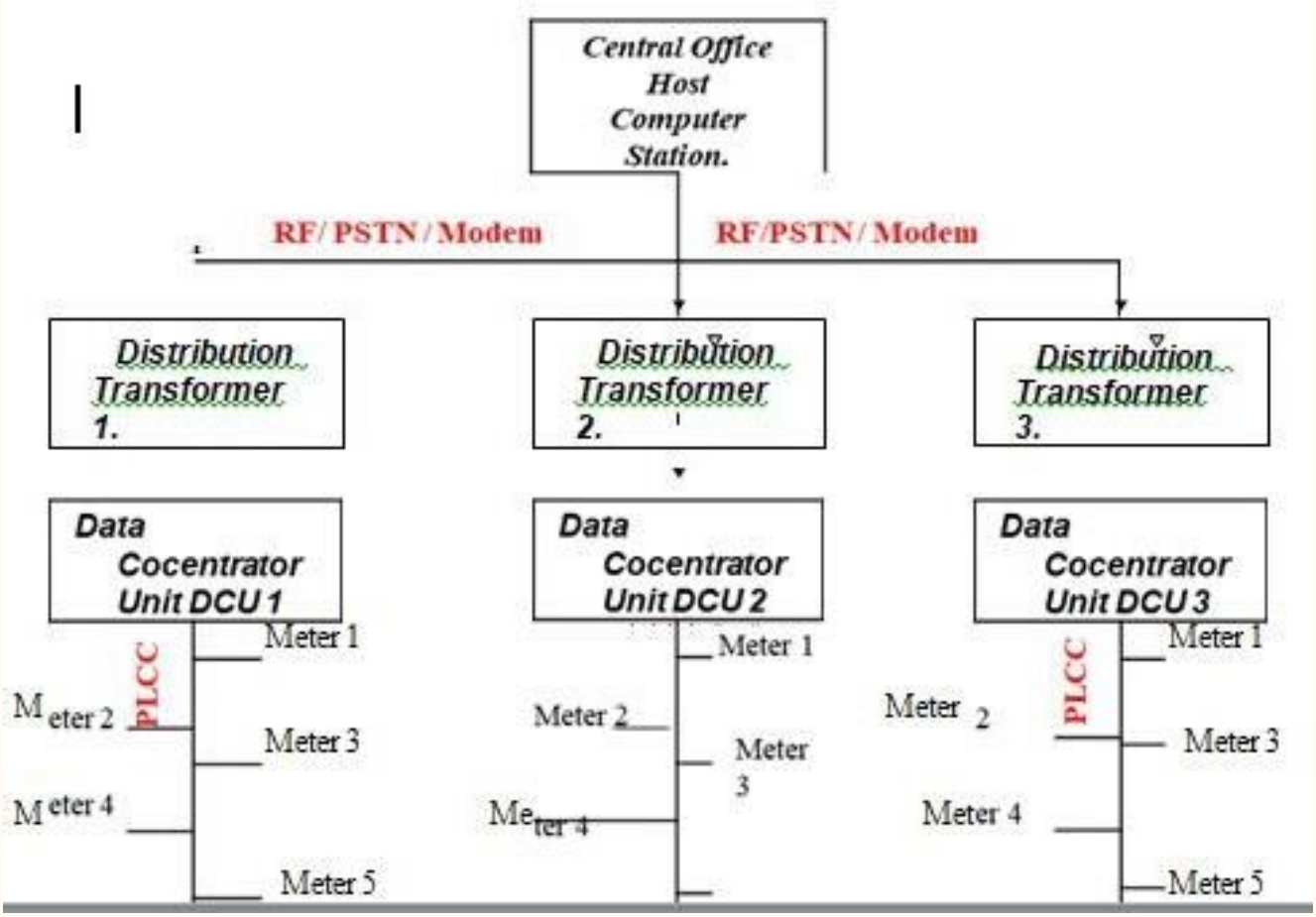
1)-AMR water maters

2)Communication network (GPRS)

3)Data Concentrator Unit(DCU)

4)Meter data management software

AMR ARCHITECTURE



Future:

AMI-Automatic Meter Infrastructure

This may be the next generation (or) the future of the AMR system.Butstill the implementation of AMR all around the world is an unreachable GOAL.Themany factors for that is cost,mainly the need to replace the excisting system.

--If you are not installedAMR for your system-START Now

If you have AMR-START think about AMI--

Conclusion:

Reading a utility meter without the requirement for visual inspection of the meter--, it is indeed an easy and fail-safe method for monitoring consumption details of a customer.

1) AMR can detect meter tampering and illegal drawing of power
2) AMR as a way of improving customer service while reducingthe cost of reading meters.
3) AMR system enables us to save millions of dollars every year in meter reading costs and also provide our customers with better information about water use, more accurate billings, and keep rates as low as we can.

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