Making your home a bit greener:

Developing an understanding of energy consumption can provide many benefits, including highlighting many opportunities for minimizing energy consumption and saving money!

Energy, CO_2 and some additional facts:

The production of one kWh electricity can be made using different energy sources, each source can be characterized by a factor that indicates how many kilograms of CO_2 are released into the atmosphere to produce 1 kWh electricity (these factors are changes that depend efficiency of the single station and the distribution network).
Some of the sources of energy are oil, natural gas, coal, municipal waste (thermal), enriched uranium (nuclear, gradients of water (hydroelectric), heat of the earth (geothermal), wind (wind), sun (photovoltaic, solar thermal), biomass, etc.
Every nation has a mix of power plants that use different energy sources, then the value of kg CO_2/kWh will be different for each country, this factor can be used to calculate the kg of CO_2 emissions avoided in the environment in the country where the equipment is installed PV. CO_2 in the atmosphere is the main cause of global warming, which directly affects the ' increase earth's temperature and climate change related.

- Florida was second only to Texas in 2014 in net electricity generation from natural gas, which accounted for 61% of Florida's net generation; coal accounted for almost 23%, the state's nuclear power plants accounted for 12%, and other resources, including renewable energy, supplied the remaining electricity generation.
- Renewable energy accounted for 2.3% of Florida's total net electricity generation in 2014, and the state ranked 10th in the nation in net generation from utility-scale solar energy.
- In part because of high air conditioning use during the hot summer months and the widespread use of electricity for home heating during the winter months, Florida's retail electricity sales to the residential sector were second in the nation after Texas in 2014.
- Electricity accounts for 90% of the site energy consumed by Florida households, and the annual electricity expenditures of $1,900 are 40% higher than the U.S. average, according to EIA's Residential Energy Consumption Survey.
- **Interesting fact:** A Florida facility using a gas fermentation process to produce an estimated 8 million gallons of cellulosic ethanol from citrus fruit, vegetable, and yard wastes began commercial-scale production in 2013.
  http://southeastfarmpress.com/orchard-crops/grant-supports-florida-waste-energy-facility

Using renewable energy sources such as solar photovoltaic panels (PV's), wind energy will ultimately result in reduction in CO_2 emission.

Electricity in Tallahassee:

The electricity distributed by the City of Tallahassee Utilities emits, on average, 1.020 lbs of CO2 per kWh. This is a result of the mix of power plants that generate the electricity, which rely on a variety of energy sources, such as natural gas, hydro, and on rare occasions oil. The city also purchases some power. In comparison, Florida's average emission rate is 1.340 lbs per kWh, and the national average is 1.329 lbs per kWh.

The CO2 emission factor of the City of Tallahassee Utilities electricity is 1.020 lbs of CO2 per kWh, or 135.60 kgCO2 per MMBtu.

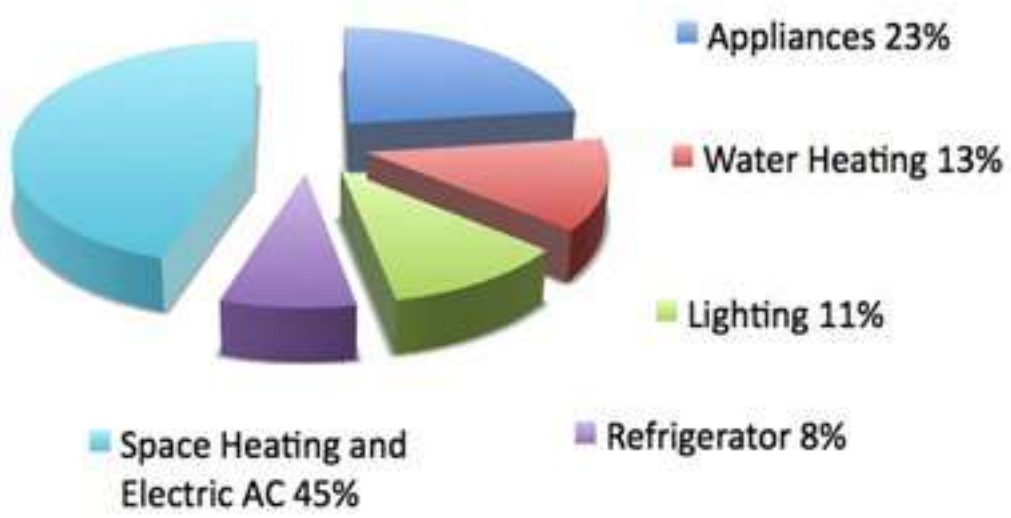

Fig. 1: Average use of energy in a "normal" household in the US

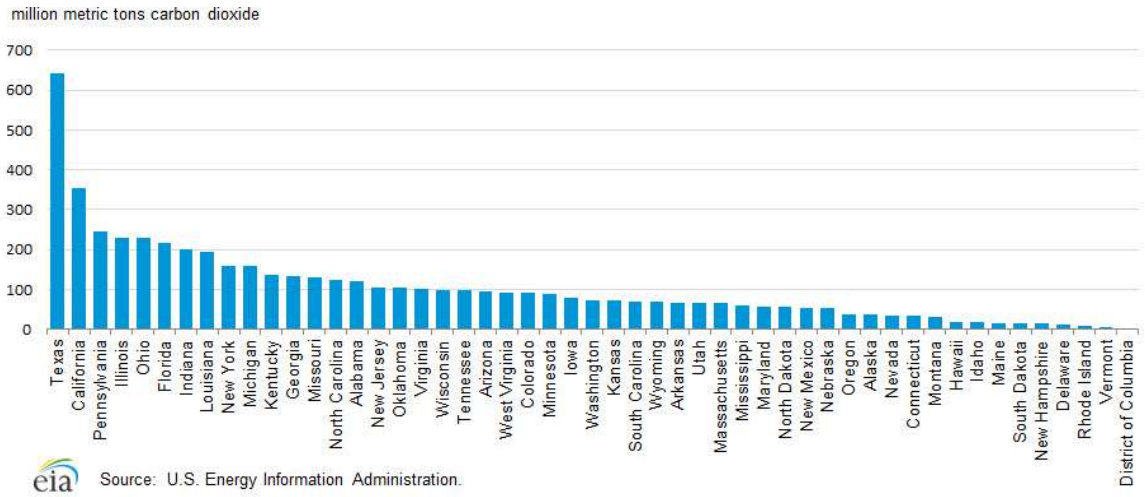

Fig.2 Energy-related emissions by state, 2013

Reduction of cooling/heating energy demand: Insulation:

Many existing buildings in hot climates, built in the last centuries, have adopted clever solutions to keep houses cool.

- **>** The underground dwellings at Coober Pedy in Central Australia arose from miners finding better thermal comfort in their mines than in their living quarters above ground. “These dwellings possess ultimate levels of thermal mass and “earth coupling” which are ideal for evening out the diurnal extremes of the region;
- **>** Ancient cliff dwellings of American Indians in Mesa Verde exploit the cliff overhang for full passive solar control to not just the walls and windows, but the whole village. Natural updrafts provide excellent ventilation;
- **>** Indonesian native buildings use thatch as insulation to deal with heat gain in a tropical climate. Open gables allow cross ventilation of the hottest air that would otherwise accumulate in the roof space. Generous eave overhangs shade the building, further reducing heat gain.

All theses solutions were based on a set of three principles, which are still relevant to reduce the cooling demand:

PRINCIPLE I: MINIMISE SOLAR RADIATION

Whereas solar gains are favourable in winter to reduce the heating demand they can cause high peak demand for cooling in summer. Depending on the climate, solar radiation can be the largest heat load in a building. Therefore some form of shading is advisable, especially for south, west and east facing facades.

PRINCIPLE II: MINIMISE INTERNAL LOADS

The energy released by people, appliances, lighting and other sources, which are not part of the heating system often have a significant effect on the indoor climate. Keeping internal loads to a minimum has a double benefit in saving energy cost directly and also in reducing air-conditioning loads.

PRINCIPLE III: REMOVAL OF HEAT

The ventilation strategy is highly relevant for the removal of heat during the day but also has to prevent infiltration when outside temperatures are higher than inside. Additional night ventilation might be useful to blow outside air at night into a building and cool its thermal mass allowing it then to absorb internal or external heat during the following day. Ambient air might be cooled in underground ducts e.g. in basements, underground car parks or gardens before introduction into the building.

The cooling demand depends on several different influences. Due to the complexity of the problem the effect of insulation on the cooling demand has to be investigated as the sum of its component parts.

Insulation reduces the heat transfer through roofs, walls, the floor and windows. Depending on the temperature difference between inside and outside the heat flows through the building envelope from inside to outside or vice versa.

In cold regions insulation reduces the heating demand in winter, when the outside temperature is colder than inside. For all regions where the outside temperature is higher than the acceptable indoor temperature, insulation is recommended due to its reducing effect on the cooling demand.

But what is the effect of insulation in warm climatic zones, where for extended periods the outside temperature exceeds the desired inside temperature and hence insulation can help to reduce the cooling demand? There can also be circumstances, when the outside temperature is colder than inside, insulation reduces heat transmission to the outside, which may lead to increased cooling demand, if the internal and solar gains are heating up the building and are not ventilated to the outside.