



SNS COLLEGE OF TECHNOLOGY

**An Autonomous Institution
Coimbatore – 35**

Accredited by NBA – AICTE and Accredited by NACC – UGC with 'A+ Grade
Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai.

DEPARTMENT OF AGRICULTURAL ENGINEERING

19AGO304 Energy Management in Agriculture

UNIT 1 – UNIT I. INTRODUCTION

TOPIC 1 & 2 – TYPES OF ENERGY RESOURCES- NON-RENEWABLE AND RENEWABLE ENERGY SOURCES





NEED FOR RENEWABLE ENERGY SOURCES



- **GLOBAL WARMING –DEFINITION**
- Carbon Dioxide is produced in large quantities as a result of activities such as the burning of fossil fuels. Methane is released in large quantities from landfill sites and farmed ruminant livestock and Nitrous Oxide levels have increased as a result of the use of nitrogen based fertilisers for example. Since the industrial revolution levels of Carbon Dioxide have risen by 31% .
- Global temperatures have risen by more than 0.5 °C since 1900 and will continue to do so. Further temperature rises are almost inevitable, but by reducing greenhouse gases we can slow down the rate and extent of the temperature changes. For example under a “low emissions future scenario” temperatures may rise by 1.5 °C by 2100, whereas under a “high emissions future scenario” this temperature increase may be at least as high as 5.8 °C.
- **Impacts**
- Possible impacts include the dramatic, such as melting of the polar ice caps, rising sea levels and an increase in extreme weather events such as drought, flooding and storms. It will also affect us in more subtle ways, for example, it may affect the way we manage our water resource, the crops we grow and the way that we grow them.



CLASSIFICATION OF ENERGY ON THE BASIS OF SOURCE



On the basis of source, the energy can be classified as direct and indirect energy.

1. Direct source of energy

The direct sources of energy are those which release the energy directly-like human labour, bullocks, stationary and mobile mechanical or electric power units, such as diesel engines, electric motor, power tiller and tractors. The direct energy may be further classified as renewable and non-renewable sources of energy depending upon their replenishment.

1.1. Renewable direct sources of energy

In this category, the energy sources, which are direct in nature but can be subsequently replenished, are grouped. The energetic which may fall in this group are human beings, animals, solar and wind energy, fuel wood, agricultural wastes, etc.

1.2. Non-Renewable direct sources of energy

In this category, direct energy sources which are not renewable (at least in near future say next 100 years) are classified. Coal and fossil fuels exemplify non-renewable direct sources of energy.



INDIRECT SOURCES OF ENERGY



The indirect sources of energy are those which do not release energy directly but release it by conversion process. Some energy is invested in producing indirect sources of energy. Seeds, manures (farm yard and poultry), chemicals, fertilizers and machinery can be classified under indirect sources of energy. Again, on the basis of their replenishment, these can be further classified into renewable and non-renewable indirect source of energy.

2.1. Renewable indirect source of energy

Seed and manure can be termed as renewable indirect source of energy as they can be replenished in due course of time.

2.2. Non-renewable indirect source of energy

The energy sources which are not replenished come under non-renewable indirect sources of energy. Chemicals, fertilizers and machinery manufacturing are the non-renewable indirect sources of energy.

CLASSIFICATION OF ENERGY ON THE BASIS OF COMPARATIVE ECONOMIC VALUE



On the basis of comparative economic value the energy may be classified as commercial and non-commercial.

1. Non-commercial energy

Each and every energy source has some economic value. Some energy sources are available comparatively at low cost whereas others are capital intensive. The energy sources which are available cheaply are called non-commercial sources of energy whereas the ones which are capital intensive are called commercial energy sources.

Human labour and bullocks exemplify the category of non-commercial source of energy. One may argue that the unit energy available from animate sources is costlier than the mechanical energy. Therefore, animal sources of energy should be classified under the non-commercial. However, one should also bear in mind that human labour and animals are readily available and can be used as a sources of power directly, whereas in case of mechanical sources of energy, the machines (tractors, stationary engines, electric motors, etc. are very costly in terms of their purchase price and also often require a skilled operator.

The commonly available and less expensive materials like fuel wood, twigs, leaves agro-wastes and animal dung, etc. are also classified as non-commercial sources of energy.



THE WAYS TO MANAGE ENERGY IN THE FUTURE



2. Commercial energy

The energy sources like petroleum products (diesel, petrol and kerosene oil) and electricity, which are capital intensive commercial sources of energy. Considering the fact that most of the commercial sources are also non-renewable and to some extent are imported in India, efforts are made to conserve such sources of energy.

There are 3 key principles that should govern the way we manage energy in the future:

Clean sustainable energy

The generation of benign energy that doesn't increase the levels of greenhouse gases in the atmosphere. Renewable energy technologies such as wind, solar and biomass/biofuel energy technologies can be adopted.

Energy conservation

Energy efficiency, conserving energy as best we can and reducing energy wastage. Energy shouldn't be use unnecessarily. We need to be more aware of the energy inputs and outputs of a given process.

Pollution penalties

Polluters should pay for the cost of the energy as well as the damage it causes.



WEB LINKS



1. [https://www.researchgate.net/publication/272488661_Energy_efficiency_in_agriculture -
_Energy_audit_impact_on_environmental_and_economic_performance_at_farm_level](https://www.researchgate.net/publication/272488661_Energy_efficiency_in_agriculture_-_Energy_audit_impact_on_environmental_and_economic_performance_at_farm_level)
Energy efficiency in agriculture - Energy audit impact on environmental and economic performance at farm level
2. https://www.blogs.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs144p2_066326.
Farm energy audit
3. https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs141p2_018358.pdf
Energy audit of agricultural Operations
4. <http://www.fao.org/3/x8054e/x8054e05.htm>
Energy for Agriculture
5. <http://www.fao.org/3/x8054e/x8054e05.htm>
Farm energy Audits by Sustainable Agriculture Research Program by the National Institute of Food and Agriculture, US Dept of Agriculture



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2. Verma SR, Mittal JP & Surendra Singh, Energy Management and Conservation in Agricultural Production and Food Processing, USG Publs, Ludhiana, 1994.

3.Kennedy WJ Jr. & Wayne C Turner, Energy Management, Prentice Hall, 1984.
Fluck RC & Baird CD., Agricultural Energetics, AVI Publs, 1984.

4.L.C. Witte, P.S. Schmidt, D.R. Brown, Industrial Energy Management and Utilisation , Hemisphere Publication, Washington, 1988.



THANK YOU