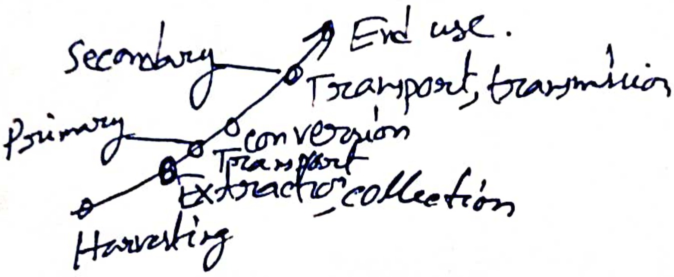
Lecture 1
17/7/23

Non-conventional Energy Systems (MEO 741)

1. What is non-conventional?
2. What is conventional?

Electricity generation
- 87% coal
- 4% natural gas
- 3% renewables
- 5% nuclear and hydro

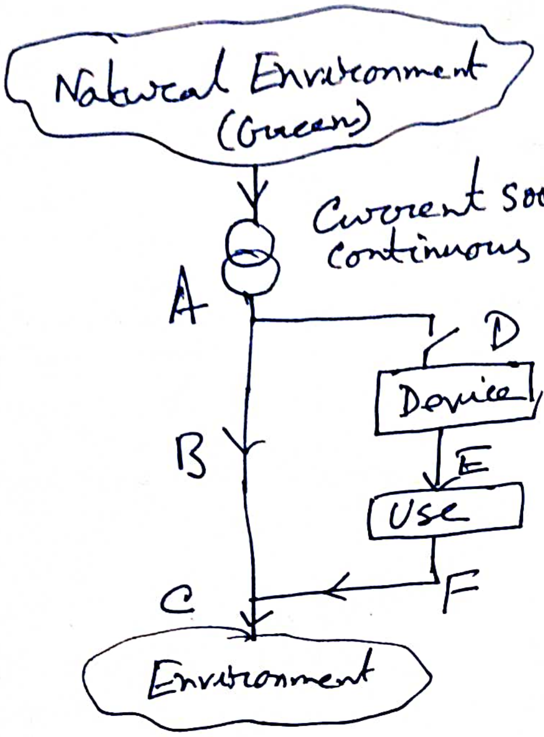
3. What is energy system?



4. What is primary and secondary energy?
5. Why non-conventional energy? (What are the challenges presently?)
- Resource scarcity
- Global warming
- Energy poverty,
- Energy security.
- Acid rain
- Particulate emission

24/11/22

Introduction of Renewable and non-renewable energy



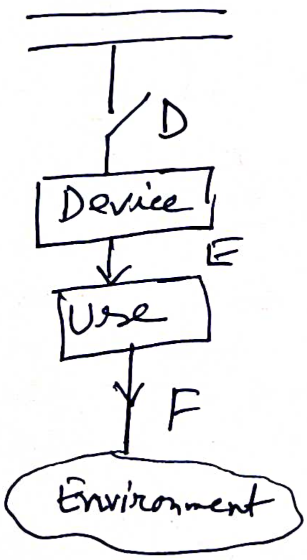
Current source of continuous energy flow

Example
~~Biomass~~ solar PV

Renewable Energy

Green Energy

Mixed resource: Brown



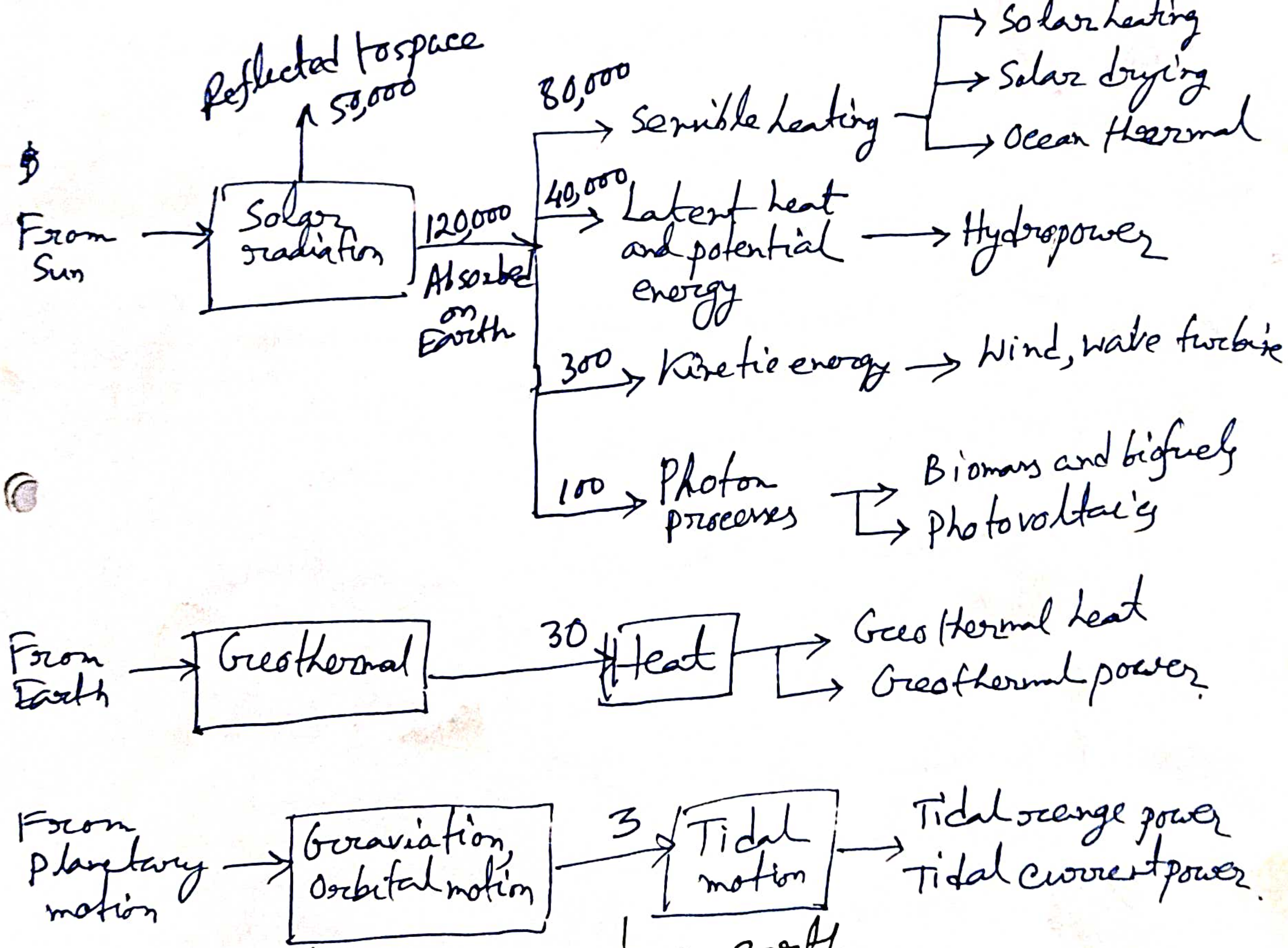
sink

Finite energy

Example
coal

Renewable energy → 'Energy obtained from natural and persistent flows of energy occurring in the immediate environment'. Energy is already passing through the environment as a current or flow, irrespective of there being a device to intercept and harness this power. (Green)

Non-renewable energy → 'Energy obtained from static stores of energy that remain underground unless released by human interaction'. (Brown)



Natural Energy currents on earth

* In (10^{12} W) → Units terawatts

Primary supply to End-use

Energy planning

1. Complete energy systems must be analysed and supply should not be considered seperately from end use.

2. System efficiency calculations can be most revealing and can pinpoint unnecessary losses.

3. Energy management is always important to improve overall efficiency and reduce economic losses. High efficiency reduces pollution and reduces capital cost also.

Scientific considerations for renewable energy project

1. Energy currents → sufficient renewable current should be present e.g. biomass ~~solar~~ for biofuels, solar radiation for solar PV etc.

2. Dynamic characteristics → Time variant renewable energy source and consumption pattern and magnitude should be considered.

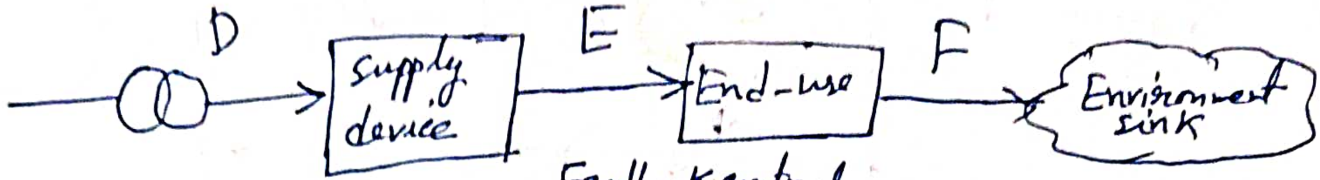
3. Quality of supply → Quality of Sources of renewable energy should be matched as per end use. Input energy should be convertible to desired ~~at~~ source efficiently.

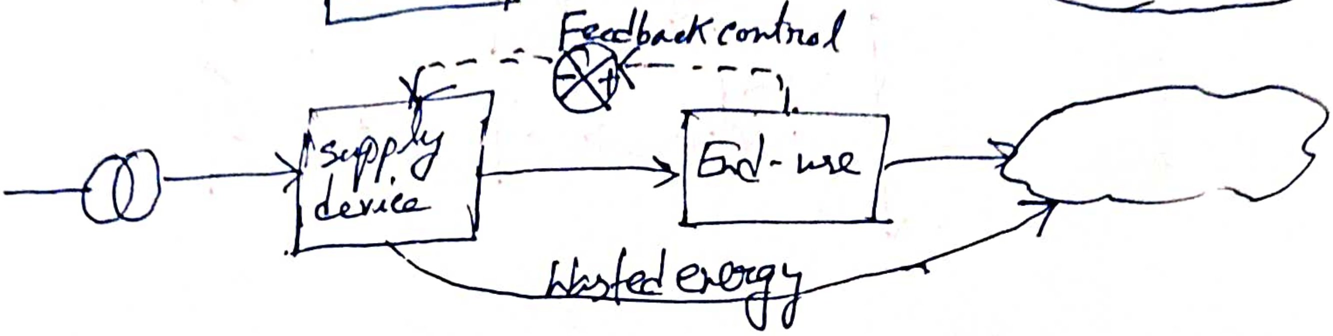
4. Dispersed ~~or~~ and centralized energy.
5. Complex systems → many subject expertise required.
Example, . . .
~~6.~~
6. Situation dependence → very specific for different geographical location and end users.
Needs of energy and form of primary energy is very much ~~dis~~ situation dependent.

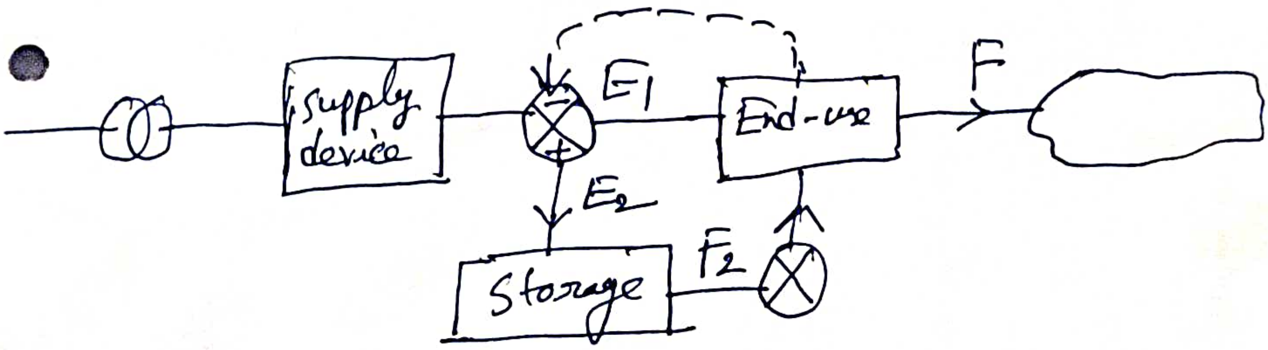
7. Environmental impact assessment.
8. Matching supply and demand.
9. Control options
   - → spill the excess energy
   - → incorporate storage
   - → load shading
   - → operate load management control.
     - → smart metering
     - → scheduling

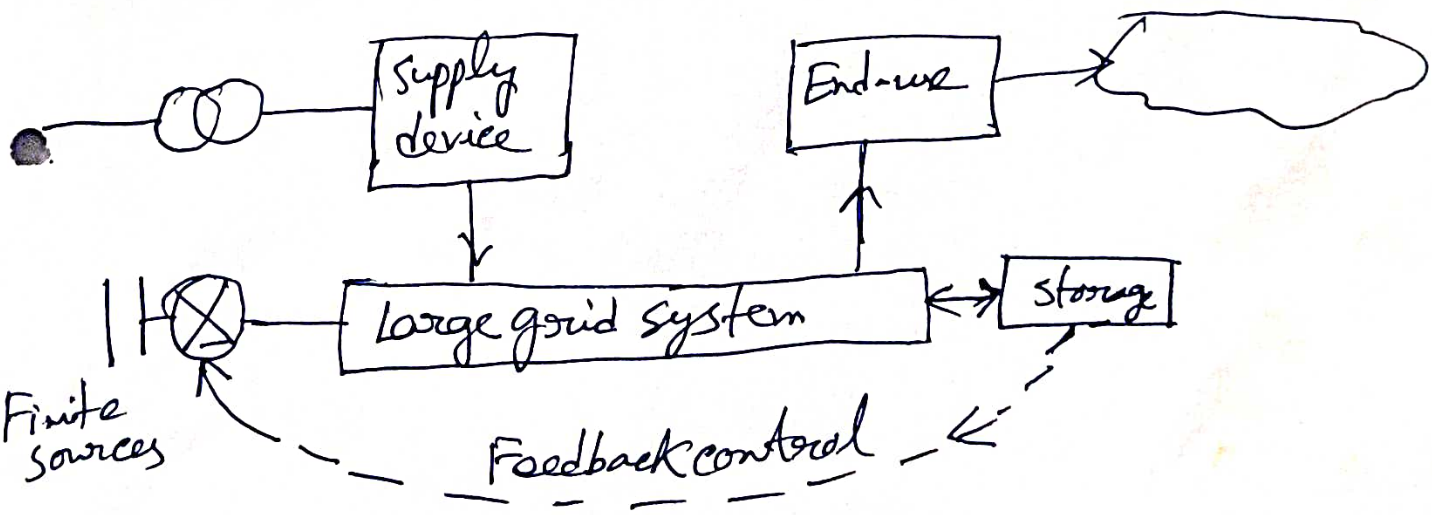
10. Social implications → different community demand curve

Matching supply and demand









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