Lecture-1

On

INTRODUCTION TO ELECTRICAL ENGINEERING (ESO203)

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OBJECTIVE:

This course aims at the basics of circuit analysis for AC/DC circuits and introduce the principles of electrical machines like transformer, DC machines, and AC machines.

COURSE CONTENT

Topic	Lecture Names
1	Introduction, Single-Phase Circuits, Power Calculations, Analysis of 3-Phase Circuits, Mutually Coupled Circuits.
2	Transformers: Magnetic Circuits, Equivalent Circuit and Performance.
3	Direct-Current Machines: Construction, Equivalent Circuit, Torque-Speed Characteristics, Applications.
4	Induction Machines: Construction, Equivalent Circuit, Torque-speed characteristics, Speed Control, Starting, Applications.
5	Synchronous Machines: Construction, Equivalent Circuit, Generator & Motor Operation, Power Angle Characteristics, Hunting, Pull-Out.
6	Special Topics: Single-phase induction machines, Stepper Motors.

Reference books

- Electrical machines, drives, and power systems, Theodore Wildi.
- Fundamentals of electric circuits, Alexander and Sadiku.
- Introductory Circuit Analysis, R. L. Boylestad.
- Electric machinery fundamentals, Stephen J Chapman.
- Electric Machinery, A. E. Fitzgerald, Charles Kingsley Jr., Stephen D. Umans.
- Engineering Circuit Analysis, Hayt, Kemmerly and Durbin.
- Principles and applications of electrical engineering, Giorgio Rizzoni.

LECTURES

- Lecture on every M,T and Th at 5:00 PM.
- Tutorials on every W at 5:00 PM.
- Tutorials may include quizzes as well, so be attentive and regular in tutorials.

Venue:

- Lecture: L18.
- Tutorials: T101, T102, T103, T104, T105, T106.

EVALUATION SCHEME

S.N.	Item	Weightage
1	Mid Semester Exam	30%
2	End Semester Exam	45%
3	Quizzes (surprise/announced)	25%

Please note that:-

- All exams, including quizzes, are compulsory.
- Missing the End Sem exam will lead to an Incomplete (I) grade in the course.
- The grade (I) will be converted to a suitable grade if the absentee takes the Makeup End Sem exam after suitable permission(s) from the required authority.
- In case the absentee does not appear for the Make-up End Sem for whatsoever reason, the grade (I) will be converted to grade (F).

Attendance policy:

Attending classes is strongly recommended!

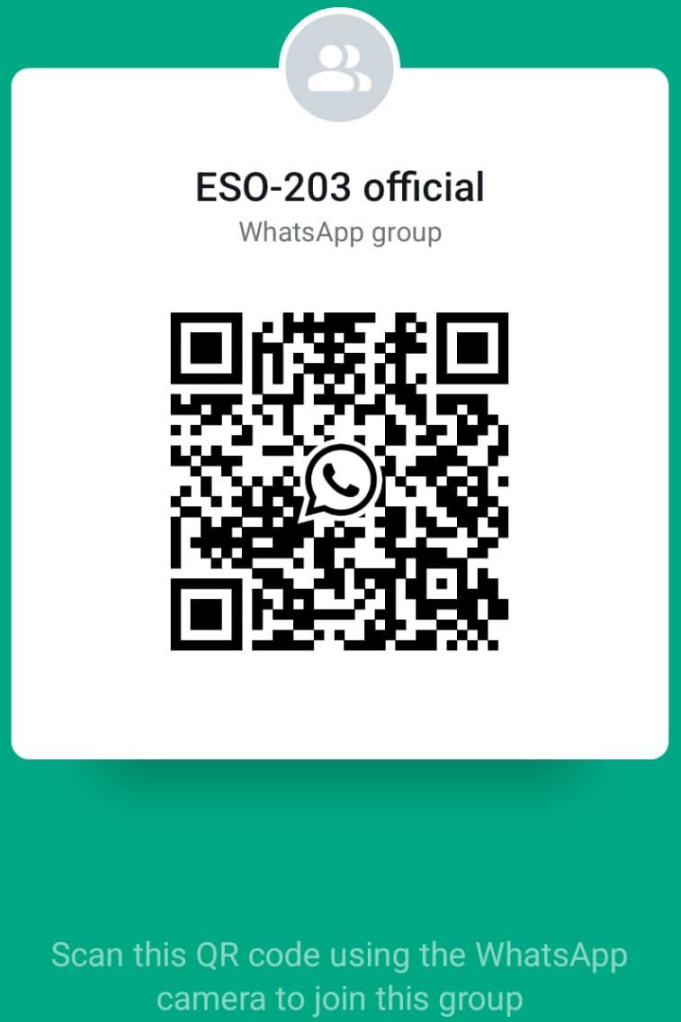
Missing more than 25 lectures → automatic drop/ “F”

Information Desk:

- Whatsapp group:- lectures, tutorial and lab.

https://chat.whatsapp.com/HBqFMNJJLm563huBBOOyKP

- Hello IITK: mooKIT (Tutorial questions).
- Lab: M, T and W, two group on each day (google from will be circulated to accommodate your choice).

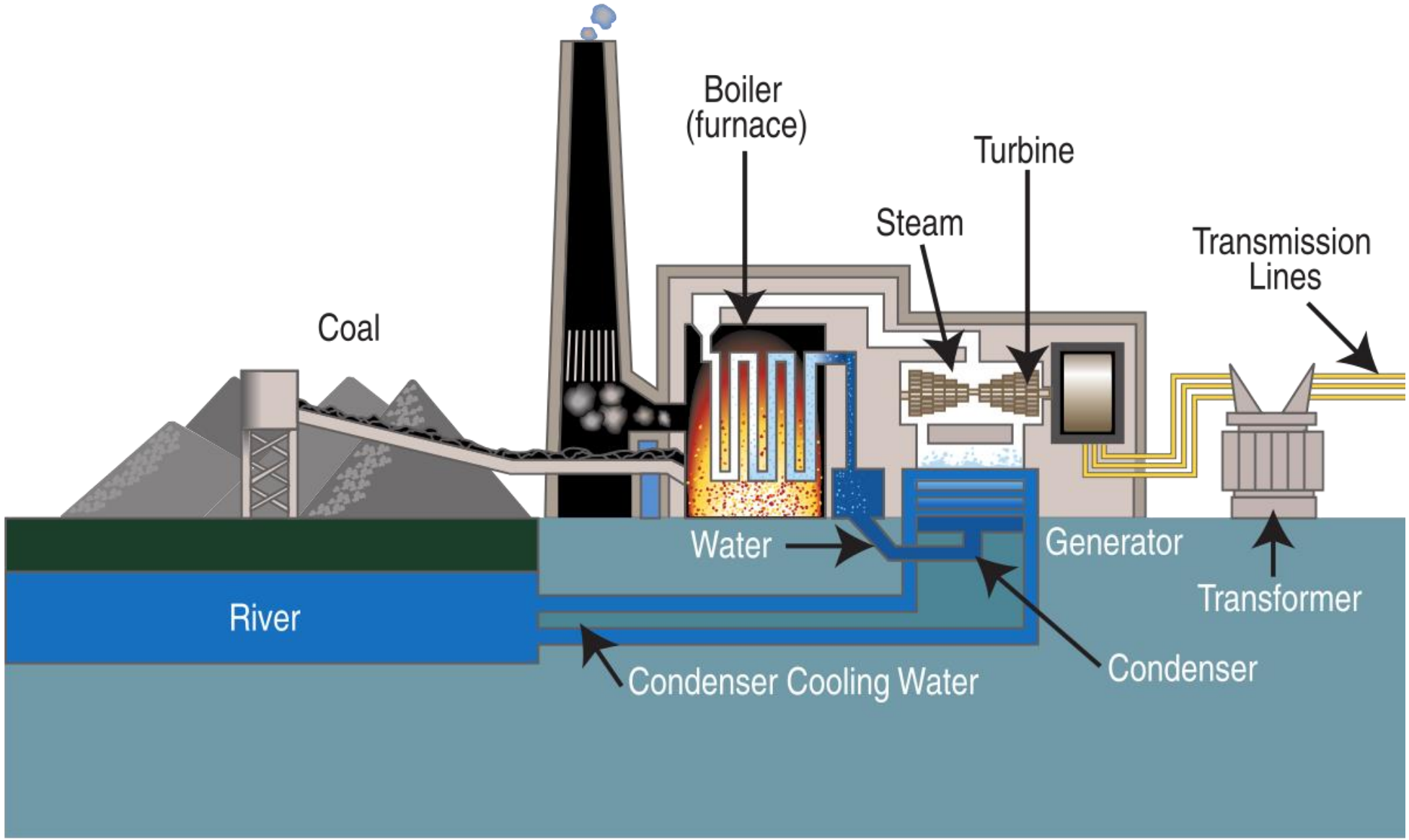


Motivation

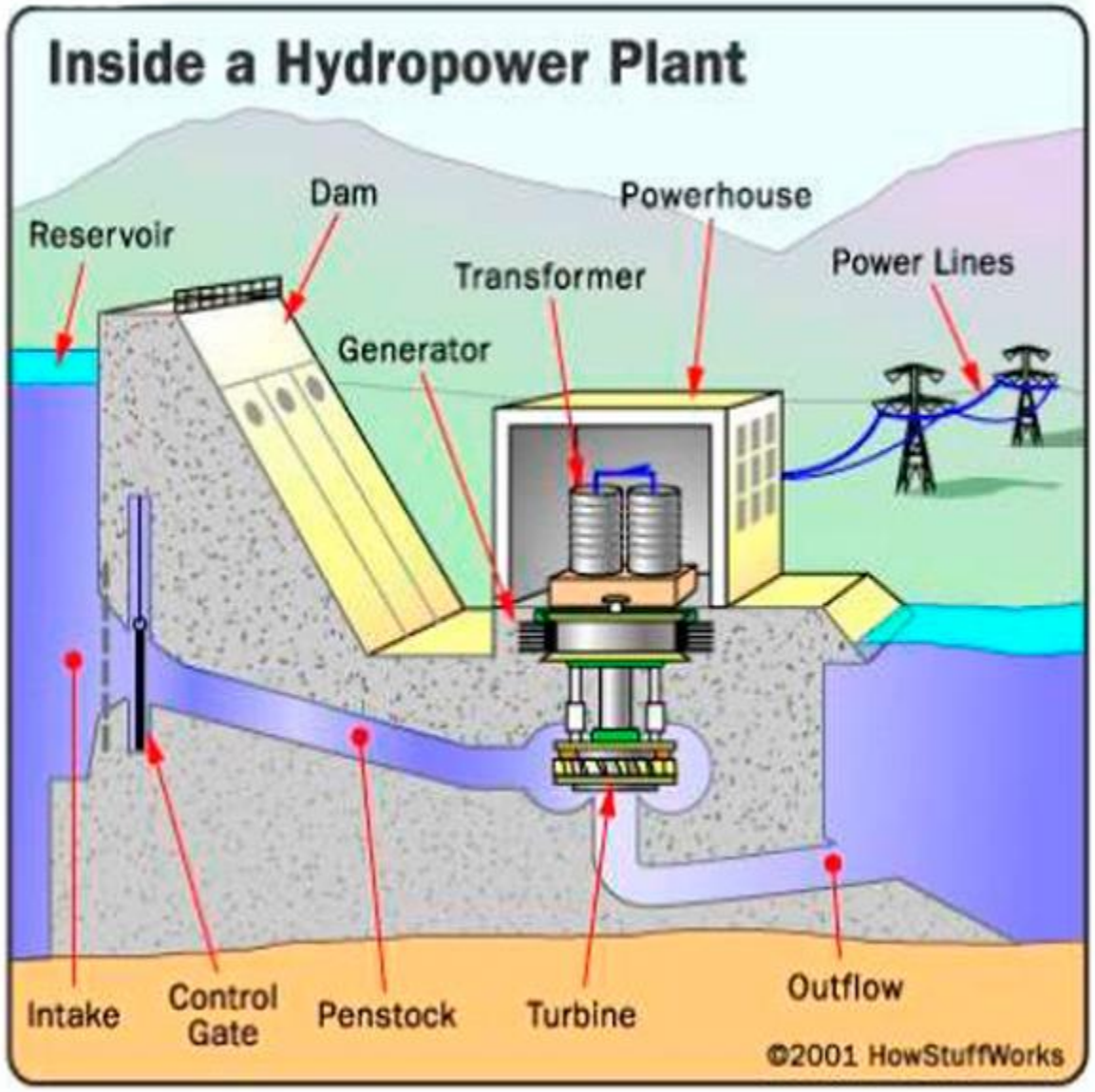
- Power generation:
  - Coal thermal power plant.
  - Hydroelectric power plant.
  - Wind power plant.
  - Solar power plant.

- Application:
  - Home appliances.
  - Industrial.

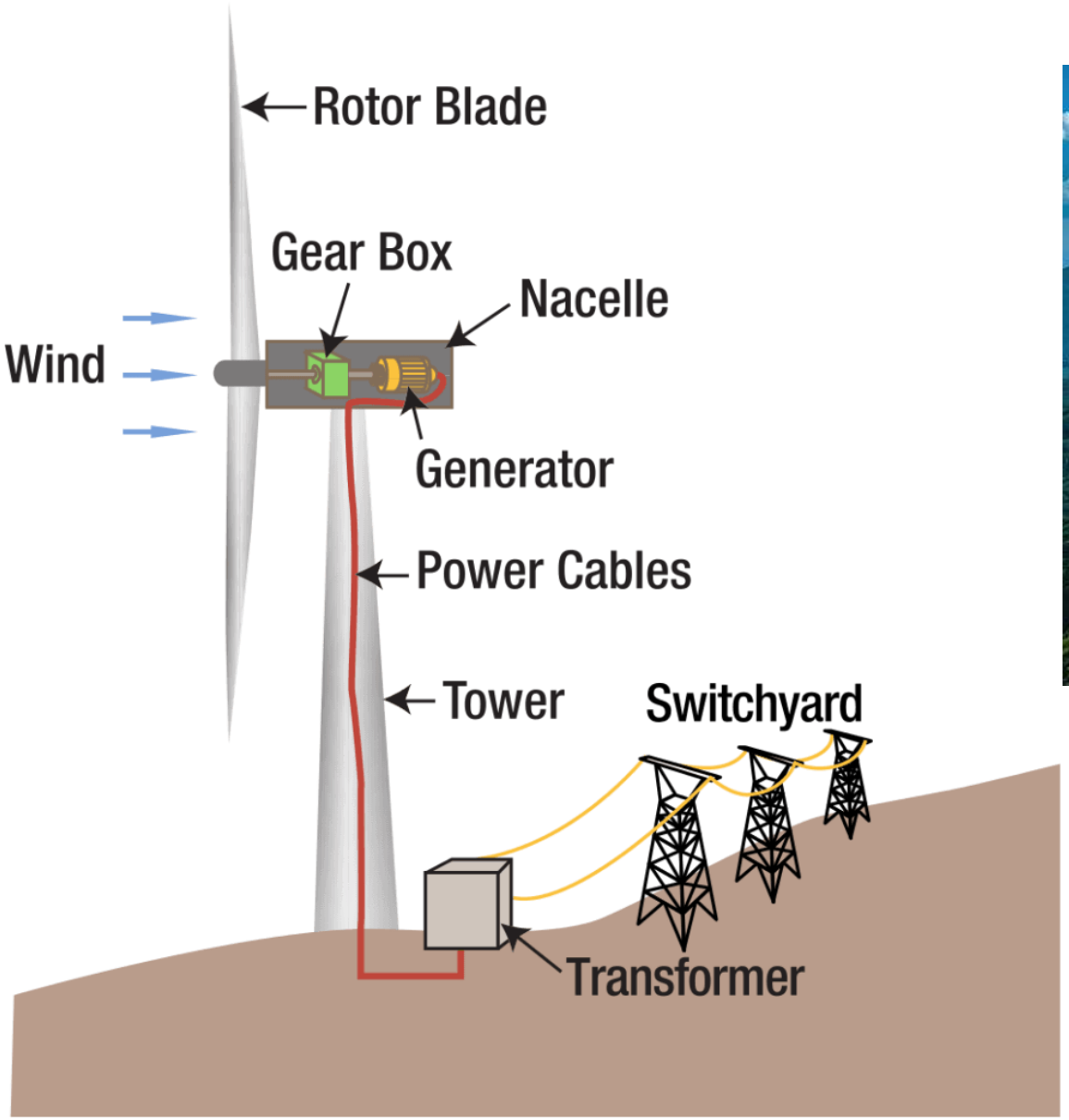
Coal thermal power plant



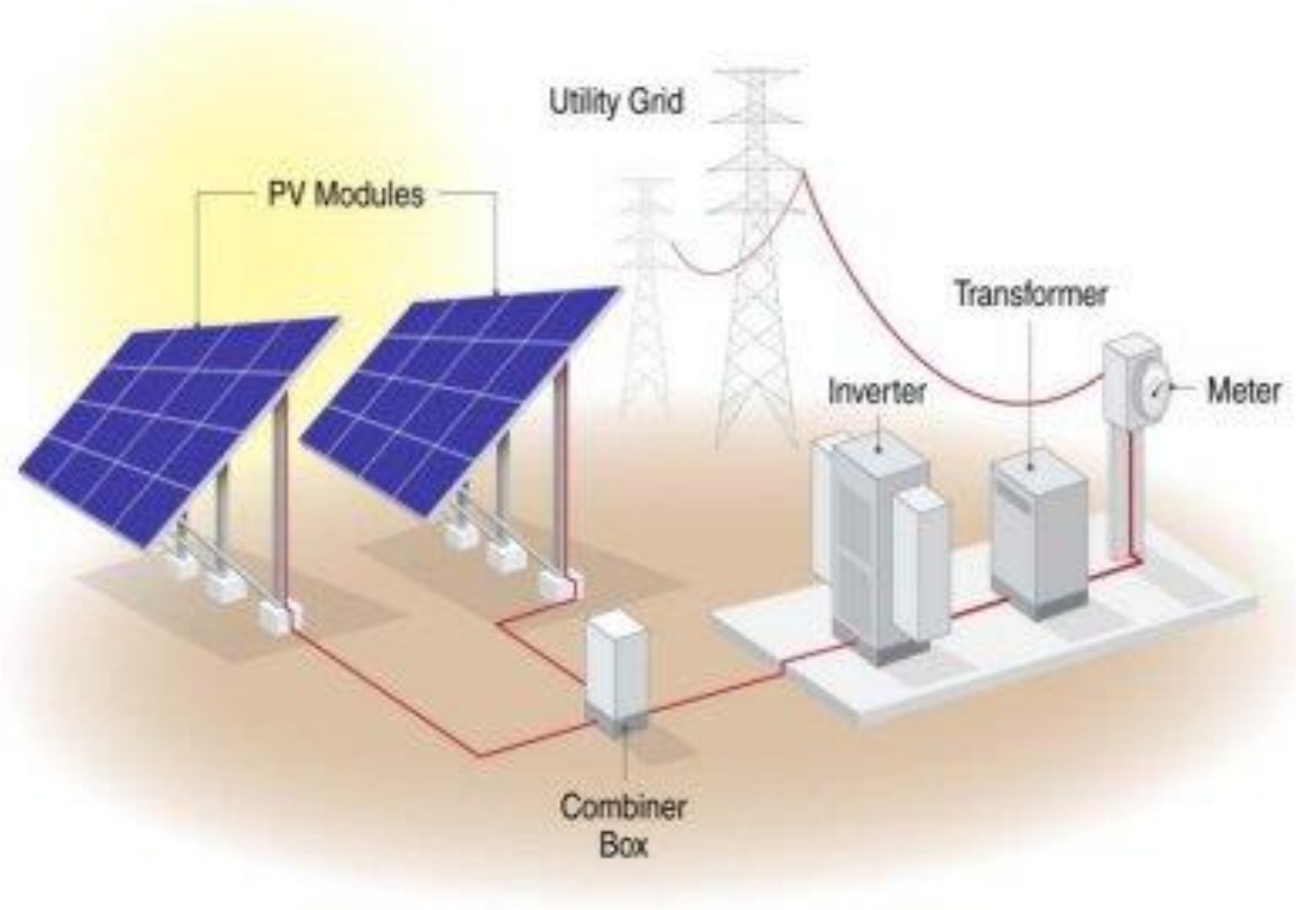
Hydroelectric Power Plant



Wind power plant



Solar power plant



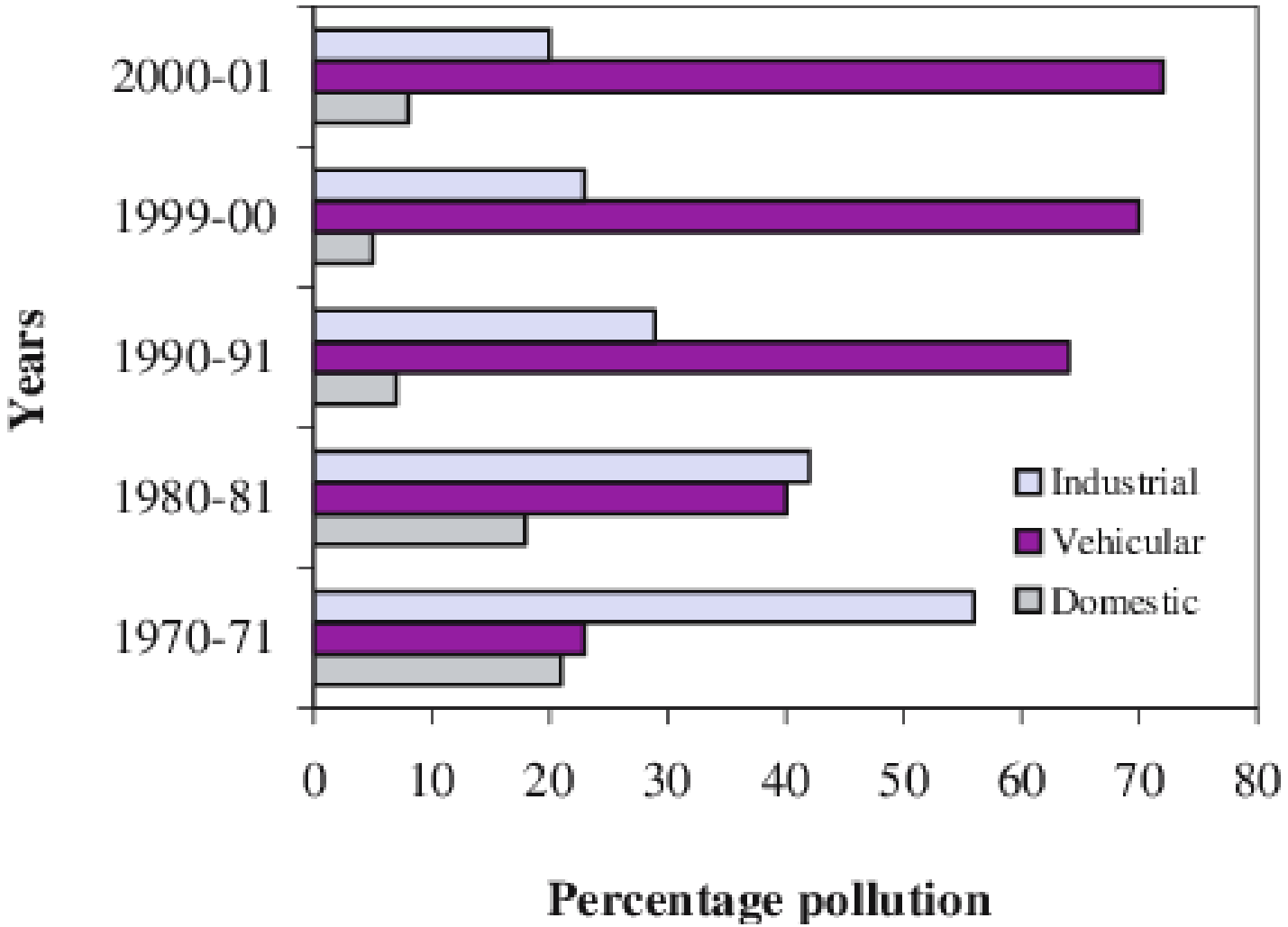
Application

- Some home applications:

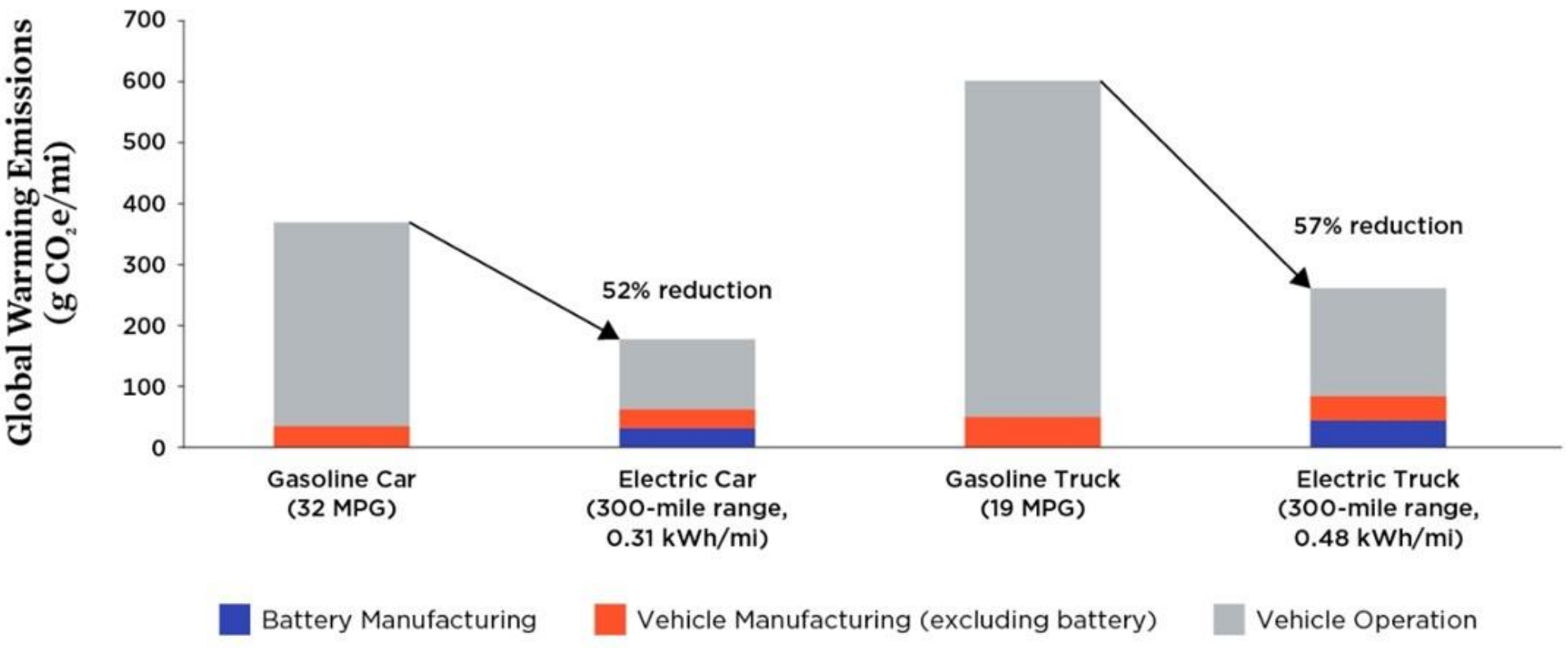
  - Water pumping (submersible pump): electrical motors.
  - Grinders: single phase motors.
  - Mixers: Universal motors.
  - Compressors: refrigerators.
  - Fan.
  - Induction Cooker.
  - etc.

Application…

- Few industrial application
  - Diesel locomotives.
  - Electric locomotives.
  - Fork lift trucks.
  - Material handling system.
  - Rolling mills.
  - Spindle and feed drives.
  - Synchronous capacitors.
  - etc.


2000-01
1999-00
1990-91
1980-81
1970-71
Years
Industrial
Vehicular
Domestic
0
10
20
30
40
50
60
70
80
Percentage pollution

Electric Vehicle vs Gasoline Vehicle



Electric Vehicles

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