

# Audit Energi Listrik

Oleh:

*Dr. Giri Wiyono, M.T.*

*Jurusan Pendidikan Teknik Elektro, Fakultas Teknik  
Universitas Negeri Yogyakarta*

[giriwiyono@uny.ac.id](mailto:giriwiyono@uny.ac.id)

# Audit Energi (*Energy Audit*)

- Energy Conservation
- Energy Efficiency
- Energy Management
- Energy Audit





# Energy Conservation

- **(Free Encyclopedia):**
- Efforts to reduce energy consumption through the result of several processes or developments, such as productivity increase or technological progress.



# Energy Efficiency

- **(Free Encyclopedia):**
- The goal of efforts to reduce the amount of energy required to provide products and services. It is achieved when energy intensity in a specific product, process or area of production or consumption is reduced without affecting output, consumption or comfort levels.
- **Sometimes called efficient energy use.**



# Energy Management (1)

- Energy Management is a technical and management function the remit of which is to monitor, record, analyze, critically examine, alter and control energy flows through system so that energy is utilized with maximum efficiency.
- (Paul O'Callaghan, Energy Management)



## Energy Management (2)

- The strategy of adjusting and optimizing energy, using systems and procedures so as to reduce energy requirements per unit of output while holding constant or reducing total costs of producing the output from these systems
- (Bureau of Energy Efficiency, India)



# Energy Audit (1)

- **(Free Encyclopedia)**
- An energy audit is an inspection, survey and analysis of energy flows for energy conservation in a building, an industry, process or system to reduce the amount of energy input into the system without negatively affecting the output(s).



## Energy Audit (2)

- (US Agency for International Development)
- Energy audit is a tool to identify areas where energy can be conserved.





## Energy Audit (3)

- **(Guide Book: Energy Audit)**
- The verification, monitoring and analysis of use of energy including submission of technical report containing recommendations for improving energy efficiency with cost benefit analysis and an action plan to reduce energy consumption.



## Energy Audit (4)

- (PP 70 tahun 2009 tentang Konservasi Energi)
- Audit Energi adalah proses evaluasi pemanfaatan energi dan identifikasi peluang penghematan energi serta rekomendasi peningkatan efisiensi pada pengguna energi dan pengguna sumber energi dalam rangka konservasi energi.



# Preliminary Energy Audit

- Preliminary energy audit is a relatively quick exercise to :
  - Establish energy consumption in the organization
  - Estimate the scope for saving
  - Identify the most likely (and the easiest areas for attention)
  - Identify immediate (especially no-cost/low-cost) improvements/savings
  - Set a 'reference point'
  - Identify areas for more detailed study/measurement
  - Preliminary energy audit uses existing, or easily obtained data



# Detailed Energy Audit (1)

- A comprehensive audit provides a detailed energy project implementation plan for a facility, since it evaluates all major energy using systems.
- This type of audit offers the most accurate estimate of energy savings and cost. It considers the interactive effects of all projects, accounts for the energy use of all major equipment, and includes detailed energy cost saving calculations and project cost.



## Detailed Energy Audit (2)

- In a comprehensive audit, one of the key elements is the energy balance.
- This is based on an inventory of energy using systems, assumptions of current operating conditions and calculations of energy use.
- This estimated use is then compared to utility bill charges.

# Peraturan Pemerintah No. 70/2009 Pasal 12

- Pemanfaatan energi oleh pengguna sumber energi dan pengguna energi wajib dilakukan secara hemat dan efisien.
- Pengguna sumber energi dan pengguna energi yang menggunakan sumber energi dan/atau energi lebih besar atau sama dengan 6.000 (enam ribu) setara ton minyak per tahun wajib melakukan konservasi energi melalui manajemen energi.

# Peraturan Pemerintah No. 70/2009 Pasal 12

- Manajemen energi dilakukan dengan:
  - menunjuk manajer energi;
  - menyusun program konservasi energi;
  - melaksanakan audit energi secara berkala;
  - melaksanakan rekomendasi hasil audit energi; melaporkan pelaksanaan konservasi energi setiap tahun kepada Menteri, gubernur, atau bupati/walikota sesuai dengan kewenangannya masing-masing.



# Auditor energi dari Berbagai Institusi:

- Freelance energy auditors
- Energy Audit / Energy Management Consultants
- Mechanical & Electrical Consultants
- Equipment manufacturers / suppliers
- Energy committee in industries
- Energy audit training centers
- Research centers
- Universities
- Related government officers





# Langkah-Langkah Audit Energi

- Seeking for where the greatest energy consumed goes to
- Measuring the energy losses started from the greatest energy consumer
- Analyzing the problem
- Establishing a saving strategy
- Calculating the saving and payback period
- Implementing the strategy.



# Analisis Data dalam Audit Energi

1. Energy Consumption (kWh, Joule)
2. Energy Intensity / Specific Energy Consumption :  
(kWh/Ton Prod), (Ton Steam/Ton Prod),  
(kWh/m<sup>2</sup>/bl)(kW/TR),  
(liter of Oil/Ton Steam), (lumen/watt)
3. Lighting Intensity (lux) for specific activity
4. Power Intensity (watt/m<sup>2</sup>, pk/m<sup>2</sup>)



# Analisis Data dalam Audit Energi

5. Energy Distribution (Energy used and losses).
6. Efficiency and effectively of equipment
7. Aspects of human comfort and lighting comfort
8. Energy saving potentials (kWh/thn, Rp/thn.)
9. Energy Management Planning



# Laporan Audit Energi

- Executive Summary
  - Energy Balance
  - Profile of Energy Consumption
  - Specific Energy Consumption
- Introductory
  - Background
  - Aims and Goals
  - Scope of Activities
  - Methodology



# Laporan Audit Energi

- Evaluation of Thermal Systems
  - Thermal Energy Balance
  - Thermal Energy Consumption
  - Combustion System & Thermal Analysis
  - Heat Integration and Process Analysis
- Electrical System Evaluation
  - Electrical Energy Balance
  - Electrical Energy Consumption
  - Demand Factor Analysis
- Evaluation of Energy Management
  - Asesemen of Energy Management



# Tugas 3

- **Buatlah makalah tentang Langkah dalam Audit Energi Listrik berdasarkan Kajian teori dari sumber pustaka**
- **Ketentuan tugas:**
  - **Tugas kelompok 2 orang**
  - **Kajian: masalah dan solusinya dilengkapi dengan diagram, gambar, data**
  - **Diemail: giri\_wiyono @ yahoo.com**
  - **Tugas terbaik nilai A dan presentasi**



**Terimakasih**