Energy System Optimization: Maximizing energy savings

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Overview

Context

- Issues
- Opportunities

Industrial Energy Management

- Energy Management Systems (EnMS)
- ISO 50001
- Culture and Operations
- Benefits and costs
- System Optimization

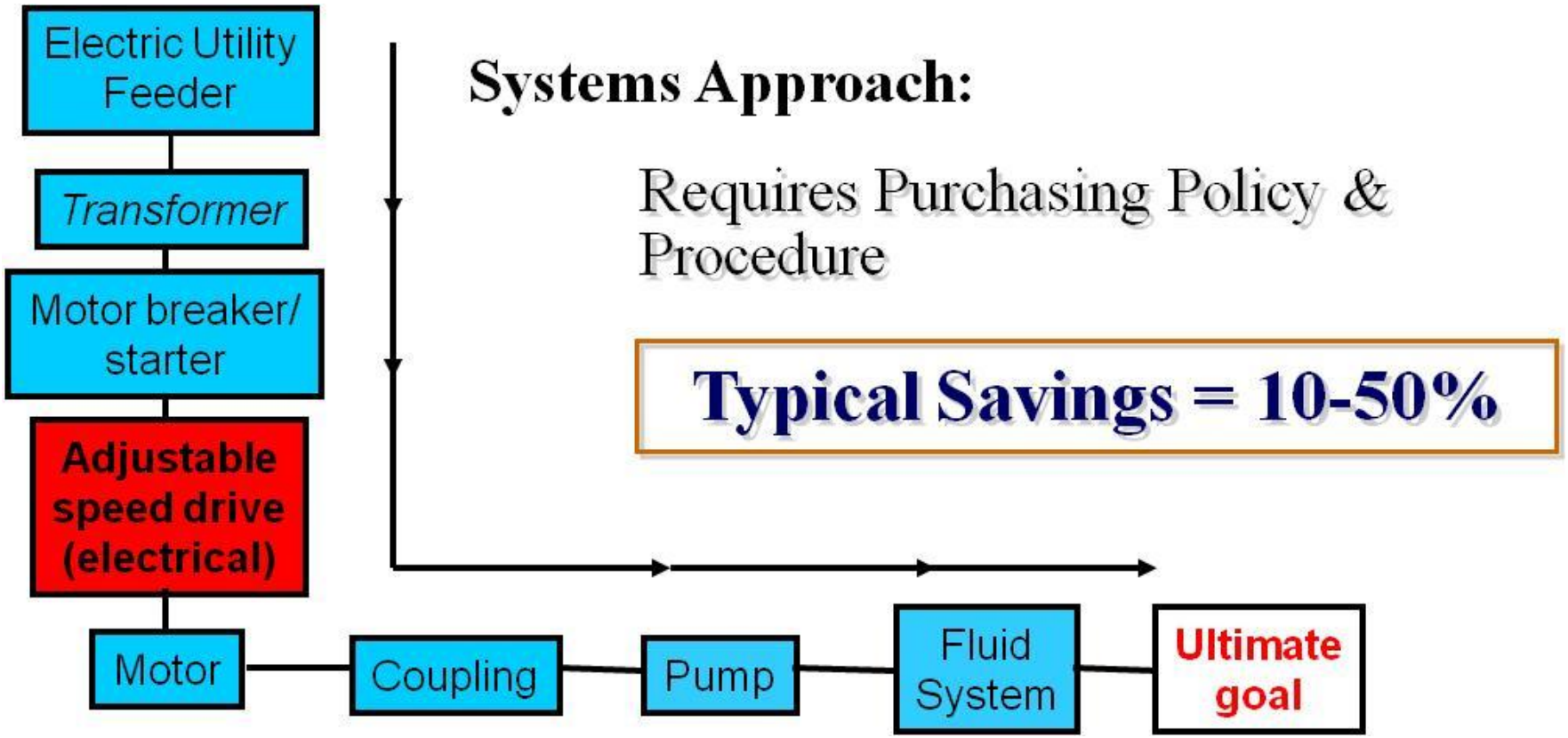
Supports

- Regulation & Resources
- UNIDO

Component v system approach

- Component approach involves segregating components and analyzing in isolation
  - Can result from education by particular technology sales engineer, e.g. variable speed drive, steam trap, etc
- System approach involves looking at how the whole group functions together and how changing one can help or impact another
  - Requires more knowledge of the system and its interactions
- The energy savings opportunities from systems are far greater than from individual components
  - 2-5 % efficiency gains for individual components against 15-30% average efficiency gains through system optimization

Pumping System



Why a system approach matters in industry

- Industrial operations are more variable than commercial or residential
  - Production schedules change
  - Utilities need to follow production yet remain optimized
  - Commercial heating/cooling system sometimes behave like this
- Potential savings are much greater
- Implementation costs are often lower through fast payback often measured in months.
- Steam and motor driven systems account for over 50% of final manufacturing energy use worldwide
- Why would you optimize a boiler efficiency at say 70% of output and then reduce output?

Why do opportunities exist?

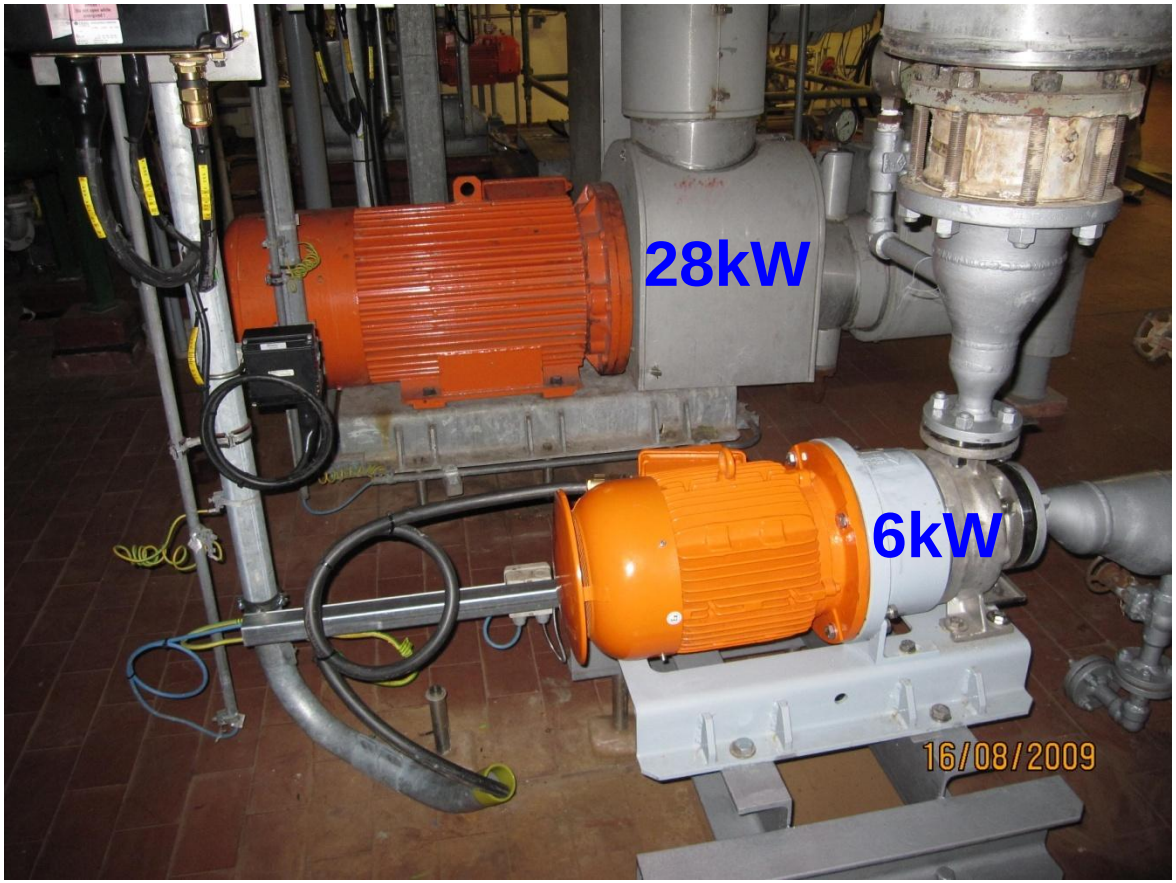
- Most energy systems are designed with:
  - The assumption that more is better
  - Little or no thought is given to system efficiency
  - No plan for future change in system demand (up only!)
  - “Lowest first cost” V life Cycle Cost (LCC)
  - Separate budget for project and operation
- Changes to existing systems face the same issues
- Poor (=cheapest) commissioning
- Improper operation
- Poor maintenance
- System requirements change over time

Typical system approach process

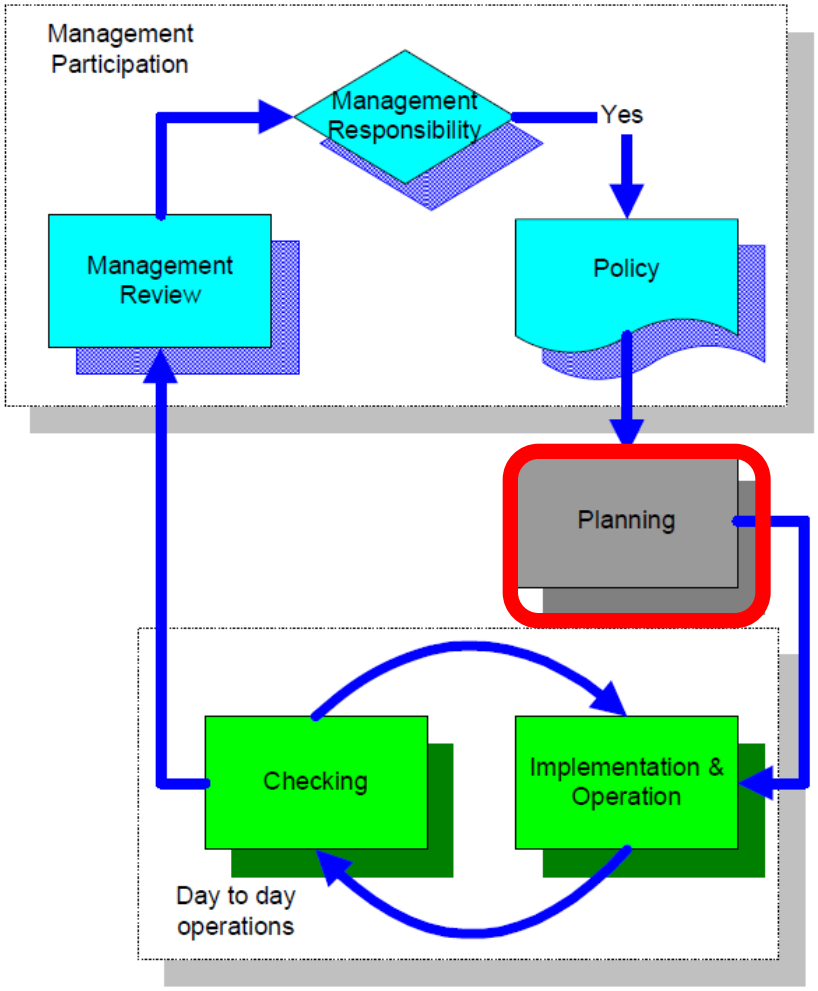
- What does the user need?
  - Consider variations, e.g. seasonal, occupancy, production schedules, alternative services, etc.
- Optimise use of the service
  - How is it used, operations, controls, etc.
- Optimise distribution of the service
  - Leaks, pressure drops, insulation, etc.
- **FINALLY** optimise generation of the service
  - Boilers, chillers, air compressors, pumps, etc.

Pump system example

1. Minimise user requirement
2. Shut bypasses
3. Determine actual flow and pressure requirement
4. Reselect motor and pump
5. Replace 150m3/h with 25m3/h
6. Save 75% or 176MWh p.a.



Planning



- How much energy are you using?
- Where are you using it? Which are significant?
- What is driving this use?
- What is your baseload?
- Who is influencing its use?
- Is an energy audit required – focus it?
- **Energy System Optimization**
- Renewable energy options
- Are there legal or other requirements?
- Develop baseline & indicators
- Set objectives and targets
- **Action Plan**

Energy Management plus System Optimization

Energy management standard provides:

- A framework for understanding significant energy use
- Action Plans to continually improve energy performance
- Documentation to sustain energy performance improvements

System optimization provides:

- A method of assessing systems to identify energy performance improvement opportunities
- Actions that can provide significant energy savings with no or limited capital investments
- More reliable operations

Energy Management + Systems Optimization **=** ***Winning Strategy for all Industrial Sectors & Sizes***

Thank you for your attention