Develop an understanding of, and follow a structured process towards energy management implementation.

LEVEL:	6
CREDITS:	5
FIELD:	Physical Planning and Construction
SUBFIELD:	Industrial Energy Managers
ISSUE DATE:	
REVIEW DATE:	

PURPOSE OF THE UNIT STANDARD:

This unit standard is for persons in the Engineering, Construction and Energy Sectors.

A person credited with this unit standard will be able to:

- Advise on the implementation of a systematic assessment of energy systems
- Identify savings opportunities.

This unit standard will contribute to the full development of the learner within the engineering, construction and energy environment by providing recognition, further mobility and transportability within the field of Physical Planning and Construction. The skills, knowledge and understanding demonstrated within this unit standard are essential for social and economic transformation and upliftment within the engineering, construction and energy environment.

LEARNING ASSUMED TO BE IN PLACE:

The following knowledge, skills attitude and / or equivalent:

- A minimum of a National Diploma (Engineering) at NQF Level 5 or equivalent.
- An understanding of electrical engineering principles at in the context of industrial systems.
- An understanding of mechanical engineering principles in the context industrial systems.
- A working knowledge of operations maintenance in industry.
- A working knowledge of relevant sections of the OSH Act.
- A working knowledge of relevant sections of SANS.
- A working knowledge of management principles.
- A working knowledge of tariffs, energy use and demand principles.
- A working knowledge of data processing.

SPECIFIC OUTCOMES AND ASSESSMENT CRITERIA

SPECIFIC OUTCOME 1:

Understand the cost of energy.

ASSESSMENT CRITERIA:

1.1 Electricity metering is understood and explained in terms of the tariff structure and the metering technology.

1.2 The electricity bill is understood, explained and the data applied in terms of tariff structure and the provider.

1.3 The value of energy management measures are correctly estimated in terms of the incremental cost of electricity.

1.4 Thermal energy sources are evaluated and selected in terms of their characteristics.

Range: Thermal energy sources include but are not limited to: Fuel oils, natural gas, LPG and coal.

Characteristics include but are not limited to: Transportation, storage, thermal energy content, application, renewable or non-renewable, cost, waste products and pollutants.

1.5 Water consumption is analysed in terms of MT&R techniques.

SPECIFIC OUTCOME 2:

Compare present energy use with historical and industry data.

ASSESSMENT CRITERIA:

2.1 Electricity data is tabulated in terms of historical raw data and derived data.

Range: Data includes but is not limited to: kWh/Day, Load Factor, Cost calculations, Cost Distribution between Demand and Energy, Energy and Demand Intensity and average Energy Cost (Blended rate.).

2.2 Fuel consumption data is tabulated in terms of thermal energy breakdown.

2.3 Data of other variables are tabulated in terms of their influence on energy consumption.

Range: Other variables include but are not limited to: Products, weather and occupancy.

2.4 Data is analysed in terms of production, savings objectives, unexpected changes, confirmed savings and comparisons.

Range: Comparisons include: Historical and benchmark.

2.5 External energy management opportunity financing options are evaluated in terms of the source and the conditions.

SPECIFIC OUTCOME 3:

Understand energy demand.

ASSESSMENT CRITERIA:

3.1 The demand profile is understood in terms of tabular and graphical representations.

Range: Representations include but is not limited to: Manual (Tabular) demand profile, Graphical 24hr demand profile and 15 minute interval Demand Profile.

3.2 The demand profile is understood in terms of the demand profile factors.

Range: Demand profile factors include but are not limited to: Peak demand, Night Load, Start-Up, Shut-Down, Weather Effects, Cyclical Loads, System Interactions, Occupancy Effects, Production Effects and Problem Areas.

3.3 A demand profile is obtained by means of an appropriate method.

Range: Methods include but are not limited to: Periodic utility meter readings, Recording clip-on ammeter measurements, Basic and multi-channel recording power meters, Energy Management System and Dedicated monitoring system.

3.4 The demand profile is analysed in terms of Energy Management Opportunities.

SPECIFIC OUTCOME 4:

Understand energy use.

ASSESSMENT CRITERIA:

4.1 An electrical load inventory is carried out to determine where electricity is used and how much and how fast it is used.

4.2 A thermal energy inventory is carried out to determine where fuel is used and how much and how fast it is used.

4.3 The facility is evaluated and energy flow quantified in terms of energy system boundary and an energy flow diagram.

4.4 The energy impact of water efficiency is understood and quantified in terms of potential savings.

4.5 Energy inventories are understood and explained in terms of their benefits.

4.6 A critical assessment is carried out in order to identify energy savings opportunities.

SPECIFIC OUTCOME 5:

Understand how to match the usage to the requirement.

ASSESSMENT CRITERIA:

5.1 An electrical load inventory is carried out to determine where electricity is used and how much and how fast it is used.

5.2 A thermal energy inventory is carried out to determine where fuel is used and how much and how fast it is used.

5.3 The facility is evaluated and energy flow quantified in terms of energy system boundary and an energy flow diagram.

5.4 The energy impact of water efficiency is understood and quantified in terms of potential savings.

5.5 Energy inventories are understood and explained in terms of their benefits.

SPECIFIC OUTCOME 6:

Understand how to maximise system efficiencies.

ASSESSMENT CRITERIA:

6.1 The principles of energy efficiency is understood, explained and applied in terms of industrial plant and processes.

6.2 Energy efficiency is understood and applied in terms of plant housekeeping.

6.3 Energy efficiency is understood and applied in terms of plant maintenance.

6.4 Energy efficiency is understood and applied in terms of plant operation.

6.5 Energy efficiency is understood and applied in terms of plant equipment/technology.

SPECIFIC OUTCOME 6:

Understand and maximise system efficiencies.

ASSESSMENT CRITERIA:

6.1 The principles of energy efficiency are understood, explained and applied in terms of industrial plant and processes.

6.2 Energy efficiency is understood and applied in terms of plant housekeeping.

6.3 Energy efficiency is understood and applied in terms of plant maintenance.

6.4 Energy efficiency is understood and applied in terms of plant operation.

6.5 Energy efficiency is understood and applied in terms of plant equipment/technology.

SPECIFIC OUTCOME 7:

Understand and optimise the energy supply.

ASSESSMENT CRITERIA:

7.1 The supply of energy is understood and optimized through technological or supply interventions.

Range: Technological or supply interventions include but are not limited to: Waste heat recovery, heat pumps, co-generation, renewable energy and competitive supplier.

7.2 Supply optimisation is understood and comprehensively assessed in terms of benefits and costs.

Range: Benefits include but are not limited to: Direct energy savings, in-direct energy savings, comfort level improvement, productivity increases, operation and maintenance cost reduction and environmental impact reduction.

Costs include but are not limited to: Direct implementation costs, direct energy costs, in-direct energy costs and operation and maintenance cost increase.

7.3 Supply optimisation is understood and comprehensively assessed in terms of savings.

Range: Savings include but are not limited to: Electrical energy, electrical demand, fuel, and indirect savings.

Indirect savings include but are not limited to: Reduced air-conditioning loads, reduced maintenance costs, reduced lamp replacement costs, increased productivity and increased equipment life.

7.4 Supply optimisation is understood and comprehensively assessed in terms of disadvantages associated with savings opportunities.

Range: Disadvantages could include but are not limited to: Increased maintenance costs, reduction in illumination level, increased heating costs through reduced lighting, reduced productivity because of reduced work environment quality, reduced safety, implementation risks and negative impacts on existing equipment.

7.5 The environmental impact of energy supply optimisation is understood and quantified in terms of emission and other pollutant reductions.

ACCREDITATION AND MODERATION OPTIONS:

1. Anyone assessing a learner against this unit standard must be registered as an assessor with the relevant ETQA.
2. Any institution offering learning that will enable achievement of this unit standard must be accredited as a provider through the relevant ETQA.
3. Moderation of assessment will be overseen by the relevant ETQA according to the moderation guidelines in the relevant qualification and the agreed ETQA procedures

NOTES:

1. CRITICAL OUTCOMES

The following critical outcomes are addressed in this unit standard:

1. Identify and solve problems (Identify potential barriers and practical problems and solve them for energy management to be carried out.)
2. Organise and manage oneself (Understand and manage the energy management process.)
3. Communicate (Describe how energy management opportunities can be carried out.)
4. Use science and technology (Identify technology opportunities for energy management.)
5. Understand the world as a set of related systems (Understand the global impact of the efficient use of energy in terms emission mitigation.)

2. ESSENTIAL EMBEDDED KNOWLEDGE

Knowledge that will help me understand and that I will be able to explain:

- An understanding of energy costs.
- An understanding of energy management performance through benchmarking and historical comparisons.
- An understanding when energy is used.
- An understanding where energy is used.

- An understanding of how to match the usage to the requirements.
- An understanding of how to maximise system efficiencies.
- An understanding of how to optimize the energy supply.

3. SUPPLEMENTARY INFORMATION:

SPECIFIED REQUIREMENTS include legal and legislative specific requirements and are contained in one or more of the following documents

- Relevant ISO Standards
- OSH Act
- Relevant SANS standards and codes
- South African Building Code
- Specifications, agreements, policies and procedures of the relevant organisation
- User manuals supplied by manufacturers

SUPLEMENTARY READING

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A ***glossary of terms*** about the terminology of
CONTEXT SPECIFIC

CREDITS

Total hours required by the learner to achieve the required outcomes:

Activity	Hours
Classroom learning	5
On-the-job learning	32
Self directed learning	5
Coaching required	8
Other	
TOTAL	**50**

CREDITS ACHIEVED: 5