A Strategic Review of Energy Management Systems In Significant Industrial Sites in Ireland

ECEEE 5-045-14

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TEMPO

- **Total Energy Management for Production Operations**
- A tool for tracking energy consumption during manufacturing.
- 2 RPOs, 3 Industry Pilot Sites,
- Industry Cluster - 20 LEs and 30 SMEs.

Survey

- Developed to identify performance, barriers and opportunities in a number of selected, exemplar sector specific companies.
- Leading Companies in EE Terms - All are certified to ISO14001, 3 are certified to ISO50001, All have CSR and Corporate Targets.
- 175 Questions completed through semi-structured interviews.
- 6 Companies, 40+ Employees across production, finance, facilites and management. 4-6 weeks per site. Completed, Jan – June 2013.

Survey Objectives

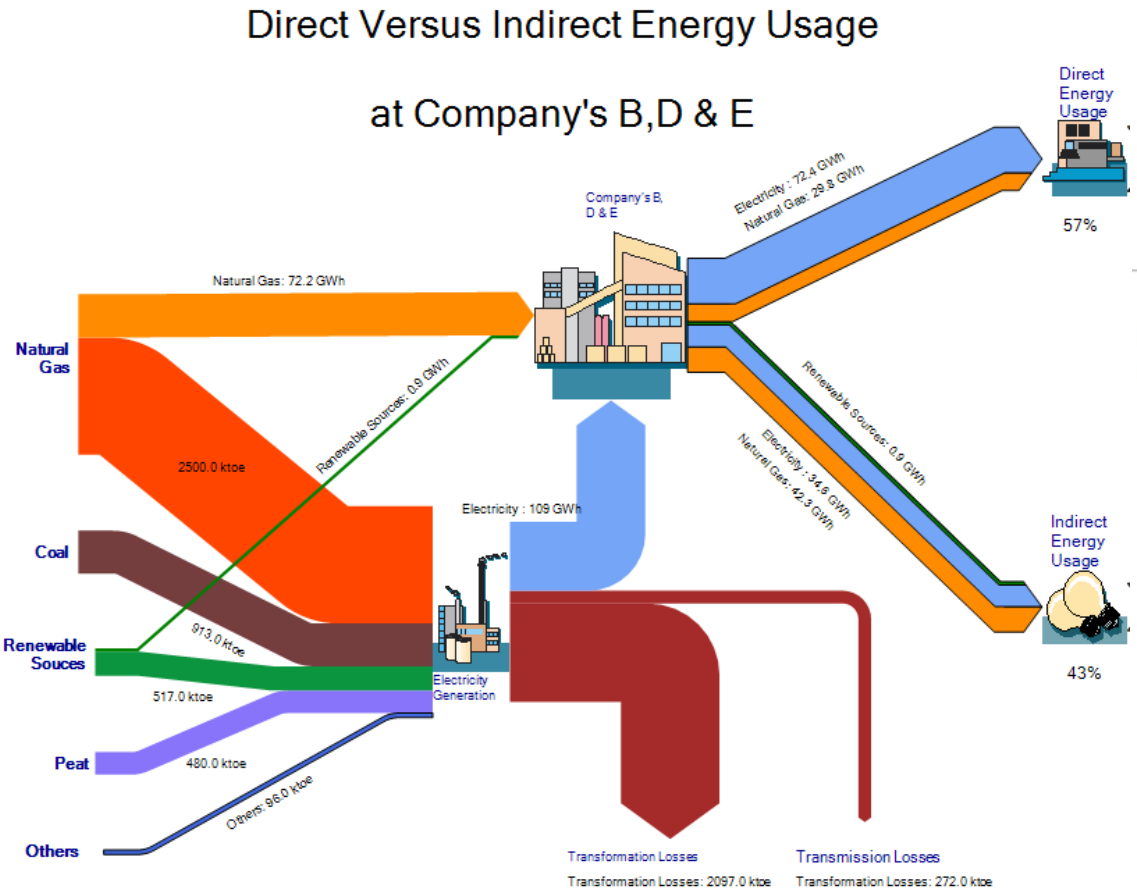
- To establish baselines for the total energy and water usage, carbon footprint and energy efficiency of the companies.
- To identify energy efficiency and energy monitoring exemplars projects within the companies.
- To analyse the relevant KPIs (Key Performance Indicators), Automation and IT systems that support production and their potential application in energy reduction.
- To develop the functional requirement specification for TEMPO.

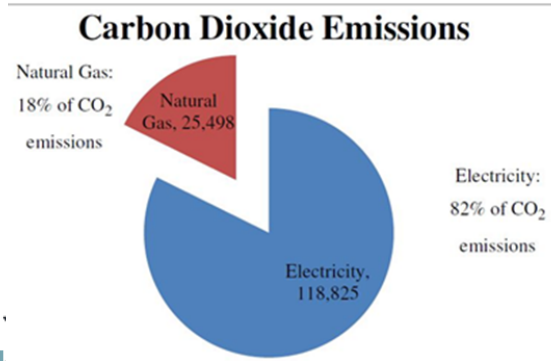
Companies

Pharmaceuticals, Medical Devices, Electronics, Semiconductor and Dairy.
Continuous and Discrete Manufacturing.

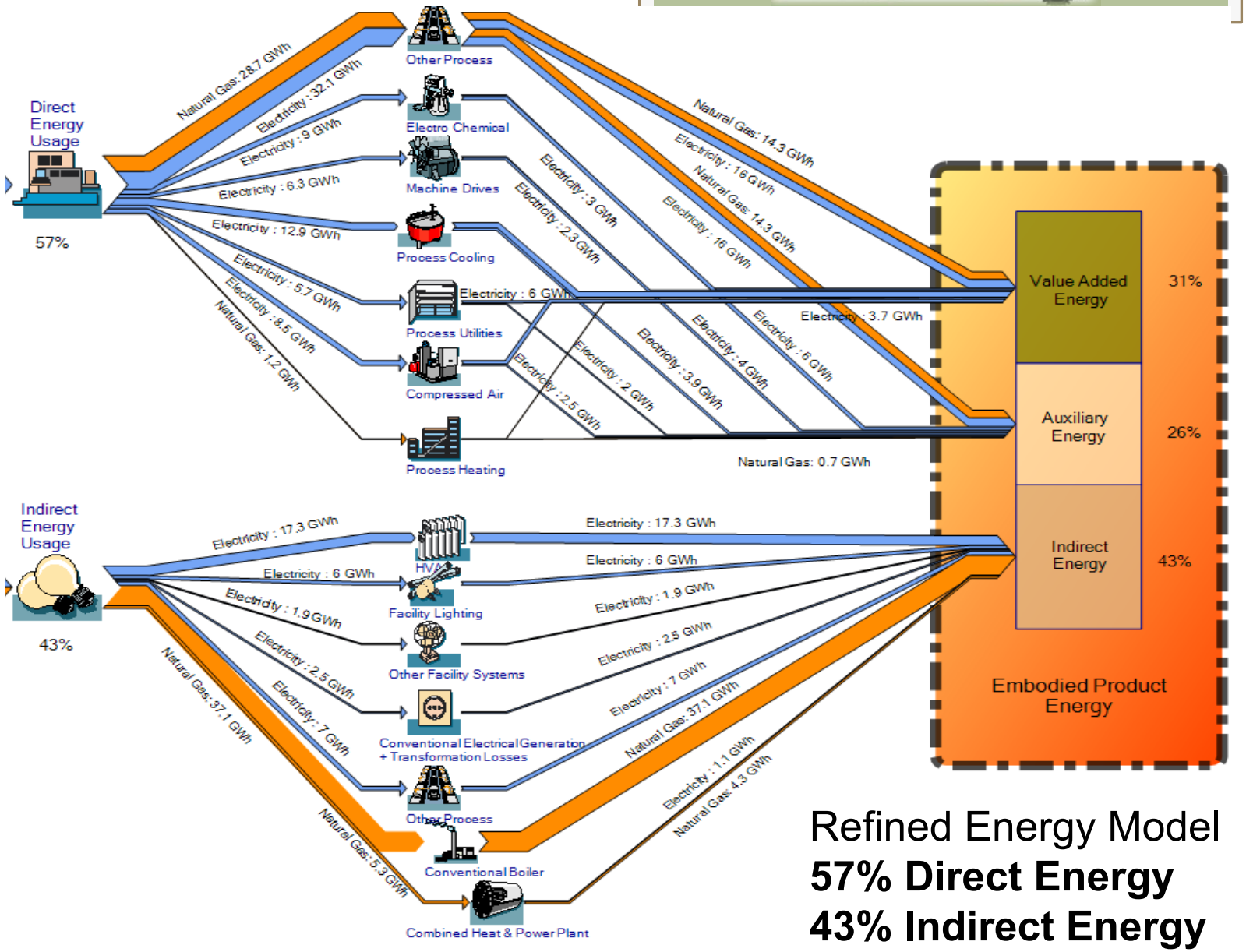
Detailed analysis:

- **6** Companies
- **7,000** employees
- **358** GWhr
- Electrical **64%**
- Natural Gas **36%**





€28m
Energy Spend (2011)

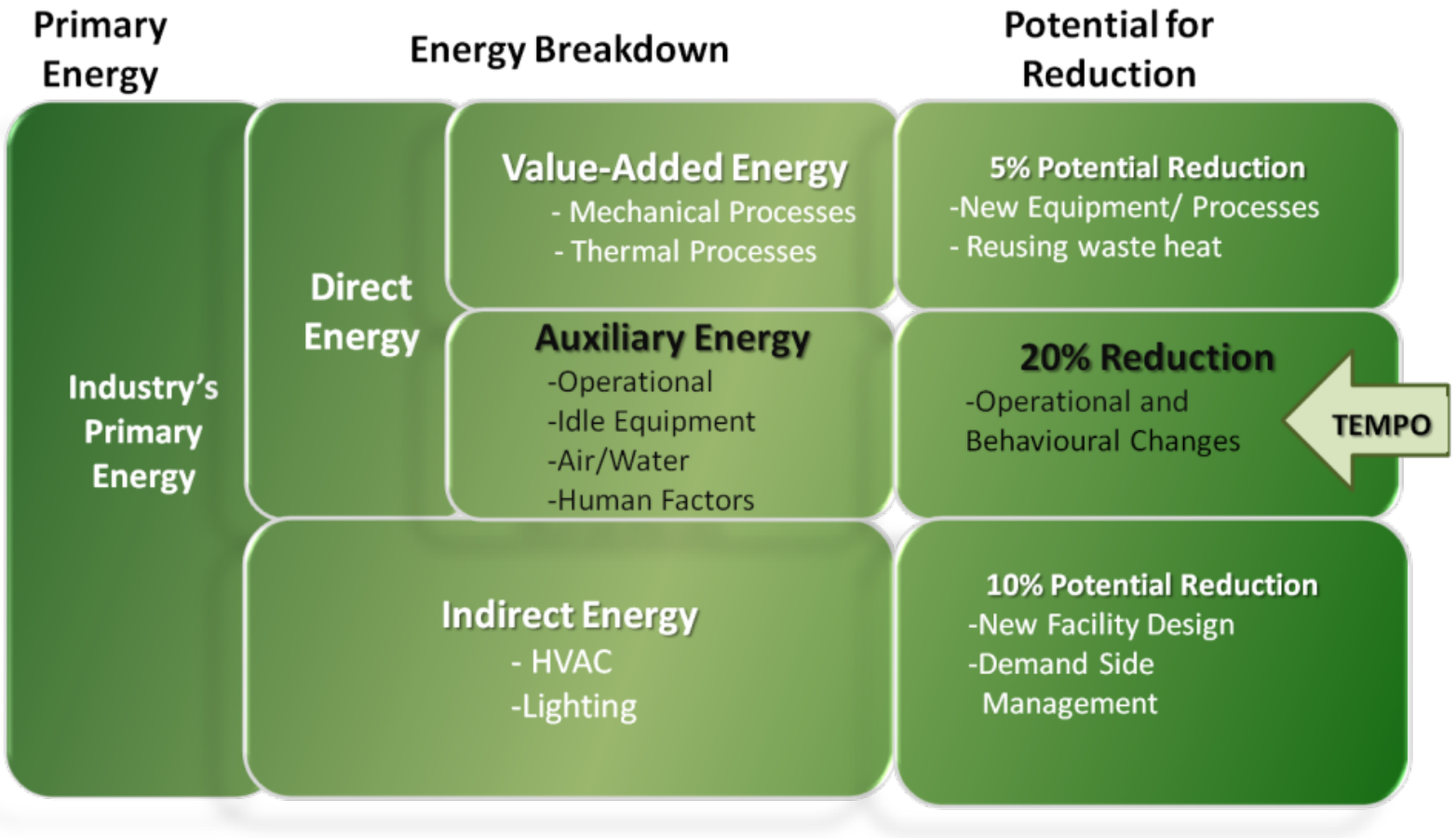


Refined Energy Model

57% Direct Energy

43% Indirect Energy

Energy Model

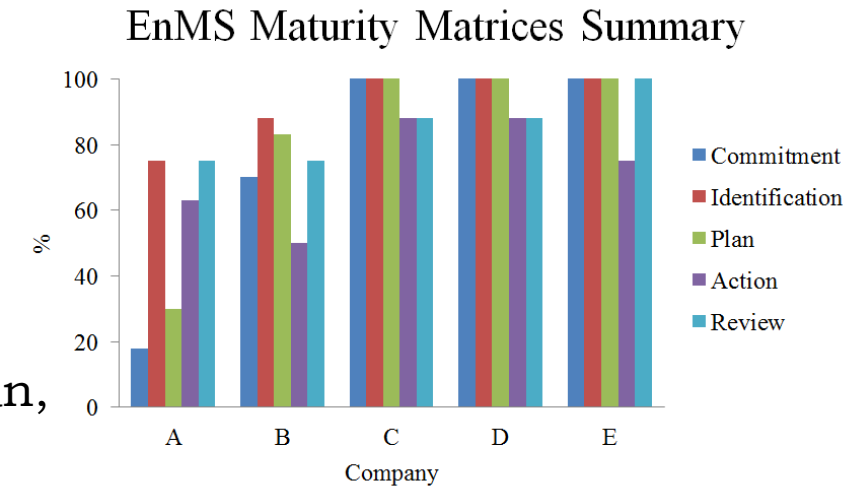


Extended from : Seow, Y., Rahimifard, S., 2011, A Framework for Modelling Energy Consumption Within Manufacturing Systems, CIRP Journal of Manufacturing Science and Technology, 4/3: 258–264.

Energy Management Systems

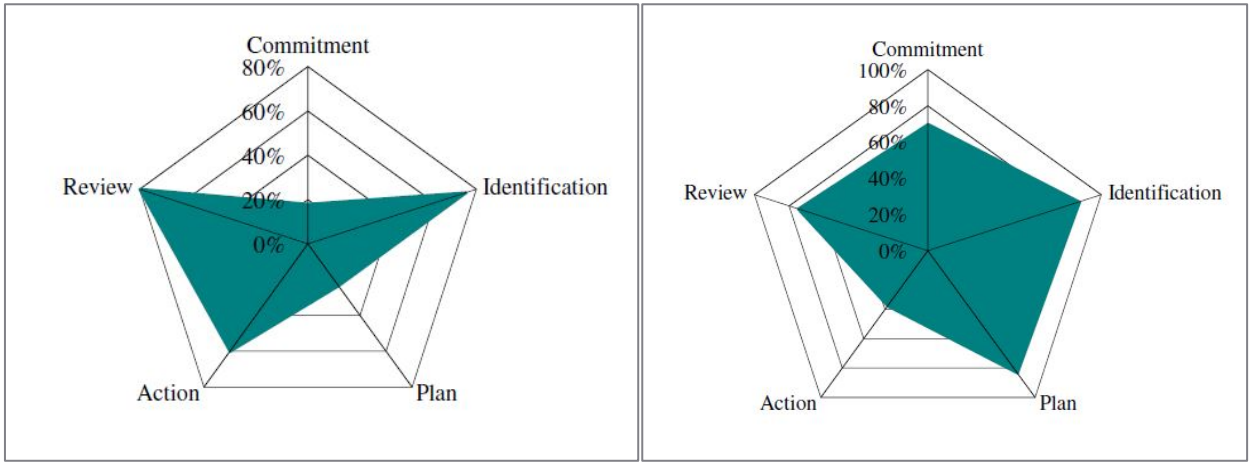
The main focus of this paper is to provide a strategic review of the respondent's energy management systems with regard to the levels of maturity of their EnMS, the key decision making priorities of management (and how they effect the energy strategy), as well as the barriers and potential opportunities, relevant to the further development of their EnMS.

The SEAI has developed a web-based tool (SEAI EnergyMAP, 2014) which may be used by industry to assess their energy management system under five pillars of excellence which are Commitment, Identification, Plan, Take Action and Review.



Maturity Index

- The level of maturity of each EnMS was assessed, scored and compared.



Barriers

Based on an analysis of the responses and other feedback, a few common themes emerged which was a lack of adequate human and capital resources and a difficulty in centralising the EnMS and maintaining compliance with regulatory bodies.

1. Human Resources
2. Cost
3. Commitment
4. Maintaining compliance with regulatory bodies
5. Maintaining quality
6. Competing priorities
7. Lacking EnPIs

Decision Making Priorities

Acountability	1	Capital Costs / Operating Costs
	2	Quality / Headcount
Dependability	3	Cycle time / Reliability
	4	Supply Chain / Supply of Utilities
Nice to Have	5	Energy consumption / production/ automation technology

Payback calculation were different in each site

Energy Metrics and Energy Performance Indicators

- None of the sites report the energy consumed as part of the production metrics.
- None of the sites attribute energy costs to the value streams based on metered data.
- None of the sites reported carbon emissions per product as a metric in the near future, however all expected to in the short term

Gaps

Key Energy Performance Indicators (EnPI)
Production Managers - Energy Intensity Indicators
Facilities Managers - Plant and Utilities Performance Indicators

All of the organisations identified a gap; there was no direct information technology link between the manufacturing and facilities systems.

They all agreed that having information on the current status of their energy performance indicators would facilitate a continuous improvement management systems philosophy.

Opportunities

- Metering costs need to kept as low as possible through virtual metering and use of existing databases
- Metering needs to be non-invasive to avoid production downtime.
- Models must be understood by production personnel.
- Models must be flexible to ongoing changes in production process, paths, machines and products.
- A hierarchical structure of EnPIs and Energy/Process views is needed.
- Linked Production and Energy models are necessary to facilitate DSM.

- **Given validated data (€s) for the actual energy consumption, the Value Stream Managers will drive continuous process improvements to eliminated energy waste.**

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Process Map Approach

Wait times to be added and additional value streams and/or processes to be mapped. Virtual and Simulated Meters being developed.

Tempo Structure