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Towers Inc.

The future of plastics

Business case

2024

Version 1.1

**The Implementation of A Real-time Energy Monitoring System**

*Note: This is a conceptual project designed to show my understanding of business analysis. The scenario involves a plastic producing company, aiming to implement a real time energy monitoring system. The data used is simulated and results projected are based on theoretical assumptions.*

**Executive summary**

This business case proposes the implementation of a real-time energy monitoring system at Towers Incorporated manufacturing plant. The system aims to reduce the company’s overall energy consumption, operational costs, and carbon footprints. With an estimated investment of £75,000, and annual savings of £40,000, executing this project will potentially result in a payback period of less than two years, while also reducing the carbon footprints by 1MtCO2. The project will be executed within six (6) months of project initiation, and the launch will be followed by post-implementation to determine if the return on investment (ROI) is on track, and continuous monitoring. Following the analysis of potential vendors, Facilio was observed to be the best option due the varieties of features the company offers, which fulfil the essential requirements. Because of the long-term benefits from the real-time energy monitoring system which aligns with the strategic goals of the company, it is recommended that the project should be undertaken.

**1.0 Introduction**

In today’s rapidly evolving technological landscape, the efficient management of energy resources is crucial for businesses aiming to reduce costs, improve operational efficiency, and meet sustainability goals. For Towers Inc., a company with extensive infrastructure and operations, the implementation of a real-time energy monitoring system represents a strategic move towards smarter energy usage and enhanced operational control. Real-time energy monitoring systems allow for continuous tracking of energy consumption, providing actionable insights that enable timely adjustments, proactive maintenance, and the identification of energy-saving opportunities. This introduction will explore the potential benefits, challenges, and key considerations involved in integrating such systems into Towers Inc.’s operational framework, emphasizing how they can transform energy management practices in a dynamic and competitive business environment.

**1.1 Problem Statement:**

Towers’ Incorporated (Inc.), a UK mid-sized manufacturing plant with a diverse range of products, total employees of 2,500, and15% market share, generates around £20 million turnover. The Towers Inc. energy consumption is around 120,000kWh/yr, which incurs the average annual energy cost of £100,000, and this is subject to potential increase due to uncertainties around UK energy prices. The lack of insights into energy usage has caused an annual increase of 12% in operational costs. Moreso, due to a long-term commitment towards sustainability, and contributing towards the UK carbon reduction targets, the company has recently been gearing efforts towards complying with environmental regulations.

Towers incorporated lacks detailed visibility into energy consumption patterns, difficulty in identifying energy waste, leading to inefficiencies and unnecessary costs. Moreover, the UK’s commitment to reducing carbon emissions and rising energy prices make it imperative for us to optimize our energy usage. Specific issues include:

* Lack of real-time visibility into energy usage patterns across different production processes and equipment.
* Rising energy costs in the UK market, putting pressure on profit margins.
* Difficulty in identifying energy waste and inefficiencies.
* Additional cost (penalty charge) of the use of inefficient machines in the factory.
* Challenges in complying with increasingly stringent UK energy efficiency regulations
* Absence of a systematic approach to monitor and reduce carbon footprint, hindering progress towards environmental compliance.

**1.2. Objectives**

The aim is to introduce solutions that provide real time monitoring and control, optimization of energy consumptions and reduce operational cost.

The objectives of the project are to;

1. Identify the major energy consumption points in the plant.
2. Provide insights into the energy consumption pattern to help management to optimise machinery use and optimise operational cost.
3. Minimise energy cost incurred due to inefficient energy consumption in production processes.
4. Achieve sustainable goals by reducing the company’s carbon footprints due to reduction in energy consumption.
   1. **Option analysis**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Do something | | | | Do nothing |
|  | Facilio | MRI Energy | IBM Envzi | Spacewell Energy |  |
| Data visualisation | Available | Available | Available | N/A | N/A |
| Rating | Medium | High | Low | High |  |
| Cost analysis | Available | Available | N/A | Available | N/A |
| Risk management | Available | N/A | Available | N/A | N/A |
| Compliance management | Available | N/A | N/A | Available | N/A |
| Alerts and Escalation | Available | Available | N/A | Available | N/A |
| Identification of inefficient equipments | Available | N/A | Available | Available | N/A |
| Total cost | £75,000 | £60,000 | £65,000 | £70,000 | N/A |
| Cost savings | £40,000 | £30,000 | £25,000 | £30,000 | £0 |
| Penalty charge | £0 | £10,000 | £0 | £0 | £10,000 |
| Carbon Emissions | 2MtCO2 | 2.5 MtCO2 | 2.5MtCO2 | 2MtCO2 | 3MtCO2 |

**2.2 Cost- benefit Analysis**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Facilio** | **Score** | **%** | **MRI Energy** | **Score** | **%** | **IBM Envzi** | **Score** | **%** | **Spacewell Energy** | **Score** | **%** |
| **Data visualisation** | Available | 5 | 5% | Available | 5 | 5% | Available | 5 | 5% | N/A | 1 | 5% |
| **Rating** | Medium | 3 | 5% | High | 5 | 5% | Low | 1 | 5% | High | 5 | 5% |
| **Cost analysis** | Available | 5 | 5% | Available | 5 | 5% | N/A | 1 | 5% | Available | 1 | 5% |
| **Risk management** | Available | 5 | 5% | N/A | 1 | 5% | Available | 5 | 5% | N/A | 1 | 5% |
| **Compliance management** | Available | 5 | 5% | Available | 5 | 5% | N/A | 1 | 5% | Available | 5 | 5% |
| **Alerts and Escalation** | Available | 5 | 5% | Available | 5 | 5% | N/A | 1 | 5% | Available | 5 | 5% |
| **Identification of inefficient equipments** | Available | 5 | 10% | N/A | 1 | 10% | Available | 5 | 10% | Available | 5 | 10% |
| **Cost savings** | £40,000 | 5 | 20% | £30,000 | 3 | 20% | £25,000 | 1 | 20% | £30,000 | 3 | 20% |
| **Penalty charge** | £0 | 5 | 10% | £10,000 | 1 | 10% | £0 | 5 | 10% | £0 | 5 | 10% |
| **Carbon Emissions** | 2MtCO2 | 5 | 20% | 2.5MtCO2 | 3 | 20% | 2.5MtCO2 | 3 | 20% | 2MtCO2 | 5 | 20% |
| **Total cost** | £75,000 | 1 | 10% | £60,000 | 5 | 10% | £65,000 | 3 | 10% | £70,000 | 3 | 10% |
| **Total score** |  | **4.5** |  |  | **2.95** |  |  | **2.8** |  |  | **3.8** |  |

Following the thorough analysis of the benefits and features from the Top four (4) vendors in the energy monitoring system industry, Facilio takes the lead with a big margin from Spacewell Energy. All the features considered are essential for the successful implementation of the project which also aligns with strategic goal of the company.

**2.2.1 Costs Analysis**

Hardware: Sensors and meters - £45,000

Software: Energy management platform - £10,000 (annual subscription)

Installation and Integration: £15,000

Staff training: £5,000

Total Initial Investment: £75,000

**2.2.2 Financial benefits**

* Estimated annual energy savings cost of £ 40,000 (10-15% reduction in energy costs)
* Reduced maintenance cost due to early identification of inefficient equipment: £10,000/year (from penalty charge).
* Potential savings from avoided peak demand charges: £5,000/year

**2.2.3 Non-Financial benefits**

* + Better energy management leading to Improved environmental performance and reduced carbon footprint (1MtCO2).
  + Energy saved: 20,000kWh/yr.
  + Easier reporting and enhanced compliance for energy efficiency regulations.
  + Better decision-making capabilities for production scheduling
  + Increased employee awareness of energy consumption

From the above analysis, If the project is executed, there will be Implementation of a comprehensive real-time energy monitoring system across the manufacturing plant after the proof of concept has been provided by the selected vendor. This will include.

* Smart meters and sensors throughout the factory
* A central data collection and analysis platform
* Real-time dashboards and reporting tools
* Integration with existing production management systems

On the other hand, if the project is not executed, the organisation will continue to incur the £100,000 with potentials to increase as equipment age, and rising energy cost. Also, it would be challenging to report the environmental compliance to energy regulations authorities, and that could attract additional penalty resulting into loss of profit to the business.

**2.3 ROI Analysis:**

* Total investment: £75,000
* Current annual energy cost: £100,000
* Estimated annual cost: £60,000 (£45,000 energy + £5,000 maintenance+ £10,000 annual subscription)
* Projected savings = £40,0000 annually
* ROI = 53%
* Payback period: Approximately 1.67 years

**2.4 Implementation Timeline:**

* Month 1-2: Planning and procurement (include vendor selection)
* Month 3-4: Installation and integration
* Month 5: Testing and employee training
* Month 6: System launch and initial optimisation

**2.5 Success Metrics:**

* System fully operational within 6 months of approval
* 15% reduction in energy consumption within the first year
* 90% of relevant staff trained and actively using the system within 6months of go-live.
* Monthly reports demonstrating energy savings, ROI, and reduction in carbon emissions

1. **RACI Matrix.**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Task | Business  Analyst | Project  Manager | Plant manager | IT. dept. | Energy manager | Finance team | Operations team | Quality  Assurance team | Vendor |
| Proof of concept | **A/R** | **R** | **C** | **C** | **C** |  | **C** |  | **R** |
| Site inspection | **R** | **A/R** | **R** | **I** | **C** |  |  |  | **R** |
| Project initiation/planning | **R** | **A/R** | **C** | **C** | **C** | **C** | **I** | **I** | **I** |
| Requirement gathering/ analysis | **R** | **A** | **C** | **C** | **C** | **I** | **C** |  | **C** |
| Vendor selection | **R** | **A/R** | **C** | **C** | **C** | **I** | **I** |  |  |
| Budget approval | **C** | **C** | **C** | **C** | **I** | **A/R** |  |  |  |
| System architecture design | **R** | **A/R** | **C** | **C** | **C** |  | **C** |  | **R** |
| Hardware/system installation | **C** | **A** | **C** | **C** | **C** |  | **C** |  | **R** |
| Software integration | **R** | **A** | **I** | **R** | **C** |  | **C** |  | **R** |
| Data security setup | **R** | **A/R** | **C** | **C** | **C** |  | **C** |  | **R** |
| Training/documentation | **R** | **A** | **C** | **C** | **C** | **I** | **C** |  | **C** |
| System testing | **R** | **R** | **C** | **R** | **R** |  |  | **A/R** | **R** |
| System launch | **R** | **A/R** | **R** | **I** | **R** | **I** | **C** |  | **C** |
| Performance monitoring | **R** | **C** | **C** | **C** | **A/R** |  | **R** | **C** | **C** |
| Post implementation activities | **R** | **C** | **R** | **C** | **A/R** |  | **R** |  | **C** |

**R**- responsible, **A**- Accountable, **C**- Consult, **I**- Informed

**3.0 SWOT Analysis**

|  |  |
| --- | --- |
| **Strengths** | **Weaknesses** |
| * **Strong Market position**: We have strong reputation, with established customers, and stable revenue stream. * **Technical expertise**: Highly skilled workforce in operation and maintenance in manufacturing which can ease transition into IoT. * **Quality control**: Well established processes for ensuring the quality of output which can be leveraged on to ensure energy efficient production with high standards. * **Operational Scale**: Moderate production scale allows for easier implementation of new energy-saving measures. * **Dedicated leadership**: The management team is committed to cost reduction and operational efficiency, critical to drive changes like energy monitoring. | * **Energy Inefficiency**: Lack of a real-time energy monitoring system leading to unsustainable rise in operational costs (12% annually), which could squeeze profit margins if not addressed. * **Obsolete equipment**: The plant relies on older equipment that may not be optimized for energy efficiency and might struggle with integrating IoT solutions. * **Lack of Data Visibility:** The company is unable identify where the most significant waste occurs, hindering quick decision-making. * **Cost Sensitivity**: The upfront investment in new systems may strain the company's budget, particularly if the return on investment (ROI) isn’t realized quickly. * **Workforce Resistance to Change:** Staff accustomed to older systems may resist adopting new technologies. |
| **Opportunities** | **Threats** |
| * **Energy Efficiency Improvements**: Implementing a smart energy monitoring system could lead to a 15-20% reduction in energy costs, boosting overall profitability and operational efficiency. * **Sustainability Initiatives**: With the global shift toward green manufacturing, Towers could align itself with environmental regulations and sustainability goals, enhancing its corporate image and potentially qualifying for government incentives or subsidies. * **Technological Advancements**: Emerging technologies like IoT, AI-driven energy analytics, and automation offer an opportunity to modernize operations and stay competitive. These advancements could increase machine performance and reduce maintenance costs. * **Market expansion for Eco-Friendly Manufacturing:** Customers and consumers are increasingly favoring manufacturers that adopt eco-friendly and energy-efficient practices. Towers can leverage its energy-saving initiatives as a marketing point. * **Cost Savings from Reduced Machine Wear:** Optimizing energy consumption not only saves costs but also extends the lifespan of machinery, leading to long-term savings on maintenance and replacement. | * **Rising Energy Costs:** Continued increases in energy prices could erode profitability even further if energy efficiency improvements are not implemented soon. * **Economic Instability**: Inflation and economic downturns may impact demand for manufactured goods, leaving Towers vulnerable to fluctuating orders while still grappling with high operational costs. * **Competitor Innovation:** As transition into technological efficient system is becoming widespread among competitors, Towers could lose market share as customers shift to manufacturers with lower costs and better sustainability credentials. * **Technological Risks:** The transition to an IoT-driven energy monitoring system poses risks related to data security issues and technical malfunctions, which could disrupt production or incur additional expenses for troubleshooting. * **Regulatory Pressures:** Failure to meet emerging energy efficiency and environmental standards could result in penalties, fines, or mandatory upgrades, further straining the company’s resources. |

**4.0 Risk Assessment**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| S/N | Description | Impact | Probability | Risk | Mitigation | Impact | Probability | Risk | Risk owner |
| 1 | Data privacy: data can potentially reveal business activities, and sensitive information can be leaked out. | High | Medium | High | Implement robust cybersecurity measures and conduct regular audits. | Medium | low | low | IT department |
| 2 | Employee resistance to new system: Employees will struggle to comprehend and adapt to the new system. | High | Medium | High | Provision of comprehensive training and change management program | Low | Medium | Low | Training department/Project manager/Business analyst |
| 3 | Technical issues may arise: There could be compatibility issues with existing equipment which might complicate installation process | High | High | High | Ensure Vendor support and internal IT Involvement. | Low | Medium | Low | Vendor, Project manager and IT department |
| 4 | Disruption to production: Downtime during installation resulting to loss of revenue affecting production target. | High | High | High | Schedule installation during maintenance period | Medium | Medium | Medium | Operations / maintenance department |

**5.0 Impact Assessment**

1. **Organizational Structure**

*Current State*: Towers Incorporated operates with a traditional hierarchical structure, where departments work independently.

*Impact*: We will reorganize team structures to ensure the appropriate levels of access and responsibility for managing the new system. Cross-functional teams, including IT, operations, and energy management, will be formed to oversee the real-time energy monitoring system, enabling more efficient energy management and ensuring alignment with our sustainability goals.

1. **Interdepartmental Relations:**

*Current State*: Communication between departments is adequate but lacks integration.

*Impact*: We are enhancing interdepartmental collaboration, especially between IT, operations, and the energy management team. These teams will work more closely to analyse real-time energy data, identify inefficiencies, and implement corrective measures. Regular communication channels will be established to facilitate quick decision-making, ensuring that energy optimization becomes a shared goal across departments.

1. **Working Practices:**

*Current State*: Current practices rely on manual oversight and reactive measures.

*Impact:* We will review and update our work practices to align with real-time energy data monitoring. Standard operating procedures will be revised, and new operational guidelines will be introduced to ensure that we act proactively on energy insights. Our workforce will adopt a more data-driven approach, using real-time dashboards to monitor and address inefficiencies in energy consumption immediately.

1. **Management Style:**

*Current State*: Management typically focuses on retrospective performance data.

*Impact:* We are transitioning towards a more agile, data-driven management style. Real-time energy insights will empower our leadership to make faster, informed decisions, enhancing our ability to respond to inefficiencies and optimize energy usage. Management will also be more focused on sustainability initiatives, setting a tone for company-wide accountability on energy savings and carbon footprint reduction.

1. **Recruitment Policy:**

*Current State:* Recruitment has traditionally focused on operational and technical skills.

*Impact:* We will adapt our recruitment strategy to attract candidates with expertise in energy management systems, IoT, and data analytics. This will ensure that we have the technical talent needed to support and optimize the real-time energy monitoring system. Going forward, we are committed to building a workforce capable of driving our energy efficiency goals and embracing cutting-edge technologies.

1. **Appraisal and Promotions:**

*Current State*: Performance evaluations are primarily based on traditional KPIs.

*Impact:* We will incorporate energy efficiency and sustainability metrics into our appraisal and promotion criteria. Employees who contribute to optimizing energy consumption and reducing operational costs will be rewarded and recognized. The use of the new system and its data will become a key factor in performance evaluations, providing an opportunity for staff to demonstrate their contribution to company-wide sustainability efforts.

1. **Supplier Relations**

Current State: Supplier relationships focus on cost and reliability.

Impact: We are building long-term partnerships with suppliers of smart meters, sensors, and energy management software. These relationships will be key to the ongoing success of the real-time energy monitoring system. We will also work with our machinery suppliers to ensure their products meet the energy efficiency standards that align with our sustainability objectives, fostering mutually beneficial partnerships that drive innovation and efficiency.

1. **People**

Training Needs: We will organize comprehensive training sessions for our team members to ensure they are equipped with the knowledge and skills needed to operate the new system. These training programs will focus on interpreting energy data and using the real-time monitoring tools to make informed decisions about machine usage and energy optimization.

**9. Change Management**

We are implementing a structured change management strategy to address any resistance to adopting the new system. This will include clear communication of the system’s benefits, workshops, and ongoing support to ensure all employees feel confident using the new technology. We aim to foster a culture of continuous improvement, where staff see the new system as a valuable tool for enhancing their work.

1. **Working Practices**

Updated Procedures: We will revise our operational procedures to integrate energy data into daily workflows. Machine operators and other key staff will now regularly review energy usage as part of their routine. This shift in practice will allow us to respond quickly to inefficiencies and reduce energy waste across all production processes.

**6.0 Recommendation:**

Based on the potential for significant cost savings, improved operational efficiency, and enhanced sustainability, manageable operational risks we strongly recommend proceeding with the implementation of the real-time energy monitoring system. This investment will position our factory at the forefront of efficient and sustainable manufacturing practices, while delivering substantial cost savings and supporting our long-term strategic goals.

**Glossary of terms**

MtCO2. - Million tonnes of Carbon dioxide.

# Real-Time Energy Monitoring System Requirements

**Functional Requirements**

1. Data collection from various energy consumption points (device-level energy tracking)

2. Real-time monitoring and display of energy usage

3. Historical data storage and retrieval

4. Automated alert system for unusual energy consumption patterns

5. Energy usage reporting and analytics

6. User authentication and access control

7. Integration with existing factory management systems

**Non-Functional Requirements**

1. Performance: System response time < 2 seconds

2. Scalability: Ability to handle increased data volume as the factory grows

3. Reliability: 99.9% uptime

4. Data accuracy: ±1% margin of error in energy measurements

5. User-friendly and intuitive interface for both desktop and mobile devices

6. Data retention for at least 5 years

7. Customizable KPIs and reports

8. Automated reporting for regulatory compliance

**Technical Requirements**

1. Compatible with existing energy meters and sensors

2. Hybrid (mix of Cloud-based and on-premises solution)

3. Secure data transmission and storage

4. API for integration with third-party systems

5. Support for standard energy management protocols (e.g., Modbus, BACnet)

6. Regular data backups and disaster recovery plan

**Regulatory Requirements**

1. Compliance with UK data protection regulations (UK GDPR)

2. Adherence to ISO 50001 Energy Management System standards

3. Compliance with UK energy efficiency regulations for medium-sized enterprises

4. Reporting capabilities for Carbon Reduction Commitment (CRC) Energy Efficiency Scheme

5. Adherence to UK Health and Safety Executive (HSE) guidelines for monitoring systems.