

# Energy Management – Savings with a Green Touch

Gunnar Westgaard<sup>1)</sup> & Stephen Bligh<sup>2)</sup>

Maritime Solutions

DNV

<sup>1)</sup>Oslo, Norway, [gunnar.westgaard@dnv.com](mailto:gunnar.westgaard@dnv.com)

<sup>2)</sup>London, UK, [stephen.bligh@dnv.com](mailto:stephen.bligh@dnv.com)

## Abstract

*Today, the environment is high on everybody's agenda and we are seeing a strong increase in focus with respect to this topic. This paper describes an approach as to how shipping companies can reduce annual expenditure relating to fuel and improve fuel efficiency, and as a consequence they are able to clearly document their environmental performance.*

*A thorough Energy Management programme highlights and prioritises potential savings, develops a gap analysis and identifies suitable solutions; subsequently this leads to an implementation phase with the monitoring of progress and the ability to strive for continuous improvement.*

*Our experience has shown that holistic approaches to such programmes are needed in order to harvest key benefits, such as reduced operational cost and a beyond compliance profile with respect to environmental performance (e.g. ISO 14001, TMSA, MARPOL).*

## Keywords

Energy; Fuel consumption; Environment; Cost-reduction; Performance; Change-management

## 1. Introduction

Approximately two thirds of the world's cargo is transported by sea<sup>1</sup>. In the years to come, stricter environmental regulations will affect the shipping industry, leading to an increased focus on reducing emissions & improving environmental performance.

The ship owner's motivation may be strengthened by the fact that reduced fuel consumption also means reduced emissions to air. If increased speed is achieved with the same fuel consumption, the ship owner's income will be positively affected. As a consequence the ship owner's bottom line result improves, all of

which is achieved by a systematic focus on Energy Management.

This paper describes the key challenges of Energy Management for a shipping company and a structured 3-phase approach to an Energy Management project; from improvement identification, through to solution development and successful implementation.

## 2. The ship-owners challenge

Representing up to 70% of their total operational cost<sup>2</sup>, effective energy management is a well known issue for the industry. Increased fuel price and new environmental rules and legislations, make it impossible to neglect these matters. In addition, there are requirements from stakeholders, such as oil majors, shareholders, and cargo shippers, who also see the benefits of having an effective energy management policy.

Improved environmental performance and reduced cost is on the top of everyone's agenda. In today's global situation an Energy Management programme within Environmental Management is needed. Documented savings visualises positive environmental performance and could potentially give competitive advantage. For example a 10 ton reduction in fuel used results in a 32 ton reduction of CO<sub>2</sub> production<sup>3</sup>.

Even though there is this room for improvement, many companies face challenges in unlocking these potentials. Most shipping companies run lean organisations focusing on the day-to-day business. Experience shows that ship-owners tend to be sceptical of the idea of taking key personnel in their organisations out of their daily operations to deal only with energy management issues. Conversely, they appear to value external experts entering the field with in-depth expertise and an ability to look at their organisation with fresh eyes.

Special competence and resources to facilitate change processes in close cooperation with the clients key

personnel have shown to be a successful approach to Energy Management.

### **2.1 Observations**

The maritime industry is facing a world which focuses more and more on the environment. Until recently other industries such as aviation, energy and onshore transportation have been under increased pressure and scrutiny with respect to environmental performance. The considerable improvement achieved by these industries in recent years has led to the maritime industry gaining higher public focus with respect to this issue.

Ship-owners should ask themselves some critical questions:

- Have we established an overall Energy Management policy or strategy?
- Do we know if we operate our vessels in the most fuel efficient and optimal way?
- Do we control our bunkers with respect to quality and quantity?
- Are we able to document our savings and improvements?

And maybe the most important one:

- What have we done to create and visualise our environmental performance?

The market is focused on the contractor's environmental consciousness, therefore it will be a competitive advantage for companies which are able to show their green profile.

ISO 14001 says that there should be a programme for environmental performance, and continuous improvement which is an essential part of this. Therefore, Energy Management could be a programme which supports this. In addition, it can be used as a tool towards TMSA targets and MARPOL Annex VI.

### **2.2 Challenges related to project execution**

Many shipping companies are running their businesses with lean organisations, focusing on daily operations. Running bigger projects simultaneously is therefore challenging, both with respect to available resources and time. In addition it is vital to have a structured approach for such projects, since it will involve many parts of the organisation, both ashore and onboard vessels.

In order to justify projects where investments are needed, there must be a setup for how to document savings, so-called Benefit Tracking. Without proper measurement and follow-up during implementation, this monitoring could fail. As a consequence if no savings are visualised, the organisation may lose its focus and interest, resulting in successful implementation being

harder to achieve.

There is also an increased interest within the maritime industry to share best practice and benchmark across companies, which again should be beneficial for all involved parties.

## **3. Energy Management – programme**

### **3.1 Reduced fuel consumption means reduced air pollution**

When discussing Energy Management within the maritime industry, there is perception within organisations that there are potential savings of 10% and beyond. This obviously depends on the starting point, but it is clear that there are saving potentials, and that these potentials can equal large sums of money.

These savings are both related to quantity of fuel vs. cost, and quality of fuel vs. cost.

Documentation of savings will also help to support ISO 14001's monitoring and measurement requirements<sup>4</sup>

Experience shows that many companies have difficulties with setting KPI's and establishing a programme for environmental management. By introducing Energy Management, they can link and calculate their Environmental performance (emissions to air) and document what they are doing.

Results from Energy Management projects can also be used as inputs to future vessel design, since potential solutions could be transferred to New Build programmes.

### **3.2 Three phased approach**

A structured and holistic approach is found to be vital for a successful implementation of an Energy Management programme. The three phases are divided into:

- Improvement identification (Phase 1);
- Solution development (Phase 2);
- Implementation and follow up (Phase 3).

Phase 1 focuses on identifying, describing, quantifying and planning how to go forward with the organisations' potential improvement areas.

Phase 2 verifies the findings from Phase 1 and a real baseline is established, together with a detailed description of today's situation and how it should be in the future. During this phase "Quick wins" will be designed and implemented, these "Quick wins" (pilot implementation) are activities where the first savings should be harvested due to the ease and the limited complexity of implementation. Detailed solution development also takes place during this phase, and a

detailed plan is produced for implementation. Mobilisation of the organisation is critical during this phase in order to prepare for change.

Phase 3 is where the solutions determined in phase 2 are implemented within the organisation according to implementation plan. Solutions are handed over to the organisation and monitoring / follow up are usually handled by a programme office. Continuous improvement are included in new procedures, and followed up accordingly.

During the whole project life cycle, there must be a high focus on:

- Project Management;
- Information, communication and involvement;
- Benefit tracking – visualise savings.

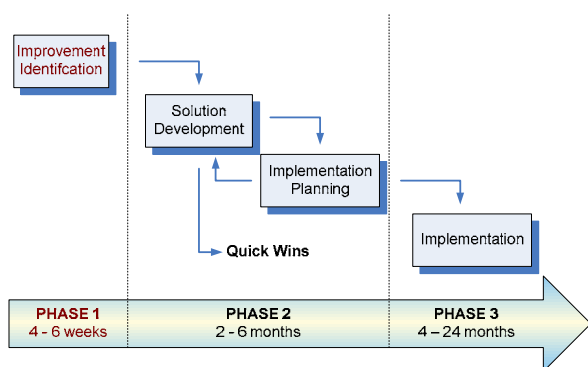


Fig. 1: Typical project life cycle

### 3.2 Project organisation

Projects of this size and complexity need to have a well defined project structure. A Steering Group should be established which will take ownership for the project. The steering group should contain key resources from the top management within the organisation; the steering group has a mandate for decisions related to project funding, investments and resource allocation. Commitment from top management is crucial for successful project execution.

Furthermore, the steering group should contain representatives from both operational and technical departments. These personnel will ensure project progress with respect to time, budget and content.

Based on status reports and updates from the project manager, the steering group makes decisions and guides the project forward.

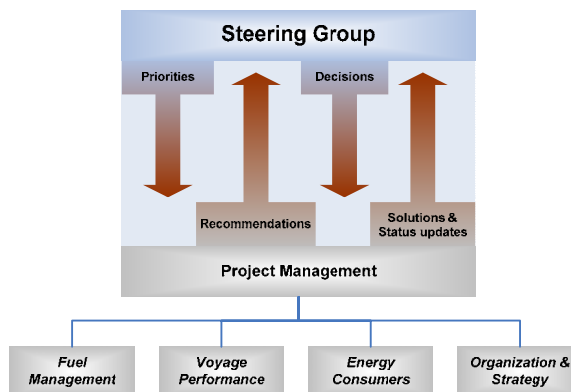


Fig. 1: Typical project organisation

The project manager (PM) ensures momentum and deadlines are met within the project. The PM also brings the right resources together, coaches the team, and is responsible for the anchoring of results in the organisation.

The different areas of interest within the project need resources with relevant knowledge and experience. These resources might consist of both seafarers and shore organisation.

### 3.3 Improvement identification (Phase 1)

In order to describe the potential for savings within the organisation, there is a need to identify possible improvement areas. People and resources from all areas of the organisation related to the operation of vessels must be involved; this can be done during both interviews and workshops.

Areas typically to be addressed:

#### Voyage Performance

- Voyage planning & execution;
- Weather routing & sea current;
- Hull condition;
- Propeller condition;
- Autopilot & rudder;
- Trim & draft.

#### Energy Consumers

- Engine tuning & efficiency – Main & Aux engines;
- Tank heating / cleaning;
- Boiler usage;
- Thruster operation;
- Other power required units.

#### Fuel Management

- Fuel procurement & contracts;
- Fuel quality, pre-bunkering;

- Fuel quantity, during bunkering;
- Condition of equipment.

### Organisation & Strategy

- Energy Management strategy / policy;
- Environmental profile;
- Performance Management;
- Organisation – roles & responsibilities;
- Training and awareness;
- Life-cycle perspective.

Based on the findings via interviews, workshops and data analyses an outline for the way forward is established, including scope, business case, reordination of initiatives and investment needs.

### 3.4 Solution development (Phase 2)

During this phase, a baseline is established; the baseline is then used for monitoring and to document savings when initiatives are rolled out during either the “Quick wins” (pilot) or the implementation phase.

It is important to document how today’s situation is and design in detail solutions for the different improvement areas. Experience has shown that if there is a lack of documentation of today’s situation, the organization will be resistant to implement new solutions. It has also shown that this phase is critical in order to involve the key resources in the organisation, resources which ultimately will own or be involved in new solutions. In a typical Energy Management project, personnel from the technical department, operational department and onboard staff will be affected by different initiatives. It is therefore crucial that these key stakeholders are prepared, understand the ideas behind the project, what it means for them, and how these solutions will improve the whole company’s performance.

It tends to be challenging to focus on today’s situation; instead companies want to focus on solutions from day one. This could potentially result in lots of work done on issues which actually work quite well already, or a lot of time and effort may be spent on developing solutions which might not be needed or should have had a lower priority.

### 3.5 Implementation and follow up (Phase 3)

Once all implementation plans are completed and the implementation logic is agreed (e.g. implement initiatives in “waves”, “big bang” or vessel specific), a programme office should be established. The main activities for this function are:

- Manage overall project timeline and dependencies
- Manage project scope
- Providing consistent and accurate progress

reporting to executive management

- Manage project risks and ensure that appropriate steps are taken to mitigate them
- Manage the quality of deliverables
- Manage project issues and ensure resolution
- Provide a central point for all communication within and outside the programme

In addition, this office must ensure benefit deliveries and milestone management are recorded. Communication and “hand-over” to the organisation is one of the key elements for success. The communication plan established during the previous phases must be followed and adjusted where necessary so that relevant people within the organisation understand what will happen and are able to change some of their daily procedures if needed.

Performance Management is essential during this phase in order to document savings and handle performance data, and going forward to ensure lasting impact and continuous improvement.

## 4. Energy Management – Case and benefits

Though Energy Management projects might have individual design, there are several elements which they typically have in common. The following case went through the typical three phased approach. During Phase 1 more than twenty people across the organisation were interviewed, three workshops were held, and extensive amount of operational data was collected and analysed. These results were structured, prioritised and presented to the steering group. The potentials identified were above 10% of annual fuel cost in the company:

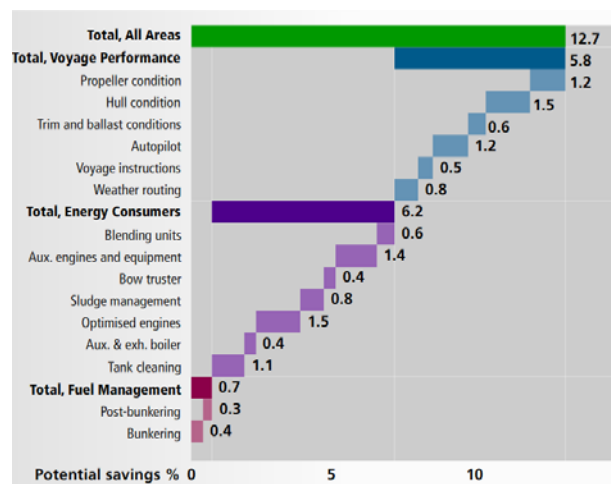
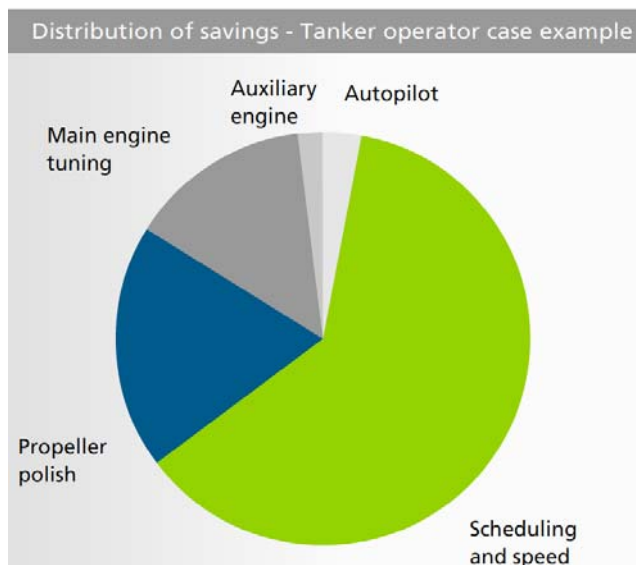


Fig. 3: Identified potential savings

Phase 2 focused on solution development for the different potentials, and further work was done in order to verify the savings. This phase demands deeper analysis and is time consuming. Results showed that some of the potentials identified in phase 1 were actually higher, while others were lower. Based on this,

different solutions were developed and a detailed implementation plan established for each solution.

A pilot implementation was also done with the identified “quick wins” (from Phase 1), and a 5.8% documented saving was delivered. This saving was based on initiatives run on pilot vessels for one month period. Close monitoring and follow-up is vital during such pilot phases in order to capture correct data and take into account external factors which could potentially disrupt main assumptions and the baseline (e.g. weather, extraordinary operational issues etc). Contribution of savings can be seen in figure 4.



**Fig. 4: Documented savings during pilot period**

When moving into Phase 3 - Implementation, the project office monitored all initiatives closely and reported back to the steering group all documented savings and also the progress reports related to agreed and validated implementation plans. The implementation of all initiatives has to be thoroughly planned and can be complex, demanding goodwill and understanding within the organisation. Therefore, communication of initiatives (what, when, how) is vital during the whole project in order to harvest all the potentials and keep up momentum within the organisation.

#### 4.1 Program benefits

There are several benefits to be seen from a structured Energy Management programme, these include the following:

- Improved and documented environmental performance (client requirements);
- Compliance/beyond compliance profile with regards to environmental performance (ISO 14001, TMSA, MARPOL);
- Reduced operational costs;

- Increased focus on energy consumption;
- System for documenting savings - Benefit Tracking;
- Improved fleet efficiency;
- Improved communication.

Lasting impact is of importance in today’s industry and Energy Management gives clarity and direction for top management; added change momentum; transfer of knowledge; and improved communication and working culture.

Through an Energy Management programme companies have reduced their operational costs whilst improving their environmental footprint. Large savings are possible, but investment of time and money is required.

The improvement of operations can lead to great savings and no major retrofitting is needed and we see that an embedded energy awareness culture emerges within the company.

#### Conclusion

This paper has presented how effective Energy Management gives value to shipping companies, both with respect to saving money and auditable improved environmental performance.

This paper has described how such projects can be designed and executed, some common challenges related to this, and the typical impact and benefits of an Energy Management programme.

Most of the solutions described in this paper are known to the shipping industry, but one of the main challenges is to have a holistic approach to the issues and thereby ensure successful implementation and sustainable results.

#### 7. References

- 1 – Shashi Kumar and Jan Hoffmann, *Globalisation, the Maritime Nexus*
- 2 - Major containership operator
- 3 - National Inventory Report 2005 Norway Greenhouse Gas Emissions 1990-2003 reported according to the UNFCCC guidelines
- 4 – ISO 14001: Environmental management systems, sub clause 4.5.1 Monitoring and measurement