Global Energy Management System Implementation: Case Study

United Arab Emirates

Roads & Transport Authority, Dubai

First Transport Authority in the Middle East & Africa Region, and leading entity of Dubai Government to achieve ISO 50001:2011 Certification (2013).

Business Case for Energy Management

Drivers: Roads and Transport Authority Dubai (RTA), in line with its Vision, Safe and Smooth Transport for All', aligned with the Dubai's Strategic Plan, is responsible to provide an integrated & sustainable transportation systems, and support Dubai's comprehensive growth plans through preparing policies and legislations, adapting technologies and innovative approaches, and implementing world class practices and standards.

RTA is committed to provide an integrated and sustainable roads & transportation system to facilitate people and goods movement while improving safety levels for all system users by targeting **20% Public Transport Share in Dubai by 2020**.

Objective: RTA through its Strategic Plan and Goal No. 5, "Safety and Environmental Sustainability", brings clear objectives to improve Energy Performance with a key aim of making RTA an "**Energy Efficient Organization**". ISO 50001:2011 Certification means that a holistic framework is implemented across RTA which enables to achieve this vision.

Energy Reduction Approach: RTA has designed the Energy Management System which enables RTA to adopt a systematic approach to induce continuous improvement to improve energy performance; covering the complex and diverse scope of Operations; which has more than 30 Billion USD of Assets.

"RTA is committed to continue excellent sustainability approach which serves the Public, and brings happiness to them by effectively contributing to shaping the future of 'Green Dubai' by developing an 'Energy Efficient Public Transportation' in Dubai"

- Matar Al Tayer, Director General and Chairman of the Board of Executive Directors.

Case Study Snapshot	
Industry	Government of Dubai
Product/Service	Public Transportation
Location	Dubai, UAE
Energy Management System	ISO 50001:2011
Energy Performance Improvement Period	4 years (2013 – 2016)
Energy Performance Improvement (%) over improvement period	19% (Total Energy Consumption (GJ) in Public Transport Operations per Million Passengers - Public Transport Ridership)
Total energy cost savings over improvement period	12,206,389.69 (USD)
Cost to implement EnMS	1,107,356.95 (USD)
Payback period (years) on EnMS implementation	0.28 (years)
Total Energy Savings over improvement period	937,606.74 (GJ)
Total CO_2-e emission reduction over improvement period	81,362.06 (metric tons)

Energy Management Program: RTA achieved ISO 50001:2011 certification in 2013. This was achieved through a holistic framework implementation across RTA Operations. This approach enabled the organization to make use of the most advanced energy technologies to reduce energy use and consumption, while boosting overall energy efficiency including reduced energy costs and reduced carbon emissions.

Organization: RTA comprises of 5 Operational Agencies (Rail Agency, Public Transport Agency, Licensing Agency, Traffic & Roads Agency and Dubai Taxi Corporation, 2 Support Services Sectors (Technological and Administrative) and a Strategy & Governance Sector.

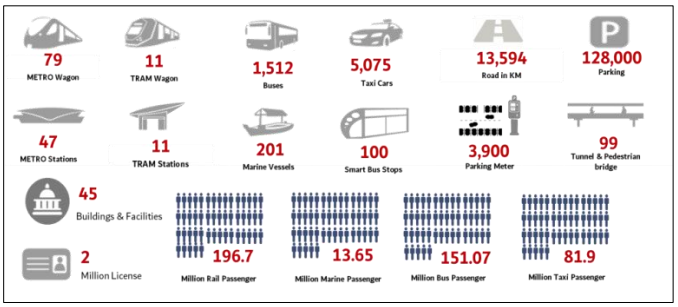

Figure 1: RTA's Scope Vs Complexity

Criticality: Energy is a critical component in RTA's Operations, considering the complexity and diverse scope, and one that has major cost implications.

Business Benefits Achieved

- Aligning with UAE National Vision, RTA's comprehensive Corporate Governance Structure enhanced adoption of 71 energy conservation initiatives between 2013-2016 across RTA operations; that resulted in overall saving of around **12.2 Million USD**. RTA have made significant investments in advanced sustainable and energy efficient public transport modes; aiming to promote climate protection, carbon reduction, clean environment, conserve valuable resources, and contribute to the preservation of a livable environment.

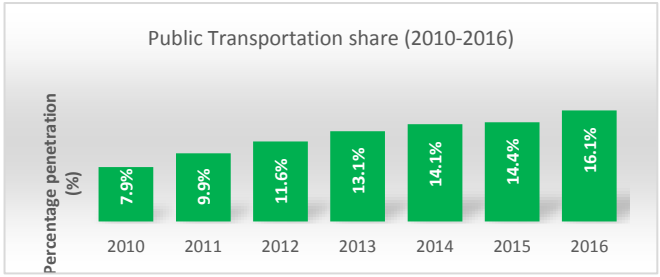

Figure 3: RTA'S Impact on Environmental Sustainability

- Some of the key projects include: The Dubai Metro, Dubai Tram, Hybrid Taxi, Electric Abras, LED streetlights & LED Traffic Lights, RTA Smart Applications and Initiated Energy and Green Awards for Stakeholders.
- Our future focus areas supporting emission reduction are Electric Buses, CNG Buses, Metro & Tram Extensions, Electric Taxis, Hybrid Buses, etc.
- RTA pioneered in Leading by Example, and become a benchmarking entity subject to Energy Management for other entities in Dubai and other Region.
- Development & Implementation of the EnMS was completed by an Internal Team; with no added cost: key benefits are:
  - Lead to reductions in Green House Gas (GHG) emissions,
  - Systematic approach in achieving continual improvement of Energy Performance,
  - Enables an organization to achieve its Policy Commitments.
  - 4 Strategic Performance Indicators and 11 Efficiency Indicators across the Organization
  - The UAE Government awarded us the 'Champion of Champions' award and the 'Sustainable Government Department of the Year' Award in the year 2016

EnMS Development and Implementation

Organizational:

Figure 4: RTA EnMS Implementation and Certification

RTA Energy Management System (EnMS) Project Team key roles included:

- Develop EnMS Framework by reviewing existing Systems / Processes in RTA and integrate with RTA Safety & Environmental Management System (RSEMS) and Policies.
- Ensure that the EnMS Framework is linked to RTA's Strategic Goals & Objectives considering the entire Business Scope.
- Contribute with technical reviews to ensure coverage of all technical requirements and developments
- Identify critical areas to minimize the risks of depletion of natural resources and minimize Energy Operational Costs.

RTA EnMS Project Team opted the Plan – Do – Check – Act (PDCA) principle as the best method, as every Management System Standard addresses this requirement including ISO 50001. The System was developed to have a 4-tier structure starting from Corporate Policy → Manual → Required Procedures and Work Methods & Control Processes to ensure effective implementation of EnMS in RTA.

As an enhancement, and aligning with the National Innovation Strategy, RTA have developed a Comprehensive Green Economy Framework aligning to RTA Energy Management System to integrate Green aspects in Energy Management.

Figure 5: RTA EnMS & Green Economy Alignment to Other Strategies

RTA EnMS and related initiatives / projects have led to tremendous growth in public transport ridership, together with strategically planning to improving the energy efficiency and reducing/optimizing Dubai's carbon footprint.

RTA has achieved a number of major Management System Certifications such as; ISO 50001, ISO 14001, OHSAS 18001, ISO 9001, ISO 22301, ISO 27001, ISO 39001, ISO 31000 and many others based on a Risk Driven Model and by having an Integrated Management System approach.

RTA EnMS Project Team got the Best Project Team Award in RTA Energy & Green Awards 2014, and highly appreciated by the Top Management.

Energy review and planning

RTA is committed for the continuous improvement for Energy Management through a documented process for energy review and planning ensuring the results will lead to actions that continually improve Energy Performance.

The RTA Energy Management System (EnMS) Scope is defined as "**Regulate, plan, design, construct, operate and maintain the integrated surface public transportation networks in the Emirates of Dubai**"

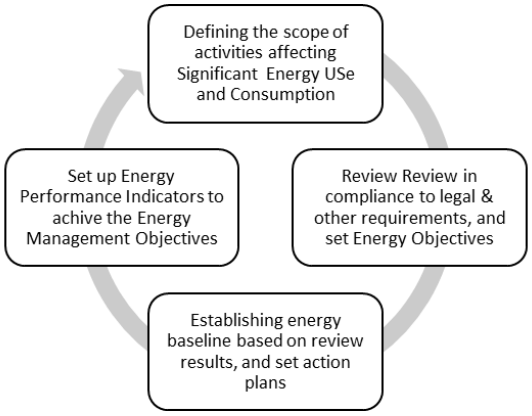

Figure 6: Energy Planning & Review Concept

Energy Review and Planning is conducted on Annual basis considering all activities and operational areas. Energy review is updated at different intervals when extensive changes in facilities, equipment, systems and processes occur.

Based on the energy performance and identified opportunities, RTA establish objectives and targets for achieving improved energy performance, long with action plans.

Legal Register maintained with all legal and other requirements / obligations related to Energy Management. Compliance is monitored through the interim audits/ inspections and a compliance evaluation report is presented to the Top Management on an annual basis.

RTA Energy Objectives & Efficiency Indicators, Examples include:

Strategic Level:	
1. Total Green House Gas Emissions per Passenger	• kg CO_2e / Passenger
2. Improvement in Street Lighting Efficiency	• kwh / lighted lane km
3. Improvement in Fuel Efficiency in Public Transportation	• Litre / Passengers
4. Improvement in Energy use in Public Transportation	• Gigajoules / Passenger
Operational:	
1. Reduce Electricity consumption	• kwh /m2
2. Reduce Gasoline consumption	• Litre / km
3. Reduce annual traction power Dubai Metro/Tram	• kwh / passenger km

"The optimal utilization of technology is the key step towards developing the Energy Efficient Public Transportation in Dubai"
- **Nasser Abu Shehab**, *Chief Executive Officer, Strategy and Corporate Governance Sector, RTA*

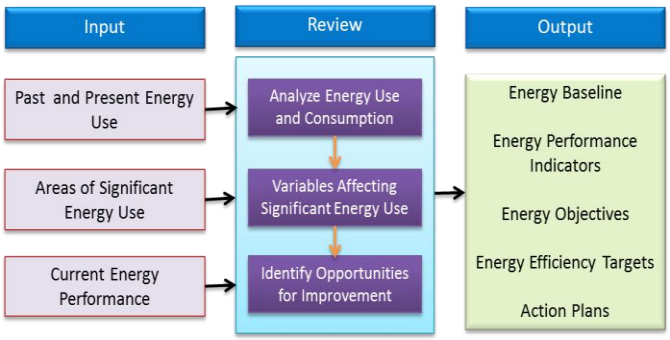

Figure 7: : Energy Planning & Review Concept

Cost Benefit Analysis:

The development and implementation of Energy Management System in RTA is done with internal Resources with no additional cost to RTA.

However the Energy Management System Certification and Lead Auditor Training added a direct cost of AED 149,000.00 to RTA.

The Total Cost estimated to implement EnMS in RTA is **40,600.00 USD** in 2013, where the Savings recorded approximately **3.81 million USD** in 2014 (1 year).

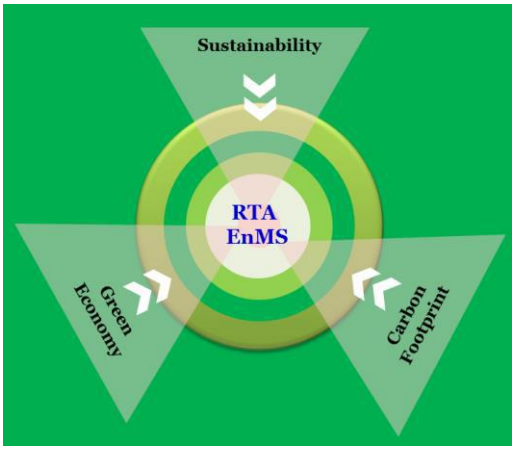

Figure 8: : RTA EnMS Enhancement through Integration

Despite the fact, that RTA's emissions are going to increase due to the yearly expansion of the Public Transportation fleet, RTA has been taking the leadership role in putting mitigation measures to reduce the CO_2 emission from Public Transportation based on the comprehensive EnMS by setting up challenging energy efficiency targets

Approach used to determine whether energy performance improved:

RTA's Energy Baseline is set by considering significant energy use and consumption. There are 4 Strategic and 11 Operational Energy Performance Indicators (EnPIs) set across RTA Operations to monitor the Energy Performance.
Results are monitored periodically, and Energy Reports are submitted on a quarterly basis to Top Management to record the Energy Performance cross RTA Operations. Annual Energy Report is submitted to the Top Management to endorse the actual Energy Performance of RTA, and to obtain approvals on targets for the next year based on the performance results.

These EnPIs are updated based on any changes in Baseline or activities that can affect the significant energy use and consumption. Benchmarking is also done against International Transportation Organization.

Approach used to validate results:

RTA Energy Analysis Report is compiled annually; with verification of results at operational level as follows:

- Comparison of bills against consumption figures based on the actual meter readings,
- Individual review sessions at different levels,
- Measurement Equipment, and validation through Software Applications, where possible
- Evaluation of Actual energy use and consumption against the expected, and investigate major deviations
- Effectiveness of action plans developed in achieving the objectives, and Corrective Actions
- Periodic Data analysis and comparison / trend analysis
- Planned Internal Audits / Inspections & Management Reviews.
- Steps taken to maintain operational control
- Third party assessment, External Certification Audits and Reports

Needs for Specific operational Controls are identified considering of Significant Energy Use and Consumption, and as per the needs for new services, related processes, etc. as per the Scope of Operations.

Operational controls are necessary to avoid significant deviation in energy use and consumption. Based on periodic energy performance review, RTA investigates those significant deviations in energy performance to ensure additional or required operational controls are established.

Key activities that affects Significant Energy Use and Consumption (Driving, Street Lighting, Lighting, etc.) which are consistent with operational objectives are identified and operating conditions are specified to obtain performance results.

Development and use of professional expertise, training, and communications:

- In order to achieve the establishment of Energy Framework, an EnMS Project Team (RTA Executive Committee) was established having delegations from each Operational Areas and Corporate Departments.
- The EnMS Project Team included technically qualified Employees subject to Energy, Environment, Sustainability, Management Systems, etc.
- A ISO 50001:2011 Lead Auditor Certification Course was conducted in February 2013 (first in the region), for the EnMS Project Team to enhance Competency.

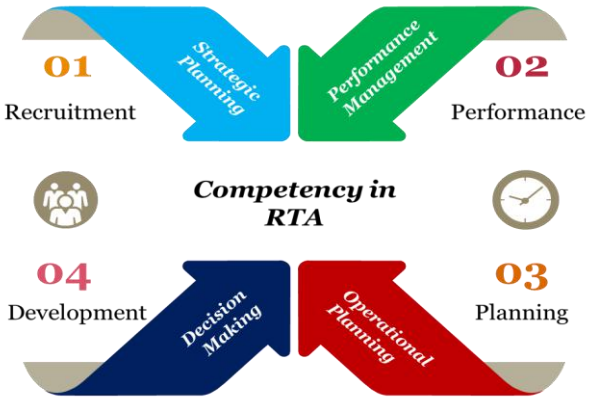

Figure 9: RTA EnMS Competency Development Model

- Key Stakeholders engagement covered Ministry of Energy, Dubai Supreme Council of Energy, Dubai Electricity and Water Authority, Statistics Department, Dubai Carbon Centre, etc.
- Approved RTA Energy Policy communicated to all Employees and stakeholder to ensure compliance.
- Specific Awareness & Brainstorming Sessions conducted for Top Management and Senior Management Team,
- Training Need Analysis across all Operational Units, resulted in added internal modular training, and delivered to wide range of technical and professional employees; (Bus & Taxi Drivers, Contractors, Maintenance Team, etc.)
- Energy Awareness messages, policies & other information are regularly communicated to employees as well as public.
- LEED Training is conducted in RTA, and also courses like Certified Energy Manager, Sustainability Manager, etc. are planned.

Tools & Resources:

1. Document Review and Information Gathering by the Team to identify improvement areas through Brainstorming sessions.
2. SWOT Analysis and Diagramming Techniques are used to study adoption of ISO 50001 Standard Requirements, aligning to existing Processes.
3. Develop and implement Pilot Model, and measure outcomes to confirm feasibility and optimization model to rollout implementation across RTA.
4. Stakeholder engagement and consultation to identify performance and improvement areas (Dubai Supreme Council of Energy, Etihad Energy Services Company, Certification Assessment Body).
5. Adopting the Plan Do Check Act Methodology across the RTA.
6. Adherence to Local Requirements subject to Energy and Sustainability (DGEP Requirements

Lessons Learned

1. RTA Energy Management System can only focus on Energy Efficiency, not directly on Energy saving as the key objective is to improve Public Transportation in Dubai. i.e. Transporting more public will directly affect energy consumption and equivalent emission.
2. No reduction in Emissions from the RTA Operations (Public), however equivalent emission reduction can be recorded from Private Sector by improving Public Transportation.

3. Management decision to adopt ISO 50001:2011 in 2013, even if there was no clear legislations which mandates the implementation of ISO 50001 in all Organization.
4. Pioneer among the government entities and first transport authority in the region to obtain an energy management system ISO 50001:2011 in 2013, however there was no similar entity to benchmark RTA's energy performance.
5. More effective implementation as the RTA Energy Management System (EnMS) was developed and implemented by RTA Internal Team.


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Certificate of Registration

ENERGY MANAGEMENT SYSTEM - ISO 50001:2011

This is to certify that: Roads and Transport Authority, Umm Ramool, Marrakesh Road, PO Box 118899, Dubai, United Arab Emirates

Holds Certificate No: ENMS 592817

and operates an Energy Management System which complies with the requirements of ISO 50001:2011 for the following scope:

Regulate, plan, design, construct, operate and maintain the integrated surface public transportation networks in the Emirate of Dubai.
Previous certificate expired on: 13/11/2016
Recertification Audit ended on: 23/10/2016

For and on behalf of BSI: Frank Lee, EMEA Compliance & Risk Director

Original Registration Date: 14/11/2013
Latest Revision Date: 16/11/2016
Effective Date: 16/11/2016
Expiry Date: 13/11/2019

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...making excellence a habit.

Registration:
14/11/2013

Latest Revision:
16/11/2016

Effective Date:
16/11/2016

Expiry Date:
13/11/2019

Keys to Success

- Top Management Commitment and Direction.
- Dedicated Project Team Members (Competent and Expert) and Commitment
- Stakeholder Consultation and Engagement
- Clarity in Scope and Objectives aligning to Federal, Local and RTA Strategies
- Data Availability and Accessibility
- Continuous and Effective Communication, endorsed through Senior Management Team

"RTA is committed to develop Dubai as a global role player with Energy Efficient and Sustainable transportation infrastructure, by promoting usage of public transportation and make Dubai Emirate a Green City."


أول مؤسسة حكومية محلية تحوز الشهادة وأول هيئة في المنطقة

آيزو نظام إدارة الطاقة لـ «طرق دبي»

RTA

إشادة

استدامة الطاقة

Through the Energy Management Working Group (EMWG), government officials worldwide share best practices and leverage their collective knowledge and experience to create high-impact national programs that accelerate the use of energy management systems in industry and commercial buildings. The EMWG was launched in 2010 by the Clean Energy Ministerial (CEM) and International Partnership for Energy Efficiency Cooperation (IPEEC).

For more information, please visit www.cleanenergyministerial.org/energymanagement.

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