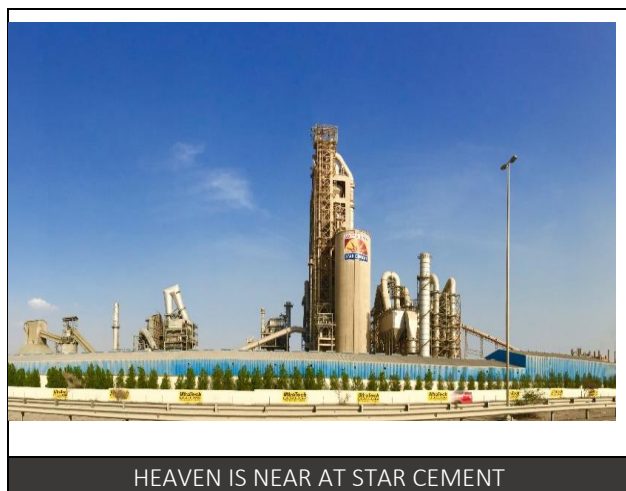


# Global Energy Management System Implementation: Case Study

UNITED ARAB EMIRATES (U.A.E)

## Star Cement Co., L.L.C.

*First Cement Company in UAE implemented ISO 50001- Energy Management system & achieved certification.*



### Case Study Snapshot

Industry	STAR CEMENT CO., LLC (SCC)
Product/Service	Clinker (various types) for Cement manufacturing.
Location	Ras Al Khaimah, U.A.E.
Energy Management System	ISO 50001
Energy Performance Improvement Period	Oct 2016 - Dec 2016
Energy Performance Improvement (%) over improvement period	5.87% improvement for the said period
Total energy cost savings over improvement period	US\$ 228,064 for the period Oct'16 to Dec'16
Cost to implement EnMS	US\$ 48871
Payback period on EnMS implementation (years)	0.16
Total Energy Savings over improvement period	128550 GJ energy saving from natural resources.
Total CO <sub>2</sub> -e emission reduction over improvement period	1055 MT of CO <sub>2</sub> reduction & 4664.96MT of raw coal (natural resource) was saved.

### Business Case for Energy Management

M/s. Star Cement has obtained the following benefits with the implementation of ISO-50001 (Energy Management System – EnMS)

1. Established a specific system to monitor and conserve the Energy consumptions thro' various approaches (like Energy Review, Management Program, Methodology for defining base line, Energy Design Review ...)
2. Focused attention towards identification and prioritization of higher power consumption areas & their monitoring to achieve desired results.
3. Wide awareness across the plant on importance of Energy conservation & developed ownership culture.
4. Reduction of CO<sub>2</sub> emission by 1055 MT & saved natural resources.
5. Company reputation as a front runner in Cement Industry in UAE thro' ISO-50001 Certification.

### Company Profile

Star Cement is a Strategic business unit of UltraTech Cement. UltraTech Cement Middle East Investments Limited a wholly-owned subsidiary of UltraTech Cement Limited, part of Aditya Birla Group.

Ultra Tech Cement has an installed capacity of 69.3 Million Tonnes Per Annum (MTPA) of grey cement and has 12 integrated plants, 1 clinkerization plant, 19

grinding units (15 in India) and 7 bulk terminals. Its operations span across India, UAE, Bahrain, Bangladesh and Sri Lanka. UltraTech Cement is also India's largest exporter of cement reaching out to meet the demand in countries around the Indian Ocean and the Middle East.

Star Cement (SC) is a leading manufacturer of cement (headquarters in Dubai) in the Middle East as a part of Ultra Tech Cement overseas operations, having Clinkerization plant in Ras Al Khaimah producing various types of clinker including Oil well clinker with a capacity of over 2.70 Million Tons /Annum and various types of cement (incl., oil well cement) production of 3.3 Million Tons/Annum from all the 4 Cement Grinding units located in Abu Dhabi, Ajman, Bahrain & Bangladesh.

SC-RAK & its Grinding Plants except Bahrain were bestowed with the prestigious certifications ISO-9001, ISO-14001 & OHSAS-18001 and SC-RAK is the only Cement plant in U.A.E. Certified with ISO-50001 in Sept-2016.

### Motivations / Drivers:

- Corporate focus and support.
- Optimize / minimize the Cost of production without compromising quality.
- Conservation of natural resources.
- Reduction of GHGs to cope up for clean and green environment.
- To face the Market challenges & winning the customers.
- Aspiration for front runner as the lowest power consumer in this region.
- Reputation of company & Brand image in the Public / market.
- Employee motivation & pride.

### Energy Management Program:

- Ultra Tech Cement Corporate Energy initiatives are being implemented as per the guidelines to compete with the group units thro' the systematic approach though there are no specific guidelines / regulations on Energy Conservation concepts in UAE.
- On this journey, SC has achieved following rewards and recognitions:  
Membership in WBCSD for Cement Sustainability initiative & WASH implementation since 2011;  
DQA Award; HR MENA Excellence Award

(Excellence in Talent Management); Customer Awards-2015 (Exporter of the Year -Dry Bulk);

API – Oil well Cement Certification Award to Star cement in the year 2016;

Awards on Environmental performance appreciation consistently between 2011 and 2015 from Local Govt., Authorities MOEW/ EPDA / Env. Agency-ADH.



### Prior approach to reduce energy use:

- Monthly Energy Conservation Committee (ECC) meetings to discuss, invite ideas, assess & finalize the ideas for implementation.
- Assess the monthly / annual benefits achieved from the Energy Conservation.
- Kaizen approach.
- Implementation of PSS techniques.

### With the adoption of ISO-50001:2011

- Continuous monitoring & measurement thro' review on daily basis to analyze and find a suitable solutions for implementation on higher power consumption areas.
- Assigning specific responsibilities with targets to the relevant stakeholders / respective SHs.
- Periodical internal Audits, MRMs, introduction of relevant formats (ERR, Management Programs, Base line and Methodology, Design review etc).
- Ensure RADAR (Result expected, Approach, Deployment, Assessment & Review) approach



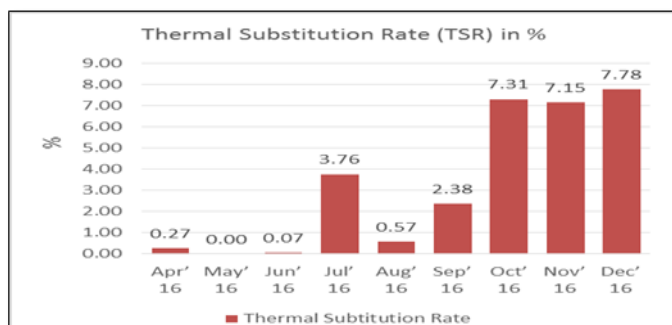
***“Say ‘Yes’ to Standards & ‘No’ to Abnormalities.”***

- Pramod Rajgaria, CEO

## Business Benefits Achieved

### Alternate Fuel (AF) handling system

- Alternate fuel handling system was installed to handle several types of solid components at different sizes varying from 5-50 mm.
- Wood chips, tyre chips and other types of solid alternate fuels are being transported and fed into Inline Calciner (ILC) by using this system.
- Cost of Project: 0.785 Mio USD
- Capacity: 8 TPH
- Energy performance improved 5.87% for Oct'16-Dec'16 against the base line 1.36% .w.r.t Apr'16 to Sep-16 (H1 of 2016-17).
- The above performance is on account of alternate fuels consumption increment from 1.54% to 8.94 % on weight basis for the specific AF-Tyre chips.
- Total Energy saved was 128550 GJ.
- Total CO2 Reduction was 1055MT and conservation of natural resources of raw coal was 4664.96MT.
- Total cost saving after implementation of EnMS is US\$ 228064 for the above mentioned period.



Focus on reduction of CO2 Emission from Fossil fuel & Alternate fuel			
Description	Unit	April-16 to Sep-16	Oct-16 to Dec-16
Clinker production	MT	1279687	746950
<b>Source of CO2 Emission</b>			
CO2 Emission due to Rawmaterial	Tons CO2	685495	400381
Fossil Fuel	Tons CO2	360329	197798
Alternate Fuel	Tons CO2	3205	10252
Bio-mass	Tons CO2	1151	3761
Heavy vehicle & Transportation	Tons CO2	2473	1455
Total CO2 emission	Tons CO2	1052653	613647
Specific CO2 emission from Rawmaterial		535.7	536.0
Specific CO2 emission from Fossil fuel & Alternate fuel	Kg CO2/ MT of clinker	285.0	283.6
Specific CO2 emission from transportation		1.93	1.95
Total CO2 emission		822.6	821.5
Net CO2 Reduction for Oct-16 to Dec-16 from Fossil fuel & Alternate fuel	MT of CO2	1055	

*"Mind Blowing and time for us to act and transform towards Bench Marking."*

- TVS. Chidambaram, COO

## EnMS Development and Implementation

### Organizational

With a positive approach on Environmental impacts, GHGs thro' conserving natural resources by maximizing utilization of AFs & ARMs, reduce power consumptions thro' various energy conservation techniques to bring down the production cost with an ultimate aim to make the stake holders /customers happy, Star Cement has adopted, established and implemented the EnMS.

### Top Management:

Functional Heads (CEO, COO & CFO) are the top management leading the Star Cement from Dubai, Head Office. Vice President-Unit Head is the top management at Star Cement, Ras Al Khaimah works & Grinding units (in Ajman & Abu Dhabi).

Driven from the Groups Mission, Vision and Strategy, the local management team is committed and established IMS Policy integrated with Energy (ISO-50001) requirements, appointed EnMS team leader, approved Energy Team, provided resources, identified & determined the scope and boundary; ensures establishments of EnPIs , Energy Objectives and Targets;

### Energy review and planning

It is evident thro' ERR (Energy Review Report) which was designed based on the end-end / sequential process of Clinkerization i.e., Limestone mining to Clinkerization pyro process.

### Planning

SC has conducted and documented the Energy Planning process, consistent with the Energy Policy and leads to continual improvement of the energy performance.

### Review

SC has established the baselines for various energy use areas of consumption. Daily Energy performance review takes place to analyze energy use and consumption and then identify significant energy use areas. Energy

Reviews facilitates to identify, prioritize and record opportunities for energy performance improvement.

#### **Base line**

The Baselines established by SC is based on the results of previous year & documented in the Energy Review Report (ERR). The base line adjustments are made when EnPI is no longer applicable or major changes have been introduced to the process or operation. The following are considered to establish the baselines:

**Energy Performance Indicators (EnPIs)** are determined based on the baselines set & the targets to be achieved. SC quantifying the energy as "KWh/Ton of Clinker".

**Significant energy use** is defined for higher power consumption areas, opportunities for higher saving potential & poor operating / maintenance conditions.

#### **Energy Objectives & Targets and Management action Plan**

The ERR provides the objectives and targets set by SC to improve Energy Performance.

**Management Program** provides the necessary action plan with timelines, verification method and responsibilities against the set objectives & Targets.

**Financing:** Financial resources and commitments are obtained from Management. The total amount spent for implementation of ISO 50001:2011 was AED 179355.

**Duration needed:** Amount of time needed to establish the EnMS in SC is approx. 9 months (Jan-16 to Sep-16)

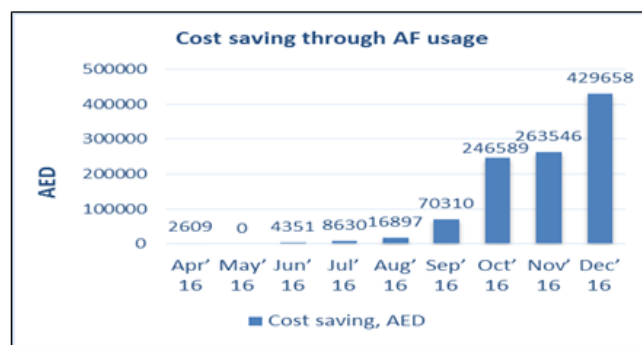
#### **Cost-Benefit Analysis**

Cost benefit calculation is carried out based on increment in % TSR and Type of alternate fuel with heat value. More heat value alternate fuel has the potential for heat enthalpy for replacing natural resources (heat values) such as coal and pet coke materials. This heat replacement benefits cost saving w.r.t the higher cost of natural resources.

95% of AF of Tyre chips consumed for Apr'16 to Sept'16 whereas the same increased to 99.5% for Oct'16 to Dec'16. Besides, minor substitution of HFO sludge (generated from SC- Captive Power Plant), waste filter bags, wood chips & waste paint sludge (negative cost) from the Paint industry being used to support the Environmental aspects of hazardous waste disposal through kiln incineration of SC pyro process instead of land filling.

The costs of raw coal and tyre chips on an average for Apr'16 to Sept'16 were AED 243.59/T & AED 202.10 /T respectively. Subsequently for Oct'16 to Dec'16 it was AED 295.20/T of coal mix (85% High Calorific Value Coal & 12% Medium Calorific Value Coal) and AED 158.36/T of Tyre chips respectively.

The achieved financial benefits are reviewed and vetted by Finance department.



***"Efficiency is doing things Right / Maximum output from the Least amount of Input."***

-Naveen Chandra Kukreti, Vice President

#### **Approach used to determine whether energy performance improved**

SC's approach for improvements in Energy performance.

- Significant energy users monitored thro' SAP.
- Review, analysis & action plans on power consumption report in daily production meetings.
- Periodical review by internal & external agencies on critical process equipment.
- Arresting false air ingress into the systems to reduce heat & power consumption for Pyro, Raw material & Coal grinding sections on monthly basis.
- Monthly ECC (Energy Conservation Cell) meeting.
- Monthly 'Why-Why analyses' meeting on Eqpt B/D.
- Monthly analysis on Operational KPIs: OEE (Overall equipment effectiveness) MTBF (Mean Time Between Failure) and MTTR (Mean Time To Repair) parameters for all relevant sections.
- Focus on energy initiatives, encouragement thro' rewards and recognitions to best performers by Sr. Leaders to motivate during quarterly GCM - a common platform for vertical interaction.
- Monthly Gate meeting headed by U.H., is also one of the platforms to support the above purpose.



- Service level agreement (SLA) based Internal Customer Satisfaction (ICS) survey is being reviewed by U.H on monthly basis for improving the relations between Internal Customers & Suppliers among all depts.

#### **Approach used to validate results**

- SC considers on Performance Evaluation, approach to track & measure activities and strategies to reduce the energy use.
- U.H., MR and the Energy Team assess the performance evaluation from ERR.
- Any deviation / abnormalities in energy performance, the consumption from the desired outcome is subjected to a root cause analysis & corrective actions will be taken as appropriate.

#### **Internal Audit**

- The frequency of Audit is based on process complexities, changes that affect the organization and previous audit results.
- The internal audits (INA) are being conducted by the trained internal auditors.
- The main focus of INA is to identify the gaps & opportunities with relevant process & to abridge with suitable CAPA measures by respective process owners.
- In the half yearly MRM (Management Review meeting), U.H. reviews the compliance of all NCs to ensure further improvement of the system.

#### **Steps taken to maintain operational control and sustain energy performance improvement**

##### **Operational Control**

SC has considered the operations and maintenance activities to ensure

- Relevance of Criteria for effective operation and maintenance of significant energy uses.
- Steps to operate and maintain facilities, processes, systems and equipment in accordance to the Criteria.
- Communications.

The Process Flow Chart provides an overview of the processes and interaction between the core elements of the EnMS.

##### **Design**

SC considers appropriate design while planning through modification / renovation activities documented in Energy Design Review Report.

#### **Procurement of Energy Services, Products, Equipment and Energy**

SC ensures that the Procurement person is given adequate information while procuring energy services, products, equipment and energy which is documented in MM module of SAP.

The evaluation of External Providers, selection, registration and re-evaluation are available in SAP.

#### **Development and use of professional expertise, training, and communications**

##### **Competence, Training and Awareness**

SC ensures that persons working for significant energy uses are competent on the basis of appropriate education, training, skills and experience.

It is documented in Corporate HR portal (Poornata.com). The training needs for significant energy uses are identified and documented in the Training Plan.

Awareness is imparted to all persons includes:

- Energy Policy, Procedures and Requirements of EnMS.
- Roles, Responsibilities and Authorities in achieving the requirements of EnMS.
- Benefits of improved energy performance.
- Impact of energy use and consumption.
- Behavior towards achieving energy objectives and targets.

##### **Communication**

SC communicates internally thro' ECC meetings and daily Prodn. Meetings on energy performance.

The external communication (direct/indirect on Energy) to relevant interested parties like Govt., authorities EPDA, MOEW , Ministry of Energy is well established by complying their local Environmental norms & regulations and timely requirements. Being awardee of many Environmental appreciations, SC is getting the support, guidance & cooperation for identifying innovative products for AFs & ARMs to improve the Energy performance.

*“Energy conserve is Energy reserve.  
Implementation of standards will preserve this reserve”.*

- S.D.K. Sankara Rao, MR

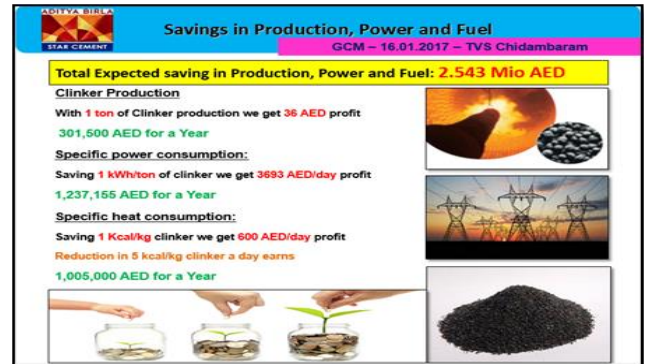
### Tools & resources

- SC has the strong business drivers like Six Sigma, Kaizen, PSS (Problem Solving Skills), 7 QC tools, Cement Sustainability Initiative (CSI), 5S, Model area / Equipment, QCDIP key indicators, Safety, BCE (Basic Condition Evaluation) & PM (Planned Maintenance) audits etc.
- EnMS is supported by DCS for Energy data logging which is being uploading in SAP.
- E-based & Webinar training interactions with ABG companies to develop multi skills.
- CTES (Corporate Technical Energy Services) support for conducting technical / energy audit for optimization.
- Sharing & replication of Best practices among ABG companies.

### Lessons Learned

- Developed Ownership culture “I operate & I maintain” thro’ Self Maintenance initiatives.
- Identification & prioritization of major energy consumers and sources for potential energy savings and set their boundaries.
- Ensure effective process monitoring and measurement of capacity utilization equipment and energy cons., to conserve natural resources through suitable replacement with available AFs & ARMs.
- Analyze and compare SC data with international targets through Whitehoppleman International Cement Review study.
- To create an awareness on Energy initiatives from

various forums like GCM, monthly Energy, gate meetings and daily production meeting to all employees incl., contract to achieve the primary Objectives & Targets through suitable rewards and recognitions by Sr. leaders.



- Deployment of 5 ABG values (Integrity, Commitment, Passion, Seamlessness & Speed) to achieve the primary objectives of Energy.
- Knowledge sharing through Best Practices among ABG companies.

### Keys to Success

- Top Management commitment
- Multi skill & effective utilization of resources.
- Encouragement of employees' through rewards and recognitions.
- Place to work (with ABG group)
- Alignment of employees through 5 values of ABG.
- Updating with the recent / new technologies & inviting challenges.
- Ability to produce multiple products from the single Kiln to meet the customer requirements.
- Amicable relations with stakeholders.
- Joint improvement projects with peers & suppliers.
- Consuming hazardous waste from the peer industries as AFs & ARMs with continuous probing to assist towards Global warming.

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](http://www.cleanenergyministerial.org/energymanagement).