

AlNakheel Hygienic Paper Manufacturing

\$1.57M and 5,629 Metric Tons CO₂-e emission reduction through effective implementation of Energy Management System ISO 50001.



The WINNER team, Energy team from the floor

Case Study Snapshot

Industry	Pulp and Paper
Product/Service	Tissue
Location	UAE – Abu Dhabi – Mussafah - ICADII
Energy performance improvement percentage (over the improvement period)	15% improvement over 5 years
Total energy cost savings (over the improvement period)	USD 1,570,000
Cost to implement Energy Management System (EnMS)	USD 183,000.00
Total energy savings (over the improvement period)	26,514 MWh
Total CO₂-e emission reduction (over the improvement period)	5,629 Metric Tons

Organization Profile / Business Case

“Applying ISO50001 helped us to significantly reduce our manufacturing costs over the Machines and Utilities energy cost.”

— Samir Masoud , Supply Chain Director

AL Nakheel Hygienic Paper Manufacturing Company is part of Fine Hygienic Holding, 24/7 producing and serving its market with hygienic paper products using virgin pulp from certified FSC sources to manufacture, distribute and sell premium quality tissue paper products. The Quality, Environmental, Energy management System and Occupational Health & Safety Systems are designed and committed to:

- Protect the environment, conserve the natural resources, and mitigate the environmental pollutions where possible.
- Ensure sustainable development principles in all aspects related to its operations including energy management, pollution preventions
- Continually improve the energy performance in all activities within defined scope and boundaries to cost-effectively minimize our consumption of energy.

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We recognize that Quality, operations, economy, environment, publicity, social community and other interested parties' concerns are all integrally linked to our strategic mission. And it is a primary top management objective—as well as the individual and collective responsibility of all employees. To that end, we strive to:

- Comply with the applicable legal requirements in the country such as but not limited to environmental, occupational health and safety and EnMS.
- Establish, develop and continually improve integrated management system for Quality, Environment, occupational Health and Safety by which to comply with the latest requirements of ISO 9001, ISO 14001 ISO 450001 and ISO50001.

Committing to reduce the Energy Consumption (Power and Gas) used for all activities within defined scope, and ensure the availability of information and necessary resources to achieve objectives and energy targets as well as to encourage staff and management to innovate to reduce energy consumption.

“ISO50001 helped us to integrate energy management into our overall efforts to improve quality and environmental management.”

— KHALIL SHORBAJI, OPERATIONS MANAGER

Business Benefits

At AlNakheel , we believe that ISO 50001 is not a document or certificate to achieve, but is a daily work process and methodology , and it is the right tools to develop, implement, and improve Energy Management Systems. It is also to continually improve the energy performance, efficiency, usage, and consumption.

Energy Management provides guidance on the usage of energy through our supply chain, from raw materials to Finish Good. Apart from costs, energy usage contributes to climate change as well. We, at Al Nakheel aspire to reduce energy consumption and use. In addition, we increase our team awareness and capability towards energy conservation. We acquire the necessary skills,

Being an ISO 50001 certified, Enables us to:

Increase energy efficiency:

We reduced our Electrical consumption 15% vs our base line in 2018, and this came from,

- We have examined the different steps of the process and have identified the ones that demand most of our energy (SEU),
- monitoring the daily consumption
- setting the right targets
- setting the action plan
- Closure of action plan
- Reward & recognition for the heroes who contributed in achieving the energy targets

Contribution to cost reduction:

We reduced our Energy bill by more than \$500,000 only in 2022 due to reducing the energy consumption,

In parallel, and as the authority in Abu Dhabi helping the organizations which prove to be the most energy efficient, by giving 30% discounted tariff price, proudly we are since last 3 years consecutively class A, which means we reduced our bill by \$1,300,000 on top **only** in 2022. This achievement was not possible without applying a best-in-class energy management system and ISO50001 strategy and methodology.

Rewarding our Heroes



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In Summary, the below table shows year over year improvement and cost saving we gained:

Table 1: YOY Cost Savings

Year	Electrical Consumption kWh/t	Improvement	Production ton/year	Elect cost \$/kWh	Total saving \$	Saving MWh/year	CO2 saving tons
2018	1250	Baseline	40,350	0.078			
2019	1181	6%	45,300	0.078	244,169	3,126	663.68
2020	1135	9%	48,236	0.063	347,266	5,547	1,177.84
2021	1091	13%	49,525	0.055	433,099	7,875	1,672.00
2022	1063	15%	53,297	0.055	548,162	9,967	2,116.21
Total:					1,572,696	26,514	5,629.72

About 50% of overall cost savings was due to operational savings, where we spent about \$20k for additional instrument, and about \$40k for training and external audits to help maintaining the EnMS.

Gain competitive advantage.

Reducing our manufacturing cost is very crucial to gain competitive edge and increase the profit margin specially with the high competition in Abu Dhabi which is the hub for tissue and paper manufacturing in the MENA (middle east and north Africa)

Compared with our competitor and based on the benchmark (see table 2), we have the lowest energy cost ever and very close to the min globally [kd0121322enn ETS efficiency benchmarks.pdf \(europa.eu\)](#), this helped our sales team to reduce the selling price while keeping same profit margin during the last pandemic year and to sell more volume.

Applying ISO50001 is not only to reduce our manufacturing cost, but it is an important step in our sustainability and green world responsibility, we are proud of what we achieved so far and looking for further improvement with the help of the EnMS.

This also improved our reputation in market regarding Corporate Social Responsibility (CSR) which placed our brand in the market to new horizons.

Plan

Following to the Board and chairman direction to apply all sustainability strategies, and one of the main aspect to apply the Energy best practice by integrating the ISO50001 aspects into the daily work, below the link to our annual report. [fhh-2021-sustainability-report-evf.pdf \(storyblok.com\)](#)

In order to support global efforts to reduce greenhouse gas (GHG) emissions, we have implemented multiple projects to reduce CO2 and GHG emissions at our facilities. We monitor our electrical and thermal consumption in all facilities and operations, ensuring that we are working according to the ISO 50001 energy management system.

Table 2: Tissue specific power consumption Benchmark

Category	Proposed Benchmark value MWh/t	Average specific electricity consumption	Max. specific electricity consumption
Newsprint	0.801	1.231	2.457
Uncoated fine paper	0.645	1.484	3.445
Coated fine paper	0.538	1.238	2.329
Tissue	0.925	1.215	3.347
Testliner and fluting	0.260	0.497	0.960
Uncoated carton board	0.268	0.447	1.425
Coated carton board	0.403	1.193	1.640

Source: Numbers are minimum and average values from RISI and JRC

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CBN (Compelling Business need) is the site strategic plan which focuses on the cost and one of the main factors in manufacturing cost is the energy which contributes about 50% to total manufacturing cost.

So, a proposal was presented to top management to implement EnMS ISO 50001 to adhere to the CBN and company policy to reduce carbon emissions. Key points of proposal were to contribute to sustainability initiatives and in parallel targeting cost reduction to gain competitive edge. In project overview statement, return on investment (ROI) and key outcomes were mentioned which brought top management/key decision makers attention towards EnMS implementation and commitment to provide resources including finance to project was ensured.

The senior management is following up the energy objectives and targets and ensures that the system is aligned with the ISO50001. Review meetings by senior management are done regularly during quarterly budget reviews and progress against action plan is discussed in weekly LPT meetings. The saving projects progress is tracked and monitored on monthly basis during LPT meeting.

Our strategy: **What is not MESURED cannot be IMPROVED.**

Automation is the key point , And we believe that initiating an online energy monitoring system is critical especially with process dynamics which could change anytime and affect negatively the energy efficiency.

Below graph is for part of our online dashboard in our DCS (Distributed Control System), it presents simultaneously the main loads and SUE, and with a predefined trends for the related parameters to analyze the change and to find which parameter affects the consumption, so the reaction is quick and effective by the operator. In this way, we avoid the delay to take decisions and actions in next day meeting or monthly meeting to react accordingly.

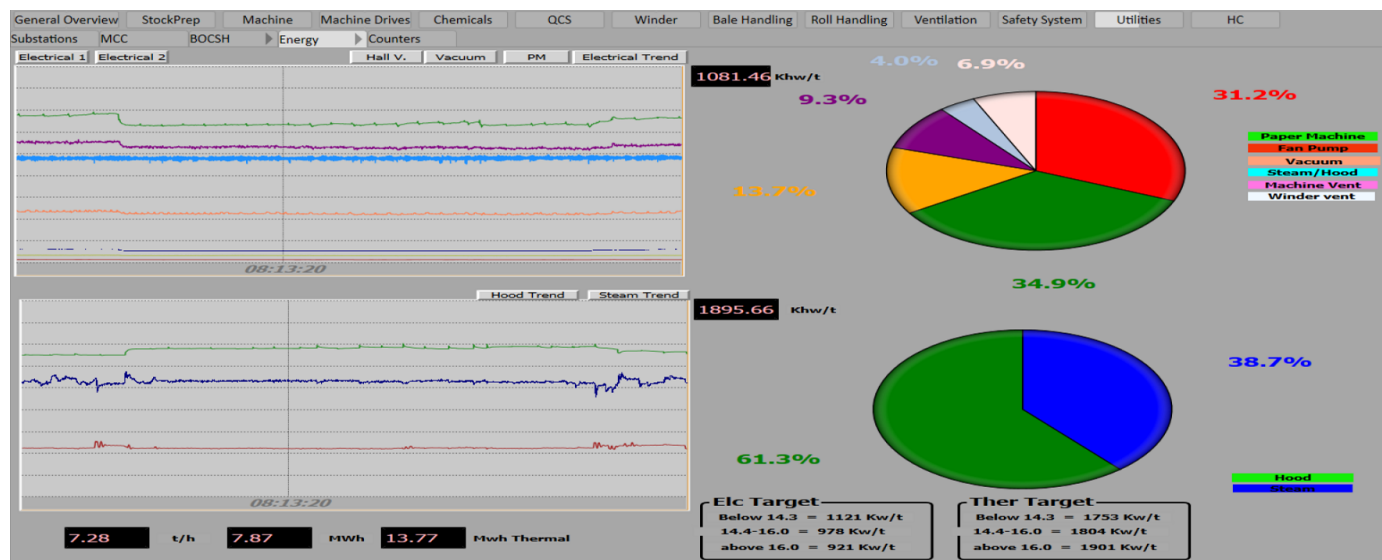


Figure 1: Online Energy Dashboard

Therefore, building a one data platform connected digitally with all machines and utilities is the key to monitor, which is our case. And accordingly, we built online dashboard where the most critical loads are presented with baselines.

Historical data is the other main aspect, and we have data since 2018 (few months after startup)

We used the historical data to identify and demonstrate the key factors for the main loads, where we can understand the impact for each factor which is the guide for the improvement,

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Winder Eff -14	HW line 1	SW Line -1	PM -6	Vacuum -6	W. Dust 5	
SW refining -18	HW refining -9	Water Pumps 0	Slice 1	Mist & Dust 2	Hall Vent 3	
PM Stop -23	J/W 0					
Act Electrical kW/t 1,124	Target 1,050			Winder Eff 93.8%	PM Stop time 615.6	

Figure 2: Sample Data Tracking & Presentation

“WITH EFFECTIVE USE OF ISO 50001, WE ACHIEVED SUSTAINABLE RESULTS IN ENERGY OPTIMIZATION WITH HUGE RETURN ON INVESTMENT (ROI), MAKING ISO 50001 A COMPETITIVE SYSTEM TO BE COST EFFICIENT.

— Abedalhade Alhader, TECHNICAL SUPPORT MANAGER

Do, Check, and Act

The PDCA (Plan, Do, Check and Act) system was initiated and managed by the energy team.

The top management nominated an energy manager and supporting team from both Operation and technical department to lead the EnMS implementation. Objectives related to EnMS (clear and SMART energy objectives) and energy optimization are included in KPIs of Energy Management Team with.

Energy team with alignment of Senior management established the energy baseline and to measure company energy performance against the baseline and global Benchmark and with our sister companies. And identified appropriate EnPIs for monitoring and measuring its energy performance.

Relevant variables are defined and targets and baseline for KPIs are generated accordingly, below table for **editable** variables and internal calculation to estimate the specific energy will be consumed.

Figure 3: sample of Relevant Variables & Baseline Targets

	PM Speed	J/W	Slice	Creping Ratio	Moisture	BW	HW Refining	SW Refining	ViscoNip load	winder Eff%	t/h	Elec kWh/t	percentage
Facial	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	1,100	40%
HBW	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	950	46%
Toilet	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	1,010	8%
AutoCut	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	1,300	6%

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Based on the above relevant and other defined factors we are able to **normalize** the energy consumption and even forecast our expected consumption based on the SKU and production parameters for the coming year. This is helping us to compare the energy consumption not at overall site but we can compare based on each relevant, see above *Figure 3* which show how much we gain or loose in kWh/t from each relevant, this is in daily bases and it is discussed on the daily operation meeting.

The team discusses the results during the daily production meeting, and on monthly basis they review the performance, analyze and define the gap and align on the action plan.

A monthly report generated and shared by the energy manager, this includes the overall energy performance, gaps and actions to close the gaps if any.

Monthly meeting is the drumbeat to go deeply in the performance, review master plan and actions progress (*Figure 5*), Whatever the actions come out from the monthly meeting and require a new investment, the team prepares the financial study and shares it with finance team to validate and fund the project if study is financially attractive.

Power BI tools are used for better presentation and to show the overall pictures over easy navigation tools (*Figure 4*)



Figure 4: Power BI Data Presentation

Figure 5: Sample Action Plan Review

Gap , Opportunities	Action	Cost \$	Owner	Due Date	Status	Comment
reduce the compressed Air power consumption	reduce the master compressor SP from 8 to 7.5 bar	-	Ahmad Hendi	2022-02-08	Done	
Paper Moisture 5.5%	increase the moisture above 6% at Heavy basis weight	-	Abed	2022-02-01	Done	
Hood unbalance impact the thermal consumption	implement the Hood Balance check	-	Ahmad	2022-02-01	Done	
the moisture sensor not calibrated	Include Hood Moisture Calibration in TBM	-	Sahrma	2022-01-30	Done	
opportunity to reduce the vacuum consumption from 850 kW to 800kWh	Install Blind Flange between Uhle Box and suction roll	10,500	Hasan	2022-07-01	Done	
Interfold High power consumption	study and implement reducing power consumption by 10 kWh/t	-	Mostafa	2022-06-30	Done	
Reducing Air compressors power consumption	Reduce the Compressed air pressure from 7.0 to 6.5 bar	-	Ahmad	2022-05-01	⊕	Partially reduced to 7.7 bar, will continue
Increase Boiler Efficiency	warm up the feed water from 40deg to 80 deg, by installing heat recovery exchanger after WE	100000	Hasan	2022-10-01	⊕	under approval
high power consumption on repulping process using low consistency pulper	repulp the broke only on the high consistency pulper	250000	Abed	2022-03-01	⊕	Done
High refining SW & HW	Optimize the refining by process setting and using different type of Inzime	-	Khalil	2022-04-15	⊕	Done
Stop loads where it is applicable	Stop Broke coerse screen	-	Khalil	2022-04-15	⊕	Done
Increase Steam drying share to be 50% , today about 40% only	Condensate pump replacing start using Edge release	-	Moath	2022-04-15	⊕	In Progress
recover the heat before send to ambient	Reduce the Hood gas consumption by the Air/Air heat recovery	-	Abed	2023-09-01	⊕	On Progress
Calibrate gas flow meters	replace the gas flow meter with spare one and calibrate the old one, for WE, DE and Boiler	-	Hasan	2023-02-01	⊕	planned next shutdown
Facial Electrical Energy	optimize the overall system pH	-	Khalil	2023-03-25	⊕	
Facial Electrical Energy	drystrength optimization	-	Zaid	2023-03-28	⊕	
Vacuum power consumption	vacuum optimization	-	Moath	2023-04-01	⊕	In Progress

Regression in Excel – Data Analysis is the tools we use to find relevant impact and factors for specific and absolute energy use.

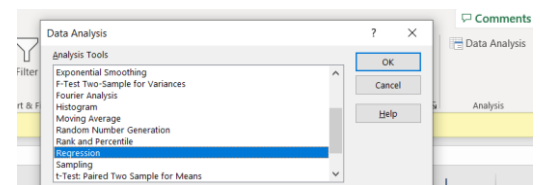


Figure 6: Regression Analysis Sample

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Energy performance improvement are quantified based on the baseline and vs the objectives and KPIs and presented by the Energy Manager during The yearly management review meeting which includes the Energy management system, to discuss the gaps and to agree on the action to close the gaps and to reduce the energy use where possible, in addition to approve the initiatives related to energy management.

The below list is sample of activities which were implemented and **contributed towards reduction in the energy consumption** over the implementation period and focusing on the SEU and using the EnMS and ISO50001 methodology:

- Vacuum Energy Optimization by:
 - a) Installing variable speed drive.
 - b) Reducing fines and polymers in system by using latest developed chemicals. Felt remained more open with less plugging and as a result there was significant reduction in vacuum pressure requirement.
- Fan pump energy optimization:
 - a) Headbox slice opening control by process center lining and regular maintenance plan.
 - b) Decreasing soft wood ratio.
- Compressed air consumption reduction by:
 - a) Reduction in operating pressure by 13%.
 - b) Detecting & Fixing the leaks of compressed air through CIL (Cleaning, Inspection, Lubrication) and Defect Handling system, and by using the leak test survey (Atlas Copco)
 - c) Replacement of open tube application with air amplifier.
- Refining Energy Optimization (50% less) by:
 - a) Increasing pH values before refining process to improve enzyme effectiveness.
 - b) Make fibers more swelled that improves fibrillation process. Resultantly, tensile increase is done with less refining load.

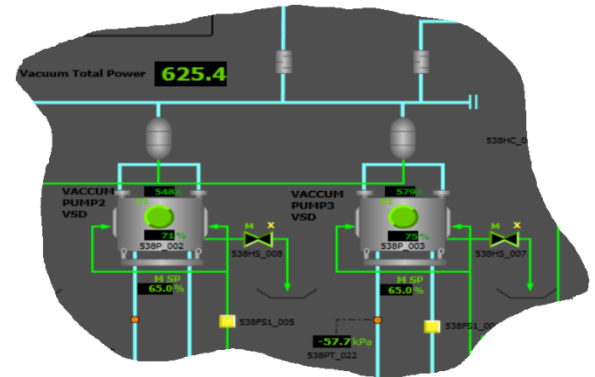


Figure 7: Reduction in Vacuum Pressure

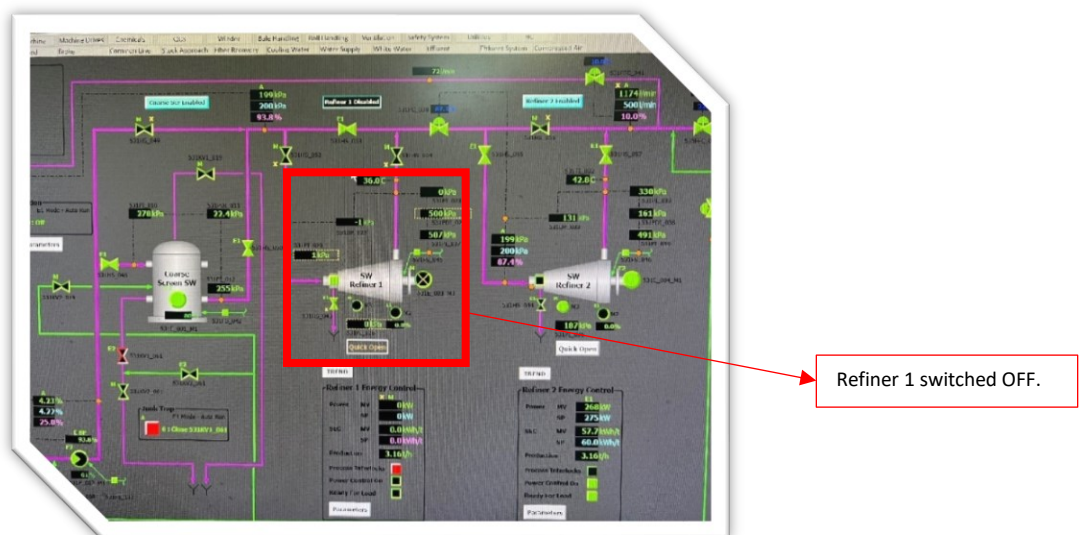


Figure 8: Refiner # 1 switched off.

- Day Light management by installing control system, Day/night sensors and roof skylight.

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As a result of the above and other initiatives we are achieving our targets YoY, with discipline, teamwork and the full understanding of the ISO50001 we are able to deliver our commitments and beyond.

Full team involvement is important to success; therefore, the rewarding and recognition system is applied to reward best saving ideas provider.

Transparency

As we are proud certified ISO50001 , we are publishing this to public through our group website

[fhh-corporate \(finehh.com\)](http://fhh-corporate(finehh.com)) , and by downloading the sustainability report (page 14) , below clearly mention our commitment to GHG and proudly apply the ISO50001 in UAE.

What We Can Do Differently

- Front line Workers Engagement: Engagement of front-line operators/supervisors will be done through awareness sessions and they will be engaged in implementation phase from the beginning.
- Integration of Energy Targets with KPIs: Energy saving ideas will be part of team KPIs to involve and engage the full team in a better way.
- Extend the Energy Management System scope to suppliers: Preference will be given to suppliers/vendors who are working on Energy conservation through Energy Management System.
- Training sessions for suppliers: Awareness sessions will be arranged for supplier/vendors through proper training on Energy Management System by Al Nakheel team to make them cost competitive.
- Instead of starting from scratch, learning should have been taken from sister companies in Fine group which are already ISO 50001 certified.

Next steps and future plans for your ISO 50001 EnMS:

- Discover the new and the best in class in saving energy in paper making specially through attending global webinars, seminars.
- Plan for external audit from the world known company to audit our energy use and to identify any gap we don't observe, which will be our plan to rectify and to invest if needed.
- Advanced EnMS training will be conducted this year by external and well-known organization.
- Enhance Reward & Recognition system to encourage more new ideas regarding energy saving.