

ECONOSCITECH INTEGRATION

ISSUE
10

INTERNATIONAL SCIENTIFIC
ELECTRONIC JOURNAL



TASHKENT STATE
UNIVERSITY OF ECONOMICS



American University
of Technology

Powered by Arizona State University®

ISSN: 3060-5075



Acceptance of articles
PUBLISHED MONTHLY



ARTICLE CONTRIBUTORS
**PROFESSORS, SCHOLARS,
SPECIALISTS, AND RESEARCHERS**



Google
scholar

OpenAIRE

ISSN

INTERNATIONAL
STANDARD
SERIAL
NUMBER
DENMARK

CONTACT:



+998 94 3540880



<https://econoscitech-integration-journal.uz>



2026

**EDITOR-IN-CHIEF:**

Zufarova Nozima Gulamiddinovna
DSc., Dean of Tourism Faculty, TSUE

DEPUTY EDITOR-IN-CHIEF:

Makhmudov Nosir Makhmudovich
DSc., Prof., Academician

DEPUTY EDITOR-IN-CHIEF:

Suyunov Dilmurod Xolmurodovich
Doctor of Economics (DSc), Professor,

DEPUTY EDITOR-IN-CHIEF:

Allayarov Shamsiddin Amanullayevich
doctor of economics (DSC), professor

RESPONSIBLE SECRETARY:

Otaboyev Axmed Maxsudbek o'g'li
TSUE independent researcher

THE SCIENTIFIC-POPULAR
ELECTRONIC JOURNAL
"ECONOSCITECH-INTEGRATION"
HAS BEEN REGISTERED UNDER
THE NUMBER C-5669651 BY THE
AGENCY FOR INFORMATION AND
MASS COMMUNICATIONS (AOKA)
OF THE REPUBLIC OF UZBEKISTAN,
EFFECTIVE FROM OCTOBER 9, 2024.

In accordance with Resolution No. 384/6 dated April 10, 2026, issued by the Presidium of the Supreme Attestation Commission under the Ministry of Higher Education, Science and Innovation of the Republic of Uzbekistan, this journal is included in the list of recommended international scientific publications for publishing the primary research findings of doctoral dissertations in the field of Economic Sciences.

Partners: Tashkent State University of Economics / American University of Technology in Tashkent (AUT)

Electronic publication. Issue 10. 500 pages.
Approved for publication in October 2026.

Editorial Board Members:

Sharipov Kongratbay Avezimbetovich,
Doctor of Technical Sciences (DSc), Professor



Teshabayev To'liqin Zakirovich,
Doctor of Economic Sciences (DSc), Professor



Said Irandoust,
Doctor of Chemical Engineering Sciences,
Professor



Abdurakhmanova Gulnora Kalandarovna,
Doctor of Economic Sciences (DSc), Professor



Khudoykulov Sadirdin Karimovich,
Doctor of Economics, (DSc), Professor



Tokunaga Masahiro,
professor, PhD of Economics of the Faculty of
Business and Commerce



Debasis Das,
professor Department of Computer Science



Nitin Goje,
professor and Program Lead - Computer Science



Nargizakhon Shamshieva
Doctor of Economic Sciences, Professor



Rakhmonov Norim Razzakovich,
Doctor of Economic Sciences (DSc), Professor

Bayxonov Bahodirjon Tursunbayevich
Doctor of Science (DSc), Professor



Shomurodov Ravshan Tursunkulovich,
PhD, Associate Professor



Boymuratov Abduraxmat Djumayevich
Doctor of Philosophy (PhD) in Economics



Sharopova Nafosat Radjabovna
DSc, Associate Professor



Sultanova Kamila Mukhtorali Kizi
Master of Science

CONTENTS

DEVELOPMENT OF AN IMPROVED METHODOLOGY FOR ASSESSING THE PERFORMANCE OF SMALL BUSINESS ENTITIES	28
Mavrulov Ravshan Nematjonovich	
METHODOLOGICAL ASPECTS OF ASSESSING AND ANALYSING AGGLOMERATION DEVELOPMENT	33
Shokhrukh Mardonov	
Nigora Makhmasobirova	
Sevara Kulsakhatova	
IMPROVING INTERNAL STANDARDS AND AUDIT QUALITY MANAGEMENT MECHANISMS AT PF MAC ALLIANCE AUDIT ORGANISATION: A PILOT CASE STUDY	39
Bobonarova Kamola	
ASSESSING THE LEVEL OF DIGITAL DEVELOPMENT AND DEVELOPING AN ARTIFICIAL INTELLIGENCE-BASED MECHANISM FOR IMPROVING THE EFFICIENCY OF INDUSTRIAL ENTERPRISES	46
Rashidov Hasan Shirinboyevich	
REASSESSING CORPORATE FINANCIAL STABILITY IN THE CONTEXT OF SUSTAINABLE ECONOMIC GROWTH: A COMPARATIVE EVALUATION OF ASSESSMENT METHODS AND THEIR APPLICABILITY TO TELECOMMUNICATIONS COMPANIES.....	52
Odilov Dilshod Qudratilla o'g'li	
MONETARY POLICY TRANSMISSION, EXCHANGE RATE VOLATILITY, AND LABOUR MARKET RESILIENCE: EMPIRICAL EVIDENCE FROM UZBEKISTAN	59
Sayipov Begzod Rahimovich	
A PROCEDURAL METHOD FOR GENERATING PBR TEXTURE MAPS FROM HISTORICAL GEOMETRIC PATTERNS.....	66
Beknazarova Saida Safibullayevna	
Yunusova Dilnoza Alimjan qizi	
HISTORICAL EVOLUTION OF TAX POLICY REFORMS IN THE CONTEXT OF WTO ACCESSION: THE EXPERIENCES OF KYRGYZSTAN, KAZAKHSTAN, AND TAJIKISTAN	72
Saitkulov Sukhrob Shavkatovich	
THE ECONOMIC MECHANISM OF STATE REGULATION OF THE RAILWAY TRANSPORT SYSTEM IN UZBEKISTAN	79
Mekhrangiz M. Khudayarova	
PUBLIC TRUST AND EXECUTIVE ACCOUNTABILITY: PRIORITIES FOR PARTICIPATORY BUDGETING AT A NEW STAGE OF DEVELOPMENT	85
Saparov Ilyos Khudaymuratovich	
INTEGRATING ISO 50001 AND KAIZEN APPROACHES INTO STRATEGIC ENERGY RESOURCE MANAGEMENT	89
Najmiddinov Yahyo Fazliddin ugli	

INTEGRATING ISO 50001 AND KAIZEN APPROACHES INTO STRATEGIC ENERGY RESOURCE MANAGEMENT

Najmiddinov Yahyo Fazliddin ugli

PhD, Department of Green Economy and Sustainable Business

Tashkent State University of Economics

E-mail: yakhyonajmiddinov1996@gmail.com

ORCID: 0009-0004-0221-0121

Abstract. This study proposes an integrated framework for strategic energy resource management by combining the ISO 50001 energy management system with the Kaizen approach. Using comparative content analysis and conceptual synthesis, the study examines how the governance, measurement, and review requirements of ISO 50001 can be reinforced through Kaizen practices related to waste elimination, employee involvement, standardisation, and continuous improvement. The findings indicate the complementary nature of the two approaches: ISO 50001 provides a systematic framework and strategic discipline for energy management, while Kaizen translates energy objectives into recurring process-level improvements. Based on this integration, a two-loop conceptual model and a seven-stage implementation algorithm are developed. The proposed framework is designed to strengthen implementation effectiveness, promote organisational learning, and enhance the link between energy performance and industrial competitiveness. Further empirical application in industrial enterprises would provide an opportunity to validate and refine the proposed framework under practical operating conditions.

Keywords. strategic energy resource management, ISO 50001, Kaizen, PDCA, energy performance indicator (EnPI), specific energy consumption (SEC), continuous improvement, industrial competitiveness.

Аннотация. В данном исследовании предлагается интегрированная модель стратегического управления энергетическими ресурсами, объединяющая систему энергетического менеджмента ISO 50001 и подход Kaizen. На основе сравнительного контент-анализа и концептуального синтеза исследуется, каким образом требования ISO 50001 в области управления, измерения и анализа могут быть усилены посредством практик Kaizen, связанных с устранением потерь, вовлечением сотрудников, стандартизацией и непрерывным совершенствованием. Результаты исследования демонстрируют взаимодополняющий характер двух подходов: ISO 50001 обеспечивает системную основу и стратегическую последовательность управления энергетическими ресурсами, тогда как Kaizen способствует преобразованию энергетических целей в регулярные улучшения на уровне отдельных процессов. На основе интеграции данных подходов разработаны двухконтурная концептуальная модель и семиэтапный алгоритм её внедрения. Предлагаемая модель направлена на повышение эффективности внедрения, развитие организационного обучения и укрепление взаимосвязи между энергетической результативностью и промышленной конкурентоспособностью. Дальнейшее эмпирическое применение модели на промышленных предприятиях позволит апробировать и усовершенствовать предложенный подход с учётом реальных условий их функционирования.

Ключевые слова. стратегическое управление энергетическими ресурсами, ISO 50001, Kaizen, PDCA, показатель энергетической результативности (EnPI), удельное энергопотребление (SEC), непрерывное совершенствование, промышленная конкурентоспособность.

INTRODUCTION

Energy has become a strategic management priority for industrial enterprises, as its cost, availability, and reliability directly influence production continuity, investment priorities, and competitive position. The increasing capital intensity of industrial technologies, together with the growing emphasis on decarbonising production, has reinforced the need to consider energy not merely as a technical input but as an important strategic resource. UNIDO (2015) notes that industry accounts for more than one-third of global energy consumption and greenhouse gas emissions and reports that improved energy management

can reduce annual energy use by approximately 10–20%, often through operational changes requiring little or no additional capital investment. Recent IEA analysis similarly emphasises that systematic energy management can generate sustained improvements that contribute to both industrial competitiveness and energy security [1].

Within this context, ISO 50001 provides a formal framework for managing energy performance. It links top-management commitment with energy policy, objectives, data collection, monitoring, and management review through the Plan–Do–Check–Act (PDCA) cycle [2]. At the same time, the effectiveness of a formal management system can be further strengthened by mechanisms that facilitate the timely identification of operational losses, encourage employee participation in improvement activities, and embed successful changes into everyday working practices. These operational dimensions are central to the Kaizen approach, which is based on continuous improvement, waste elimination, employee involvement, and standardisation.

The relevance of integrating these two approaches is supported by empirical evidence. Androniceanu applied Kaizen in a manufacturing setting and reported reductions in energy consumption of up to 7.5% on a production line, 3.5% at the extruder stage, and 20% at the injection stage. From a different perspective, Schützenhofer found that large Austrian firms with ISO-certified energy or environmental management systems implemented energy-efficiency measures at a substantially higher rate than firms relying on conventional decision-making processes. These findings suggest that energy performance is influenced not only by the availability of technical opportunities but also by the ways in which organisations structure decision-making, employee participation, and organisational learning [3].

Against this background, the purpose of this article is to develop a coherent framework for integrating ISO 50001 and Kaizen within strategic energy resource management. The study addresses three research questions: **(1)** which elements of ISO 50001 and Kaizen are functionally complementary; **(2)** how these elements can be combined within a unified and recurring management cycle; and **(3)** which indicators and organisational conditions are required to assess the effectiveness of such integration. The contribution of the study is therefore primarily conceptual and managerial rather than technical, as it seeks to establish a systematic connection between strategic energy governance and continuous process-level improvement.

LITERATURE REVIEW

The literature on energy management consistently distinguishes systematic energy management from isolated technical interventions. UNIDO defines energy management as a combination of organisational, technical, and behavioural actions implemented in an economically sound manner to improve energy performance. Its practical guidance emphasises that an energy management system creates value by embedding attention to energy performance within everyday operations and systematically guiding the organisation through policy formulation, planning, implementation, checking, and review. From this perspective, the management system serves as a mechanism for sustaining measurable and verified improvements over time rather than as an objective in itself.

ISO 50001 formalises this management logic. The standard requires an organisation to establish an energy policy, define objectives and targets, collect relevant information, measure energy performance, review effectiveness, and continually improve its energy management system. The PDCA framework creates traceability between strategic intentions and operational evidence. It also clarifies responsibilities and provides management with a systematic basis for determining which energy-efficiency opportunities should receive organisational and financial resources. This governance function is particularly important because opportunities to improve energy efficiency are frequently distributed across production, maintenance, finance, and engineering functions rather than being concentrated within a single organisational unit. Empirical evidence from Austrian firms further suggests that ISO-based management systems can facilitate implementation by strengthening internal communication and improving decision-making routines [4].

Kaizen complements formal management systems by focusing on the mechanisms through which improvements are generated, implemented, and sustained at the process level. Androniceanu describes Kaizen as an approach to continuous improvement based on incremental changes, employee involvement, and the elimination of *Muda* — activities that consume resources without creating corresponding value. The study links Kaizen with tools and practices such as 5S, value-stream mapping, visual management, standardised work, Kanban, and systematic problem-solving. Although these tools are not specifically designed for energy management, they become highly relevant when energy losses are associated with operating routines, idle time, unnecessary movement, suboptimal equipment settings, or process variability [5].

The case evidence presented by Androniceanu is particularly relevant because the improvement sequence begins with mapping energy consumption, identifying areas with the highest consumption, analysing energy losses, implementing targeted solutions, and subsequently evaluating the results. The study also emphasises the importance of standardisation following successful improvement. This sequence closely corresponds to the PDCA logic while operating at a more detailed process level. Kaizen can therefore provide an operational implementation mechanism within formal energy management by enabling employees to translate broader strategic energy objectives into observable operational issues and repeatable improvements. The same literature indicates that continuous improvement can be further strengthened through employee motivation, effective management–employee cooperation, a supportive organisational culture, strong leadership, and clearly defined roles [6].

Recent research on strategic energy management similarly places leadership and cross-functional coordination at the centre of effective implementation. Drawing on evidence from 120 participants representing 71 companies, Miera shows that effective energy leaders can contribute to securing top-management support, strengthening an energy-conscious organisational culture, and coordinating activities across organisational boundaries. The findings also indicate opportunities to further translate the recognised importance of strategic energy management into comprehensive organisational practice. This observation is consistent with the broader literature suggesting that the realisation of technical energy-saving potential is closely associated with effective managerial and organisational implementation [7].

Measurement constitutes another essential component in translating strategic intentions into practical improvements. Lawrence shows that specific energy consumption (SEC) is widely used as a key energy performance indicator but emphasises that meaningful comparisons require consistency in system boundaries, calculation methods, and underlying assumptions. This consideration is directly relevant to the integration of ISO 50001 and Kaizen: Kaizen teams require timely feedback to evaluate process-level improvements, while strategic management requires stable and comparable performance indicators. Accordingly, continuous improvement activities should be based on a consistent energy baseline and agreed energy performance indicators (EnPIs) or SEC measures rather than solely on individual before-and-after comparisons [8].

Taken together, the literature demonstrates substantial potential for closer integration between ISO 50001 and Kaizen. ISO 50001 provides a strong foundation for governance, accountability, measurement, and management review, whereas Kaizen contributes mechanisms for employee participation, loss identification, experimentation, standardisation, and continuous process-level improvement. Existing energy management research also provides valuable insights into leadership, organisational conditions, implementation mechanisms, and performance indicators; however, the systematic integration of ISO 50001 and Kaizen within a unified strategic framework remains an area with considerable scope for further development. Accordingly, this article conceptualises Kaizen not as a separate or parallel programme but as an operational continuous-improvement mechanism embedded within the ISO 50001 architecture. The proposed integration is intended to preserve the discipline and accountability of a formal energy management system while strengthening its connection with everyday production practices and continuous organisational learning.

RESEARCH METHODOLOGY

This study adopts a qualitative conceptual-design methodology based on comparative content analysis and integrative synthesis. Institutional sources were used to identify the formal architecture of energy management, while peer-reviewed empirical studies were examined to assess the practical relevance and conceptual consistency of the proposed linkages. The principal sources included ISO 50001, the UNIDO *Practical Guide for Implementing an Energy Management System*, IEA reports on industrial energy management and competitiveness, and peer-reviewed studies by Androniceanu, Schützenhofer, Lawrence, Ahmad, and Miera.

The analysis was conducted in four stages. First, the key elements of ISO 50001 were classified according to the Plan–Do–Check–Act (PDCA) cycle: strategic commitment and planning, implementation and operation, monitoring and verification, and management review. Second, Kaizen mechanisms were grouped according to their managerial purpose: identifying *Muda*, involving employees, testing incremental improvements, visualising deviations, and standardising successful solutions. Third, corresponding functions of ISO 50001 and Kaizen were systematically matched to determine how Kaizen practices could strengthen the operational implementation of ISO 50001. Finally, the resulting integrated structure was assessed against published empirical evidence concerning implementation conditions, leadership, organisational participation, and energy performance measurement.

Performance was conceptualised as a multidimensional construct. Energy-related indicators, including energy use, energy intensity, energy performance indicators (EnPIs), and specific energy consumption (SEC), were considered alongside cost savings, implementation rates, process reliability, employee participation, and the standardisation of successful practices. This multidimensional approach reflects the strategic orientation of the study: process-level improvements in energy performance generate greater organisational value when they are standardised, replicated, and embedded within a sustainable organisational capability.

Statement on the Use of Artificial Intelligence. In the preparation of this study, artificial intelligence (AI) tools were used to a limited extent, accounting for approximately 10% of the overall research process. Their use was primarily confined to language refinement, technical editing, and structural support. The selection of research methods, analysis and interpretation of the findings, formulation of scientific conclusions, and development of practical recommendations were carried out and verified by the author.

ANALYSIS AND RESULTS

The comparative analysis demonstrates that ISO 50001 and Kaizen operate at distinct but complementary levels of energy management. ISO 50001 establishes the strategic and organisational framework through energy policy, objectives, performance indicators, clearly defined responsibilities, monitoring, and management review. Kaizen, in turn, provides a practical mechanism for identifying opportunities for process improvement and enhancing the efficient use of energy resources. Accordingly, integration is likely to be more effective when the two approaches function within a unified management architecture rather than as separate parallel systems. Within this framework, Kaizen serves as a recurring operational mechanism through which strategic energy objectives are translated into process-level actions and continuous improvements.

At the PLAN stage, the energy review, energy baselines, and energy performance indicators provide a systematic basis for identifying areas requiring strategic attention. Kaizen then translates these priorities into specific process-level improvement activities by defining the relevant process, forming an appropriate improvement team, and identifying forms of *Muda* associated with energy use. This linkage enables broad strategic energy objectives to be converted into clearly defined and manageable operational priorities.

During the DO stage, Kaizen tools and practices such as 5S, value-stream mapping, visual management, standardised work, and incremental problem-solving support the integration of energy objectives into routine operational activities. These practices facilitate employee participation, improve the visibility of energy-related process conditions, and support the systematic implementation of incremental improvements. As a result, energy management becomes increasingly embedded in everyday production processes rather than functioning solely as a separate managerial or technical activity (Table 1).

Table 1
Functional integration of ISO 50001 and Kaizen[9]

PDCA	ISO 50001 function	Kaizen contribution	Integrated result
PLAN	Energy review; baseline; EnPI/SEC; objectives	Select target process; identify Muda; form team	Strategic target becomes a measurable process problem
DO	Operational control; resources; competence	5S, VSM, visual management; small-step changes	Energy objectives become daily operating practice
CHECK	Monitoring, measurement and verification	Deviation detection; before/after comparison	Improvement is verified using consistent indicators
ACT	Management review; corrective action	Standardise gains; capture lessons; restart cycle	Local gains are institutionalised and fed back into strategy

CHECK verifies whether the change has produced a real improvement against the baseline, while ACT converts a successful solution into standard work and returns the lesson to management review. The integrated cycle therefore turns continual improvement from a general requirement into an explicit operating routine (Figure 1).

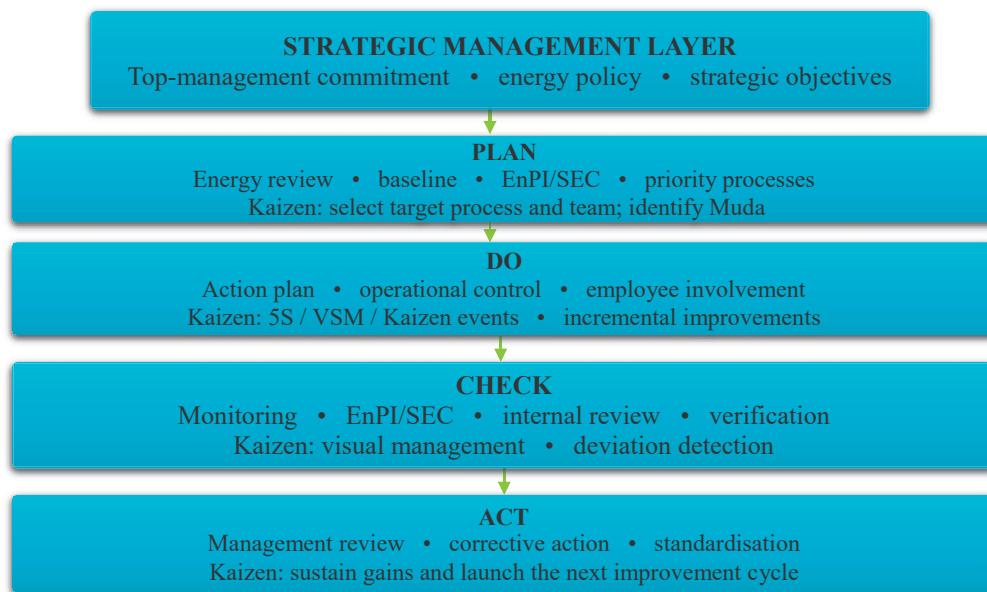


Figure 1. Integrated ISO 50001-Kaizen model for strategic energy resource management¹

The synthesis resulted in a two-loop model. The outer loop is strategic and formal, driven by top-management commitment, energy policy, objectives, resource allocation, and management review. The inner loop is operational and developmental, consisting of repeated Kaizen cycles that identify opportunities to eliminate waste, test incremental improvements, measure results, and standardise successful practices. Energy performance indicators (EnPIs) connect the two loops: strategic objectives determine which processes receive priority attention, while verified process-level results provide evidence for setting new priorities and informing subsequent investment decisions.

Leadership is positioned above the two-loop cycle because effective implementation requires sufficient authority to allocate time, resources, and responsibilities. Miera shows that effective energy leaders contribute to securing top-management support, developing an energy-conscious organisational culture, and coordinating activities across functional boundaries. This evidence supports the view that leadership should not be regarded merely as an external condition but rather as a coordinating capability that connects corporate energy objectives with continuous operational improvement.

The model is operationalised through seven stages: (1) confirm top-management commitment and energy policy; (2) map energy flows and establish an energy baseline; (3) select a priority process, identify relevant *Muda*, and establish a cross-functional Kaizen team; (4) implement clearly defined operational improvements on an appropriate scale; (5) verify the results using consistent EnPI or SEC measures; (6) standardise successful improvements through procedures, training, and visual controls; and (7) review the outcomes at the management level, reprioritise actions, and initiate the next improvement cycle. The sequence deliberately places diagnosis and small-scale testing before capital-intensive interventions, thereby providing an opportunity to manage implementation-related uncertainties and improve the quality of subsequent investment decisions.

This sequence is consistent with existing evidence concerning the organisational conditions influencing implementation. Ahmad identifies cost reduction as an important driver of energy-efficiency measures while highlighting the importance of maintaining production continuity during their implementation. Schützenhofer, in turn, shows that structured management systems can facilitate implementation through stronger information flows and more systematic governance. Kaizen extends these advantages to everyday operational processes by creating a structured mechanism for continuous employee-led improvement.

Based on the synthesis, three levels of integration maturity are proposed. At the formal level, energy policies, performance indicators, and responsibilities are established, while opportunities remain to systematically connect Kaizen projects with strategic energy objectives. At the coordinated level, selected Kaizen projects employ common energy baselines and communicate their results through the energy management system. At the integrated level, energy priorities, Kaizen routines, investment decisions, and management review operate as components of a unified and recurring organisational learning system. Progress across these levels should be assessed through four groups of indicators: energy outcomes (EnPI, SEC, and energy savings), economic

¹ Developed by the author.

outcomes (cost savings and implementation rates), operational outcomes (process reliability and stability), and organisational outcomes (employee participation, standardisation, and replication of successful practices).

UNIDO reports that enterprises operating an energy management system have achieved, on average, annual energy savings two to three times greater than those achieved by enterprises without such a system. The strategic value of integrating ISO 50001 and Kaizen therefore lies in developing a repeatable organisational capability to identify, verify, standardise, and disseminate energy-performance improvements.

The results clarify why ISO 50001 and Kaizen can form a more integrated management architecture when they are deliberately integrated. ISO 50001 addresses the principal governance questions: who is responsible, which objectives are pursued, what should be measured, and how performance should be reviewed. Kaizen addresses complementary process-level questions: how opportunities for waste elimination are identified, how employees participate, how incremental improvements are tested, and how successful changes are standardised. Their integration therefore establishes a measurable feedback mechanism between strategic intent and process-level organisational learning.

This mechanism also contributes to a better understanding of the conditions affecting the implementation of energy-efficiency opportunities identified in the literature. The practical realisation of technically and economically attractive measures can be influenced by the availability and integration of information, perceptions of implementation-related uncertainty, and the clarity of organisational responsibilities. Schützenhofer demonstrates that formal management systems can address these factors through structured information flows and systematic decision-making processes. Kaizen reinforces this logic at the operational level by encouraging teams to observe processes, test clearly defined changes, evaluate their effects, and retain solutions that generate verified value. The interaction between the two approaches is therefore particularly important: formal governance is strengthened by continuous process-level learning, while local improvement activities become more coherent when aligned with strategic governance and organisational priorities.

The implications for industrial competitiveness are equally significant. IEA reports that global industry can now generate approximately 20% more value added from a given amount of energy than two decades ago. This development supports the treatment of strategic energy management as an organisational capability for controlling costs, improving process reliability, enhancing the quality of investment decisions, and strengthening industrial competitiveness rather than viewing it primarily as a compliance function.

For industrial managers, the proposed framework suggests that energy-improvement portfolios should be governed according to both strategic significance and operational feasibility. Projects should therefore be prioritised not only according to their estimated energy-saving potential but also by considering production continuity, expected payback, data quality, replicability, and their potential to generate reusable organisational knowledge. Small-scale Kaizen projects can serve as an effective mechanism for validating assumptions, identifying operational considerations, and generating practical evidence before larger capital commitments are undertaken.

The proposed model also broadens the role of the energy manager from that of a predominantly technical specialist towards that of a coordinator of cross-functional problem-solving and organisational learning. Production, maintenance, finance, and quality functions can jointly interpret energy-performance information, while visual management tools can make deviations in EnPIs more transparent. Management review can then determine whether identified deviations are most appropriately addressed through a local Kaizen initiative, the development of a new operating standard, or a larger investment project.

The framework developed in this study is conceptual and provides a foundation for subsequent empirical application in Uzbek industrial enterprises. The empirical findings reviewed in the article originate from different countries, sectors, and organisational settings; accordingly, their reported energy-saving outcomes should be interpreted within their respective institutional and operational contexts. Future research could therefore apply the proposed model longitudinally in industrial enterprises, compare organisations at different levels of ISO 50001 and Kaizen maturity, and assess whether systematic integration generates additional benefits beyond those associated with the independent application of either approach.

CONCLUSION AND RECOMMENDATIONS

The findings of this study demonstrate that ISO 50001 and Kaizen can be integrated into a coherent framework for strategic energy resource management because they address complementary dimensions of the same managerial process. ISO 50001 establishes the formal architecture through energy policy, strategic objectives, performance indicators, clearly defined responsibilities, monitoring, and management review. Kaizen operationalises these elements through waste identification, employee involvement, incremental improvement, problem-solving, and the standardisation of successful practices. The proposed two-loop model and seven-stage implementation algorithm therefore establish a systematic connection between long-term strategic energy priorities and recurring process-level organisational learning.

For industrial enterprises, energy performance may be effectively managed as a dynamic organisational capability rather than as a collection of isolated technical initiatives. This approach enables energy-related improvements to be identified, measured, verified, standardised, and replicated across relevant organisational processes. In this context, the integration of ISO 50001 and Kaizen can contribute not only to improved energy performance but also to enhanced process reliability, organisational learning, investment quality, and industrial competitiveness.

Further empirical application represents the next stage in the development of the proposed framework. Testing the model across industrial enterprises with different energy profiles, organisational structures, and levels of ISO 50001 and Kaizen maturity would provide an opportunity to validate and further refine its components. Such research could also determine the extent to which integrated implementation generates additional energy, economic, operational, and organisational benefits compared with the independent application of ISO 50001 or Kaizen.

Based on the findings of the study, the following practical recommendations are proposed:

1. Establish cross-functional energy improvement teams. Industrial enterprises should form cross-functional teams involving energy management, production, maintenance, finance, and quality specialists. These teams can apply Kaizen principles within the ISO 50001 framework to identify energy-saving opportunities, evaluate operational improvements, and ensure that energy objectives are integrated into everyday production processes.

2. Integrate Kaizen activities with EnPIs and energy baselines. Kaizen initiatives related to energy performance should be assessed using consistent energy performance indicators (EnPIs), specific energy consumption (SEC), and established energy baselines. Linking process-level improvements with measurable indicators can strengthen the verification of results and provide management with reliable information for subsequent decision-making and investment prioritisation.

3. Prioritise incremental improvements before major capital investments. Enterprises should systematically assess opportunities for low-cost and process-level energy improvements before undertaking capital-intensive projects. Small-scale Kaizen initiatives can help validate assumptions, identify operational considerations, and generate practical evidence that supports more informed and efficient investment decisions.

4. Develop a continuous learning and standardisation mechanism. Successful energy-efficiency improvements should be incorporated into standard operating procedures, employee training programmes, visual management systems, and management review processes. Replicating proven practices across relevant production units can transform individual energy-saving initiatives into sustainable organisational capabilities and contribute to long-term improvements in energy performance and industrial competitiveness.

Overall, the proposed recommendations emphasise that the effective integration of ISO 50001 and Kaizen requires not only formal energy management procedures but also continuous employee participation, reliable performance measurement, cross-functional coordination, and systematic organisational learning. Their combined application can provide industrial enterprises with a practical mechanism for translating strategic energy objectives into measurable and repeatable operational improvements.

REFERENCES

1. Ahmad I., Arif M.S., Cheema I.I., Thollander P., Khan M.A. Drivers and Barriers for Efficient Energy Management Practices in Energy-Intensive Industries: A Case-Study of Iron and Steel Sector // Sustainability. – 2020. – Vol. 12, № 18. – Art. 7703. – DOI: 10.3390/su12187703.
2. Androniceanu A., Enache I.-C., Valter E.-N., Raduica F.-F. Increasing Energy Efficiency Based on the Kaizen Approach // Energies. – 2023. – Vol. 16, № 4. – Art. 1930. – DOI: 10.3390/en16041930.
3. International Energy Agency (IEA). *Gaining an Edge: The Role of Energy Efficiency in Industrial Competitiveness*. – Paris: International Energy Agency, 2025.
4. International Energy Agency (IEA). *Energy Management for Industry: Driving Efficiency Implementation*. – Paris: International Energy Agency, 2025.
5. International Organization for Standardization (ISO). *ISO 50001:2018 Energy Management Systems – Requirements with Guidance for Use*. – Geneva: International Organization for Standardization, 2018.
6. Lawrence A., Thollander P., Andrei M., Karlsson M. Specific Energy Consumption/Use (SEC) in Energy Management for Improving Energy Efficiency in Industry: Meaning, Usage and Differences // Energies. – 2019. – Vol. 12, № 2. – Art. 247. – DOI: 10.3390/en12020247.
7. Miera K., Bhandari I., Chaudhari S., Sundaramoorthy S., Wenning T. Energy Leaders: The Catalyst for Strategic Energy Management // Energies. – 2026. – Vol. 19, № 3. – Art. 618. – DOI: 10.3390/en19030618.
8. Schützenhofer C. Overcoming the Efficiency Gap: Energy Management as a Means for Overcoming Barriers to Energy Efficiency, Empirical Support in the Case of Austrian Large Firms // Energy Efficiency. – 2021. – Vol. 14. – Art. 45. – DOI: 10.1007/s12053-021-09954-z.
9. United Nations Industrial Development Organization (UNIDO). *Practical Guide for Implementing an Energy Management System*. – Vienna: UNIDO, 2015.

Proofreader: Xondamir Ismoilov
Layout and Designer: Hasan Maqsudov

2026. № 10

© When materials are reproduced, the ECONOSCITECH-INTEGRATION journal must be cited as the source. Authors are responsible for the accuracy of the information in materials and advertisements published in the journal. Editorial opinions may not always align with those of the authors. Submitted materials will not be returned to the editorial office.

To publish articles in this journal, you may submit articles, advertisements, stories, and other creative materials through the following links. Materials and advertisements are published on a paid basis.

You may subscribe to the journal at any time using the following details. Once subscribed, please send a screenshot or photo of your payment confirmation to our Telegram page @iqtisodiyot_77. Based on this, we will send the latest issue of the journal to your address each month.

Our address: Tashkent city, Yunusobod district, 19th block, House 17.

