

CIRCULAR ECONOMY AND ENERGY EFFICIENCY IN KAZAKHSTAN'S FIVE-STAR HOTELS

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Abstract

Hotels are among the most resource- and energy-intensive commercial buildings, yet circular-economy and energy-efficiency practices are seldom examined jointly, and evidence from Central Asia is almost absent. The purpose of the article is to determine how these practices are implemented in internationally branded five-star hotels operating in Kazakhstan and to propose a sequenced implementation framework. Semi-structured interviews with sustainability-responsible managers of four hotels in Astana, Almaty and Aktau were triangulated with corporate documentation and coded against an explicit maturity rubric. Energy efficiency is established in all four cases; circularity is established in one and developing in three. Maturity declines as practices move beyond the boundary of the individual property.

Keywords: Circular Economy, Emerging-Market Context, Energy Efficiency, Hotels, Kazakhstan, Sustainability Transition.

JEL Codes: L83, M14, Q01, Q56.

Introduction

Tourism and hospitality have expanded rapidly over recent decades and now constitute a major component of the global economy. This growth carries a substantial environmental cost. Hotels are among the most resource-intensive commercial buildings: continuous, round-the-clock operation and a broad range of services translate into high consumption of energy, water and materials, and into significant waste generation. Conservative estimates place tourism-related solid waste at more than 35 million tonnes annually, with hotels producing several times the municipal waste of comparable food-service establishments (Dey et al., 2025). The sector has historically operated within a linear take–make–dispose logic that depends on continuous resource extraction and disposal (Rodríguez-Antón & Alonso-Almeida, 2019; Jones & Wynn, 2022).

Two bodies of scholarship address this problem, and each has a distinct lineage.

The circular economy is a regenerative system that slows, narrows and closes material and energy loops in order to minimise waste, emissions and resource leakage. Geissdoerfer, Savaget, Bocken and Hultink (2017) positioned it as a sustainability paradigm in its own right; Kirchherr, Reike and Hekkert (2017) exposed its definitional instability across 114 competing definitions, and Kirchherr et al. (2023) traced its broadening across 221; Stahel (2016) supplied its intellectual foundation in the performance economy; Bocken, de Pauw, Bakker and van der Grinten (2016) systematised its strategies into narrowing, slowing and closing resource flows; and Korhonen, Honkasalo and Seppälä (2018) identified its thermodynamic, spatial and governance limits. Energy efficiency, by contrast, has been developed as an operational and engineering agenda: the International Energy Agency (2019) established it as the least-cost decarbonisation lever, and

Karvounidi et al. (2024) documented its hotel-specific application, showing that heating, ventilation and air-conditioning systems account for roughly 40–60% of hotel energy use and that occupancy-centric controls can deliver savings of 20–50% for heating and cooling. Rodríguez-Antón and Alonso-Almeida (2019) and Bux and Amicarelli (2023) brought circular thinking into hospitality specifically, while Mensah (2020) and Gössling et al. (2012) established the waste and water dimensions of hotel operation.

Despite this accumulation, two gaps persist. First, the circular economy and energy efficiency are rarely investigated together, so the interaction between a resource strategy and an energy strategy within the same property remains poorly understood (Karvounidi et al., 2024; Bux & Amicarelli, 2023). Second, the empirical base is heavily skewed towards Europe, North America and, more recently, the Gulf; Central Asia is almost entirely absent from the peer-reviewed literature (Peñaherrera-Veloz et al., 2025; Zighan et al., 2026). This matters because implementation is conditioned by infrastructure and institutions that differ sharply across settings.

Kazakhstan is an informative setting for exactly this reason. Accommodation-services revenue reached approximately KZT 300 billion in 2024, a 30.8% year-on-year increase, on the back of record inbound tourism and some USD 1.8 billion of tourism capital investment (Times of Central Asia, 2025), while circular business practice remains nascent and institutionally under-supported (Zhaksybayeva et al., 2024). Rapid sectoral growth alongside immature supporting infrastructure creates both urgency and analytical leverage: it separates what a hotel can achieve internally from what depends on actors beyond its boundary.

The scientific problem addressed here is therefore the following: circular-economy and energy-efficiency practices are treated in the literature as parallel components of a single sustainability agenda, yet it is not established whether they advance at comparable rates within the same property, nor what accounts for any divergence between them.

The purpose of the article is to determine how circular-economy and energy-efficiency practices are implemented in internationally branded five-star hotels operating in Kazakhstan,

and to propose a sequenced implementation framework for properties operating under comparable conditions. The object of the research is the sustainability operation of internationally branded five-star hotels in Kazakhstan. The subject of the research is the maturity of their circular-economy and energy-efficiency practices and the factors that shape implementation.

Two research questions, deliberately bounded to the four cases examined, guide the analysis. First, which circular-economy and energy-efficiency practices are implemented in four internationally branded five-star hotels operating in Kazakhstan, and how do these practices distribute across the narrowing, slowing and closing of resource loops? Second, which organisational, infrastructural and institutional factors do managers in these four hotels identify as shaping implementation? Both questions are answered from qualitative evidence generated within the four selected cases; neither is framed as a claim about the international hospitality industry or about emerging markets as a class.

The research methods are a qualitative multiple-case design, semi-structured expert interviews, documentary triangulation, reflexive thematic analysis and cross-case comparison against an explicit maturity rubric. The benefit to science is rare primary evidence from an unstudied region and a specification of where an efficiency-led trajectory stalls; the benefit to business is a sequenced implementation framework; the benefit to policy is an identification of the enabling conditions that individual properties cannot supply for themselves.

Theoretical background

The circular economy reframes production and consumption around closed material loops in which resources are reused, remanufactured, recycled or regenerated rather than discarded (Ellen MacArthur Foundation, 2013; Geissdoerfer et al., 2017). Its intellectual roots lie in Stahel's (2016) performance economy, which argued that selling utilisation rather than products, and extending service life through reuse and remanufacture, creates value while sharply reducing resource throughput. Bocken et al. (2016) systematise the resulting strategies into three archetypal moves: narrowing resource flows, meaning fewer resources per unit of service; slowing flows, meaning extending

product and material life through reuse and repair; and closing flows, meaning recycling at end of life. This typology is analytically decisive for hospitality because it separates efficiency, long practised for cost reasons, from the loop-slowness and loop-closing strategies that constitute circularity proper. Geissdoerfer et al. (2020) extend it with two further strategies of direct relevance to hotels: intensifying use, meaning raising the utilisation of existing assets, and dematerialising, meaning substituting physical products with services and digital solutions. Critical scholarship cautions against treating the concept as an unproblematic ideal: Korhonen et al. (2018) identify thermodynamic, spatial, governance and cultural limits to circularity and warn that, without scientific grounding, the concept risks dilution into symbolic practice.

In hospitality, circular-economy principles are expressed through a recognisable set of operational domains. Water stewardship is the most developed: hotels deploy low-flow fixtures, dual-flush systems, greywater recycling and rainwater harvesting, and increasingly treat and reuse wastewater for irrigation (Gössling et al., 2012; Mensah, 2020). Food-waste management is a second domain, given that a substantial share of hotel waste arises during preparation and buffet service; monitoring systems, portion control and redistribution schemes address it (Filimonau & De Coteau, 2019). Sustainable procurement is a third, encompassing eco-labelled inputs, reusable packaging and local sourcing (Jones et al., 2016). Because hotels consume large volumes of energy, water, food and consumables, they are simultaneously significant contributors to, and potential agents in solving, sustainability challenges (Bohdanowicz, 2006), and empirical work increasingly shows both cost and reputational returns from adoption (Jacob et al., 2025; Dey et al., 2025). A recurrent finding, however, is that implementation is uneven across regions and that fragmented measures can become reputational signalling where practices are loosely defined (Mensah, 2020; Bux & Amicarelli, 2023). A bibliometric review of 71 studies published between 2018 and 2024 confirms both the growth and the limits of the field, reporting concentration in European institutions, clustering around waste management, performance frameworks and governance, and marked under-representation of Latin

America, Africa and Asia (Peñaherrera-Veloz et al., 2025).

Energy efficiency occupies a different position in the same agenda. It is widely regarded as the entry point to sustainable hospitality because it yields immediate, measurable financial returns (International Energy Agency, 2019). The dominant levers are LED lighting, occupancy and motion sensors, efficient heating, ventilation and air-conditioning systems, and building-management systems that optimise consumption against real-time occupancy (Gössling et al., 2012; Karvounidi et al., 2024). Corporate monitoring platforms enable portfolio-wide tracking of energy, water and carbon and increasingly form the data backbone of environmental reporting (Jones & Comfort, 2019). The literature stresses sequencing: efficiency and controls first, renewable generation second (Karvounidi et al., 2024), with the diffusion of advanced systems constrained by capital cost and technical capability, particularly in developing economies (Mensah, 2020; Rasel & Siddiqi, 2024). Because a large fraction of hotel energy is used to heat water, energy and water efficiency are interdependent, and efficiency programmes therefore straddle both agendas (Rasel & Siddiqi, 2024).

The case for coupling the two agendas is ecological as well as economic. Cross-national analysis shows that no country currently meets basic human needs within planetary boundaries, and that resource use, not only emissions, must fall substantially if wellbeing is to be provisioned sustainably (O'Neill et al., 2018). For a service industry whose value proposition rests on comfort and abundance, this implies that efficiency gains alone are insufficient: the absolute reductions in material throughput that circular strategies target are also required. From a supply-chain perspective, Sarkis, Zhu and Lai (2011) show that the greening of operations is shaped by coercive, normative and mimetic institutional pressures propagated along supply chains, a mechanism directly visible in hospitality, where brand headquarters transmit sustainability requirements to franchised and managed properties worldwide. International chains have accordingly been the principal vectors of diffusion, embedding both agendas within integrated sustainability programmes that couple waste reduction, energy management and

community engagement. Comparative case evidence indicates that success rests on top-management commitment, appropriate technology and stakeholder collaboration through staff training and guest engagement (Gössling et al., 2012; Mensah, 2020). Realising circularity, moreover, is not a matter of adding isolated practices but of reorganising the business model around multiple value creation (Jonker & Faber, 2021; Bocken et al., 2014). Such behaviours are markedly less prevalent in post-Soviet and developing contexts owing to financial, institutional and cultural barriers (Bruns-Smith et al., 2015), and international standards are therefore not automatically transferable.

The barriers literature converges on a recognisable set of constraints outside mature markets: limited investment support and financial constraints, inadequate reverse-logistics and recycling infrastructure, weak regulatory and institutional capacity, and limited knowledge and awareness (Zighan et al., 2026; Farrukh et al., 2024). Institutional theory frames adoption as jointly shaped by regulatory mandates, normative expectations and cognitive-cultural factors, so transitions unfold differently across institutional

settings (Zighan et al., 2026). Kazakhstan exemplifies the resulting tension. The largest Central Asian economy, historically reliant on resource-intensive activity, it has articulated a Green Economy agenda yet still exhibits substantial policy and institutional gaps for circular business, especially among smaller firms (Zhaksybayeva et al., 2024), while tourism expands rapidly and hotel investment concentrates in Astana, Almaty and the Caspian and mountain regions (Times of Central Asia, 2025; UNDP, 2026).

Synthesising this literature, the two agendas are framed here as coupled pillars of hotel operation, connected through a resource–energy nexus and situated within a specific institutional environment. Drivers, comprising global brand standards, certification, cost pressure and guest signalling, push implementation; barriers, comprising weak recycling infrastructure, finance, awareness and guest-comfort trade-offs, constrain it; and contextual moderators, comprising institutions, policy support, local supply chains and organisational capacity, shape how drivers translate into outcomes (Figure 1). The framework structures both the coding of the evidence and its interpretation.

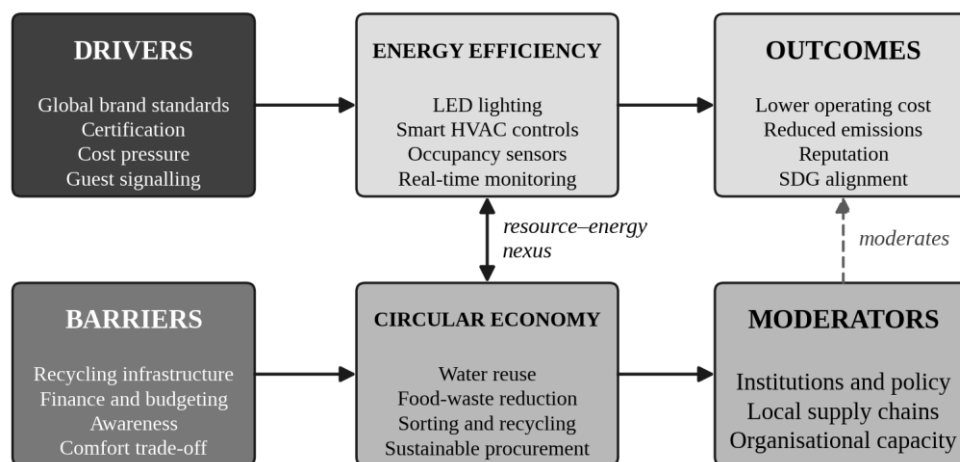


Figure 1. Analytical framework relating energy-efficiency and circular-economy practices to sustainability outcomes under contextual moderators

Research methods

The research employs a qualitative, multiple-case design. Qualitative inquiry suits complex, context-embedded processes that numerical generalisation cannot capture (Grossoehme, 2014; Tisdell et al., 2025), and a multiple-case approach

permits cross-case comparison while preserving the depth needed to understand how practices are enacted in a setting where they are still emerging. The research was conducted during 2025, and the operational data reported by participants refer to the 2024–2025 period.

The sample was constructed purposively rather than statistically. The study focuses on five-star properties, which typically possess the financial and organisational capacity to pursue sustainability initiatives, located in Kazakhstan's principal business and tourism hubs of Astana, Almaty and Aktau. Seven hotels meeting these criteria were invited and four agreed to participate, giving a participation rate of four in seven. One expert respondent was interviewed in each property, giving four

respondents in total. Each was selected for direct responsibility for, or documented knowledge of, sustainability operations, and held a sustainability, operations or engineering role at management level. Consistent with qualitative logic, the sample privileges analytical depth over statistical representativeness. All hotels and respondents requested anonymity and are referred to as Cases A to D (Table 1).

Table 1. Characteristics of the participating hotels and data sources

Case	Location	Property type	Respondent role	Documentary source
A	Astana region	International chain; multi-functional five-star resort complex	Sustainability-responsible manager	Brand sustainability policy; monitoring platform records
B	Almaty	International chain; five-star business and leisure hotel	Operations representative	Corporate brand standards; certification documentation
C	Major city, Kazakhstan	International chain; LEED-certified five-star hotel	Sustainability representative	LEED certification; internal waste records
D	Major city, Kazakhstan	International chain; LEED-certified five-star hotel	Engineering and sustainability lead	Brand programme reporting; footprint records

Semi-structured interviews were the primary data source. The protocol covered the hotel profile and sustainability policy; circular-economy practices across water, food, materials and procurement; waste reduction and recycling; energy-efficiency measures and monitoring; business and operational impacts; barriers; and future plans. Interviews were conducted by video conference, by electronic mail and in person with audio recording, and were transcribed for analysis. To strengthen credibility, interview accounts were triangulated against publicly available corporate sustainability documentation, including brand environmental and performance reports obtained through links supplied by participants. Only statements corroborated by documentation, or supported by specific and verifiable operational detail, were carried into the results.

Transcripts were assessed using reflexive thematic analysis following the six-phase procedure of Braun and Clarke (2006): familiarisation, initial coding, theme generation, theme review, theme definition and reporting, applied in the manner set out by Ahmed et al. (2025). Coding

was supported by qualitative analysis software. Cross-case matrices were then used to compare practice maturity and barrier salience across the four properties.

Because the cross-case comparison rests on a categorical maturity assessment, the categories require explicit definition. Maturity is operationalised on three criteria derived from the narrowing–slowing–closing typology of Bocken et al. (2016) and from the governance and measurement conditions that Gössling et al. (2012) and Jones and Comfort (2019) identify as prerequisites for durable practice: the organisational scope of a practice, its formalisation in policy or brand standard, and whether its outcomes are routinely measured. The resulting rubric is set out in Table 2. A dimension was coded at the highest level for which all three criteria were satisfied; where criteria conflicted, the lower level was assigned, so that the coding is conservative by construction. The categories describe the maturity of implementation within a property and carry no implication about environmental performance in absolute terms.

Table 2. Rubric for the cross-case maturity assessment

Criterion	Emerging	Developing	Established
Scope: organisational reach of the practice	Isolated areas only, or delegated entirely to external contractors	Present in several departments but not standardised across the property	Standardised across the property
Formalisation: basis in policy or standard	No property-level documentation; practice is discretionary	Partially documented, or covered by a brand standard without local targets	Documented in a formal policy or brand standard, normally with a time-bound target
Measurement: recording of outcomes	No routine measurement	Measured occasionally, or measured without reference to a target	Routinely measured and reported, normally against a stated target

**A dimension is coded at the highest level for which all three criteria are satisfied; where criteria conflict, the lower level is assigned. The categories describe the maturity of implementation and carry no implication about absolute environmental performance.*

The six-stage framework presented in the discussion was produced by a separate analytic step. Stages were derived inductively from the sequencing conditions that respondents themselves identified as prerequisites, and were then ordered according to the dependency relations visible across the four cases. The framework is therefore an analytic product of these four cases. It has not been tested against implementation outcomes, has no predictive status, and its transferability to other hotel categories, institutional settings or countries is an empirical question that this design cannot answer.

The research followed established ethical guidelines. Participation was voluntary and informed. All hotels and respondents requested anonymity, so names, brands where identifying, and exact positions are withheld, and location is reported at a level that prevents identification. Only publicly available secondary documentation was used to corroborate primary accounts, and all information was processed for academic purposes.

Research results

This section reports what the four cases show. Interpretation is deferred to the following section, and statements here are restricted to practices that respondents described and that were corroborated by documentation or by specific operational detail.

Sustainability is embedded in strategy in all four properties, though its source differs. Case A operates under a formal, board-approved sustainability policy aligned with its global brand standards, pursues Green Key certification by 2026, and embeds sustainability-linked targets in the key performance indicators of the general

manager and department heads. Case B is guided predominantly by global corporate standards rather than by a locally developed policy; designed as a sustainable building, it began actively pursuing certification in 2022. Case C treats sustainability as a design principle, holds LEED certification and targets Green Key. Case D operates within its brand's global sustainability programme, holds LEED certification, and implements LED lighting, controllable in-room climate systems, food-waste management and basic recycling. In every case the governance instruments originate with the international brand.

Circular-economy practices are present in every property but vary in scope, formalisation and measurement. Case A is the most systematic: it reuses treated wastewater for irrigation, operates drip irrigation and rainwater collection, targets a 60% reduction in food waste by 2030, prioritises EU Ecolabel- and FSC-certified local suppliers, and requires reusable transport packaging in the form of pallets and wooden crates. Case B implements circular practices mainly in core operations — housekeeping, food service and laundry — with plastic sorting and food-waste control, and the respondent stated that deeper practices remain to be adopted. Case C emphasises reuse and waste minimisation by department, combining rainwater harvesting, replacement of disposable tableware with paper alternatives, and staff discounts as an incentive for behaviour such as reusable cup use. Case D combines portion control and leftover monitoring with recycling of plastic, glass and cartons, reuse of guest-room soap, guest-room recycling and electric-vehicle charging, and records a carbon footprint of 74.0 kg CO₂e and a water footprint of 591.8 litres per room-night.

Single-use plastic reduction is the most widely shared circular initiative, and waste practice differs sharply in how far it is measured. Case A operates a plastics tracking system, targets the elimination of 90% of single-use plastic items from guest services by the end of 2026, and works with licensed waste contractors in line with national environmental legislation. Case B relies on standard practices and external providers to reduce plastic packaging, and reported no internal monitoring. Case C recorded approximately 45 tonnes of food waste in 2025, driven largely by buffet service for large events, which prompted zero-waste day initiatives and staff-consumption monitoring; it also recycled 12 kilograms of used batteries in 2025, and the respondent attributed limited results to uneven staff ownership. Case D weighs breakfast leftovers to improve forecasting, reuses guest soap, avoids laundering unused towels, sorts plastic, glass and packaging, and donates surplus bread to animal shelters, reporting a cumulative 3–4% waste reduction over two years.

Energy efficiency is the most uniformly developed domain. All four properties deploy LED lighting, operational controls on heating, ventilation and air-conditioning, and routine consumption monitoring. Case A enforces operating standards, including a prohibition on running climate systems with windows open, runs a real-time platform tracking energy, water and carbon, targets a reduction of at least 5% per quarter year-on-year in energy and water use, and trains all staff in energy-saving procedures. Case B uses efficient lighting and climate systems with regular consumption monitoring, while noting that service-quality standards limit how far consumption can be reduced. Case C combines motion sensors in staff areas with efficient lighting and monthly reporting, and recorded an 8% reduction in overall energy consumption. Case D relies on LED lighting, efficient climate systems with usage controls and engineering-team monitoring, and identified staff education and disciplined heating and cooling management as its most effective levers.

The weight given to sustainability in management systems varies. In Case A, targets linked to the Sustainable Development Goals are embedded in the key performance indicators of the general manager and department heads, creating direct financial incentives, and guest perceptions are

tracked through a satisfaction survey. Cases B, C and D report a more qualified picture: practices strengthen brand image, particularly among international guests, and support certification, but respondents did not identify them as a primary driver of guest satisfaction, since guests prioritise comfort and service quality, and some react negatively to visible paper-based substitutes. Certification and sustainability operations also add marginal cost.

Four barriers recur across the interviews. Financial and budgeting constraints were reported in all four cases: investment must fit within fixed annual budgets and be justified against competing uses. Weak local recycling and reverse-logistics infrastructure was reported in three cases (B, C and D) as a constraint that prevents willing properties from closing material loops. Limited staff and guest awareness was reported in three cases, covering difficulty in changing everyday habits, uneven staff ownership and mixed guest receptiveness. A guest-comfort trade-off was reported in two cases (B and D), limiting how far climate and service standards can be adjusted. Case A additionally reported data-transparency and external-audit difficulties.

Forward-looking plans follow the same pattern. Case A targets Green Key certification in 2026 and a 60% food-waste reduction by 2030, with sustainable food sourcing identified as the priority frontier. Case B anticipates gradual efficiency gains and stronger staff and guest engagement. Case C stated that meaningful progress depends on nationwide awareness and infrastructure. Case D plans to deepen implementation of its brand programme and to extend sustainability partnerships, having hosted a regional circular-economy event supported by German development actors.

Applying the rubric in Table 2 to this evidence produces the cross-case assessment in Table 3. Energy efficiency is coded as established in all four cases. Circular-economy practice is established in one case and developing in three. Waste and resource management ranges from emerging to established. Sustainability strategy and governance is established in three cases, reflecting formal policy or third-party certification, and business integration is established only where sustainability targets carry individual key performance indicators.

Table 3. Cross-case maturity of circular-economy and energy-efficiency implementation and barriers reported

Dimension	Case A	Case B	Case C	Case D
Sustainability strategy and governance	Established	Developing	Established	Established
Circular-economy practices	Established	Developing	Developing	Developing
Waste and resource management	Established	Emerging	Developing	Developing
Energy efficiency	Established	Established	Established	Established
Business-operations integration	Established	Developing	Developing	Developing
Barriers reported	Financial; awareness; data transparency	Financial; infrastructure; comfort	Financial; infrastructure; awareness	Financial; infrastructure; awareness; comfort

**Coded against the rubric in Table 2. Financial constraints were reported in four cases, infrastructure and awareness constraints in three each, the guest-comfort trade-off in two, and data transparency in one.*

Discussion

The results support four interpretive claims. Each is stated together with the evidence that grounds it and the limits of what four cases can establish.

The first and most robust pattern is the primacy of energy efficiency. Efficiency measures are coded as established in every case, whereas circular practice is established in only one. The cases indicate why: efficiency returns are immediate, the behavioural demands are modest, and outcomes are readily measurable, which is consistent with the view that efficiency is the natural entry point to sustainable hospitality (International Energy Agency, 2019; Gössling et al., 2012; Karvounidi et al., 2024). Case C's 8% energy reduction and Case A's quarterly reduction targets illustrate how monitoring converts efficiency into verifiable savings.

Read through the typology of Bocken et al. (2016), this asymmetry acquires a more precise structure, and it is here that the study's principal contribution lies. Maturity in the four cases does not fall along the boundary between energy and materials, as the circular-economy and energy-efficiency labels would suggest. It falls along the boundary of the firm. Narrowing strategies, which are executed entirely within the property, are established everywhere. Slowing strategies — soap recovery, towel programmes, reusable transport packaging — are present but uneven, because they depend on the behaviour of staff and guests whom the property influences but does not control. Closing strategies, which require functioning reverse-logistics and secondary-materials

markets, are the least developed in every case, and three of the four respondents identified precisely this external dependency as the binding constraint. The gradient of maturity therefore tracks the degree to which a strategy depends on assets outside the property's boundary.

This proposition is distinguishable from what the existing literature already establishes. That energy efficiency is typically adopted first is well documented (International Energy Agency, 2019; Karvounidi et al., 2024), as is the observation that hotel circularity is uneven and clusters in visible, cost-saving activities (Peñaherrera-Veloz et al., 2025; Bux & Amicarelli, 2023). These are two separate findings from two separate literatures, and both are conventionally explained by cost and payback period. The four cases here are not consistent with a purely economic explanation of that kind. All four operate under comparable brand sustainability programmes, hold or pursue third-party certification, and possess documented policies and monitoring platforms, yet their circular maturity diverges while their energy maturity does not. Governance capacity and commitment are therefore held broadly constant across the sample without eliminating the asymmetry, which locates the constraint in the boundary-dependence of the strategy rather than in intent, capability or payback alone. The practical consequence is that the gap should be treated as a co-ordination problem across the value chain, rather than as an adoption problem within the firm — a reframing that a barriers inventory does not by itself yield. Because the proposition rests on four

cases in one country, it is advanced as a testable claim rather than an established regularity; it would be falsified by properties exhibiting mature loop-closing practice in the absence of functioning reverse-logistics infrastructure, or by properties with weak narrowing practice alongside strong closing practice.

The finding also carries a caution grounded in ecological economics. Because narrowing alone does not guarantee absolute reductions in throughput (Korhonen et al., 2018; O'Neill et al., 2018), an efficiency-led trajectory that never matures into loop-slowness and loop-closing risks stalling short of sustainability, whatever its measured savings. The cases cannot show whether such stalling occurs over time, since the design is cross-sectional.

The second claim concerns the unevenness of circular practice itself. Circular measures appear in every property but are systematic only in pockets, notably Case A's water and procurement loops. This mirrors international findings that hotel circularity clusters in operationally visible, cost-saving activities while upstream eco-design and circular procurement lag (Peñaherrera-Veloz et al., 2025; Bux & Amicarelli, 2023). One qualification is important. The literature warns that fragmented measures can become reputational signalling rather than systemic change where definitions are loose (Mensah, 2020), a risk corresponding to the dilution of the concept into symbolic practice against which Korhonen et al. (2018) warn. No evidence of such signalling was found in these four cases: reported practices were corroborated by documentation or by specific operational detail, and several respondents volunteered shortfalls, including Case C's 45 tonnes of food waste and Case B's acknowledgement that deeper practices remain to be adopted. The risk is therefore raised here as a conceptual caution about fragmented practice in general, not as a characterisation of the participating properties. That guests sometimes resist visible substitutions further complicates the business case and helps explain why circularity remains partial.

The third claim concerns the barriers. Finance, recycling infrastructure, awareness and the comfort trade-off were not reported as independent obstacles but as mutually reinforcing ones: absent downstream infrastructure, investment in

sorting cannot be justified financially, which in turn limits the staff engagement on which sorting depends. The salience of reverse-logistics constraints echoes evidence from the Gulf that insufficient sorting facilities and poor secondary-materials integration disrupt circularity even where corporate intent is high (Zighan et al., 2026), and Kazakhstani evidence that institutional and policy gaps constrain circular business despite a national Green Economy agenda (Zhaksybayeva et al., 2024). Two qualifications apply. First, this research did not independently assess Kazakhstan's waste-management infrastructure or regulatory capacity; the constraint is documented here as the consistent account of managers in three properties, which is consistent with, but does not independently verify, the published assessment of Zhaksybayeva et al. (2024). Second, interpreting the pattern through institutional theory — as strong normative and mimetic pressure transmitted through brand supply chains (Sarkis et al., 2011) coexisting with weaker local regulatory support — is an inference from four cases, not a measurement of institutional strength, and is offered as the most plausible reading rather than a demonstrated mechanism.

The fourth claim concerns the role of the international brand. Brand programmes supply governance instruments — policies, certification targets and monitoring platforms — that the participating properties would have been unlikely to build independently, and every governance instrument observed in the four cases originated with the brand. The same evidence shows that these instruments did not by themselves produce circularity, since circular maturity varied while brand governance did not. A caution is required here that the original framing of this research did not make explicit: because all four cases are internationally branded, the design contains no unbranded comparison and cannot identify a brand effect. What can be said is that brand governance was observed alongside uneven circularity; whether independent or locally branded properties would perform better, worse or similarly is untested and would require a differently constructed sample.

Taken together, these claims suggest that progress requires paired action: internal operational discipline and external enabling conditions,

meaning recycling infrastructure, supplier ecosystems and policy incentives. It also suggests re-framing circularity as a business-model question rather than an operational addition. Following Jonker and Faber (2021), moving from isolated practices to a circular business model means reorganising value creation around loop-based value retention of the kind Stahel's (2016) performance economy envisages for service industries. Hospitality is in principle well suited to such a shift, since hotels already sell access and experience rather than ownership, which positions them for the intensifying and dematerialising strategies that Geissdoerfer et al. (2020) identify. Exploiting that advantage presupposes the staff capabilities, measurement systems and external partnerships that these cases identify as scarce.

Consolidating the cross-case evidence, a six-stage implementation framework is proposed

(Figure 2). The sequence front-loads assessment, target-setting and workforce engagement, which the cases identify as prerequisites, before scaling operational practice, and closes with external collaboration to address the constraints that internal action alone cannot resolve. Its status must be stated precisely. It is a proposition derived analytically from four cases in one country; it has not been implemented, tested against outcomes, or compared with alternative sequences. It is not a predictive model and is not demonstrated to transfer to other hotel categories, institutional settings or geographies. Its value is as a structured hypothesis for practitioners and as a testable object for subsequent research, and validation would require longitudinal application across a wider and more varied sample, including independent and lower-category properties.

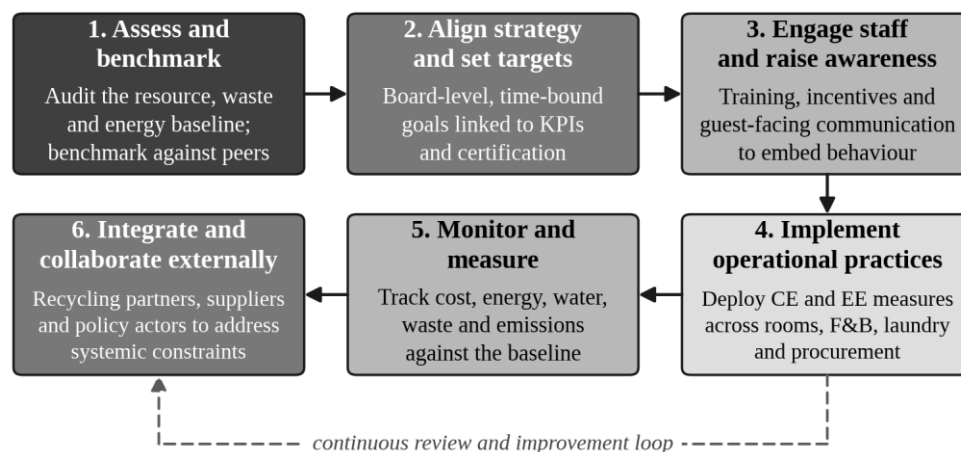


Figure 2. Proposed six-stage framework for implementing circular-economy and energy-efficiency practices, derived from four cases and not yet validated

Conclusions

Circular-economy and energy-efficiency practices do not advance at the same rate within the same property. Across four internationally branded five-star hotels in Kazakhstan, energy efficiency is established in four cases out of four, while circular-economy practice is established in one and developing in three, and waste and resource management ranges from emerging in one case to established in one. Measured outcomes reported by participants — an 8% reduction in overall energy consumption in one property, a cumulative 3–4% waste reduction over two years in another, against approximately 45 tonnes of food

waste in a third — indicate the scale of the difference between the two domains.

The divergence is structured by the boundary of the firm rather than by the distinction between energy and materials. Practices executed wholly inside the property are mature; practices dependent on staff and guest behaviour are uneven; practices requiring reverse-logistics and secondary-materials markets are least developed, and three of four respondents named this external dependency as the binding constraint. Because all four properties operate comparable brand governance instruments while differing in circular

maturity, governance capacity does not by itself account for the gap. This regularity is advanced as a proposition for testing, not as an established finding: it rests on four cases in a single country and institutional setting.

For hotel management, the implication is that benchmarking, time-bound targets and workforce engagement should precede the scaling of operational measures, and that loop-closing objectives should not be committed to in advance of the downstream capacity required to meet them. The six-stage framework proposed here sets out that sequence; it is an analytic proposition from four cases and requires validation before it is relied upon.

For policy, the results identify what individual properties cannot supply for themselves. Three of four properties reported that willingness to close material loops exceeded the available recycling and reverse-logistics capacity. Investment in that capacity, in certified local supplier ecosystems and in targeted incentives is therefore a precondition for circular progress in the hotel sector, and complements Kazakhstan's Green Economy and sustainable-tourism objectives (Zhaksybayeva et al., 2024; UNDP, 2026).

For science, the research contributes primary evidence from a region almost absent from the peer-reviewed literature and specifies where an efficiency-led trajectory stalls. Four limitations bound these claims. The evidence comes from four anonymised, internationally branded five-star properties, so independent, lower-category and regional hotels, where resource constraints are likely sharper, are not represented. The absence of an unbranded comparison means no brand effect can be identified. Reliance on self-reported interview data and public documentation may introduce social-desirability and disclosure bias, only partially mitigated by triangulation. The design is cross-sectional and cannot establish whether the observed asymmetry persists, widens or closes over time. Future research should extend the sample across hotel categories and Central Asian countries, incorporate quantitative performance data such as energy-use intensity and waste-diversion rates, test the proposed framework longitudinally, and examine guest willingness to accept circular substitutions, which these cases identify as a decisive and understudied constraint.

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