



ENERGY TRANSITION REPORT 2024



Sustainable Energy Association of Singapore

THE STATE OF ENERGY TRANSITION

IN SINGAPORE AND ASEAN

2024



FOREWORD

Governments and industries must urgently build regional frameworks for carbon trading and cross-border energy trade to advance the ASEAN energy transition and achieve net-zero targets.

If you're reading this, it means that you're invested in the state of the energy transition in Singapore and the wider region—a cause that is the very lifeblood of SEAS. Our mission is to ensure that the clean energy industries continue to advance towards our shared transition goals. For the second consecutive year, we've turned to the insights of industry professionals to help shape that mission—as these perspectives inform our strategies, and help shape programmes, and partnerships that can drive meaningful progress. By prioritising the perspectives of those on the front lines of the energy sector, we ensure that our initiatives remain aligned with real-world challenges and opportunities, enabling us to take a more focused and impactful approach to supporting the energy transition.

This year's survey tells us that Singapore has made significant strides in its energy transition journey, but despite ranking first for a second time in a row with our survey respondents, the nation remains at a crucial turning point. With limited land for large-scale renewable projects and a high reliance on imported natural gas, Singapore faces the challenge of balancing energy security with its net-zero goals. Fortunately, the ASEAN region is rich in renewable resources, and we believe that by working together, we can achieve a collective vision for a decarbonised future. This shared vision drives SEAS' mission and underpins our key activities.



Edwin Khew,
Chairman,
SEAS

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It is clear that now is the time to bring the region's carbon trading markets to a state of maturity.



The ACES 2024 'State of the Energy Transition' Survey identifies three key areas requiring urgent action: enhancing regulatory frameworks, increasing investment in renewable energy, and fostering regional cooperation. A major obstacle to progress, cited by 79.13% of respondents, is regulatory uncertainty. While SEAS has been actively working with government agencies to address this, providing strategic counsel in initiatives such as developing guidelines for Renewable Energy Certificates (RECs) standards to ensure transparent, accountable green energy markets, among others – we recognise that much more needs to be done.

Investment in clean energy remains another priority, with 67.96% of industry professionals emphasising the need for greater financial backing to scale up renewable projects. We recognise the need to create platforms that connect investors with clean energy opportunities and have been facilitating dialogue around financial mechanisms that can de-risk renewable venture.

Regional cooperation also stands out as a critical enabler for the energy transition, particularly for addressing Singapore's energy security needs. SEAS has been active in advancing cross-border collaboration, including contributing to negotiations in the Indonesian Green Corridor and facilitating cross-border power purchases to secure clean energy sources for Singapore. These initiatives are aligned with the broader goal of developing an ASEAN power grid, which will allow for greater flexibility and resource-sharing across the region, helping to meet growing energy demands with sustainable solutions.

One emerging area of focus is carbon trading, which the survey identifies as a key tool in the region's decarbonisation efforts. 68.75% of respondents believe that carbon trading can effectively reduce emissions, yet high participation costs and inconsistent regulations pose significant challenges. The conversation around carbon trading is critical to the energy transition, as it provides a market-based mechanism to incentivise emission reductions, promote innovation, and unlock new investments in clean technologies. Carbon trading plays a pivotal role in driving down the cost of emissions compliance, offering industries a flexible, scalable way to meet their climate goals, and it is clear that now is the time to bring the region's carbon trading markets to a state of maturity.

In recognition of its growing importance, SEAS has launched the inaugural Asia Carbon Summit at ACES 2024. This new addition to our flagship conference will bring together global and regional leaders to discuss the future of carbon markets, explore opportunities for collaboration, and highlight strategies to advance carbon pricing mechanisms that support ASEAN's transition to a low-carbon economy.

As we strive to achieve our Net Zero goals, we remain committed to working with governments and the private sector to shape policies and frameworks that accelerate the energy transition. By fostering collaboration, driving investment, and expanding dialogue on critical areas such as carbon trading, we continue to contribute to an ecosystem that is both interconnected and resilient.

Lastly, we'd like to thank the respondents for sharing their perspectives and contributing to our mission.

EXECUTIVE SUMMARY

The Energy Transition in ASEAN

Finding effective energy transition strategies in the race for net zero

In our second year, the ACES 2024 'State of the Energy Transition' Survey continues to reflect the broad consensus among industry professionals across ASEAN on the key challenges and enablers in the energy transition. With 250 respondents from sectors such as consulting, finance, renewable energy, and government, the findings highlight the prevailing sentiment and industry trends shaping the future of the energy transition in the region.

Key themes emerging

2023 vs 2024

A comparison between the 2023 and 2024 survey reports reveals both continuity and change in industry sentiment surrounding the energy transition in ASEAN. In both years, Singapore continues to dominate as the perceived leader in driving net-zero efforts, with high percentages (92% in 2023 and 94.95% in 2024) acknowledging its leadership.

However, the 2024 report shows a slight shift in focus toward investment and technological advancements as the primary enablers of the transition, with 77.78% of respondents highlighting clean energy investments, compared to the 2023 emphasis on cross-border collaboration and regulatory frameworks.

A notable change is the rising concern over regulatory uncertainty, which escalated from 64% in 2023 to 88.89% in 2024, indicating growing frustration with policy stagnation. This reflects a broader acknowledgment that grid infrastructure and energy storage advancements are crucial, alongside enhanced government support.

Additionally, barriers like supply chain disruptions and talent gaps emerged more prominently in 2024. The emphasis on carbon trading also strengthened in 2024, with 67.93% supporting its role in emission reductions, compared to mixed attitudes in 2023. This shift reflects evolving industry views on the necessity of robust market mechanisms for a successful energy transition.



Leading Countries in the Energy Transition

Singapore is perceived as the regional leader in driving net-zero efforts, with 94.66% of respondents identifying it as a key player. Malaysia (51.46%), Vietnam (45.15%), Thailand (44.66), and Indonesia (30.58%) follow, indicating a presence of policies and projects supporting the transition.

Barriers to the Energy Transition

Regulatory uncertainty remains the most significant obstacle, cited by 79.13% of respondents. Economic instability and financial constraints (62.14%) also emerged as major concerns, alongside shifts in government policies and priorities (60.19%).

Enablers for the Next Decade

The survey reveals optimism around government support (88.35%) and greater investment in clean energy projects (69.42%) as the primary enablers of the transition over the coming decade. Technological advancements in renewable energy (51.94) and improvements in grid infrastructure (55.83%) are also expected to play crucial roles.

Singapore's Progress and Challenges

Although Singapore is viewed as a leader, there is a split in opinions on its progress toward renewable energy targets. 46.53% of respondents rate the progress as satisfactory, while 32.18% feel moderate progress has been made, indicating room for improvement. Key challenges include limited space for renewable energy infrastructure (84.65%) and high investment costs (62.38%).

Carbon Markets and Trading

A significant 68.75% of respondents believe that carbon trading systems would effectively reduce emissions. However, lack of uniform regulations (86.39%), insufficient data and monitoring capabilities (61.26%) were identified as barriers to participation in regional carbon trading systems. There is strong support (76.44%) for increased collaboration through harmonised regulatory frameworks, which could accelerate progress.

These findings hint at the complexity of the energy transition in ASEAN, driven by a mix of regulatory, financial, and infrastructural factors. As the region continues to navigate these challenges, the focus on technological innovation, regional cooperation, and policy clarity will be pivotal in achieving long-term decarbonisation goals.

Survey Objectives and Methodology

The ACES 2024 'State of the Energy Transition' Survey was designed as part of SEAS' ongoing effort to gather organic, industry-led insights from professionals across the ASEAN region. Reaching out to our members and extended network of industry professionals from diverse sectors—including renewable energy, finance, government, and consulting—we aimed to capture an authentic snapshot of the challenges, opportunities, and regulatory concerns facing the energy transition.

Of the 250 professionals who responded to the survey, 24.40% work in consulting, followed by 14.00% from technology development and 8.00% from research & development. The geographic distribution was also notable, with the majority of respondents based in Singapore (83.60%), followed by smaller percentages from Indonesia, Malaysia, and the Philippines as well as the broader APAC region.

The survey was conducted online in August 2024.



The ASEAN Outlook

In driving efforts towards net zero, respondents believe that each country in the region is aware of its urgency and are taking steps towards it.

In selecting the top three countries, Singapore received 94.66% of votes as leader, more than half voted for Malaysia (51.46%), followed by Vietnam (45.15%), Thailand (44.66%) and Indonesia (36%). With the exception of Myanmar, other states in the region were also perceived as active leaders in the energy transition, although this does not necessarily indicate that the nation is not taking any steps towards the transition.

Persistent Challenges Across the Region

However, the region faces several substantial challenges. The overwhelming majority of respondents (79.13%) pointed to regulatory uncertainty and the lack of clear guidelines as the primary roadblock to progress. This reflects the fragmented nature of policies across ASEAN, making it difficult for investors and companies to navigate the energy sector efficiently.

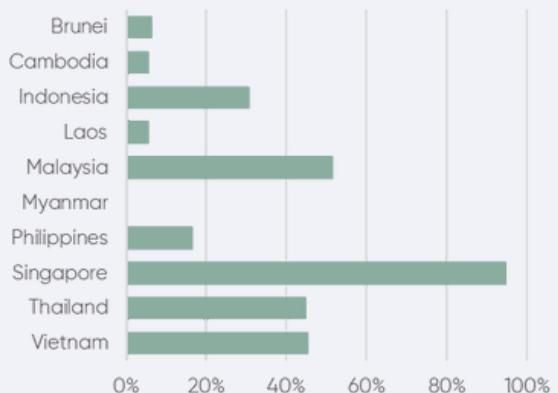
Economic instability and financial constraints were also highlighted by 62.14% of respondents, illustrating the capital-intensive nature of renewable energy projects. Furthermore, shifts in government policies and priorities – highlighted by 60.19% of respondents – create additional uncertainty. Policy reversals or changing targets can erode investor confidence, disrupt projects, and slow regional progress toward sustainability goals.

Enablers for the next decade

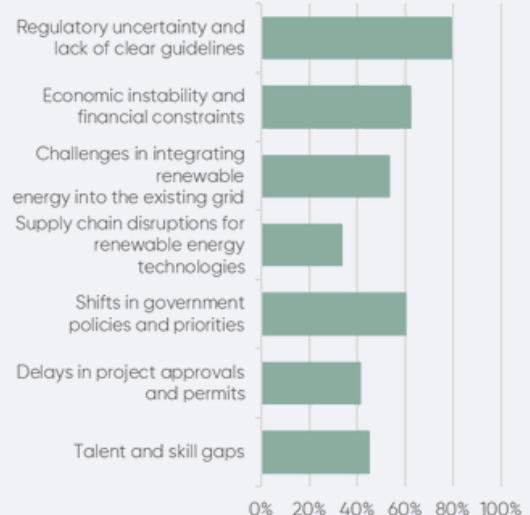
To overcome these challenges, respondents pointed out several enablers of the energy transition over the next decade. The most prominent was the need for increased government support and policy frameworks (88.35%), which indicates that clearer and stronger regulations are critical to facilitating investment and integration of renewables.

Additionally, regional cooperation and integration of energy markets (70.87%) can boost energy security, optimise resources, and attract larger cross-border investments., while greater investment in clean energy projects (68.18%) was viewed as essential for scaling up renewable capacity in the region.

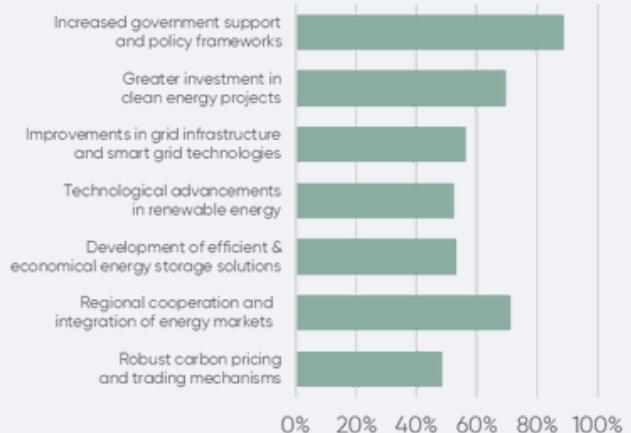
Q1. WHICH ASEAN COUNTRIES ARE LEADING IN EFFORTS TO DRIVE NET ZERO?



Q2. WHAT DO YOU SEE AS THE BIGGEST ROADBLOCKS TO THE ENERGY TRANSITION IN ASEAN TODAY?



Q3. WHAT WILL ENABLE THE ENERGY TRANSITION IN ASEAN OVER THE NEXT DECADE?



The Singapore Story

Progress and Perceptions



Singapore has made notable strides in its energy transition, though there are differing opinions on its overall progress. While 46.53% of respondents rated the country's efforts as satisfactory, suggesting that Singapore is likely on track to meet its renewable energy goals, 32.18% felt the progress was only moderate, indicating that significant improvements are still needed. This disparity reflects the complexity of Singapore's energy landscape, where ambitions are high, but practical challenges remain.

Drivers of Progress

Key drivers of Singapore's energy transition were highlighted by 88.61% of respondents who pointed to government policies and regulations as the leading force behind the country's progress. This is not surprising, as Singapore has actively introduced policies to encourage decarbonisation and investment in clean energy. Economic incentives and financial support (59.41%) were also recognised as important enablers. Strategic funding programmes, tax incentives, and grant schemes not only lower entry barriers for clean energy projects but also accelerate technology deployment by making investments more commercially viable.

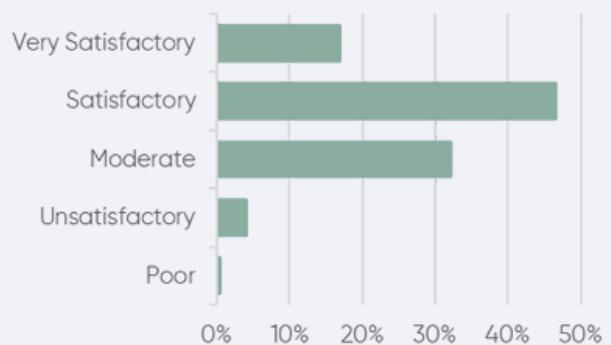
Corporate responsibility also plays a significant role, with 58.76% identifying corporate sustainability initiatives as another critical driver.

Challenges in Infrastructure and Land Use

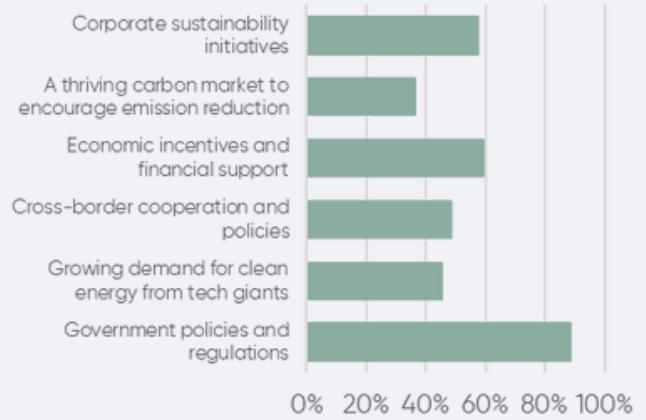
Despite these drivers, Singapore faces several critical challenges. The most significant, identified by 84.65% of respondents, is the limited space for renewable energy infrastructure, reflecting Singapore's geographical limitations in expanding large-scale renewable projects.

Another substantial hurdle is the high cost and investment requirements associated with renewable energy infrastructure (62.38%). This underscores the need for financial innovation and support to lower the cost barriers. These constraints make it crucial for Singapore to continue exploring alternative energy sources, and to maximise land use efficiency.

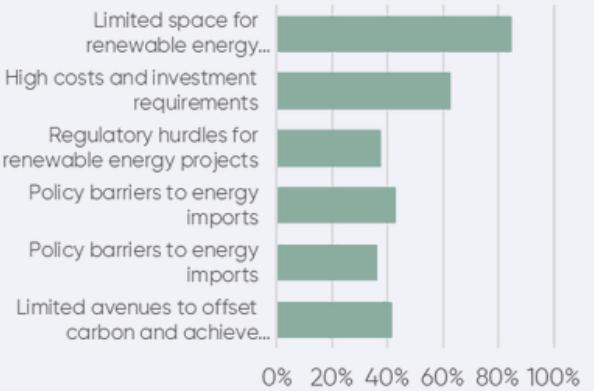
Q4. HOW WOULD YOU RATE SINGAPORE'S PROGRESS TOWARDS ITS RENEWABLE ENERGY TARGETS?



Q5. WHAT ARE THE KEY DRIVERS OF THE ENERGY TRANSITION IN SINGAPORE?



Q6. WHAT ARE THE KEY CHALLENGES SINGAPORE FACES IN ITS ENERGY TRANSITION JOURNEY?



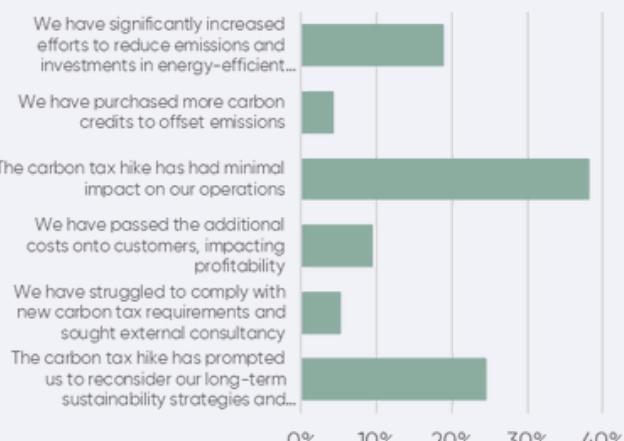
Carbon Tax and Trading: Industry Response and Sentiment

Most respondents see Singapore's carbon tax regime and trading mechanisms as mostly being moderately effective (41.15%) with only 25.52% seeing it as effective, indicating a positive but cautious view of its impact. A small percentage (5.73%) view it as very effective, suggesting that while the mechanism is working, there is a need for further refinement and impact assessment to enhance its effectiveness. Of note, over 20% state they do not have sufficient information to form a decision.

Q7. HOW WOULD YOU RATE SINGAPORE'S CARBON PRICING AND TRADING MECHANISM IN REDUCING EMISSIONS, PROMOTING SUSTAINABLE PRACTICES, ENCOURAGING INNOVATION AND INVESTMENT?



Q8. HOW HAS YOUR COMPANY PRIMARILY RESPONDED TO THE RECENT CARBON TAX HIKE TO S\$25/TCO2E?



Corporate Reactions to the Tax Hike

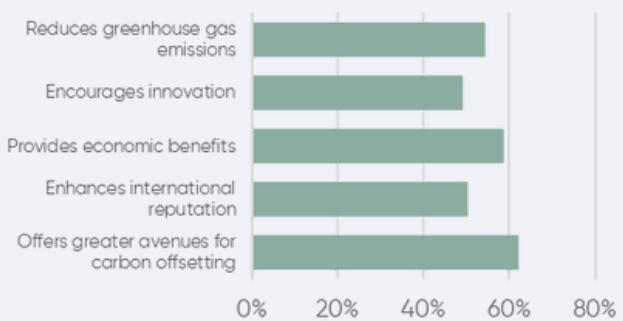
The recent increase in the carbon tax to S\$25 per tonne of CO₂ equivalent has also not spurred significant responses from companies. About a third of individuals (38.02%) stated their companies report minimal impact from the tax hike, likely due to the small pool of taxable corporations. 18.75% of respondents indicated they had significantly increased efforts to reduce emissions and invest in energy-efficient technologies.

However, the tax has also raised concerns, with some companies struggling to comply with the new requirements and others passing costs on to customers, which has impacted profitability. Only a small percentage (4.17%) have purchased more carbon credits, suggesting that the tax hike alone may not be sufficient to drive significant changes in carbon credit purchasing behaviour. These dynamics indicate that while the carbon tax is pushing businesses towards sustainability, its economic impact remains a point of contention.

Carbon Trading as a Tool for Decarbonisation

Meanwhile, the view of carbon trading as a crucial tool for Singapore's decarbonisation efforts has emerged, with 61.98% of respondents believing that it offers avenues for carbon offsetting, while 58.33% see it providing economic benefits and almost half believing it encourages innovation. This indicates that carbon trading is viewed not only as a mechanism for reducing emissions but also as a driver of economic growth and technological advancement.

Q9. WHAT DO YOU BELIEVE ARE THE MAIN ADVANTAGES OF CARBON TRADING FOR SINGAPORE?





The Future of Carbon Trading in ASEAN

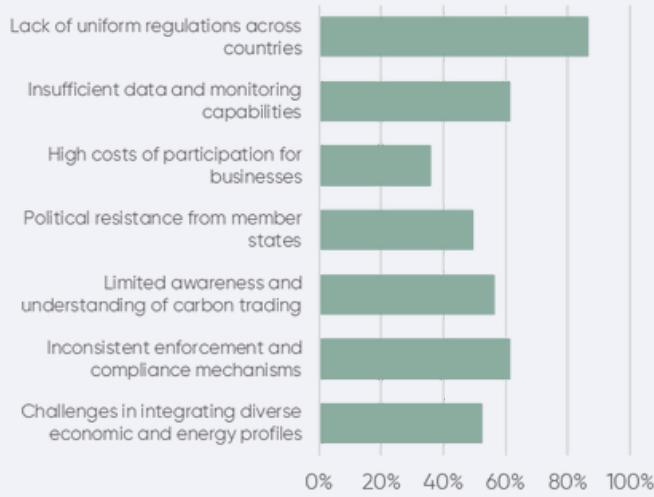
Challenges in Building a Unified Carbon Market

The future of carbon trading in ASEAN looks promising, but there are numerous obstacles that must be addressed before it can be fully realised. The most significant barrier, as identified by 86.39% of respondents, is the lack of uniform regulations across countries. This reflects the need for harmonised regulatory frameworks to enable efficient cross-border carbon trading. Without such standardisation, respondents perceive that it would be difficult for companies to operate seamlessly across the region.

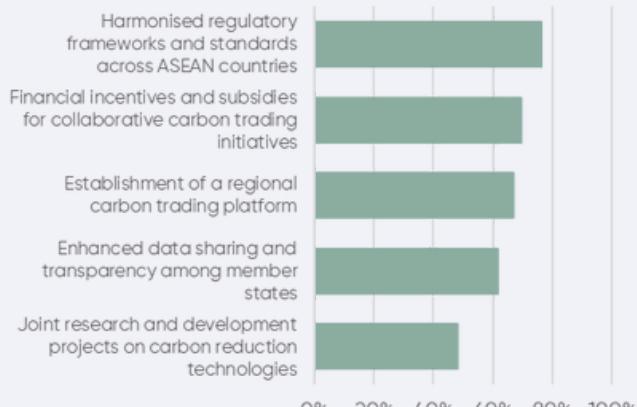
Another major challenge is insufficient data and monitoring capabilities (61.26%), which limit transparency and make it difficult to accurately track and verify emissions reductions across borders. Without robust measurement, reporting, and verification systems, market credibility and trust among participants are harder to achieve.

Closely linked to this is the challenge of inconsistent enforcement and compliance mechanisms (61.26%). Variations in how rules are applied across ASEAN risk creating market distortions, weakening investor confidence, and undermining efforts to establish a fair and reliable carbon trading system.

Q10. WHAT ARE THE MAIN OBSTACLES TO IMPLEMENTING A REGIONAL CARBON TRADING SYSTEM IN ASEAN?



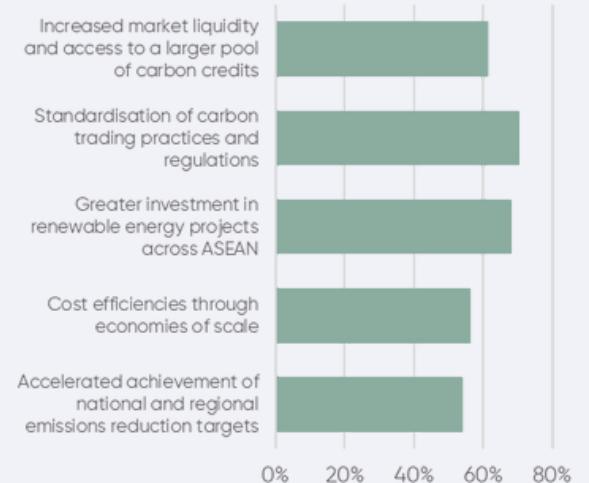
Q11. WHAT WILL ENCOURAGE GREATER COLLABORATION AND INNOVATION IN THE REGION IN RELATION TO CARBON TRADING?



Opportunities for Regional Integration and Growth

Despite these challenges, there are significant opportunities for carbon trading in the region. 77.05% of respondents saw increased market liquidity and access to a larger pool of carbon credits as a key benefit of cross-border carbon trading. This suggests that an integrated carbon market could facilitate more efficient emissions reductions by allowing countries to trade credits more freely. Standardisation of carbon trading practices and regulations was seen as another opportunity by 69.95%, emphasising the importance of creating a cohesive regulatory environment. Additionally, 67.21% noted that carbon trading could lead to greater investment in renewable energy projects across ASEAN, driving further decarbonisation efforts.

Q12. WHAT OPPORTUNITIES DO YOU SEE IN CROSS-BORDER CARBON TRADING WITHIN ASEAN?





Recommendations & Solutions

Opportunities for Regional Integration and Growth

For ASEAN, the path to a successful energy transition will require substantial collaboration across borders. The survey indicates that 76.44% of respondents see harmonised regulatory frameworks as essential to driving cross-border energy trade and carbon trading. This reflects the need for unified standards and policies across the region to facilitate smoother operations and investment in clean energy.

Additionally, 69.63% suggested that financial incentives and subsidies would help encourage greater investment in renewable energy projects, lowering the cost burden for businesses. ASEAN countries must also focus on developing advanced grid infrastructure and integrating energy storage solutions, which were identified as crucial enablers for the development of a flexible and responsive ASEAN grid.

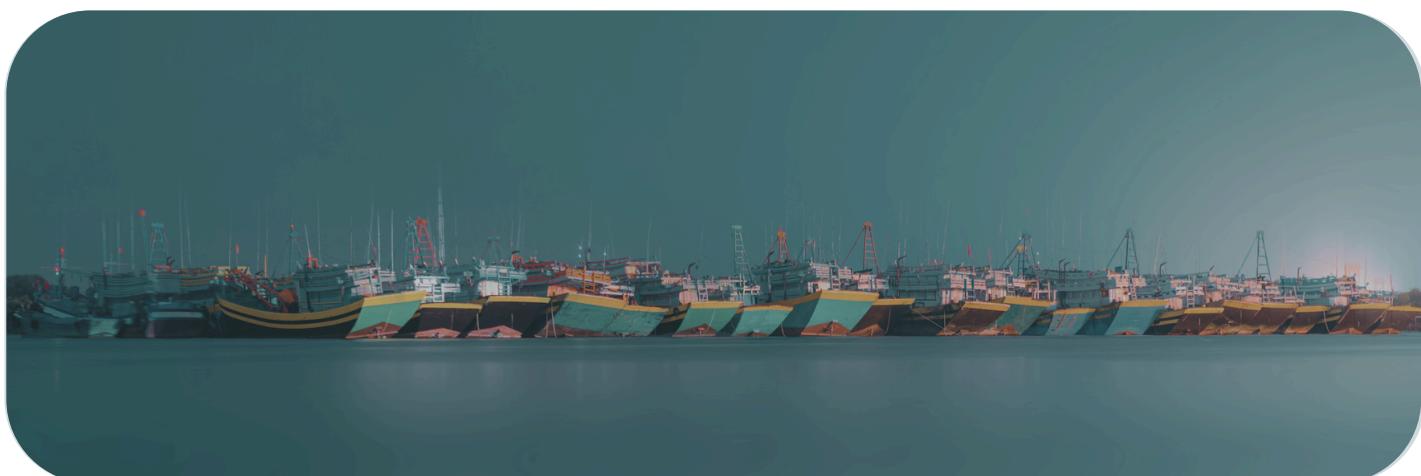
Conclusion

ASEAN and Singapore are making considerable progress in their energy transitions, with Singapore emerging as a regional leader. However, there are significant hurdles that must be overcome to achieve the region's decarbonisation goals. Regulatory uncertainty, high costs, and technological barriers continue to pose challenges for many ASEAN nations. Carbon trading presents a promising solution for reducing emissions and driving investment, but the lack of uniform regulations and political resistance may slow progress. For both ASEAN and Singapore, the future of the energy transition depends on stronger policies, greater financial support, and enhanced regional cooperation. By addressing these key issues, the region can continue to move towards a cleaner, more sustainable energy future.

Targeted Actions for Singapore

Survey respondents identified establishing comprehensive and reliable carbon accounting and verification systems (68.75%) and implementing strong, transparent regulatory frameworks (67.71%) as the most critical actions. Together, these measures form the foundation of a credible and efficient carbon market—ensuring emissions data is accurate, verifiable, and trusted by both domestic and international participants.

A robust regulatory environment will provide clarity for market actors, reduce compliance uncertainty, and attract long-term investment. By providing further guidelines and clearer policy signals, Singapore can attract more investment in clean energy projects and foster greater innovation in its energy sector. When combined, these actions can significantly enhance Singapore's competitiveness, positioning it as a trusted and influential carbon trading hub in ASEAN and beyond.



Looking ahead: The SEAS mission

Our vision for the future remains one where Singapore and the ASEAN region collectively advance toward net zero, powered by sustainable and clean energy solutions that strengthen both environmental and economic resilience.

SEAS is committed to accelerating the adoption of innovative technologies, supportive policies, and forward-looking energy practices, while fostering collaboration among industry, government, academia, and communities.

The 2024 findings highlight the urgent need for policy clarity, stronger cross-border cooperation, and robust infrastructure to unlock the region's clean energy potential. In response, SEAS will intensify efforts to advocate for harmonised regulatory frameworks, drive pioneering projects in renewable energy and carbon reduction technologies, and strengthen investment and capacity-building initiatives. At the same time, we will continue advancing education and awareness to inspire meaningful action across all levels of society.

Through strategic partnerships in Singapore, across ASEAN, and with the global energy community, SEAS will play a pivotal role in shaping a cleaner, more secure, and sustainable energy future—one that meets the evolving needs of our people, our industries, and our planet.

