Public Sentiment Toward Nuclear Energy in Southeast Asia: Evidence from Online Discourse

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Abstract

Southeast Asia has recently seen renewed debate over deploying nuclear power plants, yet it remains poorly understood how public opinion evolves over time. This paper examines how *Reddit* (a large international discussion platform) users discuss acceptance of nuclear energy in this area, with Singapore as the focal case, along with Malaysia, Indonesia, and the Philippines as comparative cases. The analysis uses 2,157 Singapore comments and 4,696 comparison comments in neighboring countries, spanning 2016 to 2025. Across the corpus, most comments are neutral or informational (64.0%). Pro-nuclear comments nevertheless outnumber anti-nuclear comments in all four countries where Singapore is the most pro-leaning case in net terms. The most supportive frames are small modular reactors, energy security, climate and clean energy benefits, and cost comparisons with other energy sources. The most cautionary frames concern safety, waste, siting, regional spillovers, and institutional capability. Our central finding is that public acceptance is conditional. Specifically, support rises when nuclear is presented as a modern, modular, professionally regulated technology, and declines when discussions turn to catastrophic-accident scenarios, corruption, old plant legacies, or unresolved waste and siting problems. Our findings provide timely insights into public opinion dynamics that could inform policy design and communication strategies.

Keywords: small modular reactor, nuclear power, public acceptance, sentiment analysis, risk perception

1 Introduction

Nuclear power has re-entered Southeast Asian energy debates through a combination of decarbonization pressure, concerns about energy security, and renewed interest in small modular reactors (SMRs). Singapore is a particularly revealing case. It has high and growing electricity demand, limited land, dependence on imported energy, and strong technical institutions, but it is also a small and densely populated city-state where any severe nuclear accident would be existential. Similar tensions appear across the region: Malaysia debates costs and governance, Indonesia trade-off between technical potential and regulatory readiness, and the Philippines deliberates nuclear through the long shadow of the never-used Bataan nuclear power plant.

As Southeast Asia stands at a crossroads in its energy transition, a comprehensive understanding of public acceptance is particularly important for emerging policy debates on nuclear power. Importantly, acceptance is rarely fixed or singular but conditional and multidimensional. One may support nuclear energy as a technology, oppose a plant near dense housing, trust engineers but distrust contractors, accept SMRs but reject the revival of an old plant, or support nuclear only if waste is exported under a credible international arrangement. As such, vote-based surveys that ask respondents to answer "yes" or "no" are unlikely to capture these subtle sentiments, limiting their usefulness for policymaking guidance. By contrast, an analysis of organic public discourse can recover more complex viewpoints by asking not only whether a statement supports or opposes nuclear power, but also what conditions make nuclear power acceptable. For policymakers, this shifts the relevant question from how much support exists to conditions under which that support becomes durable?"

To this end, this paper examines how online users in four Southeast Asian countries discuss acceptance of nuclear power plants, and what topical frames make nuclear power appear acceptable or unacceptable. We also track how these sentiments evolve over the past decade, and how prevailing concerns differ across the four countries. We answer these questions by analyzing nuclear-related discussions that *Reddit* users posted, which provide a large and unprompted record of how people reason about nuclear energy.

Reddit is a highly popular online forum that is used globally. Users with similar interest form "subreddits" or subs to discuss topics related to its theme. In each sub, any user can start a post (i.e., fresh discussion) of their choice or participate in existing ones.

Within each post, all users can offer their comments and also upvote or downvote existing comments. Due to the ease of commenting, and high level of interaction between users, *Reddit* subs have quickly grown into one of the most popular discussion forums with 116 million daily active users worldwide in 2025, and generating over 3 billion comments annually (around 8–9 million comments per day).[1] It is noteworthy that we do not claim that *Reddit* provides a representative view on nuclear energy across the four countries. Rather, *Reddit* comments provide a field site for observing the arguments through which acceptance is formed, challenged, joked about, and repaired. While survey instruments can estimate population support, they often compress the reasoning behind support into a few fixed items (e.g., risk, benefit, trust, knowledge, or ideology), and may understate true opinion when respondents temper their answers to fit social expectations or perceived researcher intent. In contrast, *Reddit* users go beyond declaring nuclear safe or unsafe—they explain why safety claims seem credible or incredible, compare nuclear with other energy sources, invoke institutional memories, worry about neighboring countries, and correct one another's factual claims.

Reddit also has distinctive advantages for studying policy discourse. Because comments reply to one another, users challenge claims, ask for sources, and sometimes convert technical disagreement into humor, so the object of acceptance often shifts within a single thread. For instance, a pro-nuclear comment may frame SMRs as modern, passive-safe, and land-efficient. A reply may reframe the same technology as unproven, expensive, and dependent on a regulatory capacity that does not yet exist. A third user may shift the comparison away from nuclear versus no nuclear and toward nuclear versus gas imports or regional grid dependence. These moves are analytically useful because they reveal the conditions that users attach to support and opposition.

For Singapore, our focal case, this online-discourse layer is especially valuable as a preliminary examination because policy options for clean energy transition are constrained and politically sensitive, and public's views are highly divergent. Data retrieved from *Reddit* can readily show which objections are prevalent: no evacuation hinterland, waste disposal, Pulau Ubin or Pedra Branca siting jokes, Malaysian and Indonesian spillovers, dependence on foreign expertise, and the credibility of Singapore's regulatory state. Similarly, it can also show which narratives generate more support: energy security, land

[1] https://investor.redditinc.com/financials/sec-filings/default.aspx

efficiency, baseload power, climate mitigation, advanced reactors, and the idea that Singapore has unusually strong state capacity. Mapping these frames before a formal public consultation begins can help researchers design more precise survey instruments, and can help policymakers avoid communicating past the real concerns.

We therefore use *Reddit* as a diagnostic tool for identifying what drives acceptance, not as a measure of how widespread support is. We extract 6,853 comments from 131 nuclear-related discussion threads across Singapore, Malaysia, Indonesia, and the Philippines. We further classify each comment's stance with a zero-shot language model and map the issue frames that recur in the debate. Its contribution is closer to agenda-setting and hypothesis generation than to opinion polling. When used and interpreted carefully, such analysis can lay the groundwork for in-depth research into the public acceptability of nuclear energy.

In this regard, this study contributes toward a more conditional picture of public's current perspectives on nuclear energy in three main ways.

First, we identify the core issues that the public are most concerned about in their respective countries. Toward this end, Singapore's veto points are land, evacuation, waste, and cross-border consequences; Malaysia's include governance, public opposition, and cost; the Philippines include old plant legacies, corruption, and utility distrust; Indonesia's include regulatory readiness and the credibility of future-oriented nuclear plans. This cross-country divergence implies that concerns surrounding nuclear adoption are country-specific, so public engagement and risk communication need to be tailored case by case rather than designed for the region as a whole.

Second, we show where support for nuclear is coming from. Rather than unconditional enthusiasm, support for nuclear technology is often comparative and pragmatic. Users back nuclear because they see weaknesses in coal and gas dependence, intermittency and land-intensiveness of renewables, regional grid dependence, or high electricity prices. This comparative logic matters because it implies that acceptance may strengthen if renewables and imported electricity come to be seen as insufficient for reliability or national resilience. This sheds light on public communication because it locates the persuadable ground.

Third, this study serves as a low-cost and scalable way to map the conditions behind nuclear acceptance from organic online discussion using natural language processing. This approach complements surveys and focus groups, and can be deployed before formal public consultations. The resulting map of veto points and supportive frames also offers a

practical input for follow-on research. For example, the insights recovered here can guide information-treatment experiments that test whether addressing specific veto points raises acceptance.

2 Literature Review

This study is broadly related to three strands of literature.

In one of the earliest studies of Singapore's nuclear acceptance, Ho et al. (2018) used focus group discussions to show that participants were generally unsupportive of nuclear energy. However, some are prepared to accept it conditionally if the country developed the relevant expertise, safety systems, and long-term necessity. Their participants repeatedly raised nuclear accidents, radioactive waste, monetary costs, opportunity costs, and regional proximity. This is a useful baseline because it shows that acceptance is not simply a pro-or-anti attitude. Rather, it is oftentimes based on conditions.

A regional study by Ho and Chuah (2021) showed that respondents from Indonesia, Malaysia, Singapore, Thailand, and Vietnam generally have low levels of support for nuclear energy development and emphasized trust, risk perception, benefit perception, and media frames as perceptual filters. From their Singapore respondents, perceived benefits were positively associated with support, and perceived risks were negatively associated with support. This implies that knowledge of nuclear energy itself is not enough to promote acceptance if institutional trust is low or siting risk is high.

A third contextual anchor comes from the 2024 Southeast Asia Climate Outlook survey (Seah et al., 2024). This report shows that climate and energy transition have become salient regional issues, while also noting that rising energy prices and cost of living are the top concern about transition. The same report records increased regional support for nuclear energy as a potential clean energy source, rising from 6.1% to 9.9%, with Singapore rising from 14.7% to 20.3%. These figures do not measure nuclear plant acceptance directly, but they help explain why nuclear may appear more frequently in online energy debates after 2024.

The second strand of literature is related to risk-perception. A seminal study on public's perception of risk emphasizes that public responses to hazardous technologies are shaped by dread, catastrophic potential, controllability, voluntariness, trust, and the distribution of benefits and harms (Slovic et al., 1991). The psychometric tradition

associated with Fischhoff et al. (1978) is especially relevant here because nuclear power is a classic high-dread technology: accidents are rare, but perceived as catastrophic, involuntary, geographically persistent, and difficult for lay people to control. This does not make public concern irrational. It means that nuclear acceptance depends on institutional and moral judgments as well as engineering assessments.

Trust is also central here because most citizens cannot directly evaluate reactor design, probabilistic risk assessment, waste pathways, emergency planning, or regulatory independence. A study by Siegrist and Cvetkovich (2000) suggests that when people lack direct technical knowledge, they rely on trust in the institutions managing the hazard. Similarly, a longitudinal study around Fukushima similarly shows that perceived risks, perceived benefits, and trust remain key determinants of nuclear acceptance even after a major accident (Visschers & Wallquist, 2013).

Lastly, the social acceptance literature adds a second distinction: support for a technology in principle is not the same as acceptance of a concrete project. Wüstenhagen et al. (2007) distinguishes socio-political acceptance, community acceptance, and market acceptance. This implies that a *Reddit* user can support nuclear as part of national decarbonization, oppose a specific site, distrust a utility, and worry about electricity prices at the same time. This is why we avoids treating "pro-nuclear" comments as equivalent to consent for a plant. Energy justice provides a further lens on social acceptance. Jenkins et al. (2016) organize energy justice around distributional, procedural, and recognition concerns. In nuclear debates, distributional concerns include who receives reliable electricity, who bears accident risk, where waste is stored, and who pays for cost overruns. Procedural concerns include whether communities can participate in siting decisions, whether regulators are independent, and whether emergency planning is transparent. Recognition concerns include whether citizens' fears are treated as legitimate or dismissed as ignorance. *Reddit* comments are rich precisely because they express these justice claims in everyday language: Who will run it? Where will the waste go? Who benefits? Who is left with the risk?

Recent work on social license for advanced nuclear technology makes a similar point from a policy perspective. It is argued that advanced nuclear deployment should be treated socio-technically where technology, geography, economics, politics, social context, and historical experience have to be considered together (Lovering et al., 2021). They also

emphasize engagement before formal regulatory processes narrow the discussion to safety compliance. The *Reddit* corpus supports that argument. Users are already debating questions that sit outside a narrow technical licensing frame, including national identity, corruption, regional diplomacy, emergency legitimacy, and whether SMRs are being used as a credible option or a rhetorical shortcut.

Taken together, these studies suggest that a more insightful and relevant policy question is not "Is the public simply for or against nuclear?" The better question is: what acceptance conditions are visible in public discourse, and how do those conditions differ by country? We therefore treat sentiment labels as entry points into a broader map of conditional acceptance. Pro-nuclear comments identify perceived benefits and confidence conditions. Anti-nuclear comments identify veto points. Neutral comments often identify the informational substrate of the debate: news, technical explanation, jokes, uncertainty, and questions that may later become either support or opposition.

3 Data and Methods

3.1 Data source

We collect *Reddit* comments from Singapore, Malaysia, Indonesia, and the Philippines. Geographic attribution is based either on country-specific subreddits, such as r/singapore and r/askSingapore for Singapore, or on post titles with nuclear-related subreddits, such as r/nuclear and r/NuclearPower.

For each country, the corpus contains *Reddit* discussions collected by searching for nuclear-related posts in country-focused and nuclear-related subreddits. We used the keyword "nuclear" as a deliberately broad and generous criterion, then manually screened each post to confirm that its theme fell within our scope of interest. We excluded non-English posts and threads, as most discussion on this platform is in English.

After removing deleted, removed, bot-generated, and very short comments, the workbook contains 2,157 cleaned Singapore comments from 26 posts spanning 2016 to 2025. The comparison corpus contains 4,696 comments from Malaysia, Indonesia, and the Philippines, spanning 2015 to January 2026. Altogether, the combined corpus covers 6,853 comments from 131 posts (Table 1).

3.2 Methods

Each comment was classified as "Pro-Nuclear, Anti-Nuclear, and Neutral" using the zero-shot classification pipeline. The pretrained model used was facebook/bart-large-mnli, a natural language inference model commonly used for zero-shot text classification (Yin et al., 2019). In practice, zero-shot classification assigns each comment to candidate labels on which the model was not specifically trained. In our case, these labels indicate support for, opposition to, or neutrality toward nuclear, with classification based on how strongly each label is entailed by the text. This approach is well suited to our setting because it requires no hand-labeled training data from any of the four countries and can be applied uniformly across them.

The classification task was defined as stance detection rather than generic sentiment analysis. This distinction matters as a comment may use negative language while supporting nuclear power or may use positive language while opposing nuclear deployment. The model accordingly classified whether each comment expressed support for nuclear power, opposition to nuclear power, or no clear directional stance.

For each comment, the classifier produced probability scores for each label (i.e., pro, anti or neutral). The label with the highest score was assigned as the comment's stance, while the associated score was retained as the model confidence. The analysis then used these comment-level labels to calculate stance distributions by country, year, *subreddit*, and issue frame.

In addition to stance classification, comments were also coded into topical frames using keyword dictionaries. Each frame was assigned by matching comments against a curated list of keywords and phrase associate with that frame (Table A1) These frames captured recurring themes such as safety and accidents, radioactive waste, land constraints, small modular reactors, energy security, climate mitigation, costs, governance and institutional trust, regional spillovers, and renewable alternatives. Since comments could discuss more than one issue, frame categories were not mutually exclusive. This allowed the analysis to examine not only whether comments were pro- or anti-nuclear, but also which arguments were associated with support or skepticism.

4 Results

4.1 Overall stance toward nuclear power

Across the full corpus, 21.6% of comments are classified as pro-nuclear, 14.4% as anti-nuclear, and 64.0% as neutral. This shows that support and enthusiasm for nuclear energy is not overwhelming even among the younger crowds that populate *Reddit*. Most comments are informational, humorous, procedural, or mixed. Among directional comments, pro-nuclear comments outnumber anti-nuclear comments by roughly 1.5 to 1 across the region.

Table 2 shows substantial regional variation in public support for nuclear energy across the four Southeast Asian countries. Singapore is the most pro-leaning in net terms: 23.8% pro-nuclear, 10.5% anti-nuclear, and 65.6% neutral. Malaysia and the Philippines show smaller pro tendencies, while Indonesia has the highest neutral share. The Philippines is notable because pro and anti comments are close: 21.3% pro versus 18.3% anti. That pattern fits a debate where nuclear is appealing as an electricity solution but entangled with old plant legacies, corruption, and utility pricing distrust.

We also weighted comments by *Reddit* engagement as a supplementary check. Because highly upvoted comments may be more visible within a discussion thread, a simple attention weight was constructed using non-negative comment scores plus one. This weighting was not treated as a measure of population opinion, since *Reddit* scores reflect platform dynamics as well as agreement. It was used only to examine whether the overall stance pattern changed when more visible comments received greater weight.

Attention-weighting reinforces the Singapore result. If each comment is weighted by their votes, Singapore's pro-nuclear share rises to 29.6% and anti-nuclear to 12.1%. This suggests that in Singapore threads, pro-nuclear comments were not merely numerous; they also attracted visible approval in the sampled *Reddit* environment. Yet the same is not equally true everywhere. The Philippines remains closely balanced even when weighted by votes. Across all four countries, weighting shifts the net pro-nuclear balance in the same direction for most: Singapore rises from +13.3 to +17.5 percentage points and Malaysia from +5.9 to +9.7, while the Philippines is essentially unchanged (+3.0) and Indonesia edges down slightly (from +5.7 to +4.1).

4.2 Temporal trends over the past decade

Our dataset spans 2016 to 2025 for most countries, which allows us to trace changes in public opinion on nuclear energy over time. However, these counts should not be read as a uniform survey series. Because we did not pose a common question at fixed intervals, comments across years are not strictly comparable. As such, they are better understood as evolving public responses to focal events. As Figure 1 shows, both comment volume and stance shift around such moments. For instance, the discussion volume rise sharply after Japan's decision to discharge treated Fukushima water in 2023 and Singapore's renewed study of nuclear options in 2024.

The Singapore time trend should be read with care because the number of comments varies substantially by year, reflecting responses to real-world developments and major events. Still, the broad pattern is stable where pro-nuclear comments outnumber anti-nuclear ones in every observed year. The balance is closest in 2019, when anti-nuclear comments reach 19.5%, and widest in 2025, when the pro-to-anti ratio reaches 3.08.

The content of the recent Singapore threads points to several reasons for the positive attitudes toward nuclear energy. Users repeatedly compare nuclear with imported gas, regional electricity dependence, land-intensive renewables, and the intermittency of solar. Many positive comments are interested in SMRs, passive safety, floating or remote siting concepts, and the idea that Singapore's state capacity could support strict regulation. The anti-nuclear comments are also coherent, emphasizing limited evacuation options, dense population, waste disposal, and whether accident would impose unacceptable downside on a small island.

4.3 Conditional acceptance of nuclear

The issue-frame analysis shows why simple sentiment shares are insufficient (Table A1). The same user can support nuclear in principle and oppose a specific plant location, or reject an old reactor but support new SMRs. These nuances cannot be captured by yes-or-no surveys.

We first examine the distribution of themes across nuclear-related posts. Across the corpus, the most common narratives in Southeast Asia concern 1) safety, accidents, and radiation, 2) regional geopolitics and neighbors, 3) governance, trust, and institutional

capability, 4) waste and land constraints, and 5) technology, SMRs, and advanced reactor designs (Table 3).

Technology is the strongest pro-nuclear topic. Across the corpus, comments mentioning technology, SMRs, or new designs are 42.1% pro-nuclear and 17.0% anti-nuclear, a net balance of +25.1 percentage points. In Singapore, the same frame is even more positive, at +36.4 percentage points. A recurring argument is that the public should not evaluate future nuclear systems only through Chernobyl or Fukushima as commenters point to passive safety, smaller units, modular deployment, and improved reactor design.

Discussions surrounding energy security are also strongly pro-leaning. Comments mentioning energy security, reliability, gas, import dependence, baseload, or grid stability are +15.8 percentage points pro across four countries and +24.6 points in Singapore. The Singapore logic is straightforward: a small state with limited domestic energy options may value a dense, reliable source of electricity even if the technology carries risks. This topic often appears alongside regional grid discussions. While Singapore users support imported renewables, they worry about overdependence on any single external supplier.

Climate and clean-energy comments are pro-leaning but less so compared to other topics. Across the corpus they are +13.1 percentage points net pro; in Singapore they are +20.3. The pro-nuclear side frames nuclear as low-carbon, cleaner than coal or gas, and useful for decarbonization. The more skeptical side asks whether renewables, storage, demand management, hydrogen, or regional power trade could deliver similar climate benefits with lower tail risk. This pattern fits a recent survey that energy transition is salient but cost and energy security concerns remain central (Seah et al., 2024).

Safety remains the largest and most emotionally powerful frame. It is not uniformly anti-nuclear: safety comments are +3.4 percentage points net pro across the corpus and +9.2 in Singapore. This is because many pro-nuclear users use safety language to argue that modern nuclear is safer than commonly assumed. But safety is negative in the Philippines, where old plant legacies and regulatory distrust are more salient. This implies that safety communication cannot be generic. A claim that "modern nuclear is safe" lands differently in Singapore, Malaysia, Indonesia, and the Philippines because each country has different institutional reference points.

4.4 Cross-country differences

Cross-country frame patterns show why Southeast Asia should not be treated as a homogeneous acceptance environment (Figure 2). The frames also differ in how often they arise: governance and safety dominate Philippine threads, regional and cost concerns are most common in Malaysia, and Singapore stands out for safety, waste, and technology (Table A2). Singapore has positive net pro balances in every topical frame measured here. Malaysia is pro-leaning on technology, regional, cost, climate, and energy security frames, but negative on governance and trust. The Philippines is especially divided: technology and energy security are pro-leaning, but safety, governance, and renewables/alternatives are negative. Indonesia is more neutral overall, but technology, safety, waste/land, and climate frames are pro-leaning in the subset of comments where those frames appear.

Governance is a topic where country differences are most obvious. Across all comments mentioning governance, trust, and capability, pro and anti shares are almost exactly balanced. In Malaysia, the governance frame is -3.7 percentage points; in the Philippines, -2.1; in Indonesia, -8.3. While these are not huge margins, they reveal that online users in these countries are skeptical that their institutions, contractors, or political systems can manage a high-consequence technology without corruption, cost overruns, maintenance failures, or weak emergency response.

The Philippines illustrates the difference between support for nuclear energy and support for a nuclear plant. Pro-nuclear comments often emphasize high electricity costs, clean energy, and the need for reliable power. Anti-nuclear or skeptical comments focus on Meralco pricing, corruption, the legacy of the Bataan Nuclear Power Plant (BNPP), old specifications, earthquake and volcano claims, and whether regulators can enforce safety. The debate is therefore not merely technical. Rather, it is a political-economy debate over who builds, owns, regulates, and profits from nuclear infrastructure.

Malaysia shows a related but distinct pattern. Supportive comments often emphasize coal dependence, cheap electricity, data-center power demand, and the idea that Malaysia is geologically less exposed to some disaster risks. Skeptical comments emphasize public opposition, political incentives, project management, waste, imported fuel dependence, and whether large capital expenditures are justified when solar and other alternatives are available. This makes cost-benefit communication especially important.

Indonesia's corpus is smaller and more neutral, so the estimates are less stable. Still, the comments suggest that nuclear is often discussed as a future-oriented national-scale technology rather than an immediate mass public demand. SMR partnerships, geothermal comparisons, and questions of regulatory readiness feature prominently. The main caution is that lower anti-nuclear shares should not be read as high acceptance; much of the Indonesian corpus is simply neutral or informational.

5 Discussion and Policy Implications

5.1 What acceptance means in the public debate

Policymakers are likely to be especially interested in public acceptance, but it is crucial to clarify what kind of "acceptance" our analysis captures. In these *Reddit* discussions, and potentially among broader stakeholders, acceptance is best understood as conditional permission.

Four conditions recur. First, nuclear becomes more acceptable when it is framed as modern technology, especially SMRs or advanced designs, rather than as a generic large reactor. Second, it becomes more acceptable when attached to energy security, reliable electricity, and decarbonization. Third, it becomes less acceptable when users imagine catastrophic downside in a dense city-state or archipelagic setting. Fourth, it becomes less acceptable when users distrust institutions that would build, regulate, or operate nuclear plants.

Singapore's online discourse is especially conditional. Pro-nuclear users often argue that Singapore is unusually capable as it can train experts, regulate tightly, manage safety-critical systems, and align nuclear deployment with national survival. Skeptical users counter that Singapore is unusually vulnerable: there is no hinterland for evacuation, no easy waste site, and little tolerance for even low-probability catastrophic events. These are not simply opposing preferences, but two different readings of the same land constraints. For supporters, smallness makes dense energy attractive; for skeptics, smallness makes accident consequences intolerable.

This interpretation also explains why the *Reddit* results can be more pro-nuclear than earlier surveys and focus groups. *Reddit* likely overrepresents younger, male, technically interested, English-speaking, and policy-engaged users. It also gives more visibility to users comfortable making technical comparisons between nuclear, coal, gas, solar, storage,

and grid imports. At the same time, issue salience has changed since earlier Singapore focus groups and 2018 regional surveys (Ho et al., 2018). Nuclear is now discussed in a climate-transition context and in relation to SMRs, not only as a Fukushima-era risk.

5.2 Policy and communication implications

The *Reddit* evidence points toward a policy environment in which public acceptance of nuclear power is highly conditional. The most supportive users treat nuclear as part of a pragmatic energy portfolio: a dense, low-carbon, reliable source that can complement solar, storage, hydrogen, imported renewables, and efficiency measures. The most skeptical users do not necessarily deny climate change or energy-security constraints; they question whether nuclear's downside risks, costs, waste burdens, and governance requirements are acceptable in their country.

For Singapore, the central communication challenge is not simply to increase knowledge. As the literature suggests, and as *Reddit* discussions confirms, that knowledge is filtered through trust, risk, and perceived benefit (Ho & Chuah, 2021). Public engagement would therefore need to make four questions concrete: 1) Where could a plant or SMR be sited, and what exclusion or emergency assumptions are realistic? 2) What waste pathway would exist for spent fuel? 3) Whether regulator would be independent and technically credible? 4) What comparison set is nuclear being evaluated against: gas, imported solar, regional grids, hydrogen, storage, carbon capture, or demand reduction?

For regional policy, the findings imply that nuclear acceptance will be regionalized even when plant decisions remain national. For example, Singapore users repeatedly mention Malaysia and Indonesia; Philippine users discuss foreign contractors and old plant history; Malaysian users debate whether nuclear could support national growth but worry about political economy; Indonesian users discuss international partnerships. A nuclear accident, waste controversy, or regulatory failure in one country would thus shape risk perceptions in neighboring countries. This implies that a credible regional safety and emergency-preparedness architecture could reduce some trust barriers.

5.3 Implications for public engagement

For public engagement, the findings imply that a credible nuclear conversation in Singapore should begin with conditions rather than persuasion. A useful consultation would not ask only whether citizens support nuclear power. It would ask what kinds of

nuclear technology are being considered, what siting assumptions are plausible, what emergency zones would mean in a city-state, what waste arrangements are technically and diplomatically available, what regulator would be trusted, and how nuclear compares with the full portfolio of alternatives. This would treat citizens as participants in a governance problem rather than targets of a knowledge campaign.

For regional engagement, ASEAN-level safety and transparency mechanisms could become part of acceptance. If Singapore does not build a plant but neighboring countries do, Singapore citizens will still care about siting, emergency communication, accident notification, and waste disposal. If Singapore eventually considers domestic or floating nuclear options, neighbors will have reciprocal concerns. The *Reddit* corpus already anticipates this regional logic. A purely national communication strategy would therefore be incomplete.

5.4 Limitations

The issue-frame results should also be read as associations rather than causal effects. If technology comments are pro-leaning, this does not prove that talking about SMRs will cause acceptance. It means that within this *Reddit* corpus, users who discuss modern reactor technology are more likely to make pro-nuclear arguments. Thus, communication strategies still need experimental, survey, or deliberative evidence before assuming persuasion.

The *Reddit* method also creates platform-specific limitations. A systematic review of *Reddit* research notes that scholars need to consider *Reddit*'s algorithms, affordances, generalizability, and ethical dimensions (Proferes et al., 2021). These cautions apply here. *Reddit* comments are public, but users may not expect their comments to be treated as research data in a policy paper. For that reason, this draft avoids reproducing identifiable comment text and uses aggregate patterns and paraphrased examples. Future versions should maintain that approach unless comments are carefully anonymized and quoted only when analytically necessary.

There are also data-integrity issues. Gaffney and Matias (2018) show that widely used *Reddit* corpora can contain missing observations and that the risks vary by research design. The present workbook was not drawn from the exact corpus they audit, but the general lesson applies: *Reddit* data should not be treated as complete social reality. Thread deletion, moderation, API access, *subreddit* rules, and search strategy all shape

what enters the dataset. This is another reason to interpret the findings as discourse diagnostics rather than population estimates.

Finally, multilingual comments complicate classification. Singapore comments are mostly English, but Malaysia, Indonesia, and the Philippines include mixed English, Malay, Indonesian, Tagalog, and code-switching. Zero-shot stance models trained primarily on English may misread idioms, sarcasm, or local political references. The country comparisons are therefore strongest when they align with issue-frame patterns and qualitative reading, and weakest when they depend on small numerical differences in classifier shares.

6 Conclusion

Southeast Asian *Reddit* discussions show signs of pro-nuclear sentiments, especially in Singapore, but they do not show simple public acceptance of nuclear power plants. The dominant stance is neutral or informational, and the directional stance is conditional. Nuclear is attractive when users imagine modern reactors, reliable clean energy, and capable institutions. It is resisted when users imagine catastrophic accidents, unresolved waste, old plant legacies, corruption, weak maintenance, or regional spillovers.

The Singapore case is distinctive because the same conditions that make nuclear attractive also make it frightening. Land scarcity, energy import dependence, technical capacity, and state planning can all support the case for nuclear. But density, limited evacuation space, waste siting, and regional proximity sharpen the perceived consequences of failure. This double-edged smallness is the core of Singapore's nuclear acceptance problem.

The practical implication is that nuclear communication should not be framed as a battle between rational science and irrational fear. The *Reddit* comments contain both technical reasoning and legitimate institutional anxieties. A credible nuclear conversation in Southeast Asia will need to address benefits and risks together: technology, siting, waste, cost, governance, emergency response, and regional diplomacy. Acceptance, if it emerges, is likely to be earned through credible institutions and concrete safeguards rather than through information provision alone.

Figures

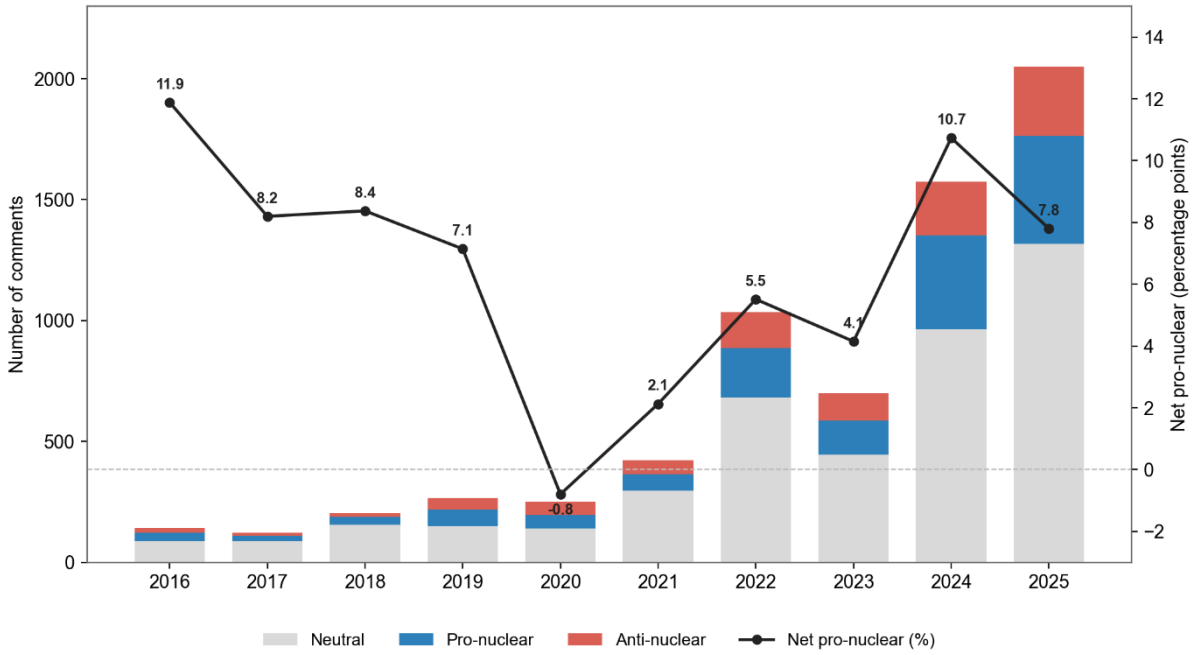

Figure 1. Comment volume and net pro-nuclear sentiment (2016–2025)

Notes: Bars show the number of comments per year across the four Southeast Asian countries, split by stance (neutral, pro-nuclear, and anti-nuclear). The black line shows net pro-nuclear sentiment, computed as the pro-nuclear share minus the anti-nuclear share in that year, with the value labeled at each point. The dashed horizontal line marks zero, where pro- and anti-nuclear shares are equal.

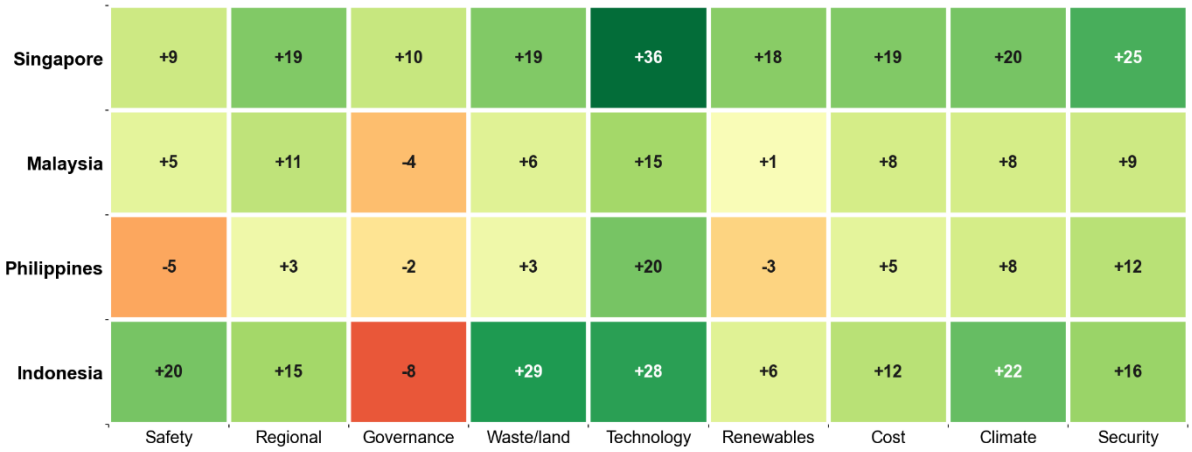

Figure 2. Topical frames net acceptance by country

Notes: Each row represents a country, and each column represents a nuclear-related topic subset. Cell values are net pro-nuclear percentage points within each country-frame subset. Green cells are more pro-nuclear views, whereas red cells are more anti-nuclear views.

Tables

Table 1. Dataset profile by countries

Country	Comments	Posts/Threads	Subreddits	First year	Last year	Median word count
Singapore	2,157	26	5	2016	2025	23
Malaysia	1,840	32	3	2015	2025	23
Philippines	2,273	50	9	2016	2026	27
Indonesia	583	23	4	2019	2025	22

Table 2. Stance distribution by countries

Country	Comments	Pro	Anti	Neutral	Net pro	Pro/Anti
Singapore	2,157	514	227	1416	+13.3 pp	2.26
Malaysia	1,840	393	285	1162	+5.9 pp	1.38
Philippines	2,273	484	415	1374	+3.0 pp	1.17
Indonesia	583	91	58	434	+5.7 pp	1.57

Table 3. Topical frames and acceptance

Frame	Comments	Share	Pro	Anti	Net pro
Safety, accidents, radiation	1,597	23.30%	25.90%	22.40%	+3.4 pp
Regional geopolitics and neighbors	1,488	21.70%	30.10%	17.50%	+12.6 pp
Governance, trust, capability	1,117	16.30%	24.10%	24.40%	-0.4 pp
Waste and land constraints	990	14.40%	30.40%	18.70%	+11.7 pp
Technology, SMRs, new designs	980	14.30%	42.10%	17.00%	+25.1 pp
Renewables and alternatives	836	12.20%	26.80%	22.10%	+4.7 pp
Cost, prices, economics	833	12.20%	30.10%	19.30%	+10.8 pp
Climate and clean energy	799	11.70%	33.70%	20.50%	+13.1 pp
Energy security and reliability	641	9.40%	35.60%	19.80%	+15.8 pp

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Appendix

Table A1. Issue-frame keyword dictionary

Issue frame	Representative keywords
Safety, accidents, radiation	safety, accident, radiation, radioactive, meltdown, Fukushima, Chernobyl, disaster, tsunami, earthquake, fallout, hazard, dangerous
Regional geopolitics and neighbors	Malaysia, Indonesia, Philippines, Vietnam, Thailand, ASEAN, neighbor, border, Johor, Batam, geopolitics, region
Governance, trust, capability	government, corruption, regulator, trust, institution, capability, maintenance, oversight, accountability, enforce, authority, politics, Marcos, Meralco, BNPP
Waste and land constraints	waste, spent fuel, disposal, storage, land, space, siting, site, evacuation, hinterland, density, populated, Pulau Ubin, Pedra Branca
Technology, SMRs, new designs	SMR, small modular, modular, reactor design, advanced reactor, new design, thorium, fusion, passive safety, molten salt, technology, floating, modern reactor
Renewables and alternatives	solar, wind, renewable, geothermal, hydro, battery, photovoltaic, green energy, alternative
Cost, prices, economics	cost, price, expensive, cheap, afford, economic, budget, capital, investment, subsidy, tariff, bill, overrun, finance, billion, profit
Climate and clean energy	climate, carbon, emission, decarbonization, clean energy, low-carbon, greenhouse, global warming, net zero, fossil, coal, pollution, environment, sustainability
Energy security and reliability	energy security, reliability, baseload, grid, import, intermittency, blackout, supply, self-sufficiency, dependence, demand, load

Table A2. Within-country prevalence of each issue frame

Issue frame	Singapore	Malaysia	Philippines	Indonesia
Safety, accidents, radiation	22.6	21.2	26.4	11.1
Regional geopolitics and neighbors	12.1	24.6	9.7	18.4
Governance, trust, capability	12.2	20.9	34.2	8.4
Waste and land constraints	20.3	15.1	12.9	13.6
Technology, SMRs, new designs	15.2	9.3	8.1	8.9
Renewables and alternatives	9.4	16.7	12.8	11.3
Cost, prices, economics	15.4	16.2	18.6	12.7
Climate and clean energy	9.8	14.2	10.1	10.8
Energy security and reliability	9.5	8.5	7.4	6.5

Notes: Cells report the percentage of each country's comments that mention the frame based on the keyword dictionary. Because frames are not mutually exclusive, rows and columns do not sum to 100%.