Thailand: linking bonds to NDC targets

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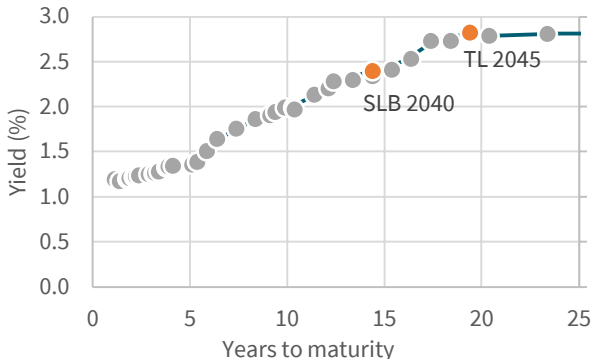
Thailand recently announced its Nationally Determined Contribution (NDC) for 2035, combined with a commitment to achieving net zero by 2050.[1] In this note, we assess the NDC and related policies, and explore ways to quantify the probability of achieving the ambitious 2035 target.

To achieve the 47% reduction in GHG emissions that the latest NDC envisions, higher investment is needed to decarbonise the economy — particularly in the energy and transportation sectors. Because of this, capital markets will continue to play a key role in financing the transition.

The Thai government issued its inaugural Sustainability-Linked Bond (SLB) in 2024. Later in this note, we review the progress towards achieving this instrument's performance targets.

Moreover, we explore how performance-linked bonds tied to NDCs could evolve further and outline a proposal for a Thai transition linker. In such a structure, the coupon adjusts in several steps if the government under- or outperforms relative to its decarbonisation targets.[2]

Figure 1. Thailand's government bond yield curve, including existing SLB 2040 and proposed transition linker (TL) 2045. Source: AFII, ThaiBMA, accessed 2 Feb 2026.



We propose a 20-year transition linker structure with the following key features:

- Twin bond structure to THAIGB 2.98% 2045 (ISIN: TH062303P607), see Figure 1.
- Performance target linked to 2035 NDC with net GHG emissions at 152 $MtCO_2e$, implying a 47% reduction compared to 2019.
- Coupon steps from 2040 to 2045 maturity (ten semi-annual coupon payments):
  - Strong/Outperformance: -0.25%/-0.125% step-downs if emissions are below 129.2 / 144.4 $MtCO_2e$,
  - Off track/Adverse: +0.125%/+0.25% step-up if emissions are above 159.6 / 174.8 $MtCO_2e$.
- Initial coupon: 2.80%, final coupon range: 2.55-3.05%.
- Fair value estimate vs THAIGB: -3.2bps running (lower yield), +0.53% upfront (higher price).

Such a structure could provide lower cost-of-capital for the Thai government if the 2035 NDC target is achieved, thus providing a strong incentive for decarbonisation. For investors, higher payouts provide a hedge against a failed transition scenario.

[1] "Thailand's Second Nationally Determined Contribution (NDC 3.0)", 4 Nov 2025.
[2] For details on the concept: "Transition linkers", Erlandsson (2024), SSRN.

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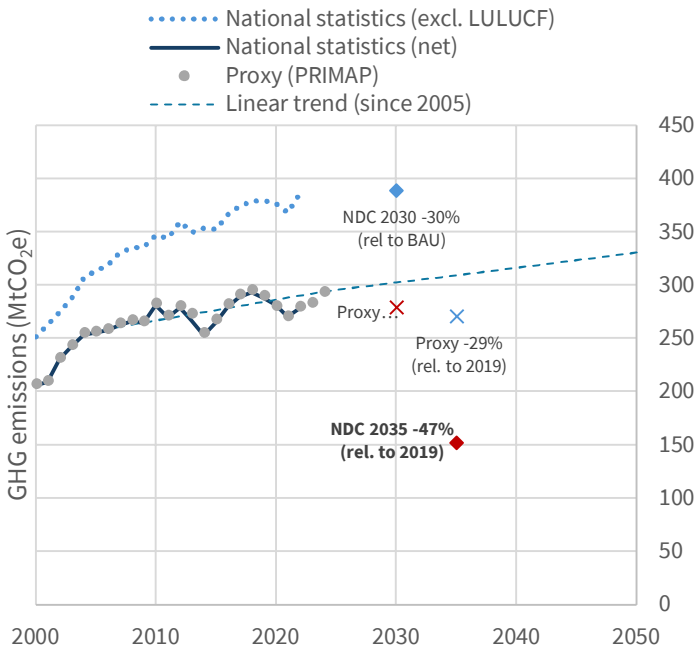
Ambitious NDC target for 2035

On 4 November 2025, the Thai Cabinet approved a new NDC. This includes a commitment to achieving net zero by 2050, bringing forward the initial target date by 15 years. By 2035, Thailand aims to reduce net GHG emissions to 152 $MtCO_2e$, implying a 47% reduction compared to 2019 levels. This is an absolute target aligned with a 1.5-degree pathway.

Compared to the earlier 2030 NDC target,[3] which was based on a 30% reduction in emissions excluding Land Use, Land-Use Change, and Forestry (LULUCF) relative to a business-as-usual scenario, this is a significant increase in ambition. Figure 2 compares the two iterations. The earlier NDC essentially set a ceiling on future emissions, whereas the latest one is operationalising a significant reduction. Furthermore, it is important to note that the 2035 target is based on net emissions, meaning LULUCF is considered.

We use proxies for the respective data points to compare the emission targets excluding/including LULUCF.[4]

Figure 2. Thailand's historical emissions, NDC targets for 2030 (excl. LULUCF) and 2035 (net emissions), including proxies for comparability. Source: AFII, PDMO, PRIMAP-hist national historical emissions time series v2.7, UNFCCC.



While the percentage reduction by 2035 based on emissions excluding LULUCF is smaller (29%), it still represents a significant change, particularly as Thailand's emissions have yet to peak. The latest NDC states that "*it aims to reach its peaking of greenhouse gas emissions before 2030*".[5]

Recap on emissions

Although there have been temporary declines in the past, emissions have shown a gradual upward trend since 2005. Preliminary data suggests they have risen again in recent years.

For market participants invested in Thailand's energy transition, it would be useful to quantify the likelihood of achieving the NDC target. While historical data can act as a reference point for emissions volatility, ultimately the trajectory depends on future policies.

[3] "Thailand's 2nd Updated Nationally Determined Contribution", UNFCCC, Nov 2022.
[4] The implicit 2035 target for GHG emissions excluding LULUCF can be found in the NDC 3.0 document (see footnote above). For the net emissions in 2030, we use 2030 NDC target excluding LULUCF and adjust it for LULUCF based on a linear interpolation from 2019 (reference year) to 2035 (target).
[5] Pg 1, Thailand's Second Nationally Determined Contribution (NDC 3.0).

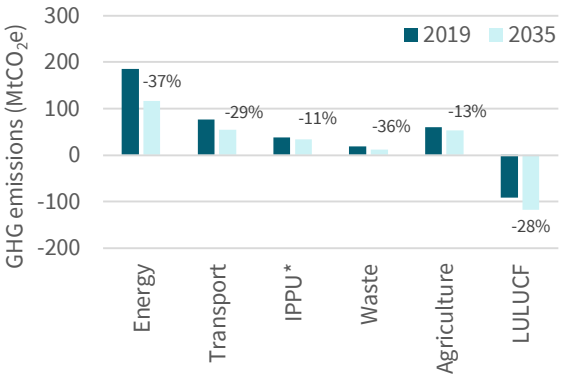
A sectoral breakdown in Figure 3 gives an overview of the main sources of emissions and their respective reduction targets.

Energy and transport are the two largest drivers of emissions, and combined they are expected to deliver two-thirds of the overall reduction by 2035.

Cuts to LULUCF emissions are also expected to be a meaningful contributor to the target.

But what is required to achieve these decarbonisation targets, and how realistic is this trajectory?

Figure 3. Sectoral breakdown of Thailand's emissions (2019 and 2035 target), including percentage reduction. Source: AFII, Department of Climate Change and Environment.



*) Industrial processes & product use

Decarbonisation pathway

Energy sector

The energy sector is Thailand's largest source of emissions, driven by the power mix used in the industrial and residential sectors. As of 2024, fossil gas made up 68% of the country's electricity generation, with fossil fuels overall accounting for 80%.

According to its 2024 power development plan, Thailand intends to add around 50 GW of renewable energy and 14 GW of energy storage by 2037, and phase out 8 GW of fossil fuel capacity by 2037. However, under the latest NDC with its pledge to bring forward net zero from 2065 to 2050, the country needs to scale up renewables more rapidly.

Transport policy

Thailand plans to cut transport emissions via wider adoption of electric vehicles (EV), cleaner fuel and emissions standards, and a shift to public transport. These strategies are highlighted in its NDC Action Plan, Long-Term Strategy (LT-LEDS).

At least 30% of new vehicles sold are expected to be electric by 2030, with internal combustion engines set to be phased out by 2035. Zero emission vehicles (ZEVs) should account for at least 30% of total automobile production by 2030.

The shift to public transport requires the development of the mass transport system, especially Bangkok's urban electric rail and intercity rail.[6] Currently, more than 80% of Thai people travel by car, with rail-based travel making up just 15% of total trips.[7]

Carbon removals

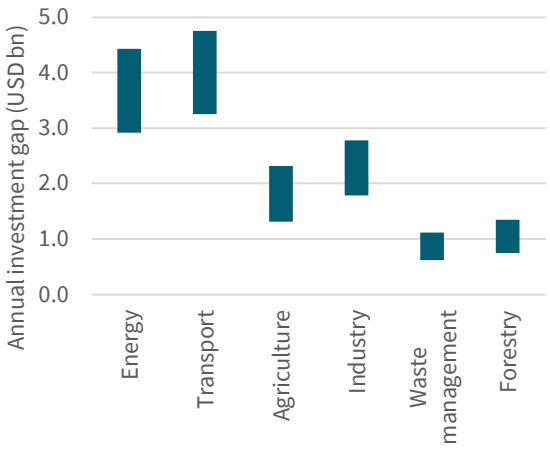
In Thailand's LT-LEDS, it targets carbon removals of about 120 $MtCO_2e$ annually by 2037. This is to be achieved by increasing forest and green areas to about 55% of national territory, compared with the 44-45% measured in recent years.[8]

[6] For a case study on BTS, see "Sustainability-Linked Bonds: alternative steps", AFII, 23 May 2023.
[7] "BTS Group Advocates Electric Trains as Thailand's Main Transport System to Drive the Country Toward Its Net Zero Target by 2050", BTS Group, 8 Oct 2025.
[8] "Kingdom of Thailand Sustainability-Linked Financing Framework", PDMO, Oct 2024.

Financing needs

According to Thailand's NDC 3.0, the amount of government financing needed for the energy transition (e.g. green energy, transportation, and industries) is USD6.11bn by 2035, plus an additional USD0.94bn for other sectors.[9] An earlier briefing by ADB[10] indicates overall climate investment needs of USD22-28bn annually from 2030-2050, with a gap of USD11-17bn. As shown in Figure 4, the required incremental investment in the energy sector alone is at least USD2.92bn per year, and the transport sector is USD3.25bn per year. Looking at sources of NDC investment from 2018-2024, corporates (44.8%) and commercial banks (20.2%) were the most important, with the government accounting for 15.3%.

Figure 4. Annual investment gap from 2030-2050 by sector. Source: AFII, ADB.



Capital markets will be essential to enabling the scale of investment. Sustainability-linked bonds and loans can play a key role here. Thailand has been active in developing this market domestically with the issuance of a sovereign SLB. State-owned enterprise, Electricity Generating Authority of Thailand (EGAT), has also issued SLBs in 2024 and 2025. EGAT's SLB framework is explicitly aligned to Thailand's Power Development Plan (PDP) for 2024.

Revisiting the 2040 SLB

In November 2024, Thailand issued its inaugural SLB (ISIN TH0623B3K608) — the first issuance of such a bond by a government in the ASEAN region. We follow up our previous analysis of this instrument with an update on recent developments and new data.[11]

Following the initial THB30bn issuance, the bond's total outstanding amount has grown to THB174.4bn (USD5.5 bn),[12] primarily through subsequent tap issuances. It is now the largest sovereign SLB globally.

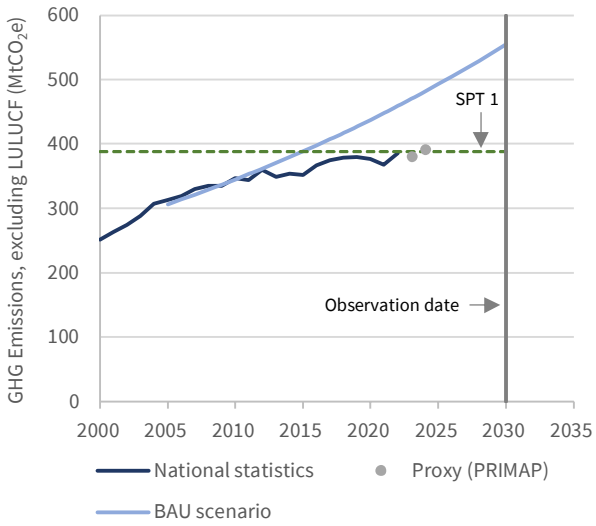
The initial progress report, together with more recent data, provides a basis to review the bond for potential pricing implications.[13] The coupon adjustment structure comprises a symmetric step-up/down mechanism linked to two sustainability performance targets (SPTs) focused on emissions and ZEVs.

[9] Pg 2, Thailand's Second Nationally Determined Contribution (NDC 3.0).
[10] "Thailand's Climate Finance Landscape: Bridging the Gap to Net Zero", ADB Briefs, Aug 2025.
[11] "Thai government embarks on SLB journey", AFII, 15 Nov 2024.
[12] "Bond information: SLB406A", ThaiBMA, accessed 2 Feb 2025.
[13] "Kingdom of Thailand's Sustainability-Linked Bond Progress Report", PDMO, Jun 2025.

SPT 1

The GHG emissions target, excluding LULUCF, is 388,500 $ktCO_2e$ by end-2030.[14] Since the publication of its SLB framework, which includes data through 2019, the most recent progress report extends coverage to 2022, with proxy data available up to 2024. (see Figure 5).[15]

Figure 5. GHG emissions, excluding LULUCF ($MtCO_2e$). Source: AFII, PDMO, PRIMAP-hist national historical emissions time series v2.7.



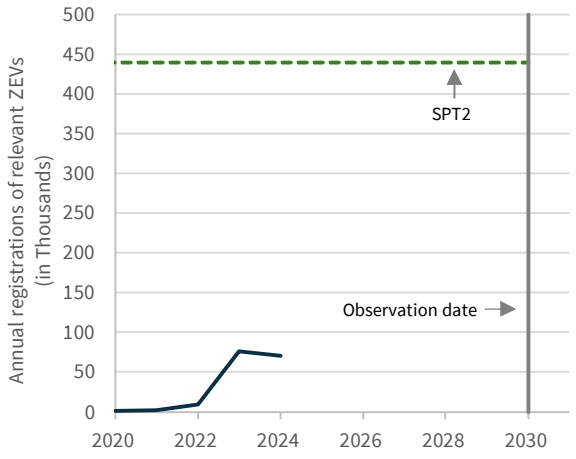
Based on recent observations, emissions are yet to peak, and were close to the 2030 target in the most recent reporting.

In our previous analysis, we set an illustrative 50-75% probability of SPT1 being achieved. All else being equal, recent data suggests the country is less likely to achieve this target. However, the longer-term NDC targets suggest an increased focus on emissions reduction. Therefore, in our view it still seems more likely than not that the 2030 target will be achieved.

SPT 2

To achieve this target, Thailand must reach 440,000 annual registrations of ZEV passenger cars and pick-up trucks by 2030.

Figure 6. Annual registrations of relevant ZEVs (in Thousands) for Thailand. Source: AFII, PDMO.



Policymakers have announced measures to support the ZEV transition, including subsidies and tax reductions. As part of the 30@30 policy, ZEVs should account for 50% of newly registered passenger cars and pick-up trucks by 2030, up from 10.9% in 2024.[16]

Following a sharp increase in 2023, ZEV registrations in 2024 were modestly lower (see Figure 6).

In the first half of 2025, registrations reportedly increased by 52.4% compared to the prior year period.[17] Even though this will likely result in a new high for the full year, the interim target (225,000 by 2025, 30% of total new registrations) will be a stretch without an acceleration in progress.

[14] This equates to a 30% reduction relative to a Business-as-Usual (BAU) projection from a 2005 baseline with an average annual increase in emissions of approximately 2.4%, assuming no major climate policy.
[15] "The PRIMAP-hist national historical emissions time series (1750-2024) v2.7", zenodo, Sep 2025.
[16] The 30@30 policy targets 30% of new vehicles produced in Thailand to be zero emission vehicles by 2030.
[17] "Thailand EV Board Adjusts EV3, EV3.5 Terms to Promote Exports as Investment in EV Supply Chain Tops 137 Billion Baht", PR Newswire, 30 Jul 2025.

Looking at the recent observations and the ambitiousness of SPT2, we consider a 25-50% probability of achieving the target by 2030 in our pricing models and will continue to monitor progress.

Pricing implications and outlook

Because of the small size of the coupon step-up/down (+/- 2.5bps per SPT) and the low number of years it applies for,[18] there is limited materiality to this option.[19] From an option pricing and financial materiality perspective, a more meaningful coupon adjustment could enhance the bond structure.

Based on strong demand for the bond in initial and subsequent auctions, Thailand's inaugural SLB was a success, meaning future issuance is a possibility.[20] In terms of bond features, it is worth noting that this year's SLB issuance by Slovenia, with a single KPI focused on decarbonisation, was well received and could become a blueprint for future sovereign SLB issuance.[21]

In the next section, we explore how performance-linked bonds tied to NDCs could evolve further and outline a proposal for a Thai transition linker.

Transition linker proposal

A transition linker is a bond where the coupon level adjusts in several steps if the government under- or outperforms vis-a-vis its decarbonisation targets, thereby reflecting the associated increases/decreases in transition risk. Such a structure could provide lower cost-of-capital for the government if the NDC target is achieved, providing a strong incentive for decarbonisation. For investors, higher payouts from coupon step-ups provide a hedge against the country falling short of its emissions goals.

In order to price a step-up / step-down bond structure on the back of Thailand's new NDC, it is essential to establish an estimated probability that the targets will or will not be achieved. This probability in turn informs whether coupon steps will happen or not. With this in place, pricing becomes a straightforward exercise, with the market fair-value equal to the discounted stream of coupon payments on an expectations-weighted basis.

Modelling probability of achieving the NDC 2035 target

Achieving the 2035 NDC target (net emissions: 152 $MtCO_2e$) requires a fundamental shift, as emissions have been on a gradual upward trajectory for some time.

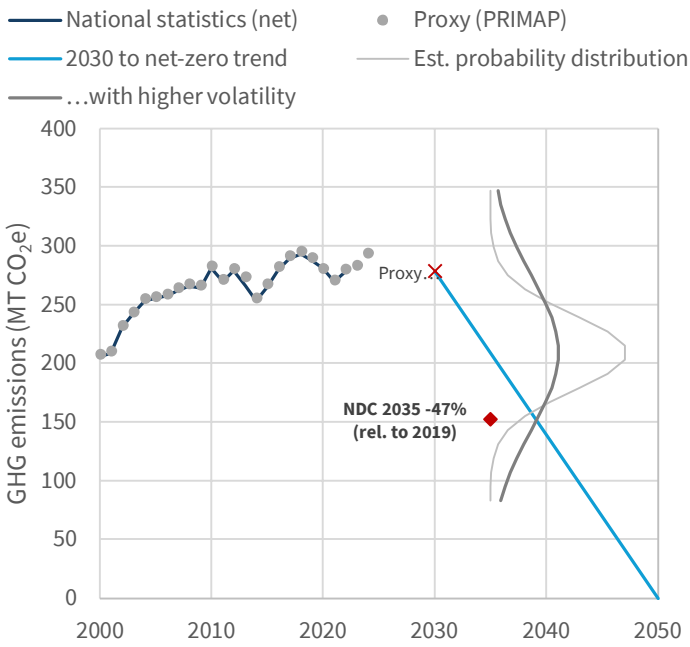
To calculate the probability of it being achieved, we use an implicit 2030 target as a proxy (278.6 $MtCO_2e$).[22] First, we derive a linear trend to net zero by 2050 and an illustrative forecast distribution based on the historical volatility of absolute changes in emissions since 2000.

[18] The coupon will be adjusted on 17 Dec 2035 for SPT1 and 17 Dec 2031 for SPT2.
[19] For more details on Sustainability-Linked Bond option pricing please see "Sustainability Linked Bond Handbook", AFII, 12 May 2024.
[20] "Thailand's future SLBs could address gender and biodiversity", Environmental Finance, 18 Jul 2025.
[21] "Slovenia launches sovereign decarbonisation SLB", AFII, 23 Jun 2025; "More governments working on debut SLBs after Slovenia hit", Global Capital, 26 Jun 2025.
[22] Based on 2030 NDC target excluding LULUCF, adjusted for LULUCF based on a linear interpolation from 2019 (reference year) to 2035 (target).

The distribution in Figure 7 is centred around the 2035 value of the net-zero trend (209 $MtCO_2e$). Based on this approach, the probability of reaching the 2035 target is currently very low at 4%.

Notably, emissions increased by 81.1 $MtCO_2e$ from 2000 to 2019, while the NDC target aims for a reduction by 135.2 $MtCO_2e$ from 2019 to 2035. This necessitates a more meaningful rate of change — with a fundamental directional shift towards decarbonisation — over a somewhat shorter time frame. This means that historical volatility is not necessarily representative of the future pathway. Figure 7 also shows a probability distribution with higher volatility (i.e. twice the historical volatility). This broader distribution implies a 19.1% probability of achieving the 2035 target, which we use as a working assumption for the next step.

Figure 7. Thailand's historical emissions, NDC target for 2035 (net emissions), linear net-zero trend (2030-2050), and estimated probability distributions of achieving the 2035 target. Source: AFII, PDMO, PRIMAP-hist national historical emissions time series v2.7, UNFCCC.



These estimated probabilities are primarily based on statistical analysis and should be complemented by fundamental analysis over time, particularly as there is more visibility regarding policy implementation and technical innovations. Accordingly, the forecast distribution is expected to change over time or be adjusted based on market observers' individual assessments of the expected decarbonisation pathway.

Pricing the transition linker

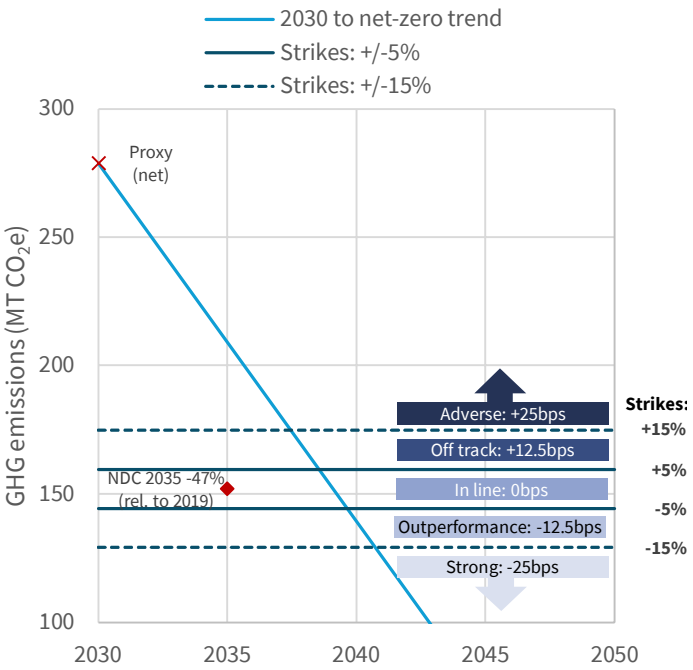
A core feature of transition linkers are multiple coupon step-ups/step-downs linked to strikes around the NDC target. Fundamentally, this dual structure provides investors a hedge against an unsuccessful transition (through the coupon step-ups) while incentivising governments to decarbonise beyond the NDC target (through the coupon step-downs). In the following example, the coupon would adjust by up to +/-25bps.

The strike levels are set in bands of +/-5% and +/-15% relative to the NDC target, as shown in Figure 8. If emissions end up in a +/-5% area around the 2035 target, the coupon remains unchanged.

If within the +5-15% range, meaning the emissions reduction is off track, the coupon would step-up by 12.5bps. In an adverse scenario of a greater than 15% deviation, the coupon would adjust by +25bps.

Meanwhile, an emissions reduction outperformance of 5-15% would result in a coupon step-down of 12.5bps. With a reduction of more than 15%, the coupon would adjust by -25bps.

Figure 8. Thailand's NDC targets for 2035 (net emissions), linear net-zero trend (2030-2050), and strike levels around 2035 target. Source: AFII, PDMO, PRIMAP-hist national historical emissions time series v2.7, UNFCCC.



To price such a bond, we rely on a Black-Scholes framework with drift (δ) and volatility (σ) parameters.[23] In this case, the drift (δ = -3%) is based on the required annual percentage change from the 2024 emissions proxy (293.7 $MtCO_2e$) to the 2035 NDC value of the 2030 to net zero trend (209.0 $MtCO_2e$).

The volatility (σ = 9.5%) is calibrated so that the model reproduces the previously estimated 19.1% probability of meeting the NDC target in 2035. These are estimations used to illustrate the pricing framework, and can be revisited with updated reporting.

Table 1 shows the implied probabilities of reaching the strike levels outlined earlier. Based on the assumed emissions path and uncertainty margins, coupon step-ups are more likely than step-downs. Notwithstanding this asymmetry, such a structure can set strong incentives for issuers to reach their decarbonisation targets.

Table 1. Proposed transition linker structure in terms of strike levels and pricing based on forecasting models.

	Strong	Outperformance	Off track	Adverse
Strike level coupon step	-12.5bps	-12.5bps	+12.5bps	+12.5bps
Full coupon step	*-25bps*	*-12.5bps*	*+12.5bps*	*+25bps*
Strike relative to NDC target	-15%	-5%	+5%	+15%
Absolute strike (MT CO_2e)	129.2	144.4	159.6	174.8
Implied probability	8%	15%	76%	67%
Upfront value	-0.036%	-0.066%	0.338%	0.294%
Running value	-0.2bps	-0.4bps	2.1bps	1.8bps

[23] For details see "An option pricing approach for Sustainability-Linked Bonds", AFII, 8 Nov 2022.

Moreover, it shows the associated valuations of expected cash flows in terms of their 'option' value. In total, these option strikes are valued at 0.53% upfront / 3.2bps running, with the step-downs being valued at -0.10% / -0.6bps and step-ups at 0.63% / 3.9bps, respectively.

The transition linker is priced as a 20-year local-currency bond, with the same coupon payment schedule and maturity as THAIGB 2.98% 2045 (ISIN: TH062303P607).[24] This is in line with the concept of 'twin bonds' — an approach crucial to the transition linkers product.[25] The adjusted coupon payments would commence from Dec 2040, and apply for the final five years of the bond's lifetime.

Considering a positive option value, a transition linker should price at a lower yield than its conventional twin bond, based on our assumptions. A higher coupon adjustment (e.g. +/-25bps and 50bps) and a longer application period would further increase the value.

This bond structure might enable the Thai government to issue at a lower yield than otherwise — that is retained if it achieves the 2035 NDC target (+/-5%). On the flipside, investors could rationally buy this lower coupon bond as their probability-weighted expectation would be to benefit from a higher coupon stream later in the bond's term. Any non-pecuniary benefits, like setting incentives for lower emissions, would be additional to this. Notably, this is not a purely hypothetical idea as a dual step-up / step-down structure tied to emissions has been issued by Slovenia.[26]

Conclusions

This note compares Thailand's NDC targets for 2030 and 2035, finding that the new target is more ambitious than its predecessor. Embedding such targets in bond structures can strengthen government incentives to meet them, while offering investors a hedge against underperformance on emissions reductions.

In 2024, the Thai government issued its inaugural SLB. Recent data provides a timely opportunity to assess progress on its KPIs. Despite the recent increase in emissions, it still seems more likely than not to achieve its SPT by 2030, in our view. Meanwhile, data on ZEV registrations indicates subdued uptake in 2024, meaning full-year data for 2025 will be important to watch. Based on the low materiality of the bond characteristics and our option pricing approach, there is limited potential to observe option value in the market.

Building of the concept of transition linkers, we suggest a bond structure with multiple strikes and coupon adjustments based on Thailand's 2035 NDC target. Such a bond structure has the potential to lower the government's cost of capital as it embarks on an ambitious decarbonisation pathway requiring significant investments. For investors, the structure can be invested in as it aligns with their fiduciary duty, and represents an opportunity to engage with the Thai government on its transition to net zero.

[24] "Bond information: LB456A", ThaiBMA, accessed 2 Feb 2026.
[25] The structural features of bonds are manifold, and it can become quite difficult to compare relatively small premiums even where there are minor structural differences. Issuing a transition linker somewhere on the maturity curve where there are few other bonds, requiring interpolations of an equivalent vanilla bond yield/spread, can introduce substantial measurement errors in terms of calculating the option value. Therefore, the recommendation is to issue the transition linker paired with a traditional bond.
[26] "Slovenia launches sovereign decarbonisation SLB", AFII, Jun 2025.

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