

Terms of reference (ToR) for the procurement of services below the EU threshold

CONFIDENTIAL

Developing Thailand's Long-Term Energy Model Through the Application of the Marginal Abatement Cost Curve (MACC) to Achieve the Net-Zero 2050 Pathway	Project number/ cost centre: G-0112244-001 G-011979-002
	Tender number 10040456

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0. List of abbreviations

AG	Commissioning party
AN	Contractor
AVB	General Terms and Conditions of Contract for supplying services and work
FK	Expert
FKT	Expert days
KZFK	Short-term expert
ToRs	Terms of reference

1. Context

Thailand officially declared its commitment to achieving net-zero greenhouse gas (GHG) emissions by 2050 at COP30 on 19 November 2025, alongside a target to reduce emissions by 47% by 2035 under its Nationally Determined Contribution 3.0 (NDC 3.0)¹. These commitments align Thailand with the global effort to limit warming to 1.5 degrees Celsius and represent a significant acceleration of the country's climate ambition. To translate these commitments into actionable policy, the Department of Climate Change and Environment (DCCE) is updating Thailand's Long-Term Low Emissions Development Strategy (LT-LEDS) to reflect the net-zero 2050 goal. Simultaneously, the Energy Policy and Planning Office (EPPO) under the Ministry of Energy is revising the Power Development Plan (PDP 2026) and other energy plans the Alternative Energy Development Plan (AEDP), the Energy Efficiency Plan (EEP), and the Gas and Oil Plans. The forthcoming PDP 2026 defines the strategic framework for the evolution of the power sector through to 2050 and anticipates structurally higher electricity demand driven by data centres, digitalization, and electrification, and accelerate the phase-down of coal with a rapid expansion of renewable energy²

The Strategic Planning Division (SPD), under EPPO, has expressed interest in developing and constructing the long-term energy models, and use Marginal Abatement Cost Curve (MACC) to establish an evidence-based, cost-optimized analysis for Thailand's energy sector transition toward the net-zero 2050 targets based on the upcoming revised LT-LEDS. The model outputs, together with the MACC, will assist policymakers to prioritize and validate the mitigation measures by identifying and confirming the most cost-effective "low-hanging fruit" (such as energy efficiency improvements and commercial solar PV) before deploying higher-cost, frontier solutions like Carbon Capture Storage (CCS) or Small Modular Reactors (SMRs). This modelling initiative will enable SPD to assess energy transition alternatives beyond the revised LT-LEDS and standard PDP scenarios through a synchronized and holistic simulation that balances ambitious renewable energy penetration with grid reliability and tariff affordability.

To deliver this workstream, two GIZ projects (Clean, Affordable and Sustainable Energy for Southeast Asia—CASE and TGC EMC RE) on behalf of the German Federal Ministry for the Environment, Climate Action, Nature Conservation and Nuclear Safety (BMUKN), are seeking to engage a qualified modelling team (modelling experts/consultants) to construct, run, and document the energy model and MACC analysis, and to support SPD's technical capacity in its use.

2. Tasks to be performed by the contractor

With close consultation with GIZ and SPD team, the Contractor is responsible for providing the following services:

2.1 Construct long-term energy model

¹ [TH NDC 3.0.pdf](#)

² [สนพ. ชี้สัดส่วนผลิตไฟฟ้าของ กฟผ. ในแผนพีดีพีใหม่ ต้องไม่น้อยกว่า 30% | Energy News Center](#)

Before developing energy model, the Contractor shall conduct a literature review of international best practices in applying MACC analysis within energy modelling to support decarbonisation pathways that are relevant to Thailand's context. Based on this review, the Contractor shall develop a comprehensive long-term energy model based on the assumptions and data from the revised LT-LEDS, the forthcoming PDP, and other relevant national energy plans and policies. Subject to data availability and as agreed with GIZ and the SPD team, the model shall cover the entire energy system, including the power, transport, industrial, and commercial sectors.

The model shall investigate at least two policy scenarios (excluding the base case), consistent with those explored in the revised LT-LEDS and the forthcoming PDP and related energy plans and policies. In addition, the Contractor shall be prepared to develop one additional scenario reflecting SPD's priorities, to be defined in consultation with GIZ and SPD.

At a minimum, the energy model shall be capable of:

- projecting demand across end-use sectors
- supporting transmission and distribution planning for the power sector
- assessing capacity expansion planning for existing and new generation technologies (e.g. renewables, gas, coal phase-out, nuclear/SMRs, CCS, and energy storage)
- co-optimising generation dispatch, capacity expansion, and interconnector planning at sub-annual resolution
- analysing fuel supply, cross-sector fuel-switch analysis, and import/export modelling

The Contractor shall propose the energy modelling tool(s) considered most appropriate for delivering the required scope of work (e.g., LEAP-NEMO, PLEXOS, OSeMOSYS, or an equivalent least-cost energy system optimisation platform that supports integrated scenario analysis across the power, transport, industrial, and commercial sectors), including a clear justification for the proposed approach. Where the selected modelling tool requires a commercial license, the Contractor shall specify the proposed licensing arrangement (e.g. subscription-based or perpetual license), associated costs, and the license duration required for implementation of the assignment. Where open-source or freely available tools are proposed, no licensing costs are required, but the Contractor shall clearly indicate the applicable licensing conditions, if any.

2.2 Develop Marginal Abatement Cost Curves (MACC) for mitigation options across energy sectors

The contractor shall assess the economic feasibility of decarbonisation pathways by developing Marginal Abatement Cost Curves (MACC) for mitigation options across the energy sectors. The analysis shall identify cost-effective interventions, quick wins, and higher-cost measures requiring policy support. The MACC analysis shall complement the energy modeling described in *Section 2.1* and shall:

- quantify the abatement cost and greenhouse gas emission reduction potential of individual mitigation options (e.g., renewable energy expansion, electric vehicle (EV) adoption, industrial fuel switching, energy efficiency, hydrogen, CCS, and SMRs).
- develop MACCs that rank mitigation options from the lowest to the highest abatement cost, and compare the results with the original MACC curves developed under the Thailand's LT-LEDS (revised)

- identify "quick wins" (high-emission reductions at low or negative cost), measures requiring policy support (those with positive abatement costs), and options that deliver cost-saving co-benefits.
- establish clear linkages between the net-zero emissions by 2050 target and the corresponding sector-specific mitigation actions.

2.3 Stakeholder engagement and consultations

The Contractor shall maintain regular communication with GIZ and the SPD team throughout the assignment to provide updates on work progress, discuss technical issues, and seek guidance on key deliverables. Meetings are expected to be held primarily online unless otherwise agreed.

The Contractor shall engage in the following stakeholder engagement activities:

- **Kick-off meeting with SPD and key stakeholders:** The Contractor shall participate virtually and present international best practices in applying MACC analysis, proposed modelling framework and methodology, work plan and timeline, data requirements and collection templates, and the proposed scenario design.
- **Regular meetings/consultations:** The Contractor shall participate in the online meetings with GIZ and/or SPD to provide updates on work progress and discuss technical issues, at least once per month.
- **Stakeholder consultation workshop:** The Contractor shall participate virtually, or in person if agreed and budget permits, to present: (i) the literature review on international best practices in using MACC analysis and energy modelling to support decarbonisation pathways; and (ii) the preliminary results of the energy modelling and MACC analysis. The workshop will serve to gather feedback from SPD and relevant stakeholders to validate key assumptions, input data, modelling results, and policy implications.

Throughout the contract period, the Contractor shall also provide reasonable ad-hoc technical support to GIZ and SPD on matters related to long-term energy modelling and MACC development, including responding to technical queries, providing additional analyses or clarifications, and supporting discussions related to the project's objectives.

Certain milestones, as laid out in the table below, are to be achieved during the contract term:

Milestones/process steps/partial services	Deadline/place/person responsible
1. Literature review and inception package • Conduct a literature review of international best practices • Prepare presentation of international best practices in applying MACC analysis, modelling objective and framework, research approach, scenario setting, and data collection/update plan • Participate in the kick-off meeting	15 November 2026 or one week before the kick-off meeting date (virtual)
2. Model construction and conduct the Marginal Abatement Cost Curves (MACC) analysis, and the preliminary results • Develop and construct model • Prepare preliminary modelling covering power, transport, industrial, and commercial sectors and MACC results,	15 January 2027

including ranking of mitigation options in comparison with Thailand's revised LT-LEDS.	
3. Presentation for stakeholder consultation on the modelling results, and gather feedback from SPD and relevant stakeholders	End of January 2027 (virtual or in-country, as agreed)
4. A brief report and Integrated Long-Term Energy Model submission	26 February 2027

Period of assignment: from 02.11.2026 until 26.02.2027.

Deliverable details:

- **Deliverable 1:** Literature review and inception package are following:
 - literature review on international best practices using MACC analysis and energy modelling to support decarbonisation pathways
 - the proposed modelling framework, methodology, research approach, scenario setting, and data collection/update plan, for presentation at the kick-off meeting.**Deadline: By 15 November 2026, or one week before the kick-off meeting date** (virtual)
- **Deliverable 2:** Constructed energy model, completed MACC analysis, and preliminary results, including the ranking of mitigation options in comparison with Thailand's revised LT-LEDS.
Deadline: By 15 January 2027
- **Deliverable 3:** Stakeholder consultation package including presentation materials on the preliminary modelling and MACC results, stakeholder feedback incorporation
Deadline: By End of January 2027
- **Deliverable 4:** Final brief report and submission of the integrated long-term energy model package.
 - The brief report (no longer than 20 pages long) shall be either in MS-Word or PowerPoint format (reading presentation) as agreed by SPD. It should include modelling methodology, data sources and assumptions, key modelling results (including scenario comparisons and MACC analysis), and policy recommendations
 - The integrated long-term energy model shall be submitted in the channel and format as agreed with SPD.**Deadline: By 26 February 2027**

3. Concept

In the tender, the tenderer is required to show *how* the objectives defined in Chapter 2 (Tasks to be performed) are to be achieved, if applicable under consideration of further method-related requirements (technical-methodological concept). In addition, the tenderer must describe the project management system for service provision.

Note: The numbers in parentheses correspond to the lines of the technical assessment grid.

Technical-methodological concept

Strategy (1.1): The tenderer is required to consider the tasks to be performed with reference to the objectives of the services put out to tender (see Chapter 1 Context) (1.1.1). Following this, the tenderer presents and justifies the explicit strategy with which it intends to provide the services for which it is responsible (see Chapter 2 Tasks to be performed) (1.1.2).

The tenderer is required to present the actors relevant for the services for which it is responsible and describe the **cooperation (1.2)** with them.

The tenderer is required to describe the key **processes** for the services for which it is responsible and create an **operational plan** or schedule (1.4.1) that describes how the services according to Chapter 2 (Tasks to be performed by the contractor) are to be provided. In particular, the tenderer is required to describe the necessary work steps and, if applicable, take account of the milestones and **contributions** of other actors (partner contributions) in accordance with Chapter 2 (Tasks to be performed) (1.4.2).

Further requirements (1.7)

- Familiarity with Thai national energy statistics, utility data, and the energy planning landscape
- Inclusion of a credible plan for data collection, verification, and harmonization

4. Personnel concept

The tenderer is required to provide personnel who are suited to filling the positions described, on the basis of their CVs (see Chapter 7), the range of tasks involved and the required qualifications.

The below specified qualifications represent the requirements to reach the maximum number of points in the technical assessment.

Team leader

Tasks of the team leader

- Overall responsibility for the advisory packages of the contractor (quality and deadlines)
- Coordinating and ensuring communication with GIZ, partners and others involved in the project
- Personnel management, in particular identifying the need for short-term assignments within the available budget, as well as planning and steering assignments and supporting local and international short-term experts
- Regular reporting in accordance with deadlines
- Oversight of stakeholder engagement and integration of feedback

Qualifications of the team leader

- Education/training (2.1.1): university degree in energy economics, engineering, public policy, or related field
- Language (2.1.2): C2-level language proficiency in English
- General professional experience (2.1.3): 7 years of professional experience in the energy sector

- Specific professional experience (2.1.4): 7 years in in long-term energy system modelling
- Leadership/management experience (2.1.5): 5 years of management/leadership experience as project team leader or manager in a company
- Regional experience (2.1.6): 5 years of experience in projects in Southeast Asia and 2 years in Thailand
- Development cooperation (DC) experience (2.1.7): 5 years of experience in DC projects
- Other (2.1.8): 3 reference projects supporting countries in their long-term energy planningEvidence of leading energy modelling team in Southeast Asia and Thailand

Key expert 1

Tasks of key expert 1

- Lead the long-term energy model construction and MACC analysis
- Compile and integrate data into the model
- Develop presentation materials and reports

Qualifications of key expert 1

- Education/training (2.2.1): university degree in energy economics, engineering, public policy, or related field
- Language (2.2.2): C2 -level language proficiency in English
- General professional experience (2.2.3): 5 years of professional experience in the energy sector
- Specific professional experience (2.2.4): 5 years in national/long-term energy system modelling
- Leadership/management experience (2.2.5): N/A
- Regional experience (2.2.6): 5 years of experience in projects in Asia, Africa, South or Central America and 2 years in projects in Southeast Asia
- Development Cooperation (DC) experience (2.2.7): 2 years of experience in DC projects
- Other (2.2.8): 3 reference projects supporting countries in their long-term energy planning using modelling tools

5. Costing requirements

Assignment of personnel and travel expenses

Per diem allowances are reimbursed as a lump sum up to the maximum amounts permissible under tax law for each country as set out in the country table in the circular from the German Federal Ministry of Finance on travel expense remuneration (downloadable from the [German Federal Ministry of Finance – tax treatment of travel expenses and allowances for international business travel as of 1 January 2026 \(GERMAN ONLY\)](#)).

Accommodation allowances are reimbursed as detailed in the specification of inputs below.

With special justification, additional Accommodation costs up to a reasonable amount can be reimbursed against evidence.

All business travel must be agreed in advance by the officer responsible for the project

Sustainability aspects for travel

GIZ has undertaken an obligation to reduce greenhouse gas emissions (CO₂ emissions) caused by travel. When preparing your tender, please incorporate options for reducing emissions, such as selecting the lowest-emission booking class (economy) and using means of transport, airlines and flight routes with a higher CO₂ efficiency. For short distances, travel by train (second class) or e-mobility should be the preferred option.

CO₂ emissions caused by air travel must be offset. GIZ specifies a budget for this, through which the carbon offsets can be settled against evidence.

There are many different providers in the market for emissions certificates, and they have different climate impact ambitions. The [Development and Climate Alliance \(German only\)](#) has published a [list of standards \(German only\)](#). GIZ recommends using the standards specified there.

Specification of inputs

Fee days	Number of experts	Number of days per expert	Total	Comments
Designation of Team leader (TL)	1	22	22	Construct long-term energy model 6 days Develop Marginal Abatement Cost Curves (MACC) 5 days Stakeholder engagement and consultation 8 days Prepare a summary report 3 days
Designation of key expert 1	1	21	21	Construct long-term energy model 8 days Develop Marginal Abatement Cost Curves (MACC) 5 days Stakeholder engagement and consultation 5 days Prepare a summary report 3 days
Travel expenses	Quantity	Number per expert	Total	Comments
Per-diem allowance in country of assignment (Thailand)	4	1(TL)	144 EUR	36 EUR per diem

Overnight allowance in country of assignment	4	1(TL)		For presenting in Stakeholder consultation workshop and attending meetings with EPPO and other stakeholders in Bangkok [114 EUR/night] against evidence Overnight stays abroad: Note: Under the BMF travel expense regulations, overnight allowances not exceeding 100% of the lump sum amounts can be submitted for reimbursement against evidence. Up to 75% of the maximum rates specified in the travel expense regulations can be submitted for reimbursement on a lump-sum basis. Please indicate in the price schedule whether your offer is on a lump-sum basis or against evidence.
Transport	Quantity	Number per expert	Total	Comments
International flights	1	1 (TL)	1.500 EUR	Travel to and from the place of service delivery in Bangkok against evidence.
CO₂ compensation for air travel Link to <i>working aid and table for determining the budget and Guidance for GIZ service providers on avoiding, reducing and offsetting GHG emissions on setting the budget.</i>	1	1 (TL)	100 EUR	A fixed budget of EUR 100 is earmarked for settling carbon offsets against evidence.
Travel expenses (train, car) - Public transport - Taxi or ride hail	8 x 25,00 EUR	1(TL)	200 EUR	Travel within the country of assignment, transfer to/from airport etc. against evidence.

6. Inputs of GIZ or other actors

GIZ and/or other actors are expected to make the following available:

- Logistics and participant management for meetings and consultation workshops.

7. Requirements on the format of the tender

The structure of the tender must correspond to the structure of the ToR. In particular, the detailed structure of the concept (Chapter 3) should be organised in accordance with the positively weighted criteria in the assessment grid (not with zero). The tender must be legible (font size 11 or larger) and clearly formulated. It must be drawn up in English.

The complete tender must not exceed 10 pages (excluding CVs). If one of the maximum page lengths is exceeded, the content appearing after the cut-off point will not be included in the assessment. External content (e.g. links to websites) will also not be considered.

The CVs of the personnel proposed in accordance with Chapter 4 of the ToRs must be submitted using the format specified in the terms and conditions for application. The CVs shall not exceed 4 pages each. They must clearly show the position and job the proposed person held in the reference project and for how long.

Please calculate your financial tender based exactly on the parameters specified in Chapter 5 Quantitative requirements. The contractor is not contractually entitled to use up the days, trips, workshops or budgets in full. The number of days, trips and workshops and the budgets will be contractually agreed as maximum limits. The specifications for pricing are defined in the price schedule.

8. Option

During the contract term, important elements of these tasks may be implemented. Specifically:

The Contractor may deliver a structured training package that equips SPD staff with the knowledge and practical skills to understand the energy model and MACC analysis, independently update input data, run the model, and interpret the results of the energy model and MACC analysis during/after project handover.

The two- or three-day training course may progress from conceptual orientation to hands-on practice, ensuring that SPD staff not only know how to operate the model but also understand its underlying logic well enough to troubleshoot, update, and maintain it over time.

The training would take place back-to-back to the stakeholder consultation, for which the TL would be in the country already.

The GIZ team would be responsible for training logistics and event arrangements, including venue booking, coordination, and participant invitations.

Type and scope

The contractor would be responsible for providing the following optional services:

- Develop the concept note and agenda of the training
- Develop the training materials which include presentations on the energy model and MACC analysis and necessary materials for hands-on practice
- Deliver training on energy model and MACC analysis for SPD staff

Requirements

Exercising the option will depend on mutual decision of SPD and GIZ team. The decision on continuation is expected to be made in the period of delivering the Kick-off meeting (anticipated around November 2026). The option will be exercised within the contract term.

The option will be exercised by means of a contract extension on the basis of the individual approaches already offered.

Quantitative requirements for the optional services

Fee days	Number of experts	Number of days per expert	Total	Comments
Designation of Team leader (TL)	1	5	5	- Develop the concept note and agenda of the training - Develop the training materials - Deliver training on energy model and MACC analysis for SPD staff
Designation of key expert 1	1	5	5	- Develop the concept note and agenda of the training - Develop the training materials - Deliver training on energy model and MACC analysis for SPD staff
Travel expenses	Quantity	Number of days per expert	Total	Comments
Per-diem allowance in country of assignment (Thailand)	8	2 days for TL and 6 days for Key Expert 1	288 EUR	36 EUR per diem
Overnight allowance in country of assignment	8	2 days for TL and 6 days for Key Expert 1		For delivering training on energy model and MACC analysis for SPD staff in Bangkok anticipatedly taken place take place back-to-back to the stakeholder consultation, for which the TL would already be in the country [114 EUR/night] against evidence. Overnight stays abroad: Note: Under the BMF travel expense regulations, overnight allowances not exceeding 100% of the lump sum amounts can be submitted for reimbursement

				against evidence. Up to 75% of the maximum rates specified in the travel expense regulations can be submitted for reimbursement on a lump-sum basis. Please indicate in the price schedule whether your offer is on a lump-sum basis or against evidence.
Transport	Quantity	Number of days per expert	Total	Comments
International flights	1	1(Key Expert 1)	1.500 EUR	Travel to and from the place of service delivery in Bangkok against evidence.
Carbon offsets for flights	1	1(Key Expert 1)	100 EUR	A fixed budget of EUR 100 is earmarked for settling carbon offsets against evidence.
Travel expenses (train, car) - Public transport - Taxi or ride hail	8 x 25,00 EUR	1(Key Expert 1)	200 EUR	Travel within the country of assignment, transfer to/from airport etc. against evidence.

Requirements on the format of the tender for the option

Please complete both spreadsheets in the price schedule, i.e. one for the main service and one for the optional service.