

Guidelines:

- This Request Submission Form should be completed by the organisation requesting technical assistance from the Climate Technology Centre & Network (CTCN) in collaboration with the National Designated Entity (NDE) of the country in question
- The Form must be signed by the NDE. Please see updated contact list of NDEs here: <http://unfccc.int/ttclear/support/national-designated-entity.html>
- The Form can be submitted as a Word file containing a digital signature or as a signed and scanned PDF file in combination with an un-signed Word file
- For requests submitted by multiple countries, all the NDEs of the respective countries shall sign identical Forms before official submission to the CTCN
- NDEs have the opportunity to submit CTCN requests in collaboration with National Designated Authorities (NDAs) for the Green Climate Fund (GCF) if targeting the GCF Readiness Programme.

| | |
|---|--|
| Requesting country or countries: | Thailand |
| Request title: | Development of national hydrogen strategy and action plan for accelerating Thailand net-zero target |
| NDE | The Office of National Higher Education Science Research and Innovation Policy Council (NXPO) Surachai Sathitkunararat, Ph.D., Assistant to the President Email: surachai@nxpo.or.th , norachai@nxpo.or.th Address: 319 Chamchuri Square Building 14th Fl., Phayathai Rd., Patumwan, Bangkok 10330 Thailand |
| Request Applicant: | The Office of National Higher Education Science Research and Innovation Policy Council (NXPO) Surachai Sathitkunararat, Ph.D., Assistant to the President Email: surachai@nxpo.or.th , norachai@nxpo.or.th Address: 319 Chamchuri Square Building 14th Fl., Phayathai Rd., Patumwan, Bangkok 10330 Thailand |

Climate objective:

- Adaptation to climate change
- Mitigation of climate change
- Combination of adaptation and mitigation of climate change

Geographical scope:

- Community level

- Sub-national
 National
 Multi-country

If the request is at a sub-national or multi-country level, please describe specific geographical areas (provinces, states, countries, regions, etc.).

Problem statement related to climate change (up to one page):

This section should answer the question “what is the problem?” Please summarise the problem related to climate change and/or the negative impacts of climate change in the country that the request aims to address.

Recently, Thailand just announced ambition to achieve Net-Zero emission target by 2065 and accelerate its resources contributing to the goal. Green hydrogen has huge potential not only to enable Thailand to achieve net-zero goal but also creating economic activities. As of now, commercial hydrogen producers in Thailand consist of only 4 companies and the hydrogen use cases are still limited in certain industries. The hydrogen production in Thailand is still mostly grey hydrogen with gas pipeline, tube trailer and cylinders/ cylinders pack as mode of transportation.

For Thailand to achieve its net-zero goal by 2065, Thailand needs to fully utilize the potential of green hydrogen in wide range of sectors. To be able to do that, Thailand need to quickly develop the fundamentals for such systematic change. Green hydrogen development in Thailand still in its infant stage and need huge amount of support and resources. One uniqueness of Thailand is wide use of bio resources as fuels (bioethanol, biogas, etc.). With available infrastructure, bio resources could have potential for large scale green hydrogen production in Thailand. This approach aligns with current Thailand national policy on Bio-Circular-Green Economy (BCG) and could benefit large rural households in agriculture sectors as well.

Considering recent development, past activities are still fragmented and need to accelerate to be able to serve the net-zero goal. Thailand still has not formulate its national strategies on hydrogen development yet and closely collaboration between policy makers among ministries, academics, regulators and private sectors is needed to do so. There are also expertise needs to properly assess the potential use of green hydrogen, its impact on social, economic and greenhouse gas emission, suitable production technologies and transportation mode for Thailand. The analysis would be crucial for Thailand to develop national strategies and prepare infrastructure and regulatory required to support the development of hydrogen economy. This masterplan along with continuous support on large scale implementation demonstration projects, possibly on regional level, could initiate rapid development of green hydrogen technologies in Thailand and attract further collaboration and funding needed in the later stage of development.

As such, guidance and assistance are needed from CTCN to develop national strategies on green hydrogen for the government to develop necessary policy and create common understanding and clear goal for relevant stakeholders. And we seek further assistance in the pilot demonstration projects along with funding support, possibly GCF in the future.

Past and on-going efforts to address the problem (up to half a page):

This section should answer the question “what has been done or is currently being done to address the problem?” Please describe past and on-going processes, projects or initiatives implemented in the country or region to tackle the climate problem as described above.

Recent efforts to explore the potential of hydrogen technology by Energy Policy and Planning Office (EPPO) was the studying on policy options and strategy to develop hydrogen for Thailand renewable energy system and the effort to put hydrogen technology in the draft National Energy Plan 2022.

On the implementation side, Thailand has been active in hydrogen technology research and development for many years, including hydrogen production from bio resources. Groups of researchers are exploring the hydrogen technologies in universities and research institutes for example, The Joint Graduate School of Energy and Environment (JGSEE) (consortium of five Thai universities) and recent established ENTEC which focusing on renewable energy and energy storage include hydrogen storage/fuel cell. Most important is an effort among leading private sectors (most are multinational corporation), research institutes, and public sectors to form a consortium, so called Hydrogen Thailand. The consortium is very active to promote hydrogen as a new alternative energy of the future for a low-carbon economy and aims to demonstrate projects on hydrogen use case for commercial uses in the future.

Specific technology¹ barriers (up to one page):

This section should answer the questions “what are the technology barriers that hinder national efforts described above” and “how will the CTCN technical assistance complement these efforts?” Building upon the problem statement and taking into consideration the existing efforts described above, please describe the specific technology barriers encountered by the requesting applicant to identify, assess or deploy climate technology(ies) in an effort to address the problem statement. The described barriers should be within the scope of the requested CTCN technical assistance (described in the section below).

In the initial development stage of hydrogen technologies in Thailand, the main barriers can be summarized in two broad categories described below.

From the fact that Thailand does not have national strategy related to hydrogen development yet, there are uncertainties among the government agencies and reluctance to act from private sectors. The main obstacle to develop such comprehensive and clear national strategy are lack of technical expertise to assess integrated information on in-depth technological aspects, socio-economic cost-benefits and impact on greenhouse gas emission. Thailand needs to explore the potential use of hydrogen and possible pathway to utilize that potential along with suitable technological options to produce and transport green hydrogen and transitional path from current grey hydrogen production. Such analysis required technical assistance and wide national collaboration. On capacity side, enhancing policy maker capacity to collaborate and develop cohesive policy support is important to develop and implement national strategy as well.

Another barrier related to the implementation side and resources needed. The implementations from stakeholders (include academics, private sectors and regulators etc.) involved in the development of hydrogen technologies for net-zero target are still fragmented. This could be a consequence of lacking common understanding and direction, as mentioned in the first barrier above. Another important barrier to implementation is regulatory which does not cover issues related to hydrogen development yet. The research in hydrogen related technology is still in early or pilot stage and need assistance on

¹ *“any equipment, techniques, practical knowledge and skills needed for reducing greenhouse gas emissions and adapting to climate change” (Special Report on Technology Transfer, IPCC, 2000)*

scaling up stage. The recent collaboration of Hydrogen Thailand, which aim to develop demonstration projects still required external expertise and resources assistance, for such projects need advance level of knowledge and experiences which still lacking in Thailand. Such demonstration projects need to be large enough to address real conditions and bringing together all relevant stakeholders, possibly on regional level. Further assistances on advanced knowledges, experiences and sizable financial resources are required for this kind of implementation which would benefit greatly to the goal of global net-zero.

Sectors:

Please indicate the main sectors related to the request:

- | | | | |
|---|---|---|--|
| <input type="checkbox"/> Coastal zones | <input type="checkbox"/> Early Warning and Environmental Assessment | <input type="checkbox"/> Human Health | <input type="checkbox"/> Infrastructure and Urban planning |
| <input type="checkbox"/> Marine and Fisheries | <input type="checkbox"/> Water | <input checked="" type="checkbox"/> Agriculture | <input type="checkbox"/> Carbon fixation |
| <input type="checkbox"/> Energy Efficiency | <input type="checkbox"/> Forestry | <input checked="" type="checkbox"/> Industry | <input checked="" type="checkbox"/> Renewable energy |
| <input checked="" type="checkbox"/> Transport | <input type="checkbox"/> Waste management | | |

Please add other relevant sectors:

Cross-sectoral enablers and approaches:

Please indicate the main cross-sectoral enablers and approaches

- | | | | |
|--|---|---|--|
| <input type="checkbox"/> Communication and awareness | <input checked="" type="checkbox"/> Economics and financial decision-making | <input checked="" type="checkbox"/> Governance and planning | <input type="checkbox"/> Community based |
| <input type="checkbox"/> Disaster risk reduction | <input type="checkbox"/> Ecosystems and biodiversity | <input type="checkbox"/> Gender | |

Technical assistance requested (up to one page):

Founded on the problem statement, past/on-going efforts and technology barriers, please describe the requested technical assistance. The technical assistance should clearly contribute to mitigation or adaptation to climate change as described in the problem statement and contribute to overcome the specific technology barriers.

Within a clearly defined scope, the description of technical assistance should be structured into the following:

- Overall objective
- Anticipated groups of activities to be performed by the technical assistance

- *Anticipated products to be delivered by the technical assistance.*

Please note that the CTCN facilitates technical assistance and is not a project financing mechanism.

For the development of Thailand Hydrogen for Net-zero, the overall objective for technical assistance is to provide Thailand a clear strategy direction to utilize green hydrogen technologies to achieve Thailand Net-Zero goal. This clear strategy (so called masterplan) should be able to serve as a map for further detailed and actionable plan for the government to develop regulatory framework, infrastructures and policy necessary to support and enable the development of green hydrogen technologies. The masterplan should also help relevant stakeholders understand their roles and how stakeholders can collaborate during the development stage and commercial stage in the future.

To be able to achieve above objectives, activities needed during the assistance should include:

- Assessment of potential use for green hydrogen in energy, transport, commercial and industrial sectors and identify three most suitable application areas for use of the technologies and its climate benefits.
- Identify the suitable technological options to produce and transport hydrogen and develop their requirements in terms of resource requirement both qualitative and quantitative (water, electricity required, area of solar PV, storage requirements etc.)
 - Considering Thailand resources, identified technologies should at least include green hydrogen from bio resources
 - Undertake SWOT analysis of the identified technologies
 - Estimate the CAPEX and OPEX for three different size configurations including the local storage
 - Identify most suitable geographical areas for location of manufacturing plants in countries
- Develop national vision paper
- Develop national action plans and technology roadmaps for the implementation of the two best suitable application areas and the identified green hydrogen production technologies.
- Identify resources and expertise required for pilot scale implementation of the selected roadmaps and opportunities to acquire them as a preliminary report.
 - The report should act as a guide for seeking further assistance in the pilot demonstration projects along with funding support, possibly GCF in the future
- Capacity Building of national policy makers to facilitate implementation of the action plan developed.
- Business matchmaking forums and private sector engagement for the purpose of technology transfer.

The anticipated products to be delivered include the report on assessment of potential use, national strategy paper, national action plans and technology roadmaps, preliminary report for pilot scale implementation and capacity building of national policy maker activities.

Expected timeframe:

Please indicate the expected duration period for the requested technical assistance. Please note CTCN technical assistance is limited to a maximum duration of 12 months.

We expect the duration of 12 months for requested technical assistance.

Anticipated gender and other co-benefits from the technical assistance:

Please describe the activities with gender linkages as well as the anticipated gender and other co-benefits (e.g. biodiversity, economic, social, cultural, etc.) that are likely to be generated as a result of the technical assistance.

For more information you can find guidelines on the CTCN's website here:

<https://www.ctc-n.org/technologies/ctcn-gender-mainstreaming-tool-response-plan-development>

Further reading on gender can be found on the CTCN website here:

<https://www.ctc-n.org/technology-sectors/gender>

The anticipated co-benefit of this assistance is creating economic activities. Green hydrogen and other related clean technologies might be the new growth driving factors in Thailand especially in mobility and automotive sectors. Also, agriculture sectors which consist of large rural households, could benefit tremendously from green hydrogen from bio resources technologies.

Key stakeholders:

Please list the stakeholders who will be involved in the implementation of the requested CTCN technical assistance and describe their role during the implementation (for example, government agencies and ministries, academic institutions and universities, private sector, community organizations, civil society, etc.).

| Stakeholders | Role to support the implementation of the technical assistance |
|--|--|
| Office of National Higher Education Science Research and Innovation Policy Council | Responsible for research, innovation, and technology development policy |
| Hydrogen Thailand Group | Group of stakeholders promoting hydrogen development and demonstrate projects. |
| Relevant private sectors | Data provider |
| Office of Natural Resources and Environmental Policy and Planning | National focal point of UNFCCC and responsible for policy development |
| Office of Energy Policy and Planning | National energy policy and planning: resolving energy issue under the National Energy Committee |
| Department of Alternative Energy Development and Efficiency | Develops and promotes renewable energies, biofuel, energy-efficiency, and energy saving strategies |
| Electricity Generating Authority of Thailand | State enterprise, managed by the Ministry of Energy, responsible for electric power generation |
| National Science and Technology Development Agency - National Energy Technology Center (ENTEC) | A leading organization & a focal point for Thailand's energy technology development |
| The Joint Graduate School of Energy and Environment | Information providers |

(JGSEE) and relevant research institutes and universities

Alignment with national priorities (up to 2000 characters including spaces):

Please describe how the technical assistance is consistent with national climate priorities such as: Nationally Determined Contribution, national development plans, poverty reduction plans, technology needs assessments, Low Emission Development Strategies, Nationally Appropriate Mitigation Actions, Technology Action Plans, National Adaptation Plans, sectorial strategies and plans, etc.

Reference document
(please include date of document)

Extract (please include chapter, page number, etc.).

Nationally Determined Contribution (NDC)

Direct alignment and contribution to NDC implementation is required for all CTCN technical assistances. Please include a direct reference to the INDC/NDC document (chapter, page number, etc.).

- Thailand intends to reduce its greenhouse gas emissions by 20 percent from the projected business-as-usual (BAU) level by 2030.

Thailand Mid-century, Long-term Low Greenhouse Gas Emission Development Strategy

- To achieve the carbon neutrality by 2065, Thailand emphasizes the importance of innovation and RD&D, especially in the areas for low carbon electricity generation, CCS, bioenergy with CCS and hydrogen economy. (p.44.)

NDC Action Plan (Energy Sector)

- Action plan 1.2.10 Development of New Clean Energy (p.19.)

Add others here as relevant

Development of the request (up to 2000 characters including spaces):

Please describe how the request was developed at the national level and the process used by the NDE to approve the request before submitting it (who initiated the process, who were the stakeholders involved and what were their roles?) and describe any consultations or other meetings that took place to develop and select this request, etc.

The request is initiated by Office of National Higher Education Science Research and Innovation Policy Council (NXPO) which identified the hydrogen development barriers during a collaboration workshop "Innovation Roadmap for Industrial Decarbonization ", participants included – Bangkok Industrial Gas Company Limited (BIG), Siam Cement Public Company Limited, PTT Public Company Limited, relevant private companies, Energy Policy and Planning Office (EPPO), The Department of Alternative Energy Development and Efficiency etc. NXPO has also consulted with National Energy Technology Centre (ENTEC), The Joint Graduate School of Energy and Environment (JGSEE) and Hydrogen Thailand Group.

Background documents and other information relevant for the request:

- Please list all relevant documents that will help the CTCN analyse the context of the request and national priorities. Please note that all documents listed/provided should be mentioned in this request in the relevant section(s), and that their linkages with the request should be clearly indicated. For each document, please provide web-links (if available) or attach to the submission form. Please add any other relevant information as required.*
- Please indicate if this request has been developed with the support of the CTCN Request Incubator.*

- Thailand Mid-century, Long-term Low Greenhouse Gas Emission Development Strategy - https://unfccc.int/sites/default/files/resource/Thailand_LTS1.pdf
- NDC Action Plan (Energy Sector) - https://climate.onep.go.th/wp-content/uploads/2021/09/NDC_Action_Plan_Energy_sector.pdf

OPTIONAL: Linkages to Green Climate Fund Readiness and Preparatory Support

The CTCN is collaborating with the GCF in order to facilitate access to environmentally sound technologies that address climate change and its effects, including through the provision of readiness and preparatory support delivered directly to countries through their GCF NDA. These actions are in line with the guidance of the GCF Board (Decision B.14/02) and the UNFCCC, particularly paragraphs 4 and 7 of 14/CP.22 that addresses Linkages between the Technology and the Financial Mechanisms².

The CTCN is therefore implementing some of its technical assistance using GCF readiness funds accessed via the country's NDA. Any application for GCF support, including the amount of support provided, is subject to the terms and conditions of the GCF and should be developed in conjunction with the NDA.

Please indicate whether this request has been identified as preliminarily eligible by the NDA to be considered for readiness support from the GCF.

Initial engagement: The GCF NDA of the requesting country has been engaged in the design of this request and the NDA will be involved in the further process leading to an official agreement for accessing GCF readiness support.

Advanced engagement (preferred): The GCF NDA of the requesting country has been directly involved in the design of this request and is a co-signer of this request, the signature indicating provisional agreement to use readiness national funds to support the implementation of the technical assistance.

NDA name:

Date:

Signature:

Monitoring and impact of the assistance:

By signing this request, I affirm that processes are in place in the country to monitor and evaluate the technical assistance provided by the CTCN. I understand that these processes will be explicitly identified in the CTCN Response Plan and that they will be used in the country to monitor the implementation of the technical assistance following standard CTCN procedures.

I understand that, after the completion of the requested assistance, I shall support CTCN efforts to measure the success and effects of the support provided, including its short, medium and long-term impacts in the country.

² Please see:

https://unfccc.int/files/meetings/marrakech_nov_2016/application/pdf/auv_cop22_i8b_tm_fm.pdf

Signature:

NDE name:

Dr. Surachai Sathitkunarath

Date:

July 20, 2022

Signature:



THE COMPLETED FORM SHALL BE SENT TO THE CTCN@UNEP.ORG

The CTCN is available to answer all questions and provide guidance on the application process.