

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:	Iran (Islamic Republic of)
Request title:	Wastewater Reusing in Combined Cycle Power Plant
NDE	Presidency Centre for Progress and Development of Iran Mr. Sirous Vatankhah Head Tel: +98 21 61 000 Fax: +98 21 61 00 61 00 Email: s.vatankhah@irannde.com , s.vatankhah@cpdi.ir Address: No. 7, Avesta St., Shikh Bahai Sq., Tehran, Iran.
Request Applicant:	Monenco Iran Consulting engineers Ms. Elham Hasanpour International Business Development Expert Tel: +98 (21) 8196 6098 Fax: +98 21 88771206 Emails: hasanpour.elham@monencogroup.com No.12, Attar St., Vanak Sq., Valiasr Ave., Tehran 1994643315, Iran

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

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

In recent decades, the population is increased and the industries and factories are developed in Iran thus the electricity demand has been increased.

In Combined Cycle Power Plant (CCPP), there are continues and intermittent wastewater that should be treated and then directed to the environment. In Iran, most of the CCPP are located in areas that are arid and semi-arid and water is rare. The amount of precipitation generally is low. So, wastewater reusing in these CCPPs is very important. Among the wastewaters, continues cases are more important.

As mentioned above, Iran is arid and semi-arid region and there is not availability to river and in most of the CCPP water source is well. The well water generally has high TDS and reverse osmosis system is required to reduce TDS of water. In reverse osmosis system, feed water will be divided to permeate water and RO brine. Permeate water is product water and is used in boilers. In CCPP the most important continues wastewater is RO brine. RO brine is the concentrated water that is produced in reverse osmosis system. RO brine because of its TDS could not be interred to environment. Now in CCPP, RO brine is transferred to evaporation pond. In evaporation pond, wastewater is evaporated naturally and the solid material will be remained in evaporation pond. During this procedure, the large amount of water is lost by natural evaporation. By considering the water rarity in most of the area in Iran, wastewater reusing will be most important.

In CCPP that has one module (500 MW) water treatment plan data will be as following:

- Water treatment plant capacity: 30-40 m³/hr (power plant water consumption)
- RO brine: 2-5 m³/hr (wastewater that has been lost)
- Anticipated wastewater recovery: 75-95%

We are looking for replacement for natural evaporation in evaporation pond to reuse wastewater. Reusing of wastewater will have two advantages. First by recovering of the wastewater water consumption in CCPP will be reduced and by reusing of the wastewater that is directed to evaporation pond this pond will be omitted.

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

The conventional replacement for evaporation pond is Zero Liquid Discharge (ZLD). ZLD is included Ultrafiltration (UF), reverse osmosis (RO) and crystallization. In ZLD almost wastewater is completely reused and waste is only crystallized solid. The performance of ZLD in wastewater reusing is excellent but the cost (including working and capital cost) is extremely high therefore it is not used usually for reusing of wastewater. In ZLD most of the cost is related to crystallization part.

Another wastewater reusing system is Minimum Liquid Discharge (MLD). This is where the concept of Minimum Liquid Discharge (MLD) comes in to play. MLD techniques often serve as pre-concentration steps to reduce the overall cost of Zero Liquid Discharge (ZLD) applications. On its own, MLD can provide a substantial economic advantage and water savings where Zero Liquid Discharge (ZLD) is not required.

MLD has the potential to minimize operating costs and maximize water recovery while reducing the amount of energy required to operate. With the industry's broadest portfolio of purification and separation technologies, MLD goals is a path toward cost savings and higher recovery.

Specific technology¹ barriers (up to one page):

In most of the region in Iran water is scarce and groundwater is the main source of water for domestic and industrial usage. RO brine is the most important continuous wastewater in CCPP. The well-known water treatment companies in the world ZLD as a conventional procedure is recommended for reusing of RO brine but the ZLD cost is very high.

The new method for wastewater reusing is MLD. Overall, due to the complexity of this issue, lack of technical capacities at the national and local levels as well as the relative new concept of wastewater reusing has not yet been advanced in its implementation.

Sectors:

Please indicate the main sectors related to the request:

- | | | | |
|---|---|--|--|
| ☐ Coastal zones | ☐ Early Warning and Environmental Assessment | ☐ Human Health | ☐ Infrastructure and Urban planning |
| ☐ Marine and Fisheries | ☒ Water | ☐ Agriculture | ☐ Carbon fixation |
| ☐ Energy Efficiency | ☐ Forestry | ☒ Industry | ☐ Renewable energy |
| ☐ Transport | ☐ Waste management | | |

Please add other relevant sectors:

Cross-sectoral enablers and approaches:

Please indicate the main cross-sectoral enablers and approaches

- | | | | |
|--|---|--|--|
| ☐ Communication and awareness | ☒ Economics and financial decision-making | ☐ Governance and planning | ☐ Community based |
| ☐ Disaster risk reduction | ☐ Ecosystems and biodiversity | ☐ Gender | |

Technical assistance requested (up to one page):

- Overall objective

To reuse the wastewater in combined cycle power plant for reducing water consumption and protect the environment by decreasing the amount of wastewater especially chemical wastewater.

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

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)

The technical assistance will delivery following Activities:

Activity 1: Desk-study on database, methodology to define the best wastewater reusing based on data from combined cycle power plants.

Activity 2: Conduct the data collection of MLD at combined cycle power plants, walking through energy audit and full energy audit in combined cycle power plants for guideline development and validation of methodology.

Activity 3: Consultation workshops. The technical assistance should have networking and working experiences with stakeholders in Iran, particularly the energy sector to demonstrate their works and recommendations.

Activity 4: Capacity building to the stakeholders. The technical assistance team shall design and conduct capacity program for MLD in combined cycle power plants.

- Anticipated Output of the technical assistance:
 - Technical report about methodology calculation through piloting of MLD in combined cycle power plants.
 - Full energy audit reports for MLD in combined cycle power plants.
 - Technical report about MLD in combined cycle power plants

Expected timeframe:

Please note CTCN technical assistance is limited to a maximum duration of 12 months.
12 Months

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

Women will be engaged in engineering, design, manufacturing and construction steps.

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
National Designated Entity	Support for coordination of the technical assistance and getting overall feedback to the CTCN and the implementer during the implementation of the technical assistance
Request Applicant	As a consultant engineering company in power plant sector
Ministry of Energy	As the owner of power plants
MAPNA Group	As an EPC contractor in power plant sector

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

Reference document (please include date of document)	
Nationally Determined	Title 3: Adaptation and Vulnerability to Climate Change, Section C.

Contribution (NDC)	Technological Needs for Adaptation, Page 10, 1 st bullet. Link of INDC: https://www4.unfccc.int/sites/submissions/INDC/Published%20Documents/Iran/1/INDC%20Iran%20Final%20Text.pdf
Technology Needs Assessment	Section 6, Priority Setting for Sound Technologies, Water Resources Sector, Page 47, No 1 Link of TNA: https://unfccc.int/ttclear/misc/_StaticFiles/gnwoerk_static/TNR_CRE/01200e6f1abb49fa89861a884176db53/23ae5924c61b44db9d3ac77898b2af07.pdf
Energy Consumption Pattern Reform	Articles 7 and 8. Link (Farsi): http://dotic.ir/news/4343/%D8%B3%D9%8A%D8%A7%D8%B3%D8%A-%D9%87%D8%A7%D9%8A-%D9%83%D9%84%D9%8A-%D8%A7%D8%B5%D9%84%D8%A7%D8%AD-%D8%A7%D9%84%DA%AF%D9%88%D9%8A-%D9%85%D8%B5%D8%B1%D9%81

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

Water and reuse of it is the subject at the national level because water is used as potable water in cities and villages and also is consumed in different industries. By using MLD, water consumption will be reduced and more water will be for domestic consumption.

In CCPP, MLD will be used to reuse wastewater. By using MLD, rate of wastewater flow to environment will be decreased and environment will be protected against wastewater pollution.

There are more than 100 power plants in the all area in Iran that MLD can be used in them. So, for this reason this is a national problem. Also, MLD can be used in oil and gas fields.

Background documents and other information relevant for the request:

- Please list all relevant documents that will help the CTCN analyze 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.

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.

Signature:

NDE name: Sirous Vatankhah

Date: March 03, 2021

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.

² Please see:

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