REQUEST FOR EXPRESSION OF INTEREST (EOI)

The Coalition for Disaster Resilient Infrastructure (CDRI), invites Expression of Interest (EoI) from eligible consulting agencies for a **"Study to enhance the resilience of Odisha's power infrastructure – Phase 1"** under its Work Programme 1: Technical Support and Capacity Development.

The objectives, scope of work, deliverables, reporting, and supervision, etc. are mentioned in the Terms of Reference (ToR) enclosed on page 4.

Interested consultants should provide information in the format given at Annexure 1 at page 11, demonstrating that they have the required qualifications and relevant experience to perform the services. The shortlisting and eligibility criteria are given at pages 2 and 10.

Consultants submitting an EOI may be required to make a presentation on their proposals before the shortlisting process. Shortlisted Consultants will be invited in the Request for Proposal (RfP) stage to submit their technical and financial bids. The final consultant will be chosen based on a Quality and Cost Based Selection (QCBS) method.

Interested consultants may obtain further information and may also give their comments on the objectives and scope of work at the email addresses below.

The EOIs should be submitted electronically to srconslt1-cdri@ndma.gov.in by 1730 hrs (IST) on 17th February 2020 in PDF format.

Sameer Pethe
Senior DRR Expert (DRI)
Coalition for Disaster Resilient Infrastructure
National Disaster Management Authority,
NDMA Bhavan, A-1 Safdarjung Enclave, New Delhi 110029, INDIA
Tel: +91 (11) 2670 1714; Mob: +91 9890050482
E-mail: srconslt1-cdri@ndma.gov.in, cc: pethe.sameer@gmail.com

INFORMATION FOR THE CONSULTANT:

Client Name	Coalition for Disaster Resilient Infrastructure (CDRI)
Brief description of the required services	Phase 1 of the study looks at the disaster management experience of the Power Sector in Odisha encompassing preparedness and survival, recovery and reconstruction, and social and community resilience; in order to a) map the existing system in detail, b) document and analyse the steps taken by Odisha state towards building resilience and identifying best practices, and c) recommend how to improve the system to deal with the impacts of future hazards.
List and description of expected outputs to be delivered	Deliverables are listed under clause 6.4 on page 10.
Nodal person	Sameer Pethe, Sr. DRR Expert (DRI)
Location of work	Odisha, India
Expected duration of work	6 months
Criteria for Preliminary Examination of EOI	- Relevant experience of the Agency - Proposed team leader and experience of similar nature - Proposed team composition - Overall experience of the agency / joint venture / consortium - Documents of registration / incorporation in country of origin - Agency not blacklisted by any Govt. institution
Criteria for essential eligibility / qualification	- The Consultant must have experience of at least 5 years in conducting similar studies with International/Central/State government or private sector. Experience of carrying out study/ projects with multiple stakeholders will be an added advantage. - Consultant with prior experience in conducting studies on disaster preparedness and response with regards to power infrastructure at international/national/state level will be given priority. - Consultant should have a team of experienced professionals from relevant fields relating to the subject matter of the proposed study. The Consultant should engage an adequate team of professionals having expertise on power infrastructure, disaster preparedness, emergency response

	and management, and community risk management. - The Consultant should have a minimum average turnover of USD 600,000 (or equivalent) for the last 3 financial years. Academic and research institutions may be exempted.
Who can apply	- Proposals are invited from institutions/ organisations only. Joint Ventures and Consortiums may also apply.

Note: CDRI or any of its designates reserves the right to cancel this request for EoI and/or invite afresh with or without amendments, without liability or any obligation for such request for EoI and without assigning any reason. Information provided at this stage is indicative and CDRI reserves the right to amend/add further details in the EoI.

TERMS OF REFERENCE (TOR)

STUDY TO ENHANCE THE RESILIENCE OF ODISHA'S POWER INFRASTRUCTURE

1. Context – Cyclone Fani

Situated on the eastern coast of India adjoining the Bay of Bengal, Odisha is one of the most hazard prone states in India. On 3rd May 2019 Cyclone Fani, the strongest cyclone since Phailin in 2013, made landfall near the pilgrimage town of Puri.

With two decades of experience in systematic management of disasters, Odisha state was well prepared for the cyclone. An early and precise warning about the coming cyclone, coupled with strong community mobilisation, enabled the state to minimise the loss of lives and human suffering caused by the cyclone.

Based on the experience of dealing with five cyclones in the last two decades, the Department of Energy was also well prepared. The department prepared contingency plans, pre-positioned funds, materials, manpower, equipment and vehicles, along with the technical and support staff and made communications plans to deal with the cyclone impact. It also held advance meetings with critical consumers like railways, industries, electricity generators, and the local load distribution centres, to plan for the systematic reduction and subsequent restoration of electrical loads during and after the passing of the cyclone, in order to prevent total grid collapse.[1]

2. Impact of Fani on Power Infrastructure

Despite these preparations, Cyclone Fani with its winds occasionally gusting at 205 kmph caused extensive damages to the power infrastructure in the state. At an estimated INR 8,392 crore (USD 1.2 billion), the power sector sustained maximum damage and losses out of all the social, productive, and infrastructure sectors.[2] Power supply was disrupted in 14 of the 30 districts in Odisha. High wind speeds caused the falling and uprooting of poles, snapping of overhead lines, damaged transformers and accessories. Five districts, namely Puri, Cuttack, Khordha, Ganjam and Dhenkanal, were severely affected. Another nine districts suffered extensive damage leaving nearly 4 million people across the state without electricity.[3]

Apart from disruptions of economic and industrial activities, the damage to power infrastructure had multiple cascading effects on other infrastructure and public services. Interdependent infrastructure services like transportation, telecom, water supply, medical, and banking services were also interrupted by the lack of power.[4] This limited peoples' access to critical resources required to cope with and recover from the

[1] Department of Energy, Government of Odisha
[2] The Cyclone Fani - Damage, Loss and Needs Assessment (DLNA), Odisha State
[3] The Cyclone Fani - Damage, Loss and Needs Assessment (DLNA), Odisha State
[4] News reports

devastation. Such disruptions have also been shown to have longer term direct and indirect impacts on the functioning of businesses, and the well-being of households.[5] The losses, in terms of revenue loss to distribution companies and loss in earnings of bill collectors (outsourced to third parties by DISCOMs) were around INR 253.5 crore (USD 36.2 million).[6] Complete restoration of power in the state took almost 2 months.[7]

3. Background of the Study

The impacts of the cyclone brought into focus the need for disaster and climate resilient power infrastructure systems in Odisha and also India as a whole. This represents another opportunity highlighting the imperative to build back better and more resilient. A study by the World Bank titled "Power For All" estimates that the annual cost of supply for achieving universal access by 2030 is INR 13,900 crore (USD 3 billion), with a cumulative cost of INR 2,00,000 crore (USD 62 billion) over the 2011–30 period.[8] It is imperative that this investment be made resilient to disaster and climate risk.

In a world that relies increasingly on electricity services, building the resilience of power systems is critical to providing reliable and sustainable services, energy security, economic well-being, and quality of life.[9] In this context, enhancing resilience refers to *"strengthening the ability of a system and its component parts to anticipate, prepare for, absorb, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner, including through the preservation, restoration, or improvement of its basic structures and functions"* (IPCC 2012). While there are existing international best practices for risk reduction, India will have to adapt the solutions to its own situation and context.

On 17th July 2019, a meeting was organised by the Indian National Disaster Management Authority (NDMA), inviting all stakeholders involved in developing policy and conducting research at national level, and those in building and operating the power generation, transmission and distribution infrastructure in Odisha. The meeting discussed the damages and losses faced by the power sector and brainstormed about a roadmap towards building disaster and climate resilient power infrastructure in Odisha, and by extension, in all high risk areas of India. There was strong consensus on the need for a detailed analysis of the impacts of the cyclone on power infrastructure in Odisha and the technical, organisational, and functional causes behind the extensive damages and subsequent time taken in the restoration of power. As a way forward, it was proposed that NDMA, in collaboration with relevant stakeholders, would initiate an in-depth study aimed towards enhancing the power sector's resilience to disasters.

It was noted that based on past experience, Odisha's power sector has developed and implemented multiple innovative approaches to managing the impacts of cyclones. These innovations, which have been adopted on

[5] Lifelines: The Resilient Infrastructure Opportunity (2019), Sustainable Infrastructure Series, World Bank.
[6] The Cyclone Fani - Damage, Loss and Needs Assessment (DLNA), Odisha State, 2019
[7] Department of Energy, Government of Odisha
[8] Power For All (2015), WB Banerjee, Sudeshna Ghosh, Douglas Barnes, Bipul Singh, Kristy Mayer, and Hussain Samad
[9] Enhancing Power Sector Resilience: Emerging Practices to Manage Weather and Geological Risks, World Bank, ESMAP

an ongoing basis over the last two decades, need to be systematically documented and disseminated so that the advances made by Odisha may benefit other cyclone affected states in the country.

The Coalition for Disaster Resilient Infrastructure (CDRI) is supporting the NDMA to carry out this comprehensive assessment of the resilience of power infrastructure in Odisha state.

4. Purpose of the Study

The overall aim of the study is to enable the enhancement of the resilience of Power infrastructure in the state of Odisha (and the rest of India) to disasters, especially those emanating from extreme climatic events, through raising awareness and enhancing understanding about managing risks among power sector stakeholders, and enhancing their capacity to take adaptive actions to mitigate these risks and cope with the impacts of future disasters.

5. Scope of work

Natural hazards are among the leading causes of power outages around the world.[10] The impacts of cyclone Fani have demonstrated the need for a thorough understanding of the power infrastructure system and the measures taken to reduce the impacts of natural hazards. The study shall address all the components of the power infrastructure system along with all the stakeholders and user groups. On the whole, the study will look at the various aspects of the system and aim to do the following:

1. Map the existing system in detail.
2. Document and analyse the steps taken by Odisha state towards building resilience and identifying best practices.
3. Recommend how to improve the system to deal with the impacts of future hazards.

The overall study will be conducted in three phases, each beginning after the completion of the last. Each phase will study three topics of increasing levels of complexity and scale to enable the improvement of the Power infrastructure in the state.

Phase I: Disaster preparedness and management

1. Preparedness and survival
2. Recovery and reconstruction
3. Social and community resilience

Phase II: Risk mapping and improvement of infrastructure

1. Risk identification and estimation
2. Codes, standards, design and regulation
3. Technology and innovation

[10] Stronger Power: Improving Power Sector Resilience to Natural Hazards. Washington, D.C.: World Bank Group.

Phase III: Institutional capacity and financing for resilience

1. Risk based governance and policy development
2. Financing resilience and adaptation
3. Capacity mapping and development, and knowledge management

The current study/project covers only Phase I defined above. The detailed scope of work for Phase I is given below.

6. Detailed Scope of work

6.1 Phase I: Disaster preparedness and management

The first phase of the study relates to the development and adoption of mechanisms for ensuring preparedness, preventing grid collapse, assessing losses, estimating needs, and channelling adequate funds to disaster affected areas in a timely manner for early restoration and resilient recovery and reconstruction. It will also look at aspects of community engagement to determine the information and support made available to the public and how it affected their resilience to the impact of the cyclone.

Poor and vulnerable communities bear a disproportionate impact of the failure of infrastructure systems. For example, power outages can affect cooling and heating (which in turn may have health implications), economic activities and income, children's educational outcomes, social and leisure activities, and regular household tasks such as cooking and cleaning.[11] Thus empowering communities with the information and support they need in order to cope with the impacts of power disruption should be a key activity taken up by the government. This relates to building the capacities of local communities to participate in the process of creating and sustaining small and large scale infrastructure, so as to enhance disaster and climate resilience of the community and its surrounding infrastructure.

6.2 Background:[12]

Preparedness: Odisha state has endured 5 major cyclones in the past two decades. Through this experience, the Department of Energy (DoE) in Odisha has learnt multiple lessons on dealing with cyclonic winds. At the time of Fani, the DoE was well prepared with the SOPs, contracts, materials and manpower required in terms of preparing for the cyclone impact, preventing grid collapse during the event and on restoration and recovery. On receiving early warning about the cyclone, the DoE held meetings with critical power consumers like railways, power generators, and the National, Regional and State Load Distribution Centres (NLDC, RLDC and SLDC) to communicate the risks and minimise commercial losses.

Survival: During the cyclone, the pre formed Special Teams at the SLDCs worked 24 hours in special time shifts to prevent technical failure and possible grid collapse. This was done through Islanding Schemes and pre-

[11] Lifelines: The Resilient Infrastructure Opportunity (2019), Sustainable Infrastructure Series, World Bank.
[12] Reported by Department of Energy, Government of Odisha

decided Back-Start procedures for a phased load reduction and a systematic restoration of the load after the passing of the cyclone. This was done in the absence of normal channels of communication.

Recovery and restoration: Immediately after the cyclone, within 24 hours, foot and bike patrol parties had begun to assess the damages and communicated them to the department in absence of mobile communications. They faced other constraints like fallen trees and waterlogging in accessing and assessing damages to the power infrastructure. Within 72 hours, pre-positioned gangs had begun emergency localised restoration and restoration timelines had been communicated to essential service providers like water supply, hospitals, banks etc. This was supported by prepositioning of Diesel Generators (DG) sets and fuel at critical locations. Restoration activities included diverting alternate power from healthy lines, deployment of Emergency Restoration Supply (ERS) Towers that were pre-positioned with trained manpower.

Reconstruction: In parallel to this, pre-signed emergency Rate Contracts were activated and materials and manpower were mobilised from ongoing projects to start work on reconstruction. These coordinated efforts led to a quick restoration of power and minimised interruptions to important consumers like railways and the process industry.

Social and community resilience: The government of Odisha has a history of successful public engagement, coordination and mobilisation around issues of disaster response and recovery. While the department highlights the meetings conducted with [commercially] important power consumers like railways and telecommunications companies, the level of outreach, information and engagement with the public needs to be studied and assessed.

6.3 Technical review and analysis:

The following aspects would be studied through field surveys, and primary and secondary data collection, as necessary. The review and analysis would be aimed at determining the effectiveness of the given actions towards improving overall resilience of the system.

Preparedness

1. Documentation and review of all preparedness actions taken by the State in advance of the cyclone. These should include all logistical arrangements, prepositioning of materials, equipment and vehicles, manpower, and funds (cash) required for response and recovery.
2. Documentation and review of Contingency plans, Standard Operating Procedures (SOPs) and Recovery Plans of the Department.
3. Documentation and review of all financial arrangements made in preparation for the cyclone including but not limited to any Rate Contracts, arrangements with suppliers, emergency tenders, purchase agreements.
4. Documentation and review of all communications and meetings with power generators, load distributors, critical power users and the public, with the intent of minimising the impacts of loss of power supply.

During the cyclone

5. Documentation and review of the processes used by the department to prevent technical failure of the grid / grid collapse. These include phased load reduction, generation management, islanding schemes, back-starting procedures and other such activities. Special attention should be paid to documenting how these procedures were carried out without access to mobile communication.
6. Review of methods and processes used to monitor the progress of the cyclone and restore power to undamaged regions after it passes.

Restoration

7. Documentation and review of processes followed for emergency damage assessments and constraints faced therein. Recommendations may be made on overcoming the constraints through the use of alternative technologies and means.
8. Documentation and review of procedures followed for restoration of power through the use of Emergency Restoration Supply (ERS) towers including prepositioning of the towers, materials, tools, manpower etc.

Reconstruction

9. Documentation and review of the processes followed for reconstruction. This was started in parallel to the emergency restoration of power supply through diverting of manpower and materials from ongoing works.

Social and community resilience

10. Documentation and review of actions taken to coordinate with electricity users through pubic engagement and messaging in order to minimise the impact on communities and the lives of citizens impacted by the cyclone. This will include contingency plans for institutional and private user groups and actions taken therein.
11. Field survey to document issues and problems faced by various user groups due to the disconnection of electricity supply following Cyclone Fani.

6.4 DELIVERABLES:

1. Documentation of actions taken with regards to preparedness, absorbing the impact of the cyclone, restoration of supply and reconstruction.
2. Documentation of current mechanisms employed in Odisha by the Department of Power to ensure the minimisation of harm to communities and other end users due to the loss of power in case of a natural disaster.
3. Review of above actions (as in 1.) to identify and document best practices and areas for improvement.
4. Documentation of best practices followed in Odisha state to minimise harm to end users in times of power loss. This includes public messaging on preparedness, actions taken to ensure minimum harm to end users, and communication of recovery timelines after the impact.
5. Recommendations on improving processes and systems in regard to all the above phases.

6. Recommendations on actions that could be taken to reduce harm to end users due to loss of power in the event of a natural disaster.
7. Dissemination of findings and recommendations through a state level workshop to key stakeholders across the Indian Power Sector.

7. Project Management and Implementation Arrangements

The CDRI will constitute a Steering Committee (SC) to guide the direction of the study and to review its progress. The CDRI will be the reporting authority for the project and all reports will be submitted to it. The CDRI, with support from the SC, will coordinate with the relevant government departments and ministries to facilitate the study.

8. Profile of the Consultant

1. The Consultant must have experience of at least 5 years in conducting similar studies with International/State/Central government or private sector. Experience of carrying out study/ projects with multiple stakeholders will be an added advantage.
2. Consultant with prior experience in conducting studies on disaster preparedness and response with regards to power infrastructure at international/national/state level would be given priority.
3. Consultant should have a team of experienced professionals from relevant fields relating to the subject matter of the proposed study. The Consultant should engage an adequate team of professionals having expertise on power infrastructure, disaster preparedness, emergency response and management, and community risk management.
4. The Consultant should have a minimum average turnover of USD 600,000 (or equivalent) for the last 3 financial years. This may be exempted for academic and research institutions etc.

The consulting firms should prepare their EOIs clearly highlighting the points above with relevant and sufficient supporting documents only. The criteria mentioned above are the minimum criteria. Any consulting firm with more experience than the criteria stipulated above will secure more marks in the respective criteria. Consultancy Firm may associate with other consultants in the form of a joint venture or a sub-consultancy to enhance their qualifications. Such association should be clearly stated in the EOI.

9. Staffing Requirements

The consulting firm is free to propose a staffing plan and skill mix necessary to meet the objectives and scope of the services. However, international experience is recommended to carry out the assignment. If all the required skills are not available within the consulting firm, the firm is encouraged to make joint ventures with other firms or organizations with appropriate expertise.

10. Ownership and Confidentiality of Data and Work Products

The ownership of the raw data collected by the Consultant during the course of the study and the deliverables including documents, maps, images, processed data, etc. will rest with the client. The Consultant will keep the data and work products confidential and will share them only with the express permission of the client.

11. About the Coalition for Disaster Resilient Infrastructure (CDRI)

The CDRI is a global knowledge exchange and capacity development partnership. The CDRI serves as a platform where knowledge is generated and exchanged on different aspects of disaster and climate resilience of infrastructure. It brings together technical expertise from a multitude of stakeholders to create a mechanism to assist member countries to upgrade their capacities and practices, with regard to infrastructure development in accordance with their risk context and economic needs.

More information about CDRI can be found at www.resilientinfra.org .

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ANNEXURE 1 –

Format for submitting consultant information

1. Name of the Organisation / Agency
2. Address, Phone, Email
3. Name and contact details of nodal person
4. Year of establishment of (lead) agency
5. Registration / incorporation details
6. Self-certification for not being blacklisted/debarred by any Govt. Institution
7. A brief write up about the agency(ies)
8. Year-wise annual turnover details for the last 3 financial years (from 2016-17) with supporting documents
9. Any documents in support of above or eligibility criteria mentioned in the EoI
10. Overview of proposed team lead and composition based on an understanding of the TOR
11. Overview of proposed methodology as per deliverables in 6.4 of TOR
12. List of completed projects of similar nature and brief description of services performed:

Name of Client	Title of Project	Sponsoring agency / authority	Date of award and date of completion	Cost of project	Remarks and brief description of relevance to current project.

13. Any documents or reports supporting the profile of the consultant.

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