

**Joint Crediting Mechanism Project Design Document Form**

**A. Project description**

A.1. Title of the JCM project

A HIGH EFFICIENCY AND LOW LOSS POWER TRANSMISSION AND DISTRIBUTION SYSTEM IN MONGOLIA

A.2. General description of project and applied technologies and/or measures

The purpose of the proposed JCM project is to stabilize the supply of electricity and reduce greenhouse gas (GHG) emissions through installation of a Japanese transmission line system employed a low-loss transmission line that will transmit electricity with high efficiency. The low-loss transmission line has employed the following improvements, which contribute to low-loss.

- (a) Increase the space factor of the conductor by modifying the formation of the aluminum wire from a circular to a fan-shaped design.
- (b) Reduce the cross-sectional area of the aluminum-clad steel wire, and increase the cross-sectional area of the conductor.
- (c) Substitute the galvanized wire with a more conductive material.
- (d) Apply an even-number of layers of aluminum wire.

By incorporating the above four measures, the low-loss transmission line, when compared to a conventional transmission line, can reduce transmission loss by 10 to 15%, and therefore contributes to a reduction in CO2.

The project proponent will construct a new single-circuit transmission line spanning 159.4km between the new Oyu Tolgoi (NOT) substation in Ömnögovi province and Tsagaan Suurga (TS) substation in Dornogovi province located in the southern region of Mongolia.

A.3. Location of project, including coordinates

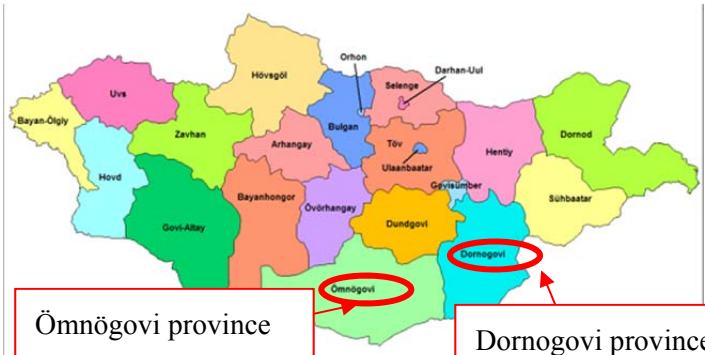
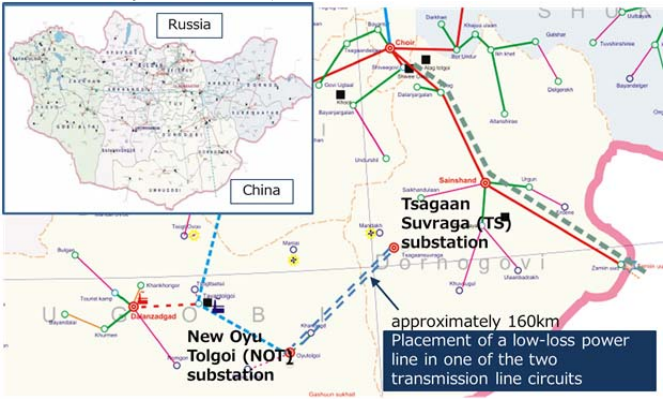
Country	Mongolia
Region/State/Province etc.:	<p>Ömnögovi and Dornogovi provinces</p>  <p>Ömnögovi province</p> <p>Dornogovi province</p>

Figure 1 Location of provinces in Mongolia

<p>City/Town/Community etc:</p>	<p>Ömnögovi province</p> <ul style="list-style-type: none"> <li>• Khanbogd county (length of transmission line in county : 74 km)</li> <li>• Manlai county (length of transmission line in county : 48 km)</li> </ul> <p>Dornogovi province</p> <ul style="list-style-type: none"> <li>• Mandakh county (length of transmission line in county : 37.4 km)</li> </ul>  <p>Figure 2 Location of transmission lines in the 3 counties (between NOT and TS: 159.4km)</p>
<p>Latitude, longitude</p>	<p>Coordinate for the transmission end at the NOT substation in Ömnögovi province: 43°06'26.4"N 106°46'10.0"E</p> <p>Coordinates for the receiving end at the TS substation in Dornogovi province: 43°52'46.5"N 108°20'27.5"E</p>

A.4. Name of project participants

<p>Mongolia</p>	<p>NATIONAL POWER TRANSMISSION GRID State Owned Stock Company (NPTG)</p>
<p>Japan</p>	<p>Hitachi, Ltd.</p>

A.5. Duration

<p>Starting date of project operation</p>	<p>01/10/2017</p>
<p>Expected operational lifetime of project</p>	<p>14 years</p>

A.6. Contribution from Japan

The project has been selected as one of the JCM demonstration projects by the New Energy and Industrial Technology Development Organization (NEDO), the largest public management organization promoting research and development under the Japanese government. Through the NEDO's demonstration program, the project obtains financial resources to cover the implementation cost of the proposed project partially.

Further, the state-of-the-art low-loss transmission line which has been developed in Japan is

introduced in Mongolia for the first time. Also, Hitachi, Ltd. instructed the Japanese technology to Mongolian counterpart, NPTG, and helps NPTG to implement proper monitoring of electricity transmitted.

## B. Application of an approved methodology(ies)

### B.1. Selection of methodology (ies)

Selected approved methodology No.	MN_AM001
Version number	01.0

### B.2. Explanation of how the project meets eligibility criteria of the approved methodology

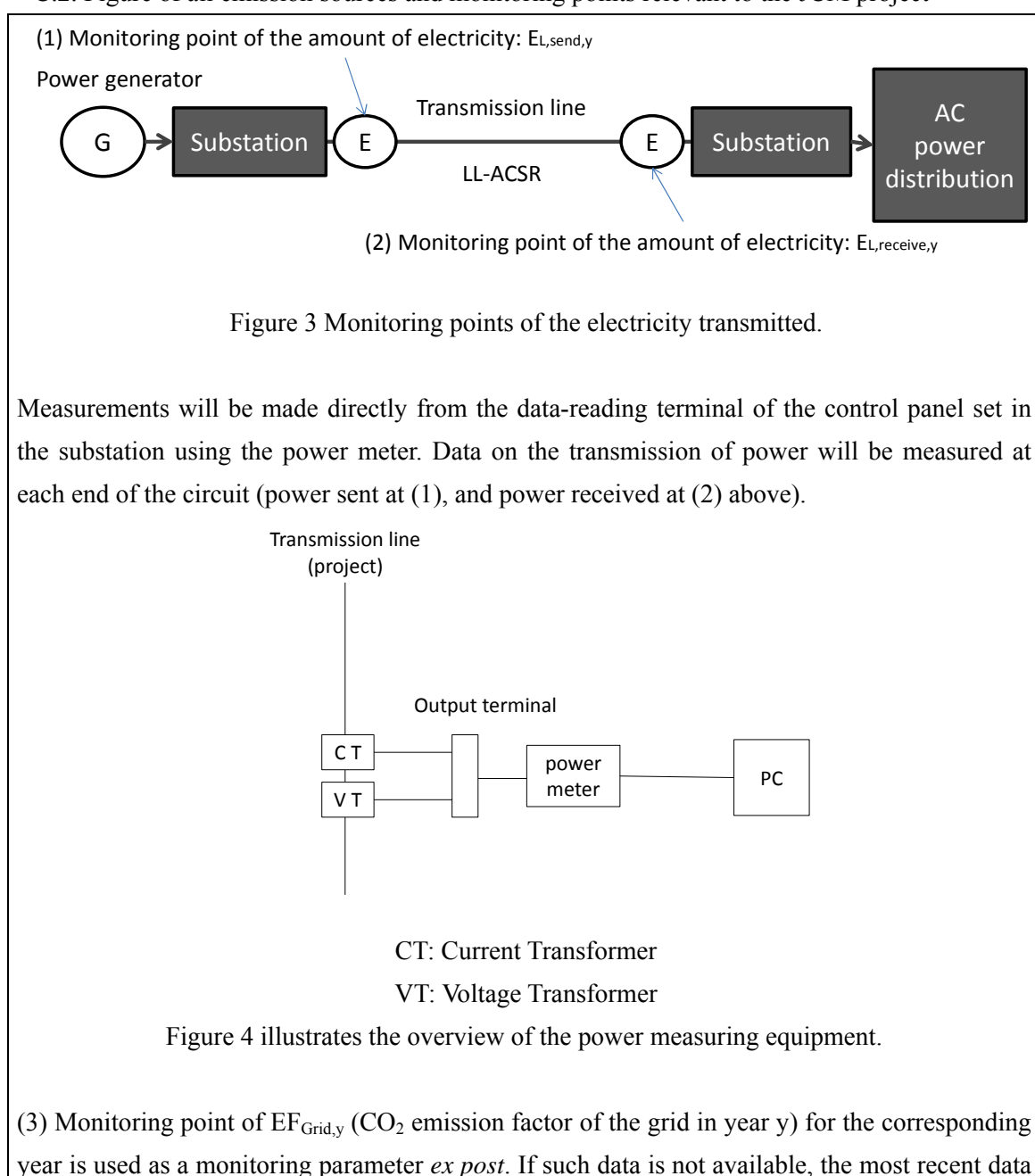
Eligibility criteria	Descriptions specified in the methodology	Project information																														
Criterion 1	The transmission line constitutes of a single or double circuit(s) directly connecting a substation and another substation within the country with no branching in between, and does not constitute a part of a loop.	This project involves the placement of low-loss transmission lines in between the new Oyu Tolgoi substation and Tsagaan Suvarga substation. There are no branch lines or loops present within the interval. Therefore, the project fulfills this criterion.																														
Criterion 2	<p>The type of conductor is LL-ACSR/SA, which meets the following technical criteria.</p> <table border="1"> <thead> <tr> <th>Type of energy-saving conductors</th> <th>unit</th> <th>Equivalent to LL-ACSR/SA 279/20mm<sup>2</sup></th> <th>Equivalent to LL-ACSR/SA 337/27mm<sup>2</sup></th> <th>Equivalent to LL-ACSR/SA 445/36mm<sup>2</sup></th> </tr> </thead> <tbody> <tr> <td>Outer diameter of conductor</td> <td>mm</td> <td>≤21.6</td> <td>≤24.0</td> <td>≤27.5</td> </tr> <tr> <td>Direct current resistance (@20degC)</td> <td>Ω/km</td> <td>≤0.1063</td> <td>≤0.0862</td> <td>≤0.0659</td> </tr> <tr> <td>Tensile strength</td> <td>N</td> <td>≥75,050</td> <td>≥90,574</td> <td>≥120,481</td> </tr> <tr> <td>Weight</td> <td>kg/km</td> <td>≤921</td> <td>≤1,132</td> <td>≤1,490</td> </tr> <tr> <td>Corresponding conductors currently in use that forms the basis of calculating the reference emissions.</td> <td></td> <td>ACSR 240/32mm<sup>2</sup></td> <td>ACSR 300/39mm<sup>2</sup></td> <td>ACSR 400/51mm<sup>2</sup></td> </tr> </tbody> </table>	Type of energy-saving conductors	unit	Equivalent to LL-ACSR/SA 279/20mm <sup>2</sup>	Equivalent to LL-ACSR/SA 337/27mm <sup>2</sup>	Equivalent to LL-ACSR/SA 445/36mm <sup>2</sup>	Outer diameter of conductor	mm	≤21.6	≤24.0	≤27.5	Direct current resistance (@20degC)	Ω/km	≤0.1063	≤0.0862	≤0.0659	Tensile strength	N	≥75,050	≥90,574	≥120,481	Weight	kg/km	≤921	≤1,132	≤1,490	Corresponding conductors currently in use that forms the basis of calculating the reference emissions.		ACSR 240/32mm <sup>2</sup>	ACSR 300/39mm <sup>2</sup>	ACSR 400/51mm <sup>2</sup>	<p>The specifications of the transmission line to be placed in this project are as follows, and meet those outlined in the eligibility criterion.</p> <p>Specification of low-loss conductor;</p> <ul style="list-style-type: none"> <li>- External diameter : 27.5 mm</li> <li>- Direct-current resistance : 0.064 Ω /km</li> <li>- Tensile strength : 120,600N</li> <li>- Weight : 1,490 kg/km</li> </ul>
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## C. Calculation of emission reductions

### C.1. All emission sources and their associated greenhouse gases relevant to the JCM project

Reference emissions	
Emission sources	GHG type
Transmission loss in the reference transmission line	CO <sub>2</sub>
Project emissions	
Emission sources	GHG type
Transmission loss in the project transmission line	CO <sub>2</sub>

C.2. Figure of all emission sources and monitoring points relevant to the JCM project



available at the time of submission of the monitoring report is used.

### C.3. Estimated emissions reductions in each year

Year	Estimated Reference emissions (tCO <sub>2e</sub> )	Estimated Project Emissions (tCO <sub>2e</sub> )	Estimated Emission Reductions (tCO <sub>2e</sub> )
2017	113	101	12
2018	236	211	25
2019	863	770	93
2020	4,059	3,618	441
2021	4,059	3,618	441
2022	4,059	3,618	441
2023	4,059	3,618	441
2024	4,059	3,618	441
2025	6,306	5,621	685
2026	6,306	5,621	685
2027	6,306	5,621	685
2028	6,306	5,621	685
2029	6,306	5,621	685
2030	7,171	6,392	779
<b>Total (tCO<sub>2e</sub>)</b>	<b>60,208</b>	<b>53,669</b>	<b>6,539</b>

### D. Environmental impact assessment

Legal requirement of environmental impact assessment for the proposed project	YES
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### E. Local stakeholder consultation

#### E.1. Solicitation of comments from local stakeholders

On 19/04/2017, the stakeholder meeting was held to introduce the project of the low-loss transmission line and JCM scheme and solicit their comments at the meeting room of Mongolyn Alt Corporation. The attendees to the meeting were from Ministry of Energy, Ministry of Environment and Tourism, and Mongolyn Alt Corporation.

The attendees showed no negative comments to this project and had several questions about this project as described in the following section. Hitachi, Ltd. answered their questions mainly and there are no remaining questions to be replied.

## E.2. Summary of comments received and their consideration

Stakeholders	Comments received	Consideration of comments received
Ministry of Environment and Tourism	Who owns the low-loss transmission line?	PPs (Project participants) explained that MOE will own the low-loss transmission line of this project after completion of the demonstration project as mentioned in MOU signed by NEDO and MOE, and NPTG will operate the line. No action is needed.
	How does the strong wind affect the transmission loss? Is there any difference in the effect of energy saving between 3 or 5MW and 75 MW?	PPs explained that the influence of the wind is same as the conventional transmission line. When the temperature of the wire itself is going down, the transmission loss will be changed. Effect of energy saving is simply proportional to the power transmission amount. However, it is not to be said strictly it is true in case of small amount of transmission such as under 10MW. Even in the case, 10 to 15% energy saving will be expected. No action is needed.

	<p>What is the standard for comparison of the low-loss transmission line?</p> <p>This JCM project will last 14 years. If the conventional transmission line has the same performance with the low-loss transmission line of this project in the future, the emission reduction will be expected?</p>	<p>PPs explained that the standard for comparison is Mongolian standard. The emission reduction will be changed, if the Mongolian standard is revised and the applied methodology is also revised. No action is needed.</p>
Ministry of Energy	<p>Chinese conventional transmission line is installed in parallel with the low-loss transmission line. Is electricity supplied as the same amount between the lines?</p>	<p>PPs explained that the electricity will be supplied through the low-loss line preferentially when the power demand is limited and it is agreed between MOE and NEDO. No action is needed.</p>
Mongolyn Alt Corporation (MAK)	<p>No question and negative comments received.</p>	<p>No action is needed.</p>

#### F. References

Ref 01: Environmental Impact Assessment

Reference lists to support descriptions in the PDD, if any.

#### Annex

N/A

#### Revision history of PDD

Version	Date	Contents revised
Ver 1.0	31/05/2017	First Edition
Ver 2.0	20/07/2017	Second Edition