

Invitation for Proposals

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**OVERHEAD LINE DESIGN ISSUES & WIND AND ICE STORM MITIGATION
INTEREST GROUP (WISMIG)**

CEATI PROJECT No. T123700-3389

APPLICATION GUIDE FOR WIND SPEED-UP FACTORS

CEATI International Inc. (CEATI) invites the submission of proposals to perform research work on the following topic:

TITLE

Application Guide for Wind Speed-Up Factors

INTRODUCTION

Most wind load standards do not include wind speed effects in rapidly varying terrain where roughness characteristics change significantly over short distances in comparison to the overhead transmission line spans. These codes do not include topographically generated features such as:

- Funnelling effects in valleys or in between hills.
- Corner effects along the foot of mountains and hills.
- Vortex formation behind steep terrain.
- Other effects that may cause significantly increase wind speeds (wind speed-ups) in the local terrain.

Only a few national codes (e.g., ASCE for the US and Canada, Australia/New Zealand's AS/NZS 1170.2, "Wind Actions," and Norway) take such effects into account to any extent. It has been reported that gust factors in the range of 1.8 to 1.9 (relative to 10 minute mean wind) may apply for wind speeds in such areas at 10 m height above ground, which could mean significant changes in design wind loads for the transmission lines. Although the above codes specify the equations needed, it is not easy to determine how they should be applied.

PROJECT OBJECTIVES

The objective of this project is to develop an application guide for using the wind speed-up factor equations in the abovementioned codes and to apply these equations to an example transmission line to be specified and compare the results.

SCOPE OF THE STUDY

The successful proponent shall conduct a literature review (including References 1-3 listed below) to gather information about wind speed-up factors due to specific local terrain features such as those mentioned above. The successful proponent shall work out the wind speed-up factors for a transmission line specified by a WISMIG participant utility using the equations in ASCE 7 / ASCE74 and AS/NZS 1170.2, "Wind Actions," to provide an understanding of the correct usage of the equations and compare the results. Finally, an application guide, with examples, shall be prepared for use by transmission utilities.

The following tasks are envisioned:

- Conduct a literature review to provide an understanding of wind behaviour under rapidly varying terrain characteristics.
- Investigate and document the basis for the equations given in ASCE 74 and AS/NZS 1170.2, "Wind Actions."

- Calculate wind speed-up factors and compare results for the WISMIG-specified transmission line.
- Develop an application guide, with examples, for use by transmission utilities, and document the full results of the investigation.

References:

1. Davenport, A.G., D. Surry, P.N. Georgiou, and G. Lythe. “The Response of Transmission Towers in Hilly Terrain to Typhoon Winds.” The University of Western Ontario, Faculty of Engineering Sciences, London, Ontario
2. CIGRE technical Brochure 256: Report on Current practices regarding Frequencies and Magnitudes of High Intensity Winds
3. CIGRE Technical Brochure 410: Local Wind Speed-up On Overhead Lines for Specific Terrain Features

POTENTIAL BENEFITS

This work will provide an application guide for calculating the wind speed-up factors with varying local terrain. Using this guide, utilities will be able to accurately estimate wind loads for transmission lines located in such situations.

DELIVERABLES

Project Report:

The primary deliverable will be a comprehensive report including the details of the investigation, calculation results obtained for the WISMIG-specified transmission line, and an application guide, with examples, for use by transmission utilities.

The successful proponent is expected to prepare a ready-to-publish report on the results of the investigation and present the results to funding consortium members. The completed report must be submitted for CEATI approval in editable, electronic format (Microsoft Word). In addition, the platform and version should be specified for any software or programs to be developed. Should Excel or Access files be developed, compatibility with version 2003 is required.

Progress Reports:

Progress reports, in reasonable detail, will also be required on either a quarterly or milestone basis—normally these are scheduled to coincide with the completion of the identified tasks. It is expected that the details submitted with the progress reports would also be incorporated into parts of the final project report.

Power Point Presentation:

A ten to fifteen (10-15) slide Power Point Presentation is required to summarize the work. This should be composed of three main sections:

1. The factors motivating the initiation of the work;
2. A description of the main findings;
3. Summary of the conclusions and recommendations for future research.

Technical Brief:

The successful proponent shall prepare the contents for the Project's Technical Brief. This is a summary of the report (between 1,000 and 1,500 words), which is published separately by CEATI. Proponents are not responsible for the preparation of a ready-to-print Technical Brief, but solely to provide the contents for the following 4 sections: Background, Summary, Conclusions, and Recommendations.

1. The Report Background section should be short (approximately 200 words) and should detail the reasons the work was conducted.
2. The Summary section should be approximately 700 words. It must provide a general description of the work program.
3. The Conclusions section should be about 150 words and should provide a general outline of the key results (do not include specifics).
4. The Recommendations section should be about 200 words and should include a description of the potential applications of the results.

Please note that all reporting must be submitted in English. If written English is not the author's strong suit, it is recommended that a technical writer be hired to review the document prior to submission.

BUDGET AND SCHEDULE

The proposal must contain a schedule and a quote of required remuneration for the work in US dollars. Proponents' responses to this section must include a full breakdown of the budget and schedule, including an indication of rates and hours and the task allocation for the key personnel by task and must correspond to any phases or milestones outlined above. (Please refer to the Proposal Template for more information).

It is estimated that the budget for this project would be around \$40,000 USD. It is expected that this project can be completed (draft final report submitted for review and approval) within twelve (12) months of initiation.

The proposal must include the names and qualifications of the key individuals who will be involved, as well as the name of the accountable manager.

CEATI is not bound to accept any proposal but any selection will take into account technical merit (as displayed by the description and details presented in the proposal regarding the ways in which the proponent plans to meet the scope and objective of the project), qualifications including relevance of the experience of the proposed project team in undertaking similar work, price and schedule. A proposal may be accepted in whole or in part. A commitment to proceed with the first phase of a multi-phase project does not automatically imply that the work of the subsequent phases will be undertaken.

ALTERNATIVE WORKS

Proponents shall generally follow the above description of work, but are encouraged to offer alternative works if these alternatives will meet the objectives and provide a better end product to the utilities sponsoring this work. Alternatives shall be fully described including logistics

explaining why the alternate works are being offered and the benefits to be realized by the funding utilities. Where alternatives are proposed, separate budgets shall be calculated for each alternative.

SUBMISSION OF PROPOSALS

The consideration of proposals received will be limited to those who indicate their intent to employ a suitable experienced project team and who possess proper facilities to perform the work. Receipt of this “IFP” does not necessarily constitute a prior determination by CEATI that your organization has the requisite experience and facilities.

The proposal must be properly completed and executed in accordance with the CEATI guidelines available at <http://www.ceati.com/technology-providers/submission-guidelines>, and shall be submitted to CEATI as an attachment in Microsoft Word at the following website: <http://prs.ceati.com/proposals/>. Be sure to indicate project number “**T123700-3389**” on the submission form. For assistance, please contact us at 514-866-5377.

The successful proponent will be required to sign the CEATI Standard Agreement upon project initiation. Proponents are encouraged to download a copy of the Standard Agreement for review from <http://www.ceati.com/technology-providers/submission-guidelines> prior to submitting a proposal, if they are not already familiar with these terms. Proponents may contact CEATI at projects@ceati.com to discuss any questions or concerns regarding these terms.

CLOSING DATE FOR RECEIPT OF PROPOSALS

~~Thursday, February 9, 2012, 4:00 pm EST~~

Now: Friday, February 17, 2012, 4:00 pm EST