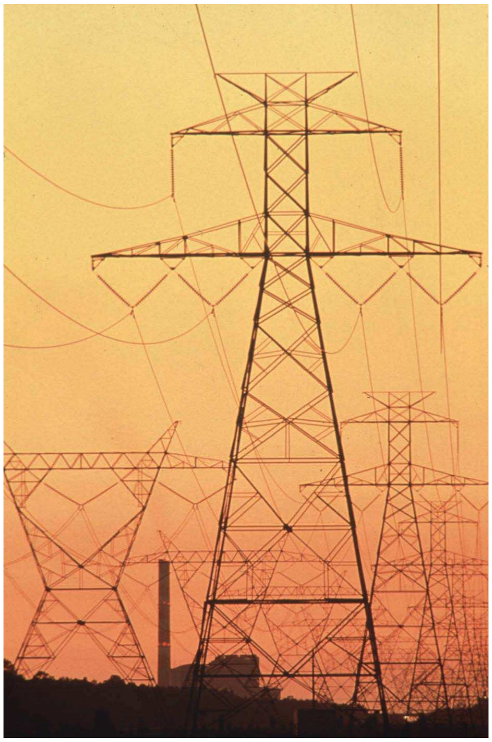
High-Temperature, Low-Sag Transmission Conductors



Successful field demonstrations of "high-temperature, low-sag" transmission conductors" will give utilities vital information on installing, operating, and maintaining these conductors to significantly increase power transmission capacity.

Transmission line thermal ratings may be significantly increased by replacing existing conductors with special "high-temperature, lowsag" conductors, which may be operated at temperatures as high as 250°C while meeting sag and annealing constraints.

The majority of overhead transmission lines currently use steel-reinforced aluminum conductors (ACSR). ACSR can be operated at temperatures up to 100₀C and, during emergencies, at temperatures as high as 150₀C with some reduction in conductor strength. Today, however, power industry deregulation is placing new demands on the delivery system and altering high-voltage transmission network power flow patterns. As a result, networks are increasingly being forced to support power flows for which they were never designed.

One approach to addressing this dilemma would involve upgrading the transfer capacity through reconductoring of selected network lines. In recent years, conductor manufacturers have produced new, nontraditional conductors capable of operating at temperatures as high as 250 ₀C without violating present electrical clearances to ground and other objects, and without losing conductor strength. While these conductors have passed accepted industry standards tests for performance, utilities are wary of installing these yet unproven technologies without having first gained an insight into their performance in a real-world setting.

Project Summary This project will evaluate the performance of selected "high-temperature, low-sag" conductors that are capable of significantly increasing the current carrying capacity of thermally constrained transmission lines without the need for extensive tower modifications. Examples include a few composite reinforced conductors, gapped conductors, and commercial forms of ACSS (Aluminum Conductor Steel Supported) such as ACSS-TW (Trapezoidal shaped Wire strands) using either aluminum alloy or pre-annealed aluminum.

The project will provide participating utilities with information on the operational performance of these new conductors through approximately three years of field trial experience and member-specified laboratory tests to evaluate conductor performance and to simulate material aging.

In addition, the project will evaluate the performance of conductor fittings—including splices and dead-ends—in both field and laboratory tests.

Further, the project will compile practical "engineering-type" information to aid utilities in designing, specifying, installing, inspecting, and maintaining the conductors. The results will position participating utilities as informed buyers and users of the technology. The project will answer questions, such as:

- How do manufacturer claims compare to field and laboratory performance?
- What are the design parameters for these conductors?
- What engineering changes are necessary when replacing existing conductors with these products?
- What is the impact of these conductors on existing tower design?
- What special handling precautions apply?
- What stringing procedure has to be followed and what equipment is required?
- How do these conductors age, and what factors influence aging?
- What is the long-term performance of conductor fittings and associated line hardware?
- What inspection techniques should be used?
- What engineering guidelines and training materials are required?

Deliverables

- Project review meetings, held twice a year, plus regular project updates. At these meetings, progress and future plan will be discussed.
- Field and laboratory test results. Will be reported regularly or when consultation with members is required.
- Technical workshops. Workshops will be conducted on specific engineering and technical aspects. Examples may include visits to manufacturers, site visits, observation of fieldwork, and training for designers and construction/maintenance personnel.
- Final project report and workshops. The final reports will include a summary and analysis of the field and laboratory results. Results will be presented to members at a final project workshop.

Benefits of Participation Participants will have the benefit of gaining design information and first-hand experience on installation and operation of "hightemperature, low-sag" transmission conductors. Host utilities will have the "high-temperature, low-sag" transmission conductor installed in their transmission system, benefiting from its higher thermal rating capacity.

Price of Project Each member will contribute $100,000 matched (or $200,000 of co-funding) to participate, irrespective of whether or not the utility is a host site. These funds will be used to cover all aspects of the proposed project.

Schedule The project is expected to last between 36 and 48 months, from January 2003. This time frame will involve at least three summers of field trials and time to establish the field trials, conduct the monitoring, write and present findings, and complete site decommissioning.

Who Should Join Utilities should join this project who are looking for ways to increase power transfer capability of their thermally limited transmission system, and who are supporting strategic science and technology development in power transmission.

Contact Information For more information, contact John Chan, EPRI Project Manager, at 650.855.2452 (jchan@epri.com) or the EPRI Customer Assistance Center (EPRI CAC) at 800.313.3774 (askepri@epri.com).

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