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**Construction Engineering
Research Laboratory**



**US Army Corps
of Engineers®**
Engineer Research and
Development Center

Building Energy Performance Improvement Through Advanced Technologies, Smart Organization, and Financing

**Proceedings of the Industry Workshop,
Chicago, IL 7-8 October 2003**

Alexander Zhivov

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Building Energy Performance Improvement Through Advanced Technologies, Smart Organization, and Financing: Proceedings of the Industry Workshop, Chicago, IL 7-8 October 2003

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ABSTRACT: Energy savings performance contracts (ESPCs) are a way to obtain needed resources such as manpower and technical expertise by paying for those resources through savings from reductions in facility energy use. However, it appears that ESPC contractors have exhausted the “low hanging fruit” opportunities for energy savings. Future projects will likely require technical and methodological support, allowing for more detailed energy systems assessment, better understanding of the available technologies and the level of their maturity, accurate replacement technology benchmarking, and economic guidance. This Workshop was organized to assemble users and contractors, researchers, and manufacturers to share the information and needs related to ESPCs and to scope future activities, which DOD and DOE are proposing to undertake. Participants made formal presentations; these proceedings include the content of those Microsoft® PowerPoint® presentations.

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Conversion Factors

Non-SI* units of measurement used in this report can be converted to SI units as follows:

| Multiply | By | To Obtain |
|---|---|------------------|
| acres | 4,046.873 | square meters |
| cubic feet | 0.02831685 | cubic meters |
| cubic inches | 0.00001638706 | cubic meters |
| degrees (angle) | 0.01745329 | radians |
| degrees Fahrenheit | $(5/9) \times ({}^{\circ}\text{F} - 32)$ | degrees Celsius |
| degrees Fahrenheit | $(5/9) \times ({}^{\circ}\text{F} - 32) + 273.15$ | kelvins |
| feet | 0.3048 | meters |
| gallons (U.S. liquid) | 0.003785412 | cubic meters |
| horsepower (550 ft-lb force per second) | 745.6999 | watts |
| inches | 0.0254 | meters |
| kips per square foot | 47.88026 | kilopascals |
| kips per square inch | 6.894757 | megapascals |
| miles (U.S. statute) | 1.609347 | kilometers |
| pounds (force) | 4.448222 | newtons |
| pounds (force) per square inch | 0.006894757 | megapascals |
| pounds (mass) | 0.4535924 | kilograms |
| square feet | 0.09290304 | square meters |
| square miles | 2,589,998 | square meters |
| tons (force) | 8,896.443 | newtons |
| tons (2,000 pounds, mass) | 907.1847 | kilograms |
| yards | 0.9144 | meters |

* *Système International d'Unités* ("International System of Measurement"), commonly known as the "metric system."

Preface

This study was conducted for Headquarters, U.S. Army Corps of Engineers (HQUSACE) under Project 4A262784AT45, “Energy Technologies Applied to Military Facilities”; Work Unit “Energy & Utilities Readiness.” The technical monitor was Mr. Gary Schanche, CEERD-CV-T.

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