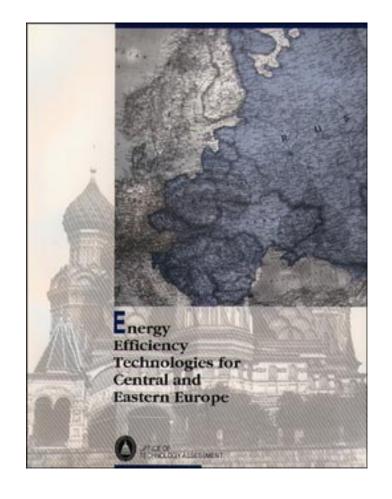
Energy Efficiency Technologies for Central and Eastern Europe

May 1993

OTA-E-562 NTIS order #PB93-203750 GPO stock #052-003-01321-5



Recommended Citation:

U.S. Congress, Office of Technology Assessment, nergy Efficiency *Technologies for Central and Eastern Europe, OTA-E-562* (Washington, DC: U.S. Government Printing Office, May 1993).

Foreword

he Senate Committee on Environment and Public Works, the House Committee on Foreign Affairs, the House Committee on Energy and Commerce, the Senate Committee on Foreign Relations, and the House Subcommittee on International Development, Finance, Trade, and Monetary Policy requested an assessment of energy and environmental technology transfer to Central and Eastern Europe. The intent is to determine how U.S. energy technology can help in resolving the economic and environmental problems of the region, and the impact of measures to expedite the process.

This report, the first of two from that assessment, focuses on the improvement of energy efficiency. It reviews how energy is used in the former centrally planned economies. Then it analyzes the potential effectiveness of modern technology in reducing energy waste and the factors that constrain improvements. The report also examinesgovernment programs assisting energy efficiency technology transfer and opportunities for U.S. businesses. Finally, it discusses congressional policy options to support technology transfer.

Technology transfer to improve the efficiency of energy use is a highly costeffective way to support economic reform, democratization, and stability in the former Communist countries. Energy is used very wastefully in Russia, Ukraine, Poland, Hungary and other formerly centrally planned economies. This waste limits economic development and contributes to local and global environmental degradation. Thus this report is timely for congressional deliberations on assistance to the region, on how to increase U.S. exports, and on how to reduce environmental problems.

The second report, to be released in 1994, will address issues of energy supply as well as continuing the analysis of energy efficiency.

OTA appreciates the invaluable advice and assistance of the many people who contributed to this project, including the advisory panel, participants at the two workshops, reviewers, and contractors.



Roger Herdman, Acting Director

Advisory Panel

Marshall Goldman, Chairman Russian Research Center, Harvard University; Wellesley College

Margaret Bowman Environmental Law Institute

Robert Campbell University of Indiana

William U. Chandler Pacific Northwest Laboratory

Charles Ebinger International Resources Group

Robert Ebel Center for Strategic and International Studies

Richard Jacobs Newstar, Inc.

Richard A. Liroff World Wildlife Fund Simon K. Mencher Alpha Finance and Management Corp.

John P. Minneman Chase Manhattan Bank

Espy P. Price Chevron Overseas Petroleum Inc.

Matthew J. Sagers PlanEcon, Inc.

Raymond Sero Westinghouse Energy Center

Ray Snokhaus Houston Industries, Inc.

Robert Socolow Princeton University

Richard Spears Spears and Associates

NOTE: OTA appreciates and is grateful for the valuable assistance and thoughtful critiques provided by the advisory panel members. The panel does not, however, necessarily approve, disapprove, or endorse this report. OTA assumes full responsibility for the report and the accuracy of its contents.

Preject Staff

Peter D. Blair Acting Assistant Director Energy, Materials, and International Security Division

Lionel S. Johns Assistant Director, OTA to Feb. 1, 1993 Alan T. Crane Project Director

Joanne M. Seder Senior Analyst

Paul S. Komor Senior Analyst

Gretchen Kolsrud Senior Associate

Joe Raguso Contractor

ADMINISTRATIVE STAFF Lillian Chapman Office Administrator

Linda Long Administrative Secretary

Tina Aikens Secretary CONTRIBUTORS Sharon Burke Michael Krajnak Adi Mannor Michael Katz

CONTRACTORS

Russian-American Science, Inc. U.S. Commercial Representative of the Russian Academy of Sciences

Stan Kolar Kolar Associates

Continuum International, Inc. Alexandria. VA

Eric Martinet Lawrence Berkeley Laboratory

Udi Helman Center for Strategic and International Studies

Jane S. Zacek Albany, NY

Steven P. Meyers Lawrence Berkeley Laboratory

Workshop Participants

European Perspectives on Energy Efficient Technology, Kaunas, Lithuania, Oct. 21, 1992

Lithuania Vykintas Suksteris Lithuanian Energy Institute

Stasys Kytra Kaunas Technological University

Anupras Slanciauskas Lithuanian Energy Institute

Antanas Juska Ministry of Energy

Knut Digerud Asea Brown Boveri

Vytautas Niedvaras Asea Brown Boveri

Juozas Burneikis Lithuanian Energy Institute

Mindaugas Krakauskas Lithuanian Energy Institute

Vidmantas Jankauskas Lithuanian Energy Institute

Vytautas Martinaitis Technical University of Vilnius

Matas Tamonis Lithuanian Energy Institute

Vaclovas Miskinis Lithuanian Energy Institute

Latvia Zigurd Krisans Latvian Academy of Sciences Halina Abramova Institute of Physical Energetic

Ivars Bekmanis Institute of Physical Energetic

Dagnija Blumberga Riga Technical University

Estonia Mart Motus Institute of Thermophysics and Electrophysics

Russia Tatiana V. Lisochina St. Petersburg State Technical University

Ukraine Nicola Gnidoy Ukraine Institute for Energy Saving Problems

Anatolij Usik Ukraine Institute for Energy Saving Problems

Michail Kulik Ukraine Institute for Energy Saving Problems

Belarus Leonid Padalko Belorussian Polytechnical Academy

Leonard L. Vasiliev Luikov Heat and Mass Transfer Institute Poland Zdislaw Bibrowski Institute of Fundamental Tehnological Research

Slawomir Pasierb Polish Foundation for Energy Efficiency

Zygmunt Parczewski Institute of Fundamental Technical Research

Czechoslovakia Jaroslav Marousek Center for Energy Efficiency

Hungary Laszlo Lennert Schlumberger-Ganz Meter Co,

Germany Joachim Stainer ESAG

Carsten Oder Institute for Industrial Production

Hans D. Haasis University of Karlsruhe

Tihomir Morovic Forschungsgesellschaft fuer umw. Energie, Germany

Hubert Meiners ICEU

Denmark Niels A. Clemmesen ABB Kraft A/S Kurt T. Andersen BWE A/S

Ove Hjuler SM-Contractors A/S

Erik G. Madsen A.J. MOE A/S

Magnus Foged COWIconsult

Arne Levorsen Danish Power Consult A/S Switzerland Daniel Spreng ETH

Gabriel Mamane University of Geneva

Belgium Thomas Trumpy International Legal Counsel

Netherlands Aad Correlje Erasmus University Wolfgang F. Lutz International Institute for Energy Conservation

United States Mark Hanson Resource Management Associates

Eric Martinet University of California at Berkeley

U.S. Perspectives on Energy Efficiency Technology Transfer, Washington, DC, Sept. 18, 1992

Ronald Bowes Office of Conservation and Renewable Energy U.S. Department of Energy

William U. Chandler Battelle, Pacific Northwest Laboratories

Rick Cudahy Sycom Enterprises

William Fulkerson Oak Ridge National Laboratory

Shirley Hansen Hansen Associates Udi Helman Center for Strategic and International Studies

Mark Hopkins The Alliance to Save Energy

Philip Israilevich Regional Economics Applications Laboratory Federal Reserve Bank

Stan Kolar Kolar Associates

Marc Ledbetter American Council for an Energy Efficient Environment Eric Martinet Lawrence Berkeley Laboratory

Rob Watson National Resource Defense Council

Robert Socolow Center for Energy and Environmental Studies Princeton University

David Wolcott RCG/Hagler, Bailly

Reviewers

Robert Archer Agency for International Development Washington, DC

Robert Berend Center for Energy Efficiency Prague, Czech Republic

Stephen Clifton Houston Industries, Inc. Houston, TX

Robert Ichord Agency for International Development Washington, DC.

Vidmantes Jankauskas Lithuanian Energy Institute Kaunas, Lithuania

Stephen Meyers Lawrence Berkeley Laboratory Berkeley, CA

Slawomir Pasierb The Polish Foundation for Energy Efficiency Warsaw, Poland **Richard Perez** Westinghouse Energy Center Pittsburgh, PA

Nikolai Raptsoun Ukrainian Academy of Sciences Kiev, Ukraine

James Ryan The Perkin-Elmer Corporation Norwalk, CT

Lee Schipper Lawrence Berkeley Laboratory Berkeley, CA

Vladimir Tonkal Ukrainian Academy of Sciences Kiev, Ukraine

Thomas Trumpy International Legal Counsel Brussels, Belgium