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# Project Summary

# Integration of Building and Energy Technology with Onsite Waste Management in the Year 2000

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**A study was conducted to examine the potential and feasibility of integrating waste management, water supply, and onsite energy generation to improve the efficiency of residential units. Viable utility systems are projected for the year 2000 to serve typical single-family residences in areas beyond the reach of sanitary sewers. The 1980 state of the art was assessed as a basis for analysis, and integrated onsite utilities were evaluated for feasibility. Detailed analyses were performed for the most promising cases. Evaluations were based on quantities of a resource saved rather than on costs, since actual costs could not be realistically projected.**

**The study concludes that more efficient use of resources to perform the same tasks is the most cost effective approach to reducing consumption. Thus low-water-use fixtures, greater insulation, more efficient furnaces, and similar approaches show greater promise than reuse technologies such as greywater heat recovery and reuse of waste heat recapture.**

***This Project Summary was developed by EPA's Water Engineering Research Laboratory, Cincinnati, OH, to announce key findings of the research project that is fully documented in a separate report of the same title (see Project Report ordering information at back).***

## *Introduction*

Rising fuel costs and recurring water shortages throughout this country have caused increasing demands for alternatives to the standard household utility system. The New England area, which has been hard hit by the rising cost of imported oil, has seen an unprecedented growth in the use of wood for space heating. The recent drought in California led to the development of many unique water reuse schemes. This study examines the potential and feasibility of integrating waste management, water supply, and onsite energy generation to improve the overall efficiency of residential units.

Significant, comprehensive utilities research is being conducted in many areas. This study therefore provides a cross-disciplinary survey with particular emphasis on integration. The staff for this study reflected this approach and included sanitary engineers, a resource economist, a solar architect, and a mechanical engineer–all with expertise in the design of alternative residential waste management and energy systems. The full report will provide members of the various research and development communities with a sufficient understanding of other fields to foster an appreciation of the potential costs and benefits of various alternative technologies.

## Study Scope

The full report attempts to project for the year 2000 viable utility systems for the typical single-family residence in rural and suburban areas that are beyond the projected reach of sanitary sewers. A range of residential units were examined, including market houses, mobile homes, custom homes, and small, multi-unit structures.

An assessment of the 1980 state of the art provided the basis for further analysis. Projections of resource availability and residential patterns were evaluated to determine the most likely setting for new residential construction in the year 2000.

## Conclusions

The typical 1980 residential construction is inefficient in terms of both enery and water consumption. This study concludes that more efficient use of resources to perform the same tasks is the most cost effective approach to reducing consumption. Thus low-water-use fixtures, greater insulation, more efficient furnaces, and similar approaches show greater promise than reuse technologies such as greywater heat recovery and reuse of waste heat recapture.

## Recommendations

The chief recommendation of this study is to implement water-efficient technologies and to improve the performance of traditional onsite wastewater technologies under the resulting low-flow conditions. Most nontraditional water and wastewater systems are either quite complex or designed to serve a very specialized market. Thus research in this area should receive a low priority, at least until the benefits of water-efficient technologies have been fully explored.

Modifying structures to facilitate source separation of recyclable materials for collection from home is one area of traditional solid waste management that has been identified for further research. Additional research on using wastepaper as an auxiliary fuel should receive priority. Increased use of biodegradable solid wastes in food production should also be examined.

Three approaches are recommended for reducing resource consumption:

1. Improve the efficiency of the equipment.
2. Recycle the resource onsite.
3. Cycle the resource from a higher to a lower use.

The full report was submitted in fulfillment of Contract 68-03-2893 by Urban Systems Research and Engineering, Inc., Cambridge, MA, under the sponsorship of the U.S. Environmental Protection Agency.

*Patricia L. Deese, Lisa Heschong, and Winslow Fuller were with Urban Systems Research and Engineering, Inc. during the time of this study.*
***Robert P. G. Bowker** was the EPA Project Officer (see below).*
*The complete report, entitled "Integration of Building and Energy Technology with Onsite Waste Management in the Year 2000," (Order No. PB 85-180 479/AS; Cost: $16.00, subject to change) will be available only from:*
*National Technical Information Service*
*5285 Port Royal Road*
*Springfield, VA 22161*
*Telephone: 703-487-4650*
*The EPA contact person is James F. Kreissl who may be reached at:*
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