

penetration and energy savings of innovations are estimated (Sections 4 and 5).

Section 4 discusses five innovations that are judged to be fully-commercialized:

- solid-state ballasts for fluorescent lighting,
- low-emissivity coatings for windows,
- microprocessor-controlled unequal parallel compressor systems for supermarket refrigeration,
- the flame retention head oil burner (FRHOB), and
- DOE-2.

Section 5 covers seven semi-commercialized innovations, ones that have entered the market but have relatively low levels of market penetration:

- dialectic coatings for lighting fixtures,
- heat pump water heaters (HPWHs),
- radiant barriers,
- Wisconsin audit,
- Computerized, Instrumented, Residential Audit (CIRA),
- Hotbox method for testing heat transfer through walls, and
- tracer gas testing.

Section 6 presents lessons from the case studies and prior research concerning which technology transfer strategies are most effective and under what circumstances each strategy is most appropriate. These lessons are tentative given our small sample size.

1.4 BARRIERS TO INNOVATION IN THE BUILDINGS INDUSTRY

The rate of innovation adoption in the buildings industry is unusually slow as indicated by its lethargic gains in productivity relative to other sectors of the U.S. economy (Nelson and Winter, 1977; Abernathy, 1983). The construction industry, in particular, has been identified as a "laggard" industry by the federal government (Roessner, 1984).

Innovation in the buildings industry is plagued by many barriers. At each stage of the innovation process (including research and development, entry into the marketplace, and widespread adoption), there are significant barriers. A variety of barriers to innovation in the buildings industry are