4. CASE STUDIES OF FULLY-COMMERCIALIZED INNOVATIONS

4.1 LOW-EMISSIVITY COATINGS FOR WINDOWS

4.1.1 The Innovation

In 1976 the U.S. Department of Energy initiated a research program at Lawrence Berkeley Laboratory (LBL) to develop new energy-efficient window technologies. After an LBL review of potential window research projects, low-emissivity (low-E) coatings were selected as the major DOE program emphasis. At that time, the principle behind low-E coatings was understood, but no low-E windows were commercially available in the United States.

Low-E coatings offer high energy savings potential by reducing a major component of winter heat loss in buildings - the transfer of long-wave infrared radiation between glazing elements. Low-E coatings reflect a large fraction of the invisible, near infrared energy back to its source while remaining transparent to visible light. They provide an insulating value equivalent to a triple-glazed window (R-2 to R-3) but transmit 70-80% of the sun's light (Greer, 1987). Since low-E windows reflect radiant heat back to its source, heat stays inside in winter and outside in summer (Rush, 1987). Thus, windows with low-E coatings admit light and useful solar heat gain, but behave thermally more like an insulated wall (American Council for an Energy-Efficient Economy and Energy Conservation Coalition, 1986).

4.1.2 The DOE Role

During the late 1970's, a series of parallel research projects was undertaken by LBL with DOE support. Several small research firms received subcontracts to investigate suitable coating systems and deposition processes (Selkowitz, 1986). Extensive conversations and meetings were held with glass