- the limited use of mass production and standardized practices;
- the numerous decision-makers involved in construction projects and the ad hoc nature of project teams; and
- the lack of coordination between sectors: commercial, residential, and industrial (The Business Roundtable, 1982).

1.4.2 Barriers to Market Entry and Penetration

Several characteristics of the buildings industry slow the market entry and penetration of energy-efficient technologies. One relevant characteristic is the large number of decision-makers involved. Consider, for example, the implications of having numerous, different parties engaged in the design and construction of buildings. The design of many large buildings involves an architect for the building envelope and mechanical engineers for the heating, ventilation, and air conditioning (HVAC) system. Poor coordination between envelope and equipment decisions often results, as when energy-efficient approaches to envelope design do not result in down-sized HVAC equipment. Often the decisions made by architects and mechanical engineers are based on minimizing first costs to stay within a construction budget. This is a deterrent to new energy-efficient products which tend to have higher first costs, but lower life-cycle costs than standard products.

The tendency to minimize first costs and to ignore life-cycle costs is widespread because of misplaced incentives and imperfect information about the performance of new technologies. Incentives to reduce life-cycle costs are usually relevant only to the building owners, owner-occupants or tenants who pay the energy bills. Yet it is builders, without direction from the eventual owners and occupants, who typically decide how energy-efficient a new structure's envelope will be. They also usually select and purchase large numbers of furnaces, water heaters, and other appliances without the