



Figure 22.4 Solar office in Doxford Sunderland (UK) with a transparent double-glazing PV system integrated in the façade. The 73 kWp PV system is manufactured by Saint Gobain and mounted in Schüco window frames. Reproduced with permission by Dennis Gilbert

Transparent PV modules used as roofing materials serve as water and sun barriers and also transmit daylight (see Figure 22.4). In glass-covered areas, such as sunrooms and atriums, sun protection on the roof is necessary in order to avoid overheating in summer. The PV cells absorb 70 to 80% of the sun radiation. The space between the cells transmits enough diffused daylight to achieve a pleasant lighting level in the area. PV cells were used in this way at the Centre for Sustainability De Kleine Aarde in Boxtel (NL) [11] and the Brundtland Centre (DK). Using transparent PV modules in the Solar Office in Doxford (UK), has resulted in a similar contrast in the façade [12]. In order to increase the usage of daylight in the workplaces, transparent PV modules have been used instead of glass.

Of course, PV cells convert sunlight into electricity (with typical efficiencies of 6–15%) with the remainder of the solar energy being converted into heat. At the project “Haus der Zukunft” in Linz (AT), this residual heat is also used to warm the home [13]. An air cavity has been created underneath the PV modules, through which warm air (heated by PV modules) is exhausted. The hybrid collector provides warm air to the heating system in the home, which in this case, makes it a cost-effective use of the collector.

At the Netherlands Energy Research Foundation (ECN) in Petten (NL), Building 42 has a conservatory with 43 kWp BP solar roof-integrated transparent laminates that reduce light and sun transmission by around 70% as compared to glass. The conservatory therefore acts as a big parasol over the offices, protecting them from the sun while still providing enough daylight (Figure 22.5) [14].

Facades are basically constructed using *in situ* bricklaying or concrete constructions, prefab elements or structural metal facades that are mounted in place. Concrete constructions form the structural layer and are covered with insulation and a protective cladding [15]. This cladding can be wood, metal sheets, panels, glass or PV modules. For luxury office buildings, which often have expensive cladding, cladding with PV modules is not more expensive than other commonly used materials, for example, natural stone