Windows are central for the development of liveable nearly zero-energy homes and require careful consideration. Various studies have indicated that the effect of windows on energy consumption may change significantly with improved building insulation levels. Current guidelines on windows may therefore not apply in very well-insulated buildings, and more up-to-date information is needed about window solutions that are appropriate for the new conditions. This study maps the effect of multiple combinations of window size and basic glazing—and frame properties on energy, daylighting and thermal comfort in nearly zero-energy houses located in the European cities Rome and Copenhagen. The aim was to identify options that can support the easy and robust design of future homes with typical use of roof and façade windows. Hourly daylight levels were calculated in DAYSIM, while space heating demand and operative temperatures were calculated in EnergyPlus. The results support previous findings on the limited ability of nearly zero-energy buildings to utilise solar gains. It was found that U-values are becoming increasingly important for the energy performance of windows. The paper sketches the increased flexibility and related possibilities that may appear with improved roof window frame constructions and glazing U-values far lower than currently standard levels.