Previous research on the diffusion of solar PV in Africa has mainly focused on solar home systems (SHS) in individual countries and thus overlooked developments in other PV market segments that have recently emerged. In contrast this paper adopts a regional perspective by reviewing developments in supportive policies, donor programs and diffusion status in all PV market segments in Kenya, Tanzania and Uganda, as well as identifying the key factors put forward in the literature to explain differences in the diffusion of SHS in these three countries. The paper finds two emerging trends: (i) a movement from donor and government-based support to market-driven diffusion of solar PV; and (ii) a transition from small-scale, off-grid systems towards mini-grids and large-scale, grid-connected solar power plants. The paper points out three generic factors that have contributed to encouraging SHS diffusion in all three countries: (i) the decline in world market prices for PV modules; (ii) the prolonged support from international donors; and (iii) conducive framework conditions provided by national governments. The paper also identifies five key factors that have been elaborated in the literature to explain the higher level of SHS diffusion in Kenya compared to Tanzania and Uganda: (i) a growing middle-class; (ii) geographical conditions; (iii) local sub-component suppliers; (iv) local champions; and (v) business culture. Finally, the paper discusses the lack of attention in the literature given to analysing the amount, nature and timing of donor and government support across countries, processes of learning and upgrading in local PV industries and the interaction between the different explanatory factors.