Prefabricated modular tower of the kind used as a support for wind generators and other applications uses reduced-thickness prefabricated elements which are reinforced with an internal structure of horizontal and vertical stiffeners, preferably made of reinforced concrete. The elements are tensioned both horizontally and vertically by flexible metal cables. The main advantages of the invention are that it enables fast construction of very high towers using a limited number of elements. The elements are not heavy and are easy to transport, all of which leads to savings in manufacturing, transport and installation costs.