

**Macrocategoria:** Geometria e Sicurezza

**Titolo articolo:** Photovoltaic Roundabouts for Enhancement of Self-Sufficiency and Resiliency

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**Abstract:** Roundabouts have become a common type of intersection design in many countries. The area of the center island can be used to install a photovoltaic system to power local loads such as lighting systems. The objective of this study is to evaluate the degree of self-sufficiency that a roundabout can achieve depending on the availability of the area for the installation of a photovoltaic system and the energy demand for lighting. The methodology is divided into five steps aimed at calculating the parameters required to characterize the roundabouts from the point of view of the electricity that can be generated by the photovoltaic systems installed, and then to evaluate the energy consumption required to operate the different system solutions for lighting. The mini roundabouts are not considered as a location for the photovoltaic system; in fact, the minimum diameter must be between 29 and 34 m. Considering the available irradiance in Italy, systems with monocrystalline silicon modules are sufficient to ensure energy self-sufficiency at diameters of 24 m or more. Systems with polycrystalline silicon modules are suitable to ensure energy self-sufficiency at diameters of 25/26 m or more. Photovoltaic (PV) technology continues to make progress in increasing efficiency, such as bifacial PV modules. This means that even smaller roundabouts could be eligible for a PV system sized to meet local electricity needs.

**Keywords:** Photovoltaic technology; monocrystalline silicon; polycrystalline silicon; energy demand; electricity productivity; street illumination; roundabout design

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