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Abstract

By ratifying the Paris Agreement on Climate Change, Switzerland has committed to become CO2 neutral by the year 2050. The 2011 Fukushima reactor disaster has pushed the Swiss government to progressively retreat from nuclear power. These two simultaneous goals will bring the country to face an Energy Dilemma which is described in the first part of this paper. To meet its 2050 goals, several energy reduction measures and policies are being implemented as well as increasing support for inland renewable energy production. An analysis of Switzerland's current energy options shows that, regardless of such measures, available renewable energy options such as hydroelectric, wind and solar photovoltaic, while useful and necessary, cannot be sufficiently scaled to replace both nuclear power and carbon fossil fuel energy sources by the year 2050. This will result in major economic and societal consequences for the country if sufficient clean energy resources cannot be secured. The second part of the paper introduces the Space Energy Option - the concept of harvesting energy in space -- Astrostrom -- to address Switzerland's energy dilemma. To demonstrate its economic feasibility, a cost comparison between a Solar Power Satellite (SPS) and a nuclear power station of comparable capacity was made using a simple Levelized Cost of Electricity (LCOE) calculation by making a comparison of the Engineering, Procurement and Construction (EPC) costs of both systems. Then the price per kWh delivered by SPS is compared with the current price of solar power in Switzerland to determine a profitability scenario. The analysis indicates that Switzerland could not only provide sufficient CO2 neutral energy to meet its 2050 policy goals, but potentially could also achieve energy independence that is both sustainable and profitable.

A short bio

Arthur R. Woods is a Swiss independent researcher and astronautical artist with two art projects successfully flown on the Russian Mir space station: the Cosmic Dancer sculpture in 1993 and Ars Ad Astra: The First Art Exhibition in Earth Orbit in 1995 during the EuroMir95 mission. His work has been exhibited in a number of international space and art exhibitions, most recently (2019) in 'Fly me to the Moon. The Moon Landing: 50 Years On' at the Kunsthaus Zürich. He has co-managed several studies for the European Space Agency. He is a member of the International Academy of Astronautics and co-chair of the Moon Village Association's Cultural Considerations Working Group.