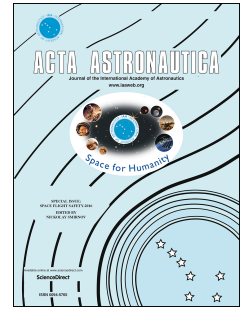


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Space assets, technology and services in support of energy policy**C.A. Vasko^a, M. Adriaensen^b, A. Bretel^c, Isabelle Duvaux-Bechon^d and C.G. Giannopapa^{a,d}**^a *Eindhoven University of Technology, P.O. 513, 5600 MB Eindhoven, The Netherlands, christopher.vasko@gmail.com*^b *Procurement Department, European Space Agency, 52 Rue Jacque Hillairet, 75012, Paris, France*^c *Catholic University of Paris, 69, Boulevard de Beausejour*^d *Strategy Department, European Space Agency, 8-10 Rue Mario Nikis, 75015 Paris, France***Abstract**

Space can be used as a tool by decision and policy makers in developing, implementing and monitoring various policy areas including resource management, environment, transport, security and energy. This paper focuses on the role of space for the energy policy. Firstly, the paper summarizes the European Union's (EU) main objectives in energy policy enclosed in the **Energy Strategy 2020-2030-2050** and demonstrates how space assets can contribute to achieving those objectives. Secondly, the paper addresses how the European Space Agency (ESA) has established multiple **initiatives** and **programs** that directly finance the development of space assets, technology and applications that deliver services in support of the EU energy policy and sector. These efforts should be continued and strengthened in order to overcome identified technological challenges. The use of space assets, technology and applications, can help achieve the energy policy objectives for the next decades.

INTRODUCTION: THE EUROPEAN ENERGY SECTOR

Europe has been facing problems related to energy supply. In particular, it faces strong dependency on imports from third countries, instabilities in oil and gas supply, and volatile energy prices. Additionally, the energy market faces a number of challenges in relation to the interconnection of national and international markets and the need for more transparency and European integration as well as the large investments related to energy infrastructure, transport issues, slow – albeit increasing – development of improved efficiency and renewable energy resources and the increased challenges posed by the global increase of energy demand and by climate change.

Space can be used as a tool by decision and policy makers in developing, implementing and monitoring various policies, amongst them energy policy [1]. The European Union is the world's largest regional energy market and the world's second largest energy market. Energy is a core element to industry, economy and the citizens and it is essential to ensure safe, secure, sustainable and affordable access to energy. The Union's import dependency in all fuels was 53.2% in 2013 [2]. The 2013 EU-28 energy gross inland consumption was 31.1% dependent on petroleum products, 21.4% on gas, 29% on solid fuels, 4.8% on nuclear and 13.5% on renewable sources [2]. Europe's import dependency for crude oil and gas is mainly from Russia (33.4% for oil and 39% for gas) and Norway (11.7% for oil and 29.5% for gas). Other sources for oil are Nigeria (8.1%) and Saudi Arabia (8.6%) and for gas Algeria (12.8%) and Qatar (6.7%) [2].

Europe perceived the risk of its dependence on energy supply during the 1973 Arab oil embargo. This highlighted three main issues [3]. First, the need for energy policy collaboration between the European countries and the producing world became evident. Second, necessary institutional mechanisms were needed to increase coordination for supply distribution. Third, Europe needed to prepare mechanisms to prevent becoming a possible victim of exporting countries who use energy supply as a political and economic weapon. This geared up the development of a common energy policy in Europe which had developed at a very slow pace. Europe also felt the energy disputes between the Ukraine and Russia in 2005-2006, when four-day energy cuts aimed at the Ukraine affected Europe. Since then, a variety of efforts have been made in Europe to enhance and speed up a European Energy policy. This energy insecurity was recently repeated in 2008-2009 when gas supplies to Ukraine were suspended and fifteen Member States were affected. This reminded the Union of its energy dependency and the need for a common voice and approach vis-à-vis the international communities and in particular when dealing with countries that are suppliers of energy products. The EU's key energy partners are Russia, Norway, U.S., India, China, Central-Eastern European Countries and OPEC countries (Algeria, Angola, Ecuador, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, United Arab Emirates and Venezuela).

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