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## Viewpoint

## The concept of energy security: Beyond the four As

Aleh Cherp<sup>a,b</sup>, Jessica Jewell<sup>c,\*</sup><sup>a</sup> Department of Environmental Science and Policy, Central European University, Nádor utca 9, 1051 Budapest, Hungary<sup>b</sup> International Institute for Industrial Environmental Economics, Lund University, PO Box 196, 22100 Lund, Sweden<sup>c</sup> International Institute for Applied Systems Analysis, Schlossplatz 1, A-2361 Laxenburg, Austria

## HIGHLIGHTS

- Energy security should be conceptualized as an instance of security in general.
- 4As of energy security and related approaches do not address security questions.
- We define energy security as low vulnerability of vital energy systems (VES).
- VES support critical social functions and can be drawn sectorally or geographically.
- Vulnerability is a combination of exposure to risks and resilience capacities.

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## ABSTRACT

Energy security studies have expanded from their classic beginnings following the 1970s oil crises to encompass various energy sectors and increasingly diverse issues. This viewpoint contributes to the re-examination of the meaning of energy security that has accompanied this expansion. Our starting point is that energy security is an instance of security in general and thus any concept of it should address three questions: “Security for whom?”, “Security for which values?” and “Security from what threats?” We examine an influential approach – the ‘four As of energy security’ (availability, accessibility, affordability, and acceptability) and related literature of energy security – to show it does not address these questions. We subsequently summarize recent insights which propose a different concept of energy security as ‘low vulnerability of vital energy systems’. This approach opens the road for detailed exploration of vulnerabilities as a combination of exposure to risks and resilience and of the links between vital energy systems and critical social functions. The examination of energy security framed by this concept involves several scientific disciplines and provides a useful platform for scholarly analysis and policy learning.

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## 1. Introduction

As a policy problem, energy security emerged in the early 20th century in connection with supplying oil for armies (Yergin, 1991). Academic reflections on energy security date back to the 1960s (e.g. Lubell, 1961) and came of age with the oil crises of the 1970s. In the late 1980s and 90s, the academic interest in energy security declined following the stabilization of oil prices and the receding threat of political embargoes. It re-emerged in the 2000s driven by the rising demand in Asia, disruptions of gas supplies in Europe, and the pressure to de-carbonize energy systems (Yergin, 2006; Hughes and Lipsy, 2013; Hancock and Vivoda, 2014).

However, there is an important difference between contemporary and ‘classic’ energy security studies. In the 1970s and 80s, energy security meant stable supply of cheap oil under threats of embargoes and price manipulations by exporters (Colglazier and Deese, 1983; Yergin, 1988). In contrast, contemporary energy security challenges extend beyond oil supplies and encompass a wider range of issues (Yergin, 2006). Moreover, energy security is now closely entangled with other energy policy problems such as providing equitable access to modern energy and mitigating climate change (Goldthau, 2011). Thus the concept of energy security implicit in the classic studies has become a subject of intense re-examination.

*Energy Policy* has published over a dozen articles on the concept of energy security over the past five years. Many of these publications mentioned the “four As of energy security” (availability, accessibility, affordability and acceptability) introduced by the Asia Pacific Energy Research Centre (APEREC, 2007). However, there has

\* Corresponding author.

E-mail address: [jewell@iiasa.ac.at](mailto:jewell@iiasa.ac.at) (J. Jewell).

been no academic reflection on this approach except by [Jewell et al. \(2014\)](#) who noted its remarkable similarity to the “5As” of access to health care (availability, accessibility, accommodation, affordability and acceptability) proposed in 1981 by [Penchansky and Thomas \(1981\)](#). It is thus time to ask: have the four As helped to conceptualize the ‘new’ energy security and if not why and what alternative approaches can be used?

In this paper we seek to answer these questions. [Section 2](#) explains the rationale and the principles for conceptualizing energy security. [Section 3](#) describes the history and the influence of the four As. [Section 4](#) examines the four As in light of key security questions. [Section 5](#) describes alternative approaches and [Section 6](#) presents our conclusions.

## 2. Why and how to conceptualize energy security?

It is a common observation that energy security means different things in different situations and to different people. There are natural explanations for this variation. First, energy systems vary from one place to another which gives rise to different energy security problems. Secondly, the ‘energy security’ term is sometimes extended to other energy policy issues ranging from energy poverty to climate change. Does this variety demonstrate “impracticality of seeking a common definition of energy security” ([Chester, 2009, 893](#))?

We do not think so. Indeed, the presence of different meanings of energy security do not necessarily mean the existence of different concepts of energy security. In some cases it may instead mean that one and the same concept finds different expressions under different conditions. This is what largely explains variations in energy security priorities and policies between different countries. Such differences stress rather than negate the need for conceptual clarity, which can support rational policy analysis, international comparison and learning. Energy security in this respect is not much different from ‘justice’ or ‘minority rights’ which despite their different meanings are nevertheless subject to vigorous conceptual debates and policy comparisons.

Different interpretations of energy security may also result from the usage of the term by those who seek to increase the priority of other policy agendas by calling them a matter of ‘[energy] security’. Such attempts highlight the need to disentangle the debate about the concept of energy security from normative and empirical discussions about climate change mitigation, energy poverty alleviation, and other energy policy agendas, however legitimate they may be.<sup>1</sup>

A good social science concept should not aim to eliminate different meanings of a contested term but rather to “reduc[e] the limitations, ambiguities, and inconsistencies ...[by enhancing] ... the clarity and precision of these meanings as well as their ability to function in hypotheses and theories with explanatory and predictive force” ([Hempel, 1964, 12](#)). Thus a better energy security concept is needed not only to enable rational policy analysis and learning by separating energy security from other policy problems, but also to provide a shared language, without which scholars cannot communicate with each other or with policy-makers.

A good starting point in conceptualizing energy security is the observation in Baldwin’s seminal article *The concept of security* that “economic security, environmental security, identity security, social security, and military security are different forms of security, not fundamentally different concepts” ([Baldwin, 1997, 23](#)). This

logically applies to energy security as well, meaning that a valid concept of energy security should be based on a concept of security in general.

Baldwin defines security as a “low probability of damage to acquired values”, building on a half-century tradition of security studies starting with [Wolfers \(1952\)](#).<sup>2</sup> He then goes on to argue that this general definition should be adopted to specific situations and that such ‘closer specifications of security’ should answer at least the following questions<sup>3</sup>:

- Security for whom?
- Security for which values?
- From what threats?

These questions have rarely been explicitly asked in the energy security literature, though similar questions (What to protect? From which risks? and By which means?) are briefly mentioned by [von Hippel \(2011\)](#) and used by [Leung et al. \(2014\)](#) to structure their analysis of securitization of energy in China. In the next sections we discuss to which extent the four As and their derivatives contribute to a ‘closer specification of energy security’ by engaging with these key questions.

## 3. History of the four As and related thinking

The four As of energy security (availability, affordability, accessibility and acceptability) are a frequent starting point of contemporary energy security studies. Two of the four As – availability and affordability – prominently featured already in the classic energy security studies ([Deese, 1979](#); [Yergin, 1988](#)) and still remain at heart of the International Energy Agency’s mainstream definition of energy security “as the uninterrupted availability of energy sources at an affordable price” ([IEA, 2014](#))<sup>4</sup>. The other two As – accessibility and acceptability – have a more complex history. Both were among the global energy goals proclaimed by the World Energy Council<sup>5</sup> in its *Millennium Declaration* ([WEC, 2000](#)) but were not connected to energy security until the 2007 APERC report.

It is likely that these terms bled over to the field of energy and later energy security from other fields. The full “A-framework” is first mentioned in a 1981 article addressing the ‘5As of health care access’ ([Penchansky and Thomas, 1981](#)). This paper (cited almost 500 times in Scopus and over 1000 times in Google Scholar) was influential beyond its original scope. In particular, similar frameworks were used by the UN, with respect to human rights, education, and food (e.g. [Office of the High Commissioner for Human Rights, 2000](#); [UNESCO Secretariat, 2002](#)).

In 2007, APERC used the A-framework, merging the classic ‘availability’ and ‘affordability’ with ‘acceptability’ and ‘accessibility’ to structure their report on energy security in Asia. The report did not justify the use of the four As by reference to prior literature, empirical observations or logical reasoning. Neither did it laid a claim that the four As constitute a generic concept

<sup>2</sup> A classic definition of energy security by Daniel Yergin echoes this approach by referring to energy security “assur[ing] adequate, reliable supplies of energy at reasonable prices and in ways that do not jeopardize major national values and objectives” ([Yergin, 1988, 111](#)).

<sup>3</sup> Baldwin suggests four more questions: “How much security?”, “At what costs?”, “By what means?” and “In what time period?” but contends that it may not be necessary to answer all of these if only more general specifications of security are sought.

<sup>4</sup> A 2010 version of the IEA’s definition cited by [Hughes \(2012\)](#) included a clause “while respecting environmental concerns”.

<sup>5</sup> ‘Accessibility’ in this context meant access to (modern) energy in developing countries and included affordability.

<sup>1</sup> As Baldwin argues, one of the problems with “cloaking normative and empirical debate in conceptual rhetoric exaggerates the conceptual differences between proponents of various security policies and impedes scholarly communication” ([Baldwin, 1997, 5](#)).

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