



Original research article

# Energy dependence with an Asian twist? Examining international energy relations in Southeast Asia

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## ABSTRACT

This study explores the international dimension of energy security, particularly interstate dependent relations. By developing an assessment method based on the reciprocal dependent nature of international energy interactions and the causal relations of individual energy indicators, the proposed index is applied to examine interstate energy dependence and determine whether the dependence should be considered positive, negative or mutual. Using nine Southeast Asian countries as case studies and including other relevant players involved in the dependent dynamics, the findings show interdependence in international energy relations and indicate how specific characteristics of the interactions lead to different aspects of dependent relations: external supply dependence, external demand dependence, and economic interdependence. Based on dependence levels measured by the index, symmetric and asymmetric energy dependence of the selected nine cases has been analyzed and compared, in which the results not only delineate variations of dependency status but also reflect different aspects of energy dependence in each energy product. The index has also been applied to describe bilateral energy interactions between selected countries, demonstrating how asymmetric energy dependency relations are formed and why energy import dependence is not always negative.

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## 1. Introduction

Due to the uneven geographical distribution of natural resources, countries with limited energy resources are inevitably forced to interact with other countries in order to acquire adequate energy supplies to meet the demands of their economies. Valuable resources and minerals have long been considered as catalysts for interactions among individuals, social groups, and political entities because of the differential in geographic distribution. While the interaction to gain access to required resources has evolved from human settlement/migration, exchange of resources, conquest and conflict over territorial claims, to trade and economic activities, resources that are considered valuable and play vital roles in international relations have shifted from precious minerals like silver and gold to energy resources, e.g., coal, crude oil, natural gas, and uranium, resulting in the so-called geopolitics of energy [1–4]. The necessity of energy to the well-being and functioning of modern

society enhances the ties between the balance of demand and supply. Thus, countries with scarce domestic energy resources must rely on external resources while countries with abundant resources use this advantage to gain wealth. These interactions range from commercial activities, e.g., trade, import, export, investment and fuel transport to indirect interactions, e.g., buffer, processing, and transit countries. Forms of dependence are thus formed and have historically led to the debate over the security of energy supply.

The reason why energy dependence is crucial in ensuring the security of supply is because dependency is rarely symmetrical and asymmetrical dependence leads to uncertainty, which could lead to vulnerability and energy insecurity of the reliant party. Dependence or reliance on possibly vulnerable trade partners can result in supply disruption or major price changes. In addition, once used as political weapons, energy resources can harm the functionality of a country and its economy. One well-known example is the case of the Arab embargo in the 1970s when the Organization of the Arab Petroleum Exporting Countries (OAPEC) announced an embargo of oil exports to Canada, Japan, Netherlands, U.K., and U.S., cut production output, and raised posted prices, which led to oil shocks, crashed stock markets, and economic crises [5]. The effects of the embargo resulted in numerous attempts by oil-importing countries

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to depoliticize crude oil markets and to change policy direction to strengthen energy independence [6].

In existing literature, dependence on external energy resources is often considered as negative. Led by the nationalism of energy resources and competition among states [2,7–11], not only is energy reliance regarded as a risk to energy security [12–14], but energy independence has also become an inevitable and ultimate policy goal towards the enhancement of energy security [15–17]. Influenced by such priori, the literature regarding the quantification of energy security and energy dependence mainly focuses on importing countries and the security of supply [18–34] whereas the academic discourse focusing on energy-exporting countries and demand dependence is notably smaller [35–38]. The main concern is that, despite the growing importance and complexity of interdisciplinary research on energy [39], there are only a small number of studies on international energy relations. While several studies focusing on international energy regimes and governance highlight international energy institutionalization and interactions [40–44], the number of peer-reviewed academic articles specifically on *international energy relations* is limited (only five published articles based on the Scopus database [45]; four articles found in Web of Science [46]). Focusing on the international dimension of energy security, this study addresses two controversies in the current literature: the common assumption of energy dependence as negative and research centrism in the security of energy supply and importing-country perspectives.

In contrast to the conventional interpretation of energy insecurity in which reliance on foreign sources is considered as negative, a dependent relationship can alternatively be regarded as a two-way street or mutual dependence. Even though energy resources are still considered as triggers for interstate wars and conflicts [3,47–49], commercial activities, particularly cross-border commodity trade, are focal tools to obtain energy resources. Transactions are reciprocal; energy-exporting countries, to a certain extent, rely on the importing countries as well. The mutual costs that occur are what defines interdependence [50]. Still, mutual dependence does not necessarily mean mutual benefit. As mentioned earlier, interdependence is usually asymmetrical – less dependent actors have the power to ensure the ability to predict and control outcomes (e.g., stable energy supply and predictable demand), while more dependent actors have a greater tendency to be exposed to uncertainty (e.g., interrupted supply and/or demand, price shocks, or geopolitical factors) caused by policy decisions or internal political conditions of the country on which they are relying. The questions that follow are what determines the nature of energy interdependence and how it can be quantitatively assessed. In other words, at what point should energy dependence be considered positive dependency where one party can take the advantage of being less-reliant to exercise political power over the other party; as divided from negative dependency in which one party is more strategically threatened by exposure to uncertainty and vulnerability that may lead to insecurity of energy supply than the other; or mutual dependency where both parties equally share the costs and benefits of the interaction. Nevertheless, provided that dependent relationship is reciprocal, external energy dependence does not simply imply energy insecurity.

The existing research puts an emphasis either on energy-importing countries or energy-exporting countries, thereby diminishing the linkage between relevant actors and the reciprocal dependent nature of international energy interactions which affects the dependency dynamics. This study attempts to bridge this gap in energy security quantification by taking into account the structure of international energy relations and identifying political power as a key variable determining the variation and implications of energy dependency relations as well as the inclusion of other players involved in the dependency dynamics so that an assessment

tool can be used to measure energy interdependence among energy importers, exporters, and countries that act as middlemen. On the other hand, focusing overly on the significance of energy supply may overshadow other kinds of dependence that could, to a greater or lesser extent, shape the dependent relationship. This study, thus, extends the aspects and types of external energy dependence to cover external energy demand and mutual economic dependence.

The key question of the study is whether asymmetrical energy dependence (as measured by the proposed conceptual framework and the energy dependency index) affects the ability of a country to ensure its energy security. By dividing international energy security into three main components: 1) sensitivity to external dependence, 2) vulnerability and geopolitical uncertainty, and 3) relevant policy responses, this study also aims to capture the growing complexity of international energy security in which interdependence and geopolitics are closely linked and where existing studies that focus primarily either on importing or exporting countries might not be able to provide an assessment that illustrates the overall structure of international energy relations or allow comparisons across countries with different energy situations.

This article addresses the lack of existing academic research regarding international energy relations and the theoretical understanding of external energy dependence based on an international relations approach to political power, interdependence and vulnerability analysis. Through this, it provides an alternative interpretation of external energy dependence, expands the aspects and characteristics of the dependent dynamics considered among states. As a contribution to research on energy security quantification, the study proposes a comprehensive assessment method that is designed based on mutual dependency and incorporates the positive and negative causal links between individual indicators, some of which were specifically designed for the international energy interactions, which allows comparisons of international energy risks across countries with different energy contexts. In this article, Southeast Asian (SEA) countries are used as a case study due to the fact that the region is a cluster with specific proximity and strong regional interaction. With diversity in country-specific energy contexts, each country plays different roles in their international energy interactions.

This paper is divided into seven parts. Following this Introduction, Section 2 presents the conceptual framework for interdependence and energy security. Section 3 describes the construction of an energy dependency index while Section 4 presents and discusses empirical results. Section 5 carries out an uncertainty analysis on the variables contributing to the index. Section 6 applies the index to selected bilateral energy interactions within the region in order to test whether or not the index can be used to describe the power balance in actual international energy interdependent relations.

## 2. Conceptual framework: energy dependence, interdependence, and energy security

To examine the nature of energy dependence and determine at what point international energy relations should be considered as positive, negative or mutual and to answer whether asymmetrical energy dependence (as measured by the index) affects the ability of a country to ensure the security of energy supply, the conceptual framework and assessment method were designed based on the power and interdependence approach proposed by Keohane and Nye [38] and vulnerability analysis frameworks [53,54].

In an interdependent relationship that imposes costs and benefits, the key aspects to highlight include the distinction between dependence and interdependence and the concept of power. According to Keohane and Nye, dependence is defined as “a state of

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