

---

# Exploring a possible energy transition in Vietnam; Scenarios for the electricity sector and cost assessment of de-carbonisation.

Thanh Dang Van<sup>\*1,2</sup>, Patrick Criqui , and Jean-Christophe Simon<sup>1,2</sup>

<sup>1</sup>Economie du développement durable et de l'énergie (EDDEN) – CNRS : FRE3389, Université Pierre-Mendès-France - Grenoble II – France

<sup>2</sup>Politiques publiques, ACtion politique, TErritoires (PACTE) – Université Pierre Mendès-France - Grenoble II, Université Joseph Fourier - Grenoble I, CNRS : UMR5194, Institut d'Études Politiques [IEP] - Grenoble, Université Pierre-Mendès-France - Grenoble II – IEP - BP 48 38040 Grenoble cedex 9, France

## Abstract

As an emerging country in Southeast Asia, Vietnam has been experiencing strong economic growth over the past decades. Its rapid development is characterized by industrial and urban transformations which translate into sustained demand for energy, and particularly electricity. Electricity production grew 14,1% over 1990-2010, and per capita consumption jumped from 93 to 999 kWh/habitant.

These trends for electricity sector expansion are to be considered in a policy and regulatory framework with strong State intervention. Public intervention is proactive for the upgrading of the national capacity and the orientation of the electricity mix. The national electricity plan is considering a tremendous expansion of the national electricity capacity by 2030. By that time, the electricity capacity would be increased sevenfold (20.000 MW in 2010 upgraded to 146.800 MW in 2030), according to official sources. The seventh Masterplan envisages a mix where hydropower accounts for 11.8%, energy storage hydropower 3.9%; coal thermal power 51.6%; and gas fired power 11, 8%; power using renewable energy 9.4%; nuclear power 6.6% ; and imported power 4.9%.

This is a considerable challenge in terms of investment, technology choice and prospects for reconciling energy, environment and climate policies. In this context, our research mobilizes economic analysis to investigate current trends with a view of characterizing a possible electricity transition in Vietnam.

We have carried out, over the past two years, an investigation covering three complementary fields:

- First we consider prevailing policies for the electricity sector, their priorities, measures and instruments to promote expansion of the electricity sector.
- Secondly we build scenarios for the electricity mix, taking into account fundamental parameters of capacity, demand management, electricity mix.

---

\*Speaker

- Thirdly we analyse cost effect of various scenarios, with a specially adapted Elecsim Model (which is currently developed at EDDEN Laboratory), in order to make an assessment of policy options in the middle and long run.

At this stage we can present a characterization of selected scenarios:

- Scenario including and increased share of nuclear energy is favourable in terms of overall costs – i.e. production and distribution costs, and reduction of CO2 emissions from electricity sector. This is however to be considered with political debate and environmental issues.
- On the other hand scenario based on high share of renewables is attractive politically with up to 40% of new renewables (and a total of 50%) considering hydro-electricity. But constraints and costs for deployment of new sources should not be overlooked.
- Scenario including CCS is not satisfactory either in terms of investment costs or even for emissions reduction –this is because of technological uncertainty.
- Last scenario, with a balanced mix of energy sources, bears the highest cost, but minimizes dependency on one technology, thereby increasing security of supply for the country.

The scenario selection is a first step for further analytical work on economic evaluation of electricity system options. This scientific approach offers a sound approach of electricity sector development at national level, and it highlights options for mix selection as a means to initiate an energy transition.

*Major References :*

Asia-Pacific Economic Cooperation (APEC) 2009 Peer Review on Energy Efficiency in Vietnam.

Energy Alliance. (2012). Case study power sector reform in Vietnam.

IEA. (2013). Southeast Asia Energy Outlook.

Kyoto University (KU), (Coordinateur), (AIM), et al. 2012 A Low Carbon Society Development towards 2030 in Vietnam.

Nhan Thanh Nguyen and Minh Ha-Duong (2009). "Economic potential of renewable energy in Vietnam's power sector." *Energy Policy*, 37 (5):1601-1613, May 2009.

Soussan, J., & Nguyen, T. T. H. (2012). Internalizing the Externalities: SEA of the Viet Nam Power Development Plan VII.

WB. (2009). Vietnam power sector: Generation options— La Banque Mondiale.

World Bank Group. (2014). Exploring a Low Carbon Development Path for Vietnam.

Wu, Y., Shi, X., & Kimura, F. (2012). Energy Market Integration in East Asia: Theories, Electricity Sector and Subsidies.

The Vietnamese government service

2006 Chng trình mc tiêu quc gia v s dng năng lng tit kim và hiu qu (giai on 2006-2015)

2007a Chin lc phát trin năng lng quc gia ca Vit Nam n năm 2020, tm nhìn n năm 2050

2007b Chng trình mc tiêu quc gia ng phó vi bin i khí hu giai on 2012 - 2015

2011a Chiến lược phát triển ngành Du lịch năm 2020

2011b Chiến lược quốc gia về biến đổi khí hậu

2011c Quy hoạch phát triển kinh tế quốc gia giai đoạn 2011-2020, có xét đến năm 2030

2012 Quy hoạch phát triển ngành than Việt Nam đến năm 2020, có xét đến năm 2030.

Ministry of Natural Resources and Environment (MONRE) (Vietnam)

2010 Vietnam's second national communication to the United Nations Framework Convention on Climate change.