

Xth Apec -
Tsukuba
Conference
Innovation of
Mathematics
Education through
Lesson Study
Challenges to
Energy Efficiency
on STEM and
Cross - border
Education

C. Torres

Question 1

Question 2

Question 3

Xth Apec - Tsukuba Conference Innovation of Mathematics Education through Lesson Study Challenges to Energy Efficiency on STEM and Cross - border Education

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Resumen

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What is your major issue on Energy in you economy?

In relation to STEM, what reform is going on in your economy?

In relation to lesson study for Cross Border, what is possible for you?

Math Class



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Overview

Peru is one of Latin America's economic success stories, with a rapidly expanding economy and a population being brought out of poverty. Much of this growth has been thanks to energy-intensive sectors, such as oil and gas, mining, construction and manufacturing.

This has been positive for Peru's population. In 2015 Statistic and informatics national institute (INEI) showed that between 2013 and 2014 the poverty rates in 1,2 from 23,9 percent to 22,7 percent. But all this development comes with the need for a modern energy infrastructure to power it, as well as to meet the demands of a burgeoning urban middle class.

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What is your major issue on Energy in your economy? I

Peru is one of three APEC economies in Latin America located on the Pacific coast of South America. With a land area of 1,28 million square kilometres, Peru shares borders with Chile to the south, Ecuador and Colombia to the north, and Brazil and Bolivia to the east. Peru has three main geographical regions: the Costa to the west, the Sierra (Andes mountains), and the Selva, covered by the Amazon rainforest. The economy is divided into 25 political departments (administrative regions), and in 2011 had a total population of about 29,6 million people.

Around 34,8 % of Peru's population is considered poor and 11,5 % extremely poor. Its major population centre is the Lima region, which represents nine million people, nearly a third of the total population. Peru's urbanization rate is 76 %.

What is your major issue on Energy in your economy? II

Owing to its scarce oil resources, Peru is a net importer of oil. Particularly, domestic production is not only insufficient to meet the economy's demand, but since most crude oil produced is of extra-heavy quality and several of Peru's domestic refineries are unable to process it, a substantial share of domestic production is exported. In contrast, natural gas resources are significant and the economy is a major global gas producer, representing the only source of liquefied natural gas (LNG) exports in South America.

Table 1 Key data and economic profile, 2011

KEY DATA		ENERGY RESERVES ^a	
Area (million sq. km)	1.3	Oil (million barrels)	1 206
Population (million)	29.6	Gas (trillion cubic metres)	0.3
GDP (USD (2000) billion at PPP)	236.0	Coal (million tonnes)	8.7
GDP (USD (2000) per capita at PPP)	7 970	Uranium (tonnes)	1 800

a. Proved reserves at the end of 2011 (MINEM, 2011c).

Source: EDMC (2013).

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What is your major issue on Energy in your economy? III

Table 1 Key data and economic profile, 2011

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Energy efficiency

The Peruvian Government has actively pursued energy efficiency since the 1980s and 1990s, when it created the Energy and Environment Centre (CENERGIA) and the Energy Conservation Project (PAE). PAE was created in 1994 after an energy shortage in Peru, and was the basis of a strong energy conservation campaign run by the government; after international awards and good results, in 2001 PAE was converted from a temporary project to a permanent programme and it continues today (MINEM, 2009).

What is your major issue on Energy in your economy? IV

Notable energy developments

In June 2010, Peru LNG, a consortium of four world-class energy companies—the Hung Oil Company of the United States, SK Energy of Korea, Repsol of Spain, and Marubeni Corporation of Japan—was able to start operation of the Melchorita LNG plant (the Melchorita Plant), Peru's and South America's first natural gas liquefaction plant, and sent its first shipment of LNG to Mexico. The USD 3.8 billion invested in this plant represents the largest investment ever made in a single project in Peru. The plant has a nominal capacity of 4.4 million tonnes per year and can process up to 17.5 million cubic metres per day of natural gas. (Peru LNG, 2011).

Major issue

Obstacles for rural electrification

1. Insufficient financial resources for investments in grid extension and installation of minigrids. Private companies generally don't invest in this sector as cost of providing access are high due to remoteness of the sites, dispersed nature of the populations and difficulty of the terrain. Local communities don't dispose of sufficient proper financial resources to make infrastructure investments in their community. Consequently, only the central government and non-governmental organizations (NGOs) are left for this kind of investment. NGOs are specialized on small systems whereas the *Ministry of energy and mining* is involved in middle size systems.
2. Difficulty to operate mini-grid profitability due to the low purchasing power and the low energy demand of rural clients.

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In relation to STEM, what reform is going on in your economy? I

Reform 1

Encourage a scientific attitude to appropriate a research-based pedagogical practice.

Provide innovative tools to support a research-based pedagogical practice.

Promotion of National Physics Olympiad through all the country.

In relation to STEM, what reform is going on in your economy? II

Reform 2

Support and strengthen the articulation between the Science and Technology Fairs and Clubs of the SDCTT (Sub-Directive of Science, Technology and Talents) of the CONCYTEC (National Council of Science, Technology and Technological Innovation) and the national framework and guidelines developed by the Ministry of Education.

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In relation to lesson study for Cross Border, what is possible for you?

1. The Peruvian curriculum has been changing to focus in problem solving.
2. CONCYTEC and Ministry of Education could support projects which involve lesson study for Cross Border.
3. Creation of Capacity and Network Project (CANP 5) which is supported by International Commission on Mathematical Instruction (ICMI) and International Mathematical Union (IMU). In this group are participating 4 countries: Bolivia, Ecuador, Paraguay and Perú.