



**Asia-Pacific
Economic Cooperation**



APEC Energy Demand and Supply Outlook, 7ª ed. Release

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APEC Countries

AUSTRALIA 1989
BRUNEI 1989
CANADÁ 1989
INDIA 1989
JAPÓN 1989
COREA DEL SUR 1989
MALASIA 1989
NUEVA ZELANDA 1989
FILIPINAS 1989
SINGAPUR 1989
TAILANDIA 1989
ESTADOS UNIDOS 1989
TAIWÁN 1991
HONG KONG 1991
CHINA 1991
MÉXICO 1993
PAPUA NUEVA GUINEA 1993
CHILE 1994
PERÚ 1998
RUSIA 1998
VIETNAM 1998



MODELLING KEY ASSUMPTIONS & METHODOLOGIES

COMMON ASSUMPTIONS

- **GDP and Population.** GDP projections are from the OECD for OECD-member countries and other significant non-OECD member countries modelled by the OECD (2018). Remaining economies are modelled by APERC using a *Solow-Swan growth model*. Population projections are from World Population Prospects 2017, published by UN DESA (2018).
- **Energy Prices.** Japan (IEEJ) provided the key global fuel price assumptions used in this Outlook. APERC made some adjustments for each energy type accordingly to the *different energy and economic positions of each economy*.
- **CO2 Emission Factors.** They are applied *universally to all* APEC economies over the entire Outlook period and are based on (IPCC, 2006).

MODELLING KEY ASSUMPTIONS & METHODOLOGIES

SCENARIO ASSUMPTIONS

- The APEC Target scenario (TGT) *simultaneously* considers the APEC goals to *reduce energy intensity* and *increase the share of renewables* in the energy system.
- The 2-Degrees Scenario (2DC) generally follows the carbon emissions *reduction pathway with 50% chance of limiting* average global temperature increases to 2 degrees Celsius, included in (IEA, 2017).
- Business-as-usual (BAU). The BAU scenario reflects current policies and trends within the APEC energy sector.

MODELLING KEY ASSUMPTIONS & METHODOLOGIES : *Some Comments*

- The APERC Macro Model, using a *Solow-Swan growth model* (SSGM):

$$GDP = TFP * K^{\alpha} * L^{\beta}$$

Where: GDP is gross domestic product; TFP is total factor productivity; K is capital; L is labour ; and α and β are the elasticities of capital and labour ($\alpha + \beta = 1$).

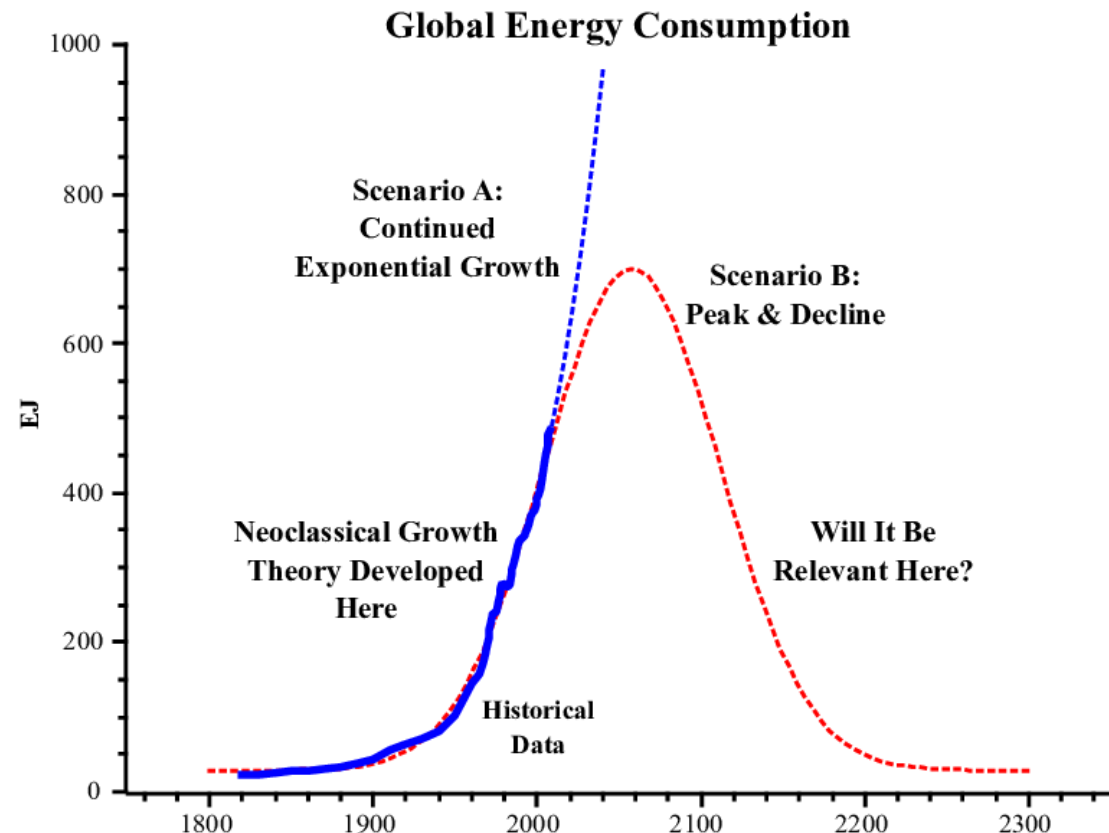
The APERC Macro Model : Comments

- The ten economies modelled by APERC (**non-OECD** members countries) with the SSGM are considered developing countries, but in the World GDP PPP Ranking, China (is the first) and Rusia (the sixth) y Perú (46th), but **within OECD** are Mexico (11th) , Chile (43th).
- Explicit assumptions made by SSGM:

1.	Constant depreciation of capital	9.	Homogeneous households/firms
2.	Closed economy (no trade)	10.	No debt financing
3.	Constant returns to scale	11.	No government
4.	Constant savings rate	12.	Perfect competition
5.	Diminishing marginal productivity of K, L	13.	Profit maximization
6.	Incomes proportional to marginal productivity	14.	Single commodity produced
7.	Full employment	15.	Single economic sector
8.	Free technology		

The APERC Macro Model : Comments

- The SSGM implies a *sustained exponential growth* (scenario A), but geologists and engineers envision scenario B.
- Peak in fossil fuel demand in 2030 (*Shell Sky Scenario*, 2018. *Mckinsey*, 2019).
- Peak in CO2 emissions due to fossil fuels in 2024 (*Mckinsey*, 2019)



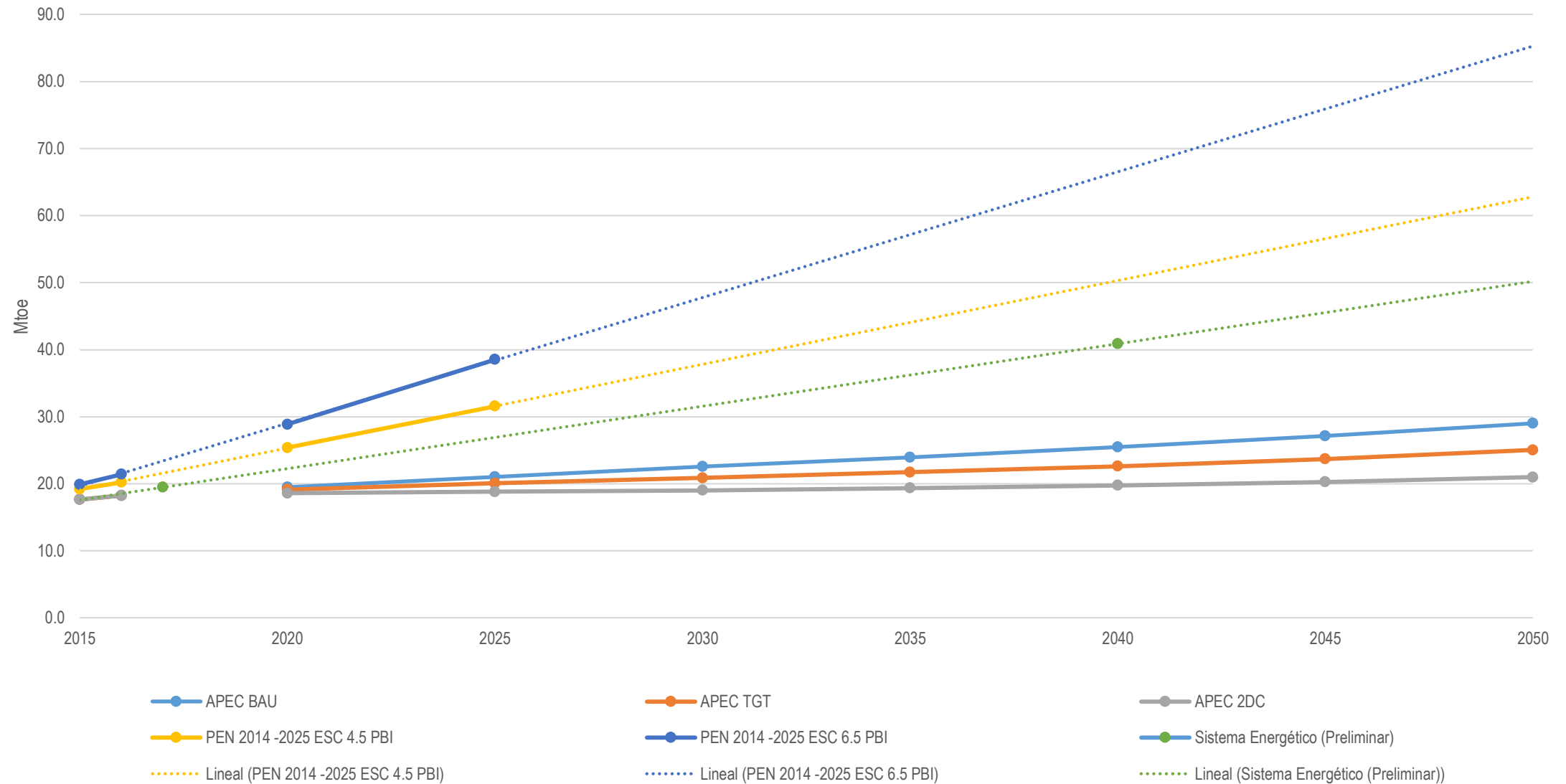
The APERC Macro Model : Comments

- The SSGM does not include *natural resources* as a factor of production (mainly *energy*. A biophysical perspective).
- After *Washington Consensus* , all countries began *opening theirs markets*.
- Technological progress is a product of economic activity (*endogenous*). Knowledge and technology are characterized by their *growing returns*. The *need for public policies by de government*. *Paul Romer* (Nobel Prize 2018).
- The energy sector is generally *oligopolistic*.

The APERC Macro Model : Comments

- The estimation of losses at the stage of the energy transformation process is not clear.
- APERC has chosen to use final energy *excluding non-energy use*, this contributes to underestimating CO2 emissions.
- APERC scenarios do not consider an *energy equity target*.
- The APEC's goal of reducing energy intensity *does not necessarily imply* that energy efficiency is improving, since this indicator depends much on the economic structure and its shift towards the services sector *favoring developed countries*.

Long-term Energy Projections of Peru: APEC vs. MINEM

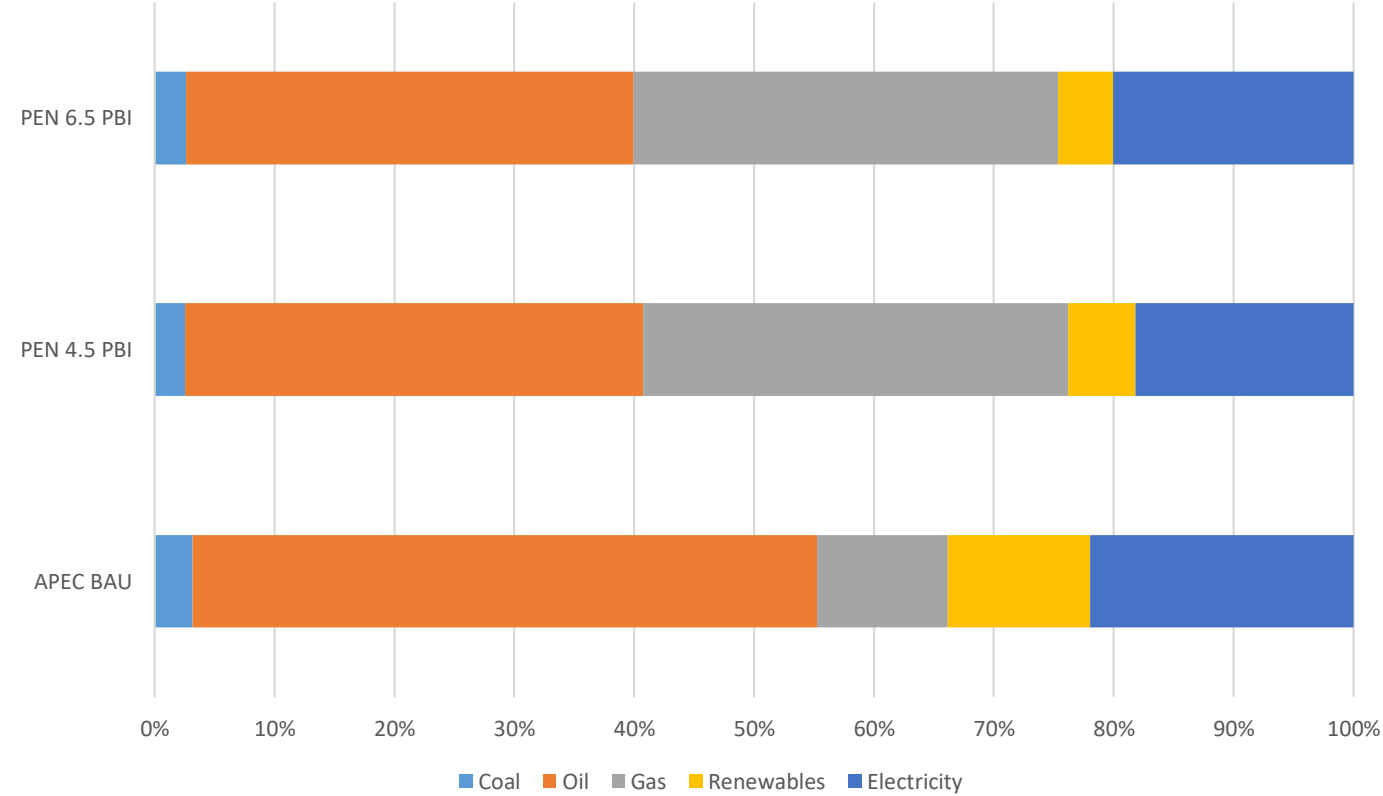


NOTE: MINEM (Ministry of Energy and Mines)
PEN (National Energy Plan)

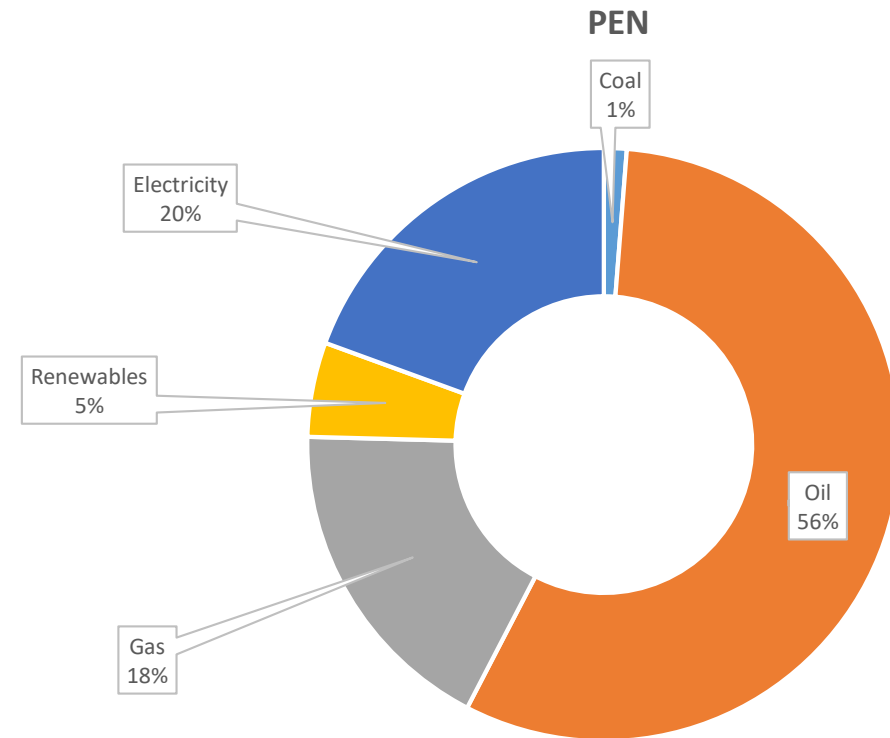
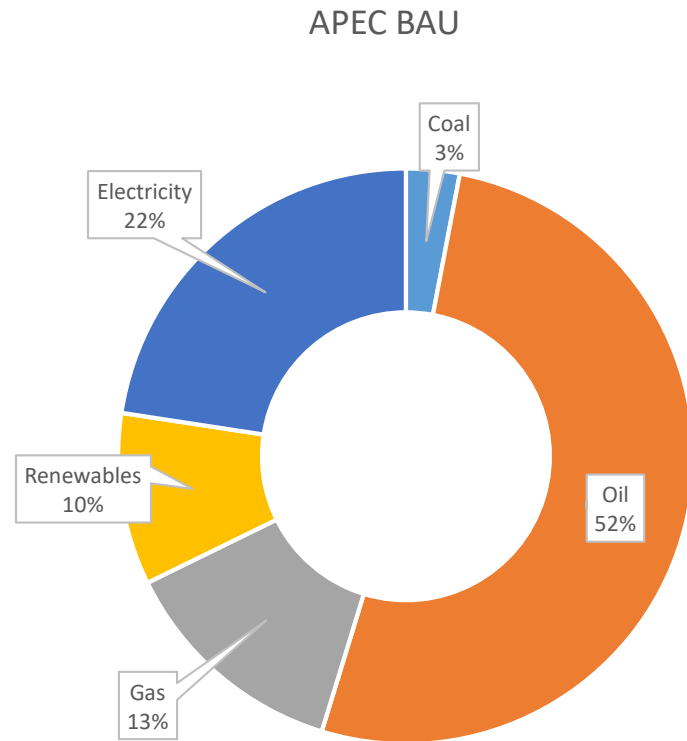
Source: prepared by José Meza Segura, FIM-UNI, nov. 2019

Final energy Demand Structure of APEC BAU (2025 scenario) vs. the PEN 2014 - 2025

	<i>APEC BAU</i>	PEN 4.5 P	PEN 6.5 PB
	2025	2025	2025
Final energy demand by fuel (Mtoe)	21.2	31.6	38.5
Coal	0.7	0.8	1.0
Oil	11.1	12.1	14.4
Gas	2.3	11.2	13.6
Renewables	2.5	1.8	1.8
Electricity	4.7	5.7	7.7



Final energy Demand Structure of APEC BAU vs. the PEN 2040 scenario



	APEC BAU 2040	PEN 2040
Final energy demand by fuel (Mtoe)	25.7	40.9
Coal	0.8	0.5
Oil	13.3	23.1
Gas	3.3	7.3
Renewables	2.5	2.1
Electricity	5.8	7.9

Source: prepared by José Meza Segura, FIM-UNI, nov. 2019

Final Comments

- The APEC Energy projections for Peru are *underestimated*.
- The economic growth models according to the *neoliberal mainstream* tries to represent the real economy (production of goods and services) in monetary terms, *forgetting the physical world* that provides the natural resources (which are finite) creating the illusion of boundless economic growth.

“The SSGM model is not the most suitable for projections in the energy sector ”