

MODELING ENERGY PRODUCTION AND ECONOMIC DEVELOPMENT IN COLOMBIA

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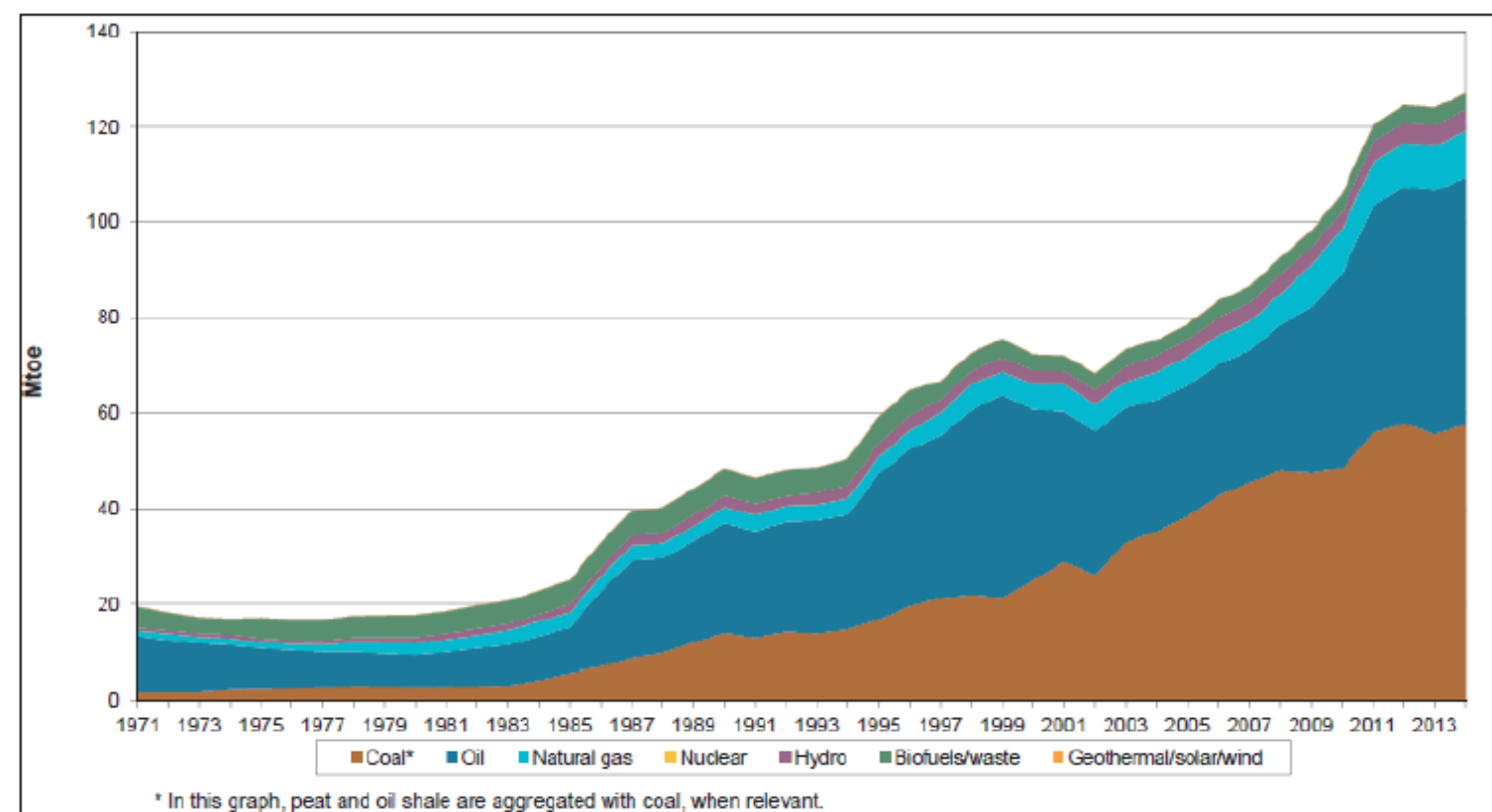
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Introduction

- The high oil prices recorded throughout 2004 and 2012 period led to the world economic growth for almost one decade.
- These prices gave countries with middle income and low levels of oil production, like Colombia, the opportunity to develop its oil industry as well as promote its economic development, through policies such as 'The mining locomotive' focused on developing hydrocarbons industry'.

Colombia Energy Production

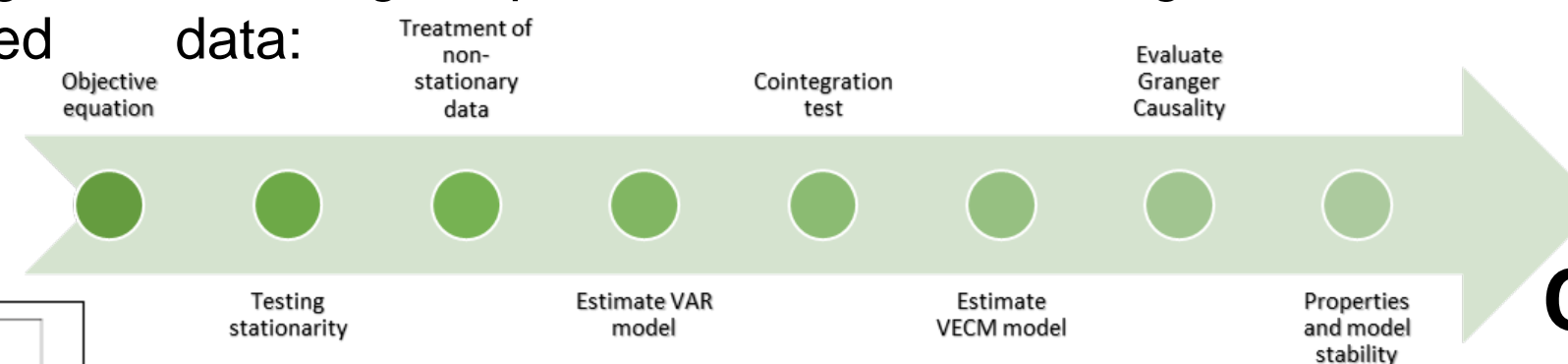


Source: OECD/IEA 2016

- Nowadays the oil industry is facing structural, technological changes and a severe crisis. In consequence, this work try to find answers the question: *what should be the new direction of the Colombian energy policy to ensure economic development?*

Methodology

- This study contributes to policy making, by using a Vector Error Correction model (VECM) to determine the implications of possible short and long-run relationships between the variables coal, natural gas, oil and renewable energy (hydroelectric, the wind, biomass and waste) production and GDP per capita. To this purpose the following steps were executed, using 1965-2016 data:



Results

Causality relationship between the GDP and energy production sources, Short-Run

Variable	Cointegrating rank	Causality	Variable	Hypothesis proved
GDP	1	-	DOIL	Neutrality
GDP	1	↔	DRE	Feedback
GDP	1	→	DCOAL	Conservation
GDP	1	↔	DNG	Feedback

Causality relationship between the GDP and energy production sources, Long-Run

Variable	Cointegrating rank	Causality	Variable	Hypothesis proved
GDP	1	←	DOIL	Growth
GDP	1	←	DRE	Growth
GDP	1	↔	DCOAL	Feedback
GDP	1	↔	DNG	Feedback

- The results exhibit a feedback hypothesis supported for both, natural gas and renewable energy production in the short-run, meanwhile in the long-run renewables confirmed a growth hypothesis and natural gas a bi-directional Granger causality with GDP per capita.

- An increase in the Colombia oil production could positively affect the GDP in the long-run, supported on the growth hypothesis tested.
- No Granger causality was found for oil in the short-run. It might be explained by the number of optimal lags variables defined in this work (two years).
- Evidence of unidirectional Granger-causality from GDP per capita to coal production is an indication that Colombia is relatively less dependency on coal.

Conclusion

- Considering increase the GDP per capita in the long-run, the Colombian government could take the opportunity to continue developing the oil industry and its infrastructure, to keep the self-sufficiency before the end of its crude oil.
- However, given the current low oil prices scenario, the policymakers and government might redirect the energy policy by strengthening the production of *natural gas* and *renewable energy*. This, supported on the insights of a feedback hypothesis in the short-run and the growth and a bi-directional Granger causality in the long-run.

