

The Future of Gas:

**The Urgent construction
of the Bridge toward the
Gas Civilization**



The Future of Gas:

The Urgent construction of the Bridge toward the Gas Civilization

Prof. Edmilson M. dos Santos – IEE and RCGI / USP

Summary of Thoughts

- (i) The Construction of the Gas Civilization
- (ii) Panorama of World Energy Investments
- (iii) The role of Natural Gas in the World Energy Mix
- (iv) Opportunities and Challenges for NG in Brazil

The Construction of the Gas Civilization

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AVANÇADOS DA USP

Gás natural: a construção de uma nova civilização

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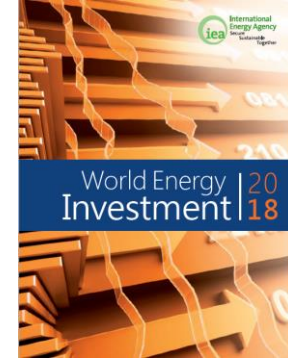
Introdução

O GÁS NATURAL (GN) é uma mistura de hidrocarbonetos leves que, a temperatura e pressão atmosféricas ambientes, permanece no estado gasoso. Na natureza, ele é originalmente encontrado em acumulações de rochas porosas no subsolo (terrestre ou marinho). Frequentemente, encontra-se associado ao petróleo.

Para todos os efeitos, denominam-se gás natural as misturas de hidrocarbonetos gasosos com predominância de moléculas de metano (CH_4). Na

Panorama of World Energy Investments

Reference are the WEI
Published by the
International Energy
Agency



World Energy
Investment 2019

iea.org/we/2019

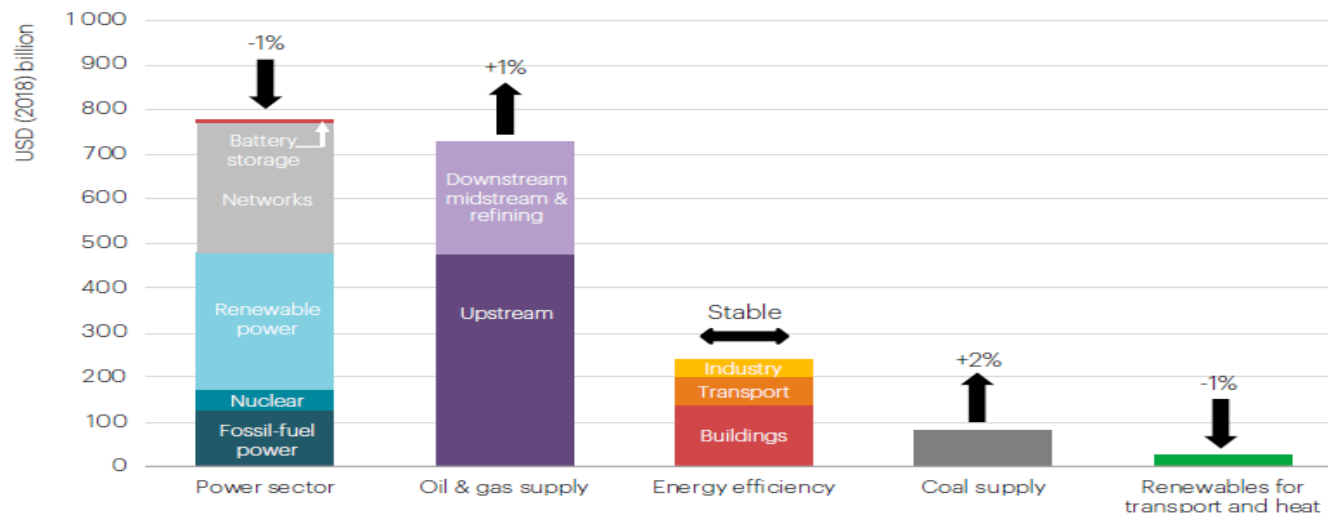


Panorama of World Energy Investments

Overview and key findings

After three years of decline, global energy investment stabilized in 2018

Global energy investment in 2018 and change compared to 2017



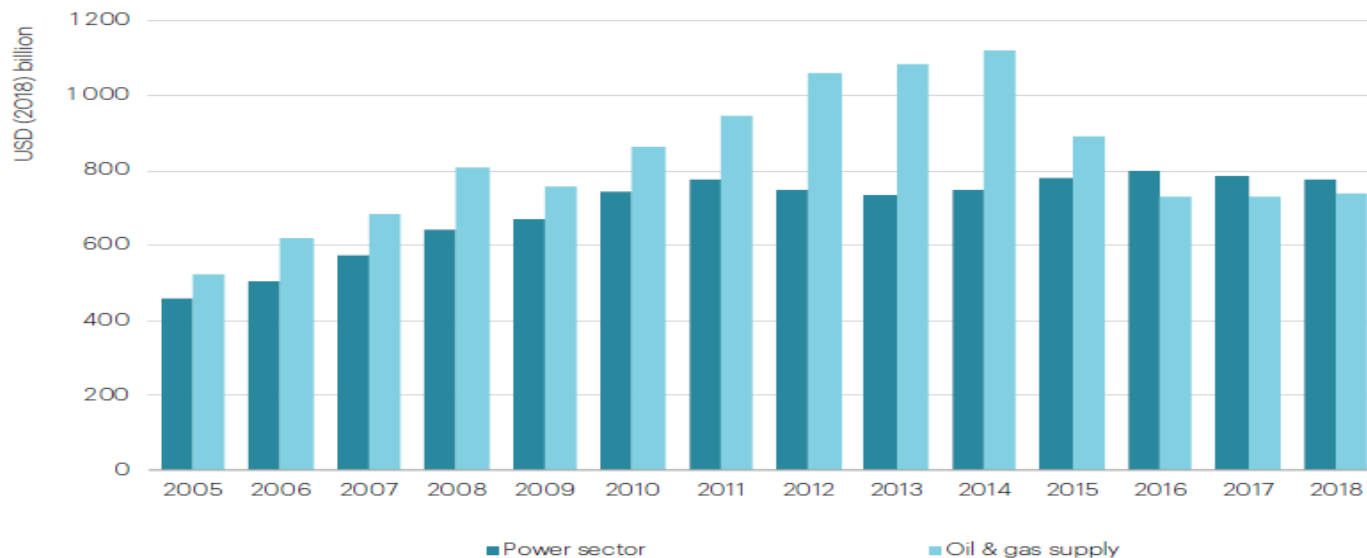
Note: Investment is measured as the ongoing capital spending in energy supply capacity and incremental spending on more efficient equipment and goods (in energy efficiency). The scope and methodology for tracking energy investments is found in the Annex of this report as well as at [iea.org/media/publications/we/WEI2019-Methodology-Annex.pdf](https://www.iea.org/media/publications/we/WEI2019-Methodology-Annex.pdf). Renewables for transport and heat include biofuels for transport and solar thermal heating. Electricity networks include transmission and distribution.

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Overview and key findings

Despite a downtick, power was again the largest sector for investment

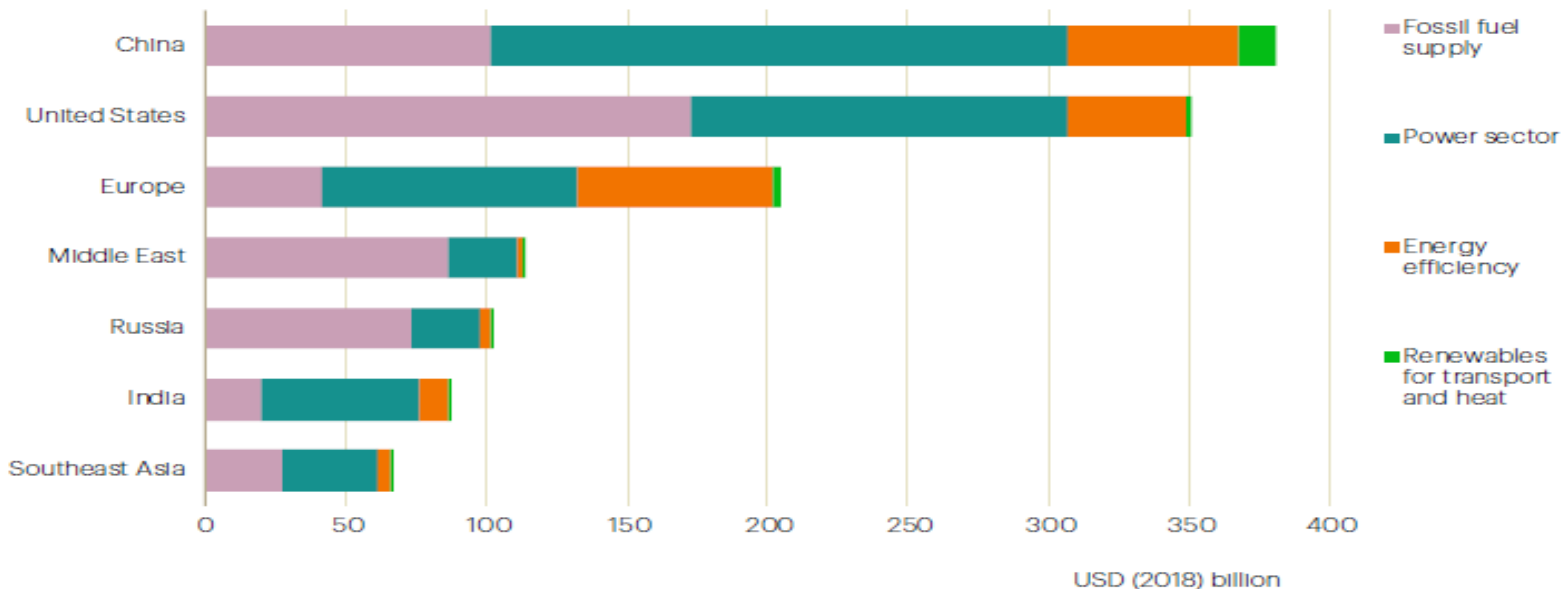
Global investment in the power sector compared with oil and gas supply



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China remained the largest market for total energy investment in 2018

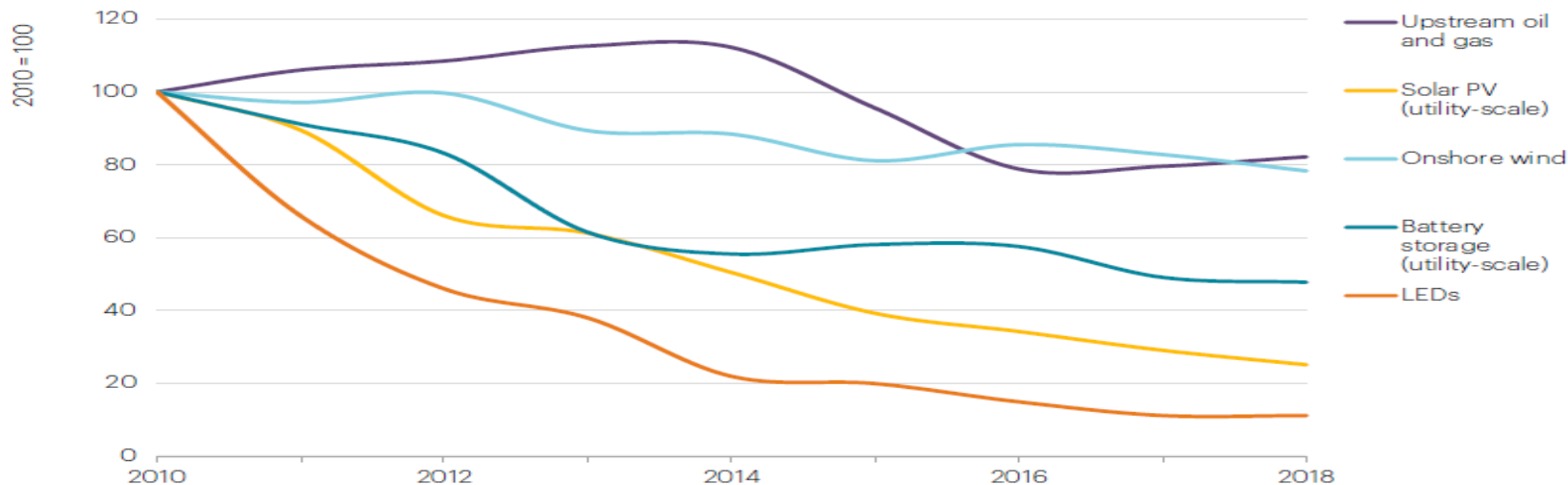
Energy investment by sector in selected markets in 2018



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Changing costs have reshaped the investment landscape in some areas

Capital costs in selected energy-related sectors

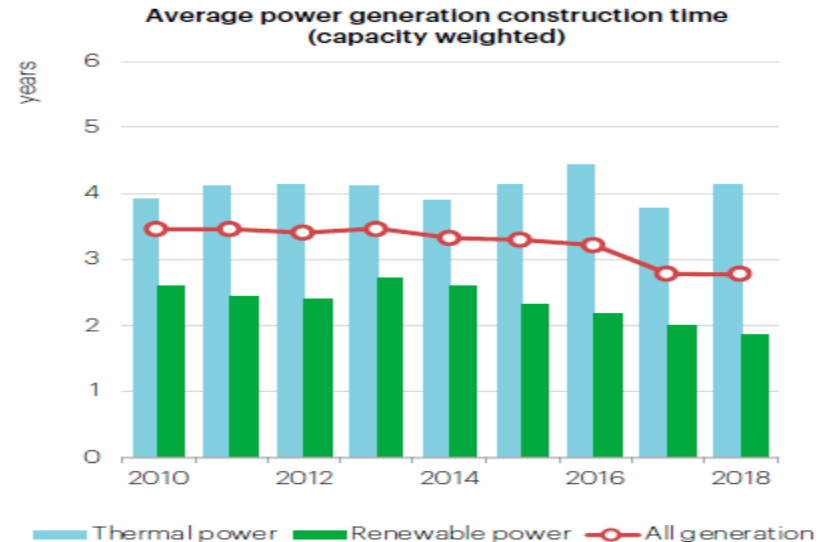
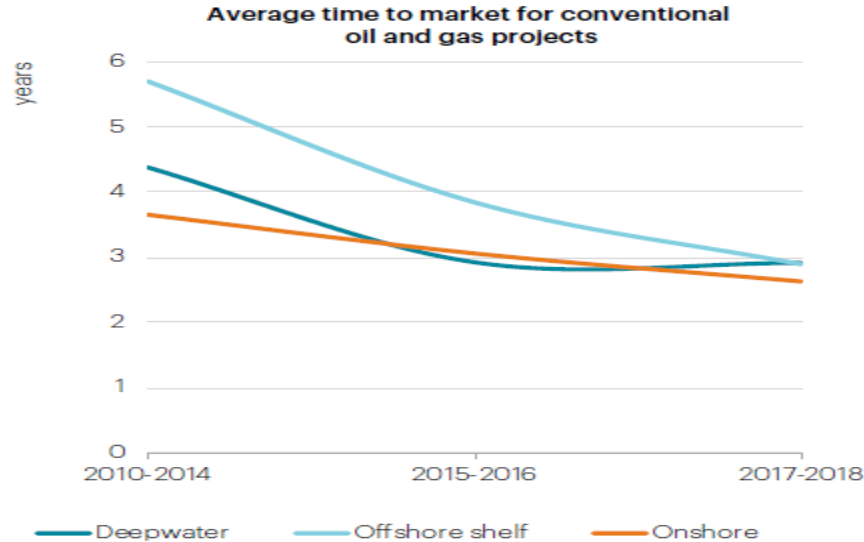


Note: LEDs = light-emitting diodes, PV = photovoltaic. Capital costs reflect global weighted average costs of components or commissioned projects in a given sector.
Source: IEA analysis with calculations for solar PV and wind costs based on IRENA (2019).

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There has been a broad shift towards projects with shorter lead times...

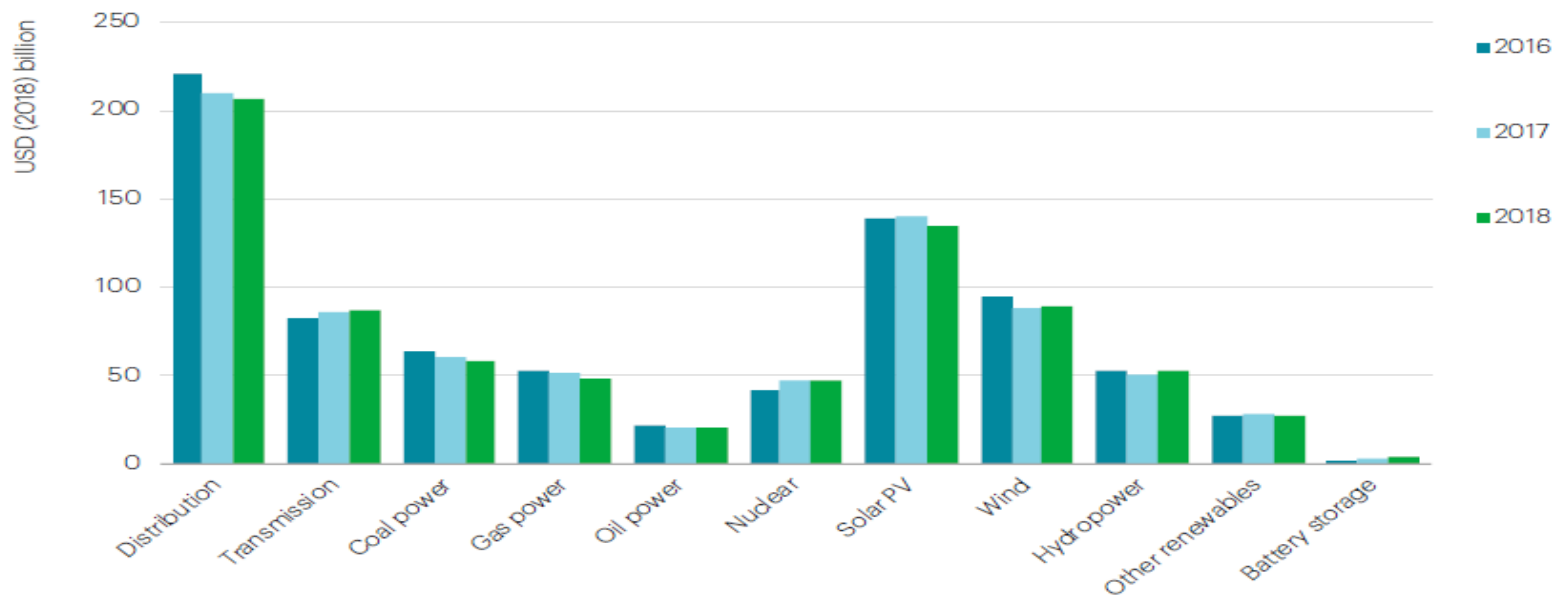
Trends in project development and investment timelines for oil and gas supply and power generation



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Power sector

Global investment in the power sector by technology



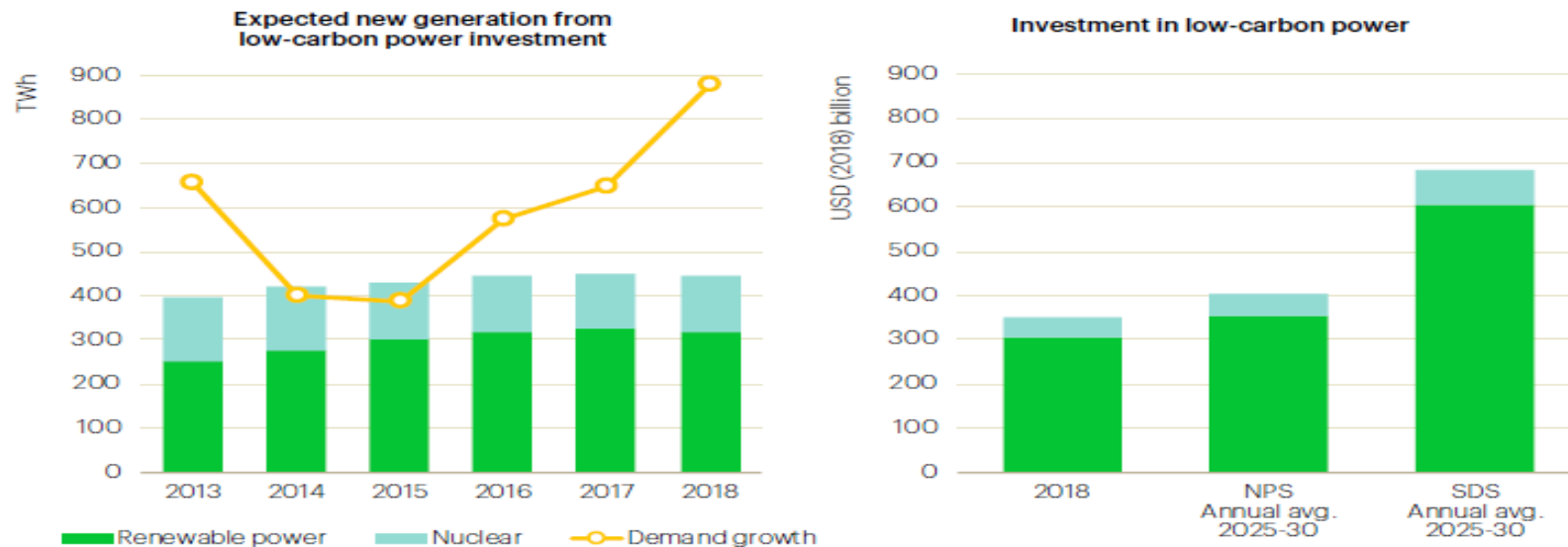
Note: Gas and oil-fired generation investment includes utility-scale plants as well as small-scale generating sets and engines. Hydropower includes pumped hydro storage.

Source: IEA analysis with calculations for solar PV, wind and hydropower based on costs from IRENA (2019).

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Output from low-carbon power investment is not keeping pace with demand; a doubling of renewables spending is needed in the SDS

Expected generation from low-carbon power investments and annual investment needs by scenario

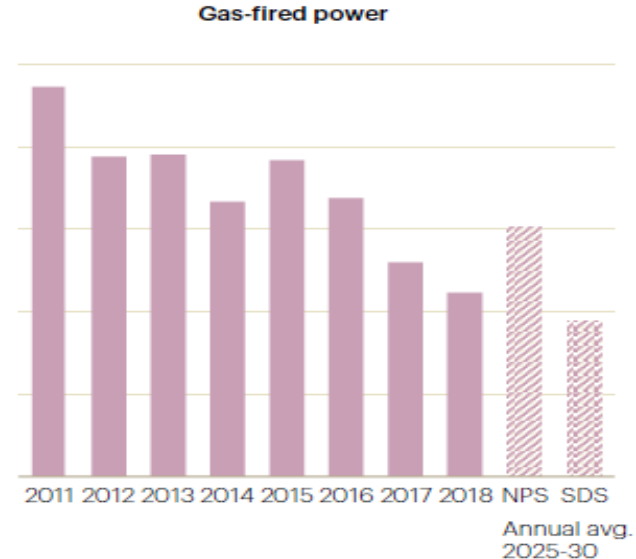
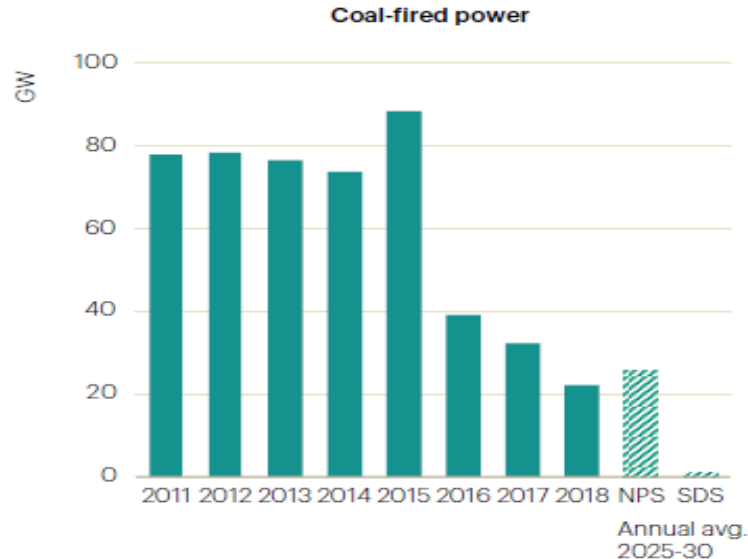


Note: Generation is based on the expected annualised output of the capacity associated with investment in a given year. TWh = terawatt hour. NPS = New Policies Scenario; SDS = Sustainable Development Scenario.

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Gas power remains in the mix; while the coal fleet continued to grow in 2018, sustainability goals point to a swift FID phase-out for unabated plants

Final investment decisions (FIDs) for coal-fired & gas-fired generation versus annual average needs 2025-30 by scenario



Note: NPS= New Policies Scenario, SDS=Sustainable Development Scenario. FIDs for coal-fired and gas-fired generation capacity in NPS and SDS does not include plants equipped with carbon capture.

Source: IEA analysis with historical FID data based on McCoy Power Reports (2019).

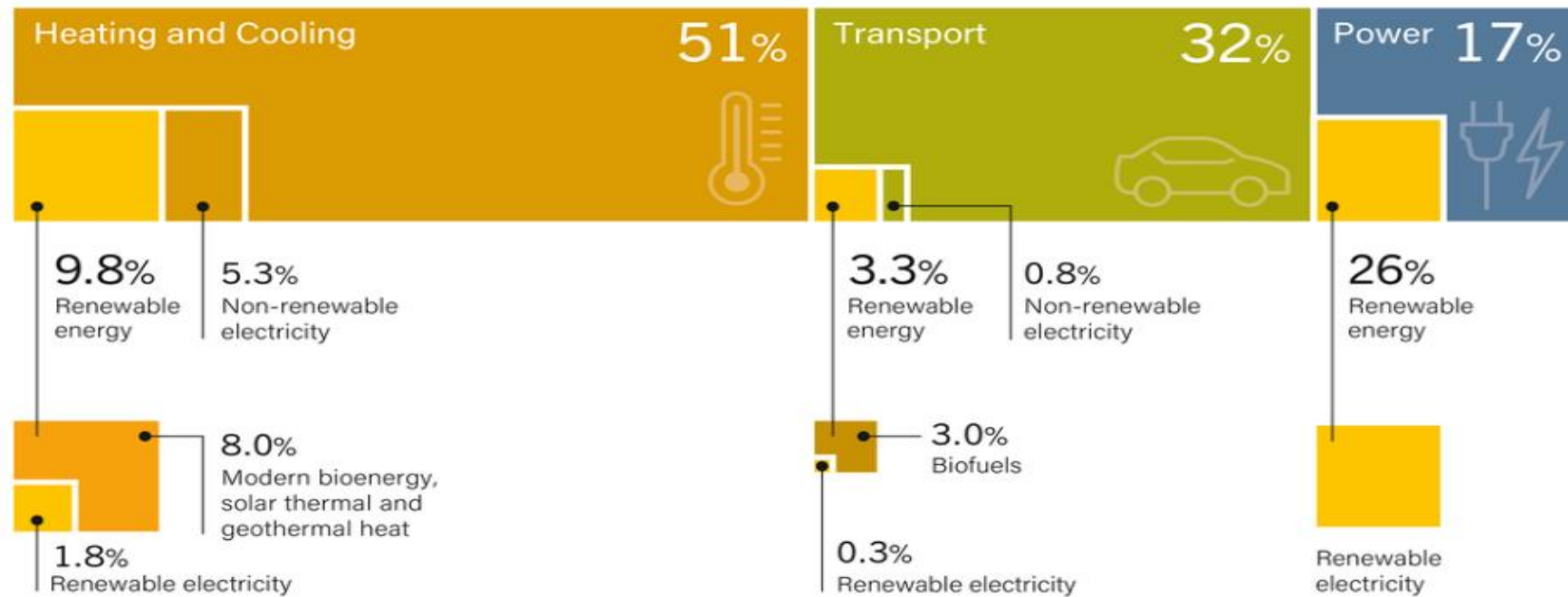
The role of Natural Gas in the World Energy Mix

IRENA
REN21's Renewables
2019 Global Status
Report



The role of Natural Gas in the World Energy Mix

Renewable Energy in Total Final Energy Consumption, by Sector, 2016



Note: Data should not be compared with previous years because of revisions due to improved or adjusted methodology.

Based on OECD/IEA.

Opportunities and Challenges for NG in Brazil

Official Reference is
PDE 2027



Opportunities and Challenges for NG in Brazil

- Investment dominance of Upstream O&G – PRESALT
 - But PRESALT is basically a Oil Driven Exporting Project

- Regarding NG – PRESALT GAS is a DOMESTIC PROJECT
 - Major UNBALANCES between UPSTREAM and DOWNSTREAM investments

Opportunities and Challenges for NG in Brazil

- PRESALT GAS is the Brazilian Door to the Gas Civilization
- Which means developing the Diffuse Uses of NG across the Total Energy Mix – But basically in captive Heat and Cool
- Necessary Bridge Toward the Gas Civilization is NG Power
 - Major Unbalances between NG X RENEWABLE POWER

Opportunities and Challenges for NG in Brazil

- We advocate in favor of a 10 YEARS NATURAL GAS DRIVEN POWER POLICY FOR BRASIL
 - NG Power working on base loads
 - Recovering storage capacities in Hydropower
 - More balanced penetration of other Renewables
 - Construction of basic NG infrastructure linking the country to the PRESAL resources

Opportunities and Challenges for NG in Brazil

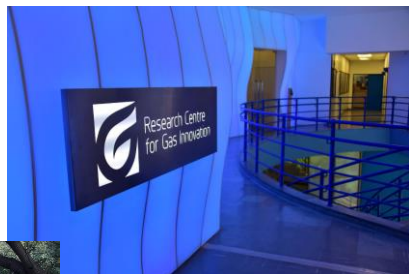
- FOR THAT WE NEED:
 - Urgent participation of private capital in existing facilities
(privatization of Petrobras' existing NG assets)
 - Urgent reviewing of Petrobras' strategic vision in respect to NG
(Anchoring the construction of new infrastructure)
 - Gradual construction of more competitive domestic markets with
trends of declining prices

Opportunities and Challenges for NG in Brazil

- FOR THAT WE NEED:
 - Scaping from the LOW PRICE TRAP
 - Rather than LOW PRICED GAS ... WE NEED GAS
 - LONG TERM PROMOTION POLICY at final uses stage – This is the Construction of the Gas Civilization
- HOW OPEN should Brazil for cheaper NG imports
 - Domestic x Bolivian x US Gas - SHORT and LONG TERM

Opportunities and Challenges for NG in Brazil

- Investment dominance of Upstream O&G – PRESALT
 - But PRESALT is basically na Oil Driven Exporting Project
- Regarding NG – Major UNBALANCES between UPSTREAM and DOWNSTREAM investments
- Descasamentos Fundamentais a serem discutidos:
 - Descasamento entre ÓLEO e GN – Presal é OIL DRIVEN



OBRIGADO

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