# Brazil Crude Oil Production Report

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# Introduction

This project analyzes the production of oil in Brazil in April 2016. The data provided offers an opportunity to develop insights into Brazil's Oil production patterns, and provide ANP with the information needed to report to the global energy bodies. The analyses focus on the production of petroleum, gases and water according to the various states, basins, and operators.

# Objectives

Generate a report for ANP and the Energy Commission to show the performances of the various operators, basins and states.
Identify key values and insights to boost productivity.

# Tasks

- Prepare the data for analysis (Data Cleaning)
- Analyze and visualize the data using Python and Power BI
- Interpret trends and identify key areas
- Make recommendations or propose solutions

# Data Collection and Cleaning

- Imported the data from excel into python
- Changed the data types of columns

# Analysis and Insights

## Descriptive Statistics

To get a general overview of the data being worked with, the following were identified over the period under consideration:

- Production
    - Total of 72.79 mmcf/day of gas produced

    - Total of 2.14M bbl/day of oil produced
    - Total of 1.80M bbl/day of water produced
    - Average production time of 579.05 hours
    - Total gas royalties of 1.63M mmcf/day
- Installation Types
    - UEP and Instalacao EMB/DESEMB
    - UEP – 765 installations
    - Instalacao – 40 installations
- States
    - Total of 8 states
- Basins
    - Total of 9 basins
- Operators
    - Total of 7 operators
- Fields
    - 82 fields across Brazil

## Analysis By State

This focuses on generating charts that give life to the data from the perspective of each state. This provides an opportunity to establish and compare relationships between variables. To do this, the following were determined:

- Total produced gas by state
- Total produced water by state
- Average production time by state
- Total produced petroleum by state
- Average duration by state

The production wells in Rio de Janeiro were the most active wells: they produced a total of 37.6K bbl/day of gas, 1.35M bbl/day of water and 1.44M bbl/day of petroleum. However, the average production time spent in this state was the second lowest at 553.14 hours. Ceara had the highest average production time with 705.24 hours, but the state managed the lowest amount of gas produced (0.1K mmcf), the third lowest amount of petroleum produced (5.4K bbl/day), and the fourth lowest water produced (10.28K bbl/day). Sao Paulo was the second highest producer of gas, and third highest producer of petroleum and water. Notably, the production of water at the wells in Sao Paolo was about a tenth of the production of water in Espirito Santo and a one-forty-

third of produced water in Rio de Janeiro – Rio de Janeiro and Espirito Santo being the other top producing states in Brazil.

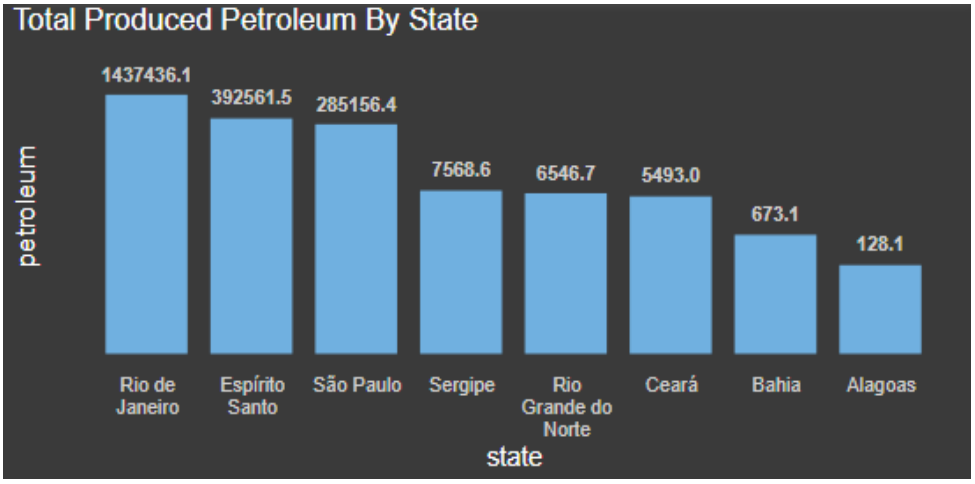


*Figure 1: Total Produced Petroleum by State*

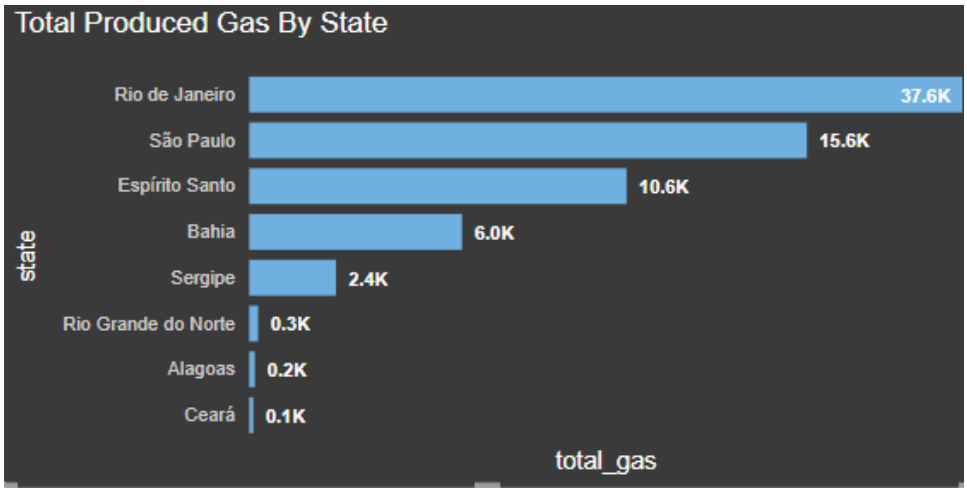


*Figure 2: Total Produced Gas by State*

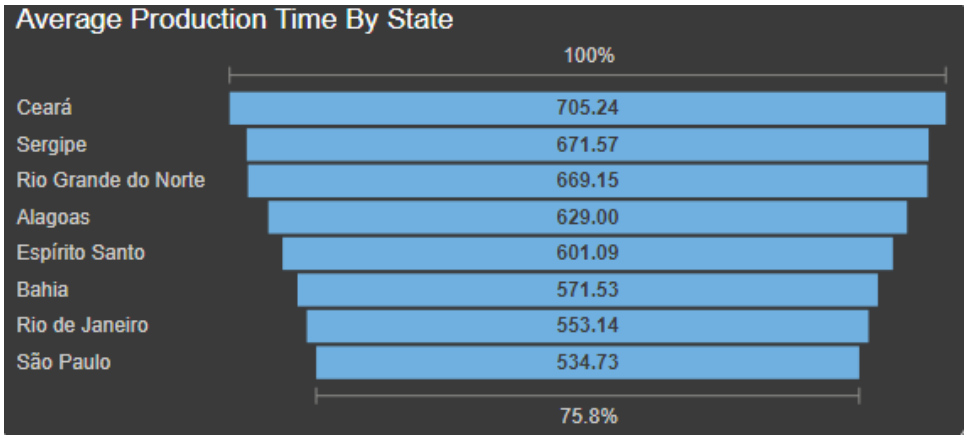


*Figure 3: Average Production Time by state*

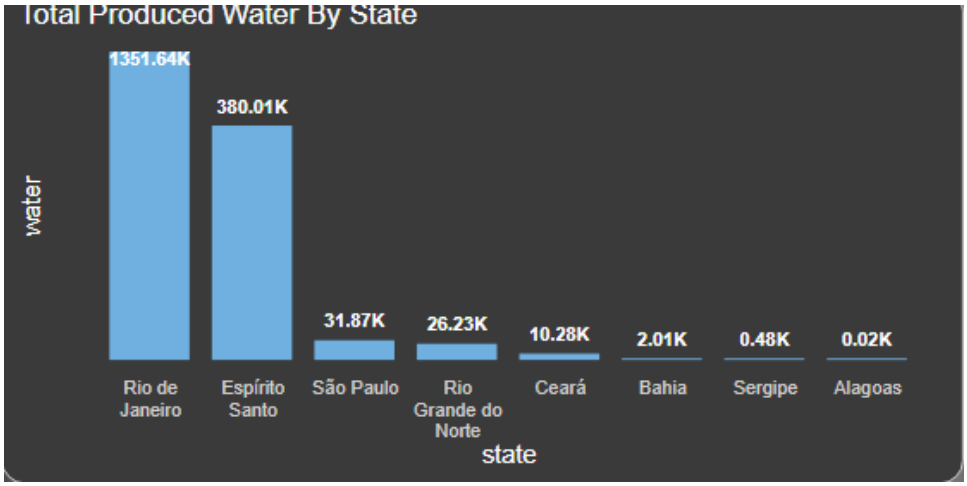


*Figure 4: Total Produced Water by State*

## Analysis By Basin

To further understand production in Brazil in April 2016, analysis of production was done by basins. The following were the parameters for the analyses:

- Average production time by basin
- Total Petroleum by basin
- Total gas produced by basin
- Total water produced by basin

Campos produce the most petroleum and the most water with 1.47M bbl/day and 1.67M bbl/day respectively. Campos was also the second largest producer of gas with 27.17K mmcf/day. Santos and Espirito Santo were the next best producers of petroleum and water but were still far off Campos. However, the wells in the Santos

basin produced the most water with 34.37K bbl/day. Alages was the least performing basin for petroleum and water while Reconcavo produced the least amount of gas with 17.4 mmcf/day. The production outputs were not a reflection of the production hours as Reconcavo had an average of 706.55 hours of production compared to Campos' 566.6 hours and Santos' 434 hours.

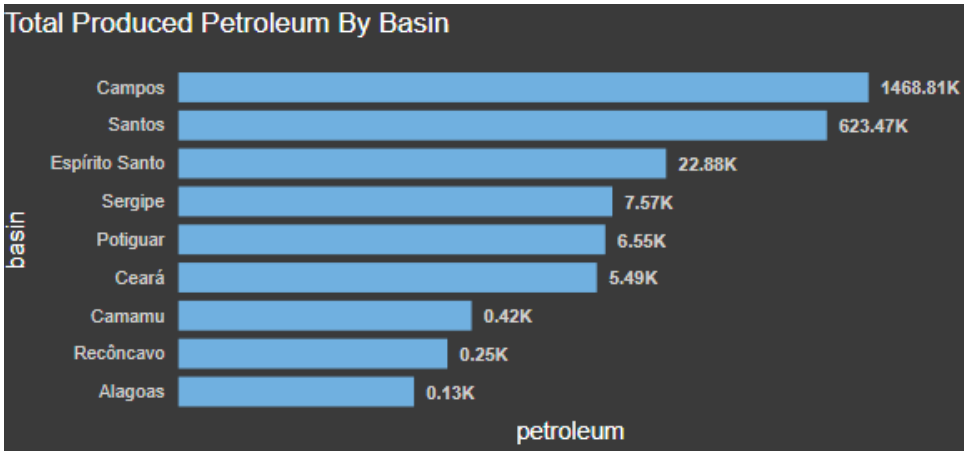


*Figure 5: Total Produced Petroleum by Basin*

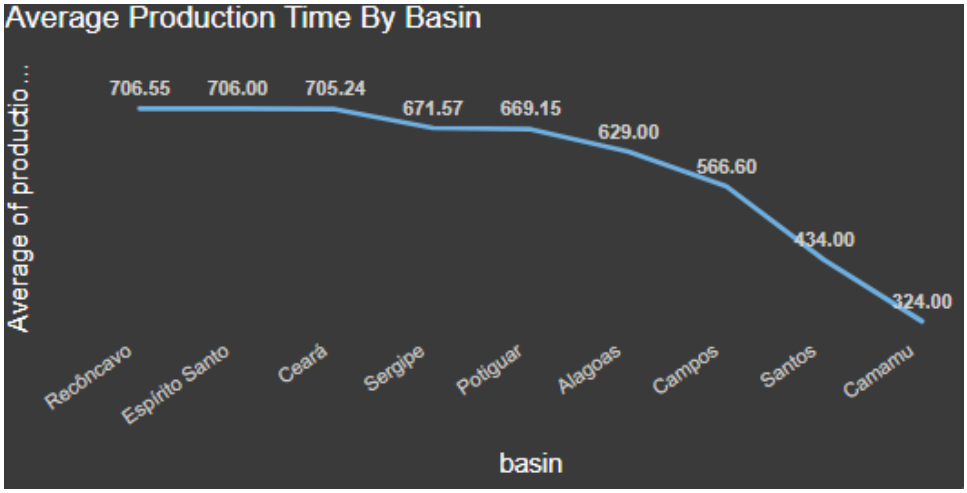


*Figure 6: Average Production Time by Basin*

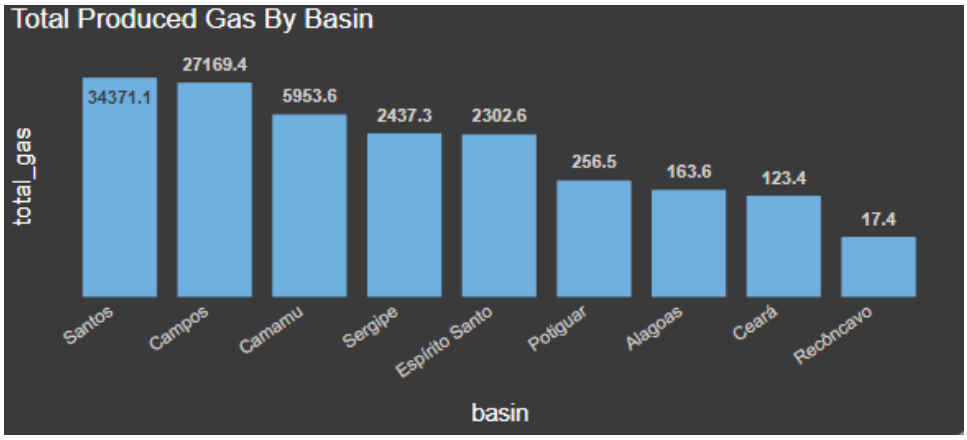


*Figure 7: Total Produced Gas by Basin*

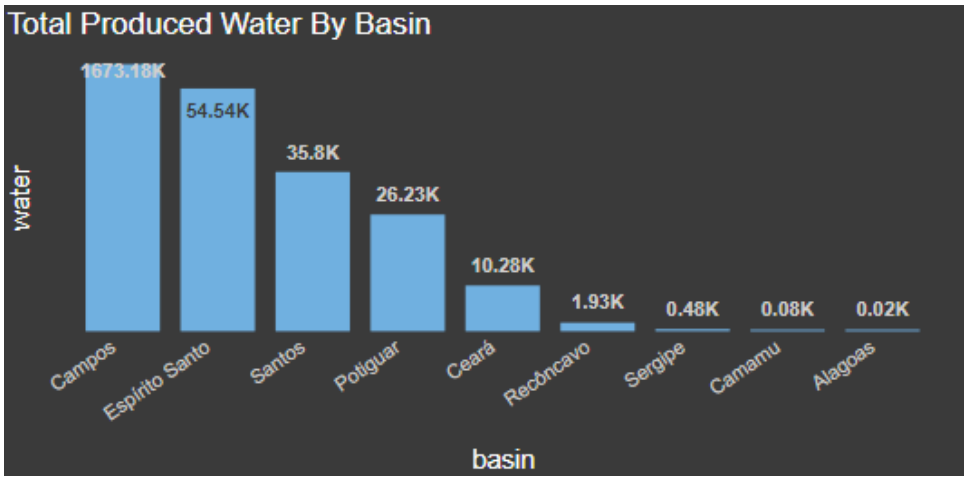


*Figure 8: Total Produced Water by Basin*

## Analysis By Operator

To observe trends across the operators, the following parameters were used:

- Total produced petroleum by operator
- Total produced gas by operator
- Total produced water by operator
- Average production time by operator

Petrobras had the highest petroleum produced, water produced, total gas produced and average production hour with 2.03M bbl/day, 1.66MM bbl/day, 71.943K mmfc/day and 611.03 hours respectively. The analysis suggests OGX had no

production in April 2016. Shell Brazil was the second highest producing operator although the gap between them and Petrobras was enormous suggesting the Brazilian oil sector is dominated by Petrobras.

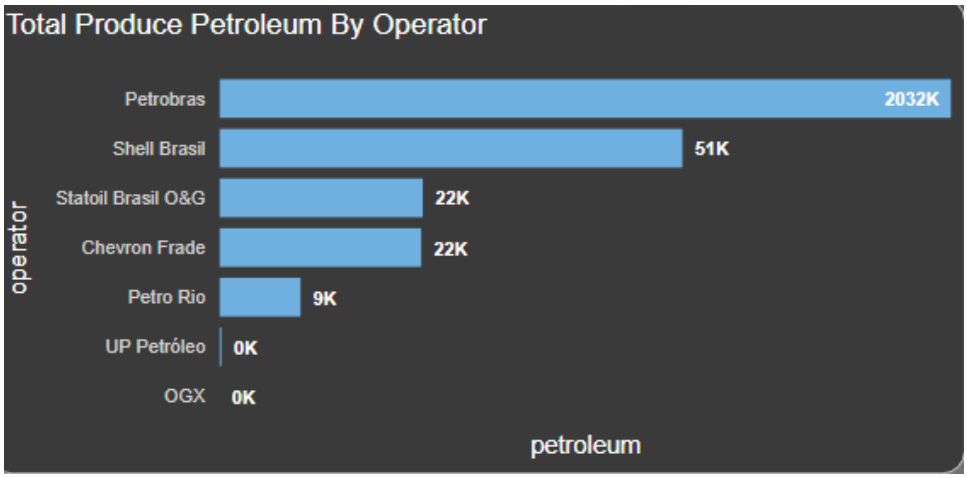


*Figure 9: Total Petroleum Produced by Operator*

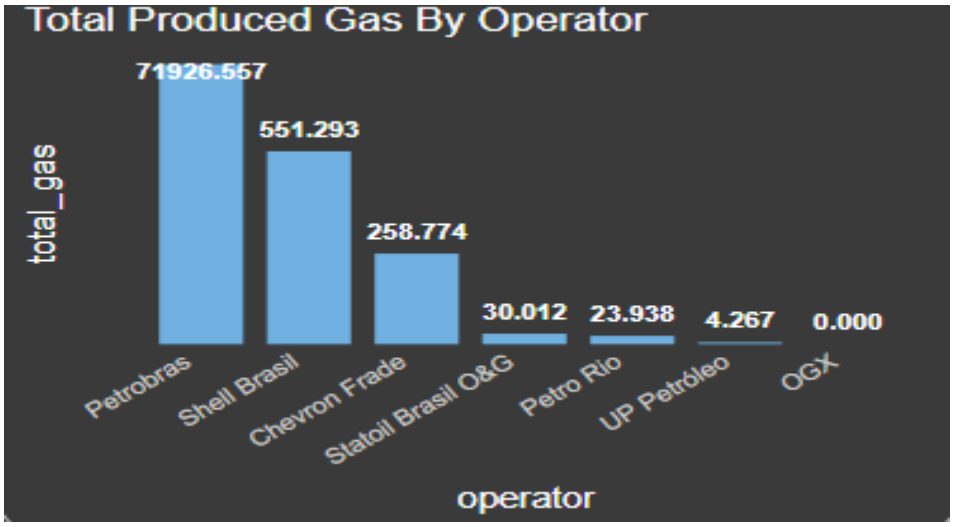


*Figure 10: Total Produced Gas by Operator*

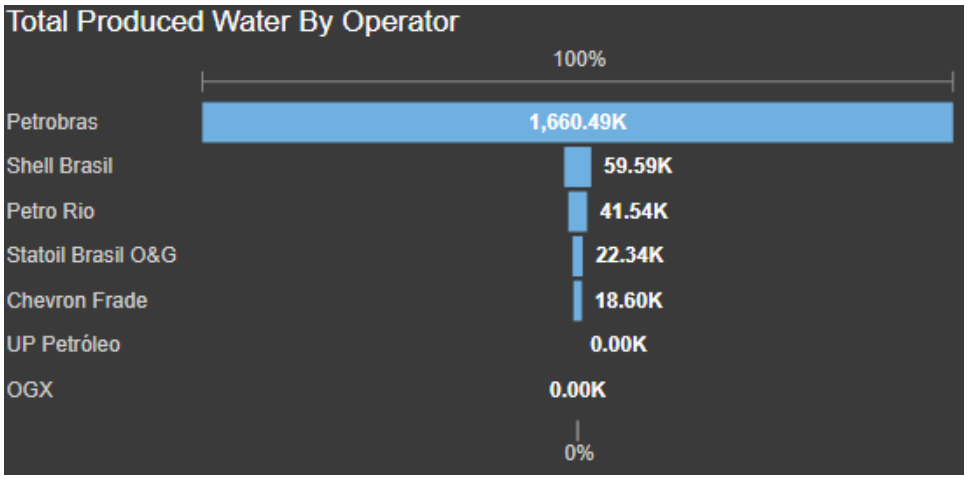


*Figure 11: Total produced Water by Operator*

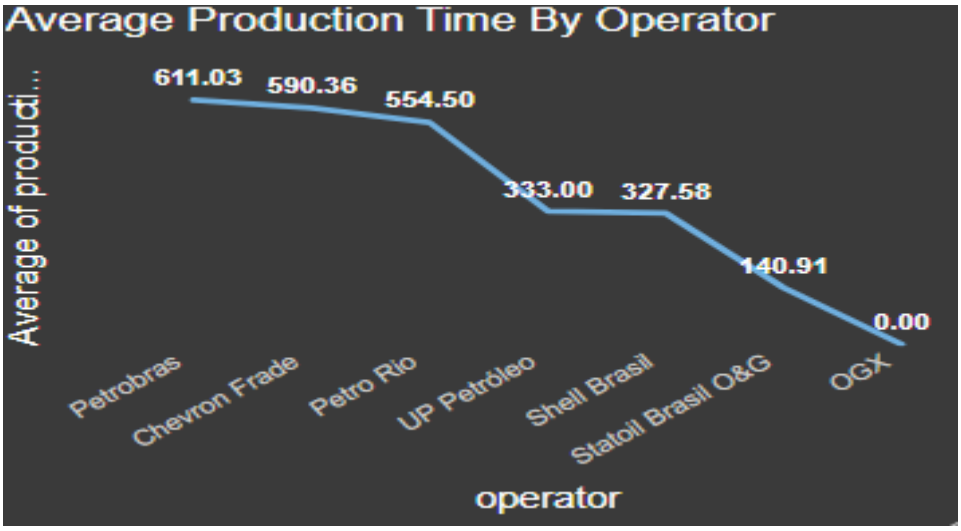


*Figure 12: Average Production Time by Operator*

# Recommendations

Review production hours allocated for the various states and basins. Some wells with low volumes of produced petroleum and gas have high average production hours; this is not an efficient use of resources.

Wells in Sao Paolo should be the point of focus when trying to minimize the production of water while maintaining good production of petroleum and gas.

# Conclusions

The Brazilian oil sector is dominated by Petrobras across multiple states and basins. Identifying ratio of produced petroleum to produced water will help understand the wells.

OGX operates with no petroleum products suggesting this operator is now setting up in Brazil.