

# **Mozambique Natural Gas Condensate Analysis: Offsetting Production Royalties with Production By-Products\***

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## **Abstract**

Oil is often produced in developing parts of the world with limited infrastructure where stakeholders are often challenged with comprehensive build-outs that include roads and even airports. In these environments, production by-products such as natural gas condensates can be unfeasible to commercialize due to low quantities relative to the cost of processing and transportation. This study looks at work done in Mozambique on natural gas condensate characterization and commercialization studies to provide recommendations to new projects for facilities design and contract negotiation to consider ways of using production by-products, such as condensate, in the royalty negotiation process, especially in remote and developing regions. These results can also be used in future petroleum projects in Mozambique.

## **Selected References**

Iledare, J.C., 2016, Regressive Royalty Framework for Oil and Gas Development Strategy: Lessons from Nigeria: SPE Economics & Management, p. 68-77.

Muhai, J., 2015, Ministry of Mineral Resources and Energy, Mozambique Report, Energy Policy, Japan: The Institute of Energy Economics.

# Mozambique Natural Gas Condensate Analysis: Offsetting Production Royalties with Production By- Products

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# About the Natural Gas Project

- 800KM pipeline to South Africa
- Objective was to replace coal with natural gas for synthetic fuel production
- The Owner/operator is also the primary customer/  
consumer

# Sample Royalty Strategies and Challenges

- The objective was to promote internal development (jobs, commercialization, other projects)
- Corruption, infrastructure, educations and lack of resources have challenged the execution of this objective in many un-developed countries.

Country	Estimated Royalty Rate
Kuwait	15%
Libya	16.67%
Nigeria	0-20%
Australia	10-12%
Argentina	12%
Algeria	5.5%-20%
India	5-12.5%
Brazil	5-15%
Canada	5-30%

# Challenges with royalty strategy for developing countries

- Lack infrastructure, education and resources to immediately benefit from large capital energy project where the energy is mostly exported
  - Inability to leverage the investment locally
- Limited number of educated and people with disposable income
  - Only a small number of people are capable of benefiting from these strategies (investors, the small # of educated people, etc.)
  - Prone to corruption
  - Prone to bad decisions that appear like corruption

# Production vs Consumption

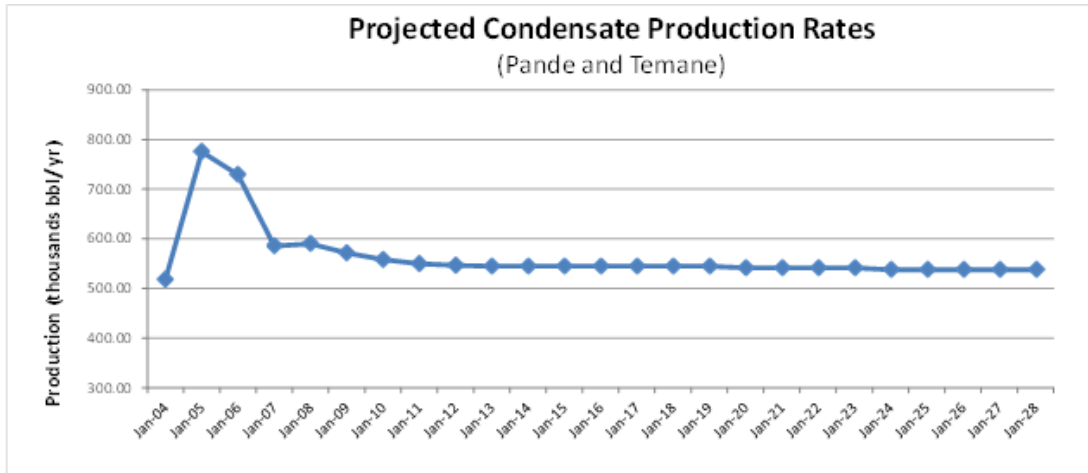


Figure 1- Natural gas condensate projected production rates for the Temane/ Pande field (ENH- Empresa Nacional de Moçambique, 2001)

At the time of the project the consumption of motor fuel was not enough to consume all of the condensate

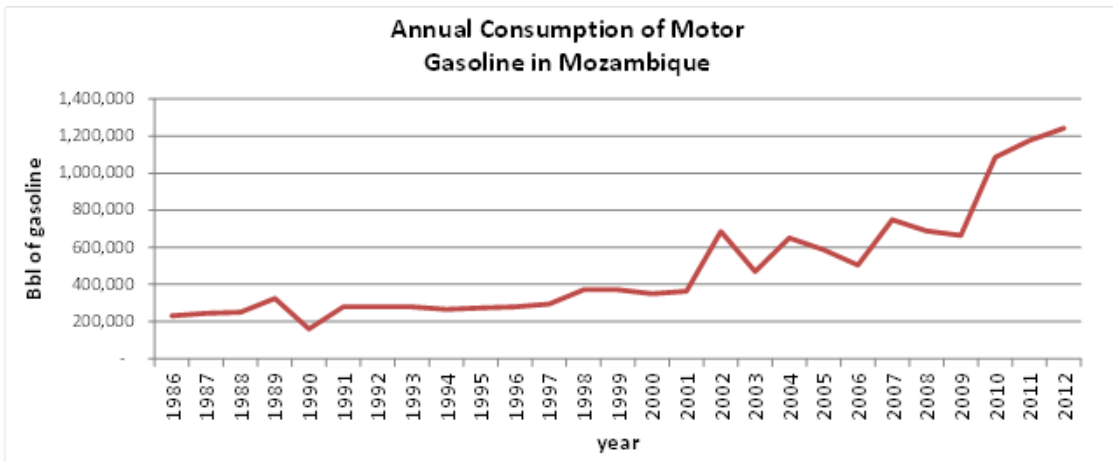
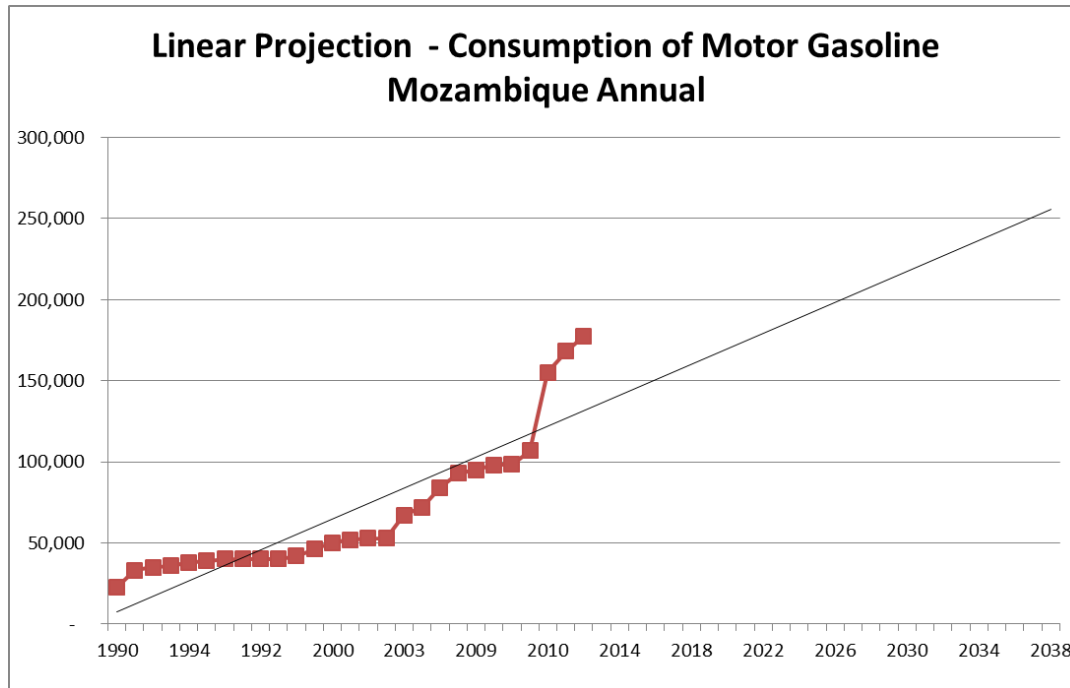


Figure 1- Mozambique gasoline consumption rates. (EIA - United States Energy Information Administration)

# Production vs Consumption



The consumption growth projections would enable 100% local consumption of the condensate in well over 20 years.

# About Mozambique

- +/- 25 million people
- Average age 17 years
- 52% below poverty??? (<\$1,200/ year)

Export most of the natural gas and electricity (hydro-electricity) produced. Most of the biomass produced is consumed

Description	2011 (1,000 ktoe)
Fuel consumption	8.3
Biomass	6.4
Electricity	0.9
Natural gas	0.08
Petroleum products	0.88
Production	12.8
Biomass	8
Export	4
Import	1.7

Sources: 1) Gilberto Mahumane, Peter Mulder, Mozambique Energy Outlook, 2015-2030. Data, Scenarios and Policy Implications, a Eduardo Mondlane University, b VU University, Amsterdam, The Netherlands, 2) Ministry of Natural Resources Mozambique 3) CIA facts cia.com



# Oil consumption in Mozambique

Would need almost 5x this consumption in 2014 to consume all of the condensate

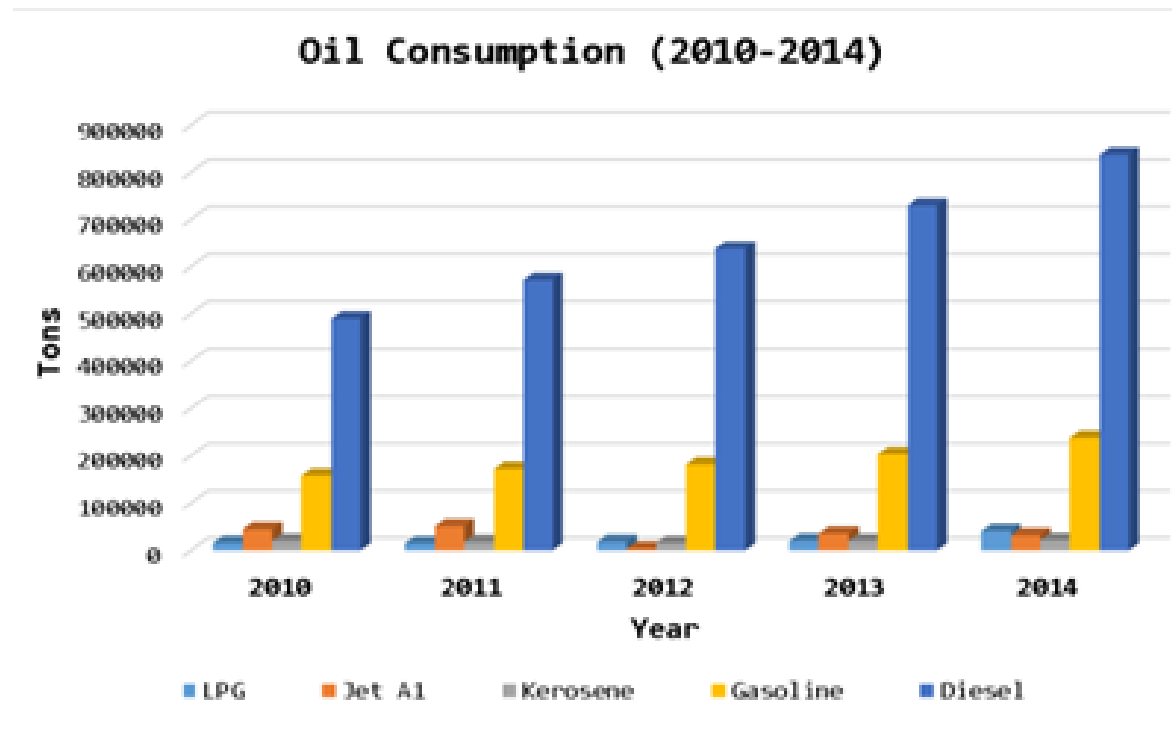


Figure 1- Petroleum fuel products consumption and imports (Muhai, 2015)

# Production vs Consumption: Opportunities

- As –is consumption would not consume all of the condensate
- The condensate could be processed
  - More condensate consume as a motor fuel
    - Potential for 10-20% replacement of gasoline (petrol) fuel imports
    - At 20% consumes ~50% of the condensate production by 2014, assuming the current situation
  - Some condensate consume as a kerosene fuel
    - Potential for 100% replacement of kerosene fuel imports

# Production vs Consumption: Challenges

- The government would have to invest in infrastructure (this could be in the form of a grant or small loan 10-20million USD)
- The government would have to find a way to commercially sustain/ maintain (i.e. privatize or government owned)
- The government would have to negotiate existing commitment to private investors in natural gas royalties
- Would required buy-in and alignment from IMF and other international stakeholders

# Unique Considerations

- Education cost
  - *(Sasol trained the CPF team they may not train local team on condensate fractionation)*
  - Lack of education and professional development challenges the explanation of this strategy
  - Challenges hiring the talent to develop and design the infrastructure (may need to be outsourced)
  - May challenge the required on-going maintenance and support required for the project
- Infrastructure costs
  - At the time of the project the roads were very bad and would not sustain regular transportation of fuel truck from the CPF to most populated parts of Mozambique
  - The project would require storage and distribution upgrades

# Benefits Analysis: Current Royalties from Gas

Table 1- Break-down of royalty payments to the Mozambique government by respective stakeholder. (CIP-MOÇAMBIQUE, CENTRO DE INTEGRIDADE PÚBLICA, 2013)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	Totals
SASOL Petroleum Temane										
Royalty Payments	1.2	0.9	1.8	1.8	2.4	1.6	2.7	2.7	3.2	18.2
Corporate Income Tax	0	0	0	0	0	0	0	0	0	0
CMH										
Royalty Payments			0.6	0.7	0.9	0.6	1	1	1.1	5.8
Corporate Income Tax					2.8	2.3	0	1.1	4.7	10.8
Dividends (20% government share)	0	0	0	0	0	0.4	0.2	0.5	0.2	1.3
International Finance Corporation										
Royalty Payments			0.1	0.1	0.2	0.1	0.2	0.2	0.2	1.2
Corporate Income Tax	0	0	0	0	0	0	0	0	0	0
<b>Total Revenue (mill USD)</b>	<b>1.2</b>	<b>0.9</b>	<b>2.5</b>	<b>2.6</b>	<b>6.2</b>	<b>5</b>	<b>4.1</b>	<b>5.5</b>	<b>9.4</b>	<b>37.3</b>

## Projected Value of Condensate to Mozambique as a fuel

Year	Estimated value of reduction in gasoline imports (10% blending)	Estimated value of reduction in gasoline imports (20% blending)	Estimated value of reduction in gasoline imports (40% blending)
2002	\$5,762,400	\$11,524,800	\$23,049,600
2003	\$3,939,600	\$7,879,200	\$15,758,400
2004	\$5,468,400	\$10,936,800	\$21,873,600
2005	\$4,939,200	\$9,878,400	\$19,756,800
2006	\$4,233,600	\$8,467,200	\$16,934,400
2007	\$6,291,600	\$12,583,200	\$25,166,400
2008	\$5,778,158	\$11,556,316	\$23,112,633
2009	\$5,586,000	\$11,172,000	\$22,344,000
2010	\$9,114,000	\$18,228,000	\$36,456,000
2011	\$9,878,400	\$19,756,800	\$39,513,600
2012	\$10,436,118	\$20,872,236	\$41,744,472
Sum	\$71,427,476	\$142,854,952	\$285,709,905

# Cost benefit

- The value to Mozambique to use natural gas condensate as a royalty is up to 8x greater than the current natural gas royalty strategy
- The opportunity to support internal development is significant (not calculated for this paper)
  - More fuel to support local entrepreneurs
  - Pride of ownership
  - Education and knowledge development in fractionation and blending
  - Pride of innovation

# Conclusion

- This is an alternative strategy to consider in very poor and developing nations
- Challenges stakeholder to assess alternative royalty strategies that may be more beneficial to all involved including local nationals
- Hidden costs are important to consider
  - Education, maintenance, infrastructure, distribution and etc.



# References

- CIP -MOÇAMBIQUE, CENTRO DE INTEGRIDADE PÚBLICA. (2013, November). *PANDE TEMANE GAS EXPORTS TO SOUTH AFRICA: First major extractive sector projects fails Mozambique, Edition No 17/2013*. Maputo: CENTRO DE INTEGRIDADE PÚBLICA MOÇAMBIQUE.
- EIA - United States Energy Information Administration. (n.d.).
- ENH- Empresa Nacional de Mocambique. (2001). *Field Development Plan: for Teman and Pande Field*. Maputo: Empresa Nacional de Mocambique.
- Iledare, J. C. (2016). Regressive Royalty Framework for Oil and Gas Development Strategy: Lessons From Nigeria . *SPE Economics & Management*, 68-77.
- Muhai, J. (2015). *Ministry of Mineral Resources and Energy, Mozambique Report, Energy Policy* . Japan: The Institute of Energy Economics.
- Staff, P. b. (2015, January). *The Law Library of Congress* . Retrieved from <https://loc.gov/law/help/crude-oil-royalty-rates/index.php>
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