Surplus or Shortage? The Challenge of Setting a Domestic Supply Obligation for Tanzania’s Offshore Gas

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Tanzanians need more energy. So authorities are looking for a larger domestic supply obligation (DSO) from the country’s offshore project than the currently agreed 8.5 percent.

The Natural Gas Utilization Master Plan (NGUMP) and Petroleum Act indicate the government could be looking for a DSO of up to 60 percent.

Notes: The implied DSO in the PSAs of 8.5% is based on a DSO of 10% in the Block 2 PSA and a DSO of 7% in the Block 1 and 4 PSAs, weighted by their estimated reserves. The Petroleum Act implies the DSO could be total profit gas. We used our economic model of the project to estimate that this could entail a DSO of around 60% in our baseline scenario. Sources: Petroleum Act, 2015; NRGI Tanzania offshore gas model, 2021.

Proportion of Tanzanians with access to power

36%

Proportion of Tanzanians who can cook with clean fuels

2%
### Key questions

1. How much gas might Tanzania need in the future?

2. How worried should government officials be about a shortage or surplus of gas?

3. What are the implications of a larger DSO for the offshore project and government revenues?

4. What could be the way forward for the government?
No one knows how much gas Tanzania will need in the future.

But projections in the NGUMP are more optimistic than others …

… and may not be realized:

- Renewables could be more viable than expected.
- Petrochemical and gas-to-liquid plants – also anticipated to use large gas volumes – are very uncertain.

Notes: NGUMP includes regional demand for Tanzanian gas in its projection. This chart only shows domestic demand. These projections were made at different times, with different assumptions. So we have had to calibrate them to be comparable. E.g. by shifting the NGUMP projections back by five years to account for offshore production being unlikely to start before 2030 in contrast to the NGUMP assumption that it will start in 2025. See annex of report for further details on how we have configured these scenarios. Sources: NGUMP, 2016; Demierre et al, 2014; IEA, 2019; IEA, 2020.
We looked at two demand scenarios for DSO gas

**NGUMP demand-low onshore supply**
- Domestic demand is as high as NGUMP predicts
- Tanzania supplies its neighbors with the amount of gas assumed by NGUMP
- Onshore gas supply only from current projects

**IEA demand-high onshore supply**
- Domestic demand is only as high as IEA STEPS predicts
- Tanzania supplies Kenya to satisfy the demand assumed by IEA STEPS
- Onshore gas supply from current projects and Tanzania’s other onshore reserves
In the “NGUMP demand-low onshore supply” scenario, there is a large gas shortage even with a 60 percent DSO.

Notes: Supply from the DSO is based on our baseline assumptions of total offshore production and the DSO being the same annual amount throughout the project’s lifetime. Supply from current onshore projects is based on Songo Songo and Mnazi Bay producing the reserves in their current development plans. We used the projections provided in the Orca annual report 2019 for Songo Songo, and assumed Mnazi Bay’s future production will be similar to 2019 levels. Sources: NRGI Tanzania offshore gas model, 2021; Orca, 2020; Wentworth, 2020.
Even in the “IEA demand-high onshore supply” scenario, there is eventually a shortage with a DSO up to 40 percent.

But there is a large initial surplus.

Notes: In addition to the assumptions set out in the previous slide, we assumed that further onshore gas is developed if and when the country needs it, from the estimated 7.1 tcf of recoverable onshore gas reserves for which there is currently no development plans. We assumed these fields are developed after there has been two years of surplus demand. We assumed that they each operate for a minimum of ten years and can produce at the same potential rate as Mnazi Bay until the known reserves are depleted. Sources: NRGI Tanzania offshore gas model, 2021; Orca, 2020; Wentworth, 2020.
This surplus could leave Tanzania facing huge take-or-pay penalties.

With a 20 percent DSO, penalties would be equivalent to two-thirds of the country’s health budget.

With a 40 percent DSO, penalties would be equivalent to its entire education budget.

### Present value of take-or-pay penalty (USD millions, 10% discount rate)

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<thead>
<tr>
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<th>8.5% DSO</th>
<th>20% DSO</th>
<th>40% DSO</th>
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</thead>
<tbody>
<tr>
<td>NGUMP demand-</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>low onshore supply</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>IEA demand-</td>
<td>85</td>
<td>631</td>
<td>2,000</td>
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<tr>
<td>high onshore supply</td>
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### Penalty as proportion of government revenues from offshore project

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<tr>
<td>IEA demand-</td>
<td>1%</td>
<td>11%</td>
<td>37%</td>
</tr>
<tr>
<td>high onshore supply</td>
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Notes: We assumed 100% of the DSO is covered by a take-or-pay clause. We calculated the penalty by multiplying the quantity of surplus gas with our estimated wellhead price and processing plant tariff of $4 per mmbtu. Source: NRGI Tanzania offshore gas model, 2021.
A more diversified energy mix reduces the risk of a gas shortage.

And provides other benefits:

- Options to adjust to uncertain and varying demand
- Maximal use of Tanzania’s energy resources rather than wasting them
The “landing zone” for a deal on Tanzania’s offshore project is narrow. The project may need a long-term delivered LNG price of $9 per mmBtu to be viable. This price may be below long-term prices in Asia, the largest LNG market.
A large DSO worsens the project’s prospects if demand is low …

…so large DSOs based on optimistic demand projections carry significant offtake risk.

Given these challenges, if government requires a large DSO, companies will likely ask for incentives... ...such as lower taxes.

| Tax reduction that companies will likely request at different DSO volumes |
|---------------------------|---|---|---|---|---|---|---|---|
|                           | 0% DSO | 8.5% DSO | 20% DSO | 30% DSO | 40% DSO | 50% DSO | 60% DSO |
| High domestic demand      | 0%     | 0%       | 0%       | 0%       | 0%       | 0%       | 0%       |
| Low domestic demand       | 0%     | 0%       | -8%      | -16%     | -27%     | -42%     | -69%     |
| Low domestic demand with renegotiated take-or-pay agreement | 0% | 0% | -7% | -11% | -15% | -19% | -24% |

Notes: The tax incentives needed are based on increasing the project’s return to our assumed hurdle rate of 13 percent. The scenario with a renegotiated take-or-pay agreement accounts for these agreements not acting as perfect insurance for companies. It replicates the recent Ghana experience in which the government initially failed to pay its take-or-pay penalty and then negotiated a reduction in the price it paid for its gas.

To navigate these trade-offs, Tanzania’s government could:

1. Diversify the energy mix
2. Negotiate a variable DSO
3. Limit the DSO to below 20 percent
4. Change the public narrative from “gas” to “energy”
5. Work with the companies to reduce project costs and carbon intensity

The advantages and disadvantages of a large DSO:

- Less risk of gas shortage

Disadvantages:

- Risk of offshore not being developed
- Lower government revenues
- Risk of take-or-pay penalties
- Lost opportunity for other domestic energy sources
- Less risk of gas shortage
Find the full report and the economic model that informed it here:
resourcegovernance.org/analysis-tools/publications/surplus-or-shortage-challenge-setting-domestic-supply-obligation-tanzania-gas