

ANNEX I

Main trends and scenarios of energy sector development follow, with a particular focus on the electricity sector. Trends include the period from 2004 to 2014, as well as prognosis until 2040.

1 Main challenges for the energy sectors

- High levels of lignite generated pollution increase public expenses on healthcare. In addition, high externalities of the lignite industry are also related to heavy water pollution in producing regions.
- Natural gas production in the past has allowed a change in the energy balance and a reduction of the share of lignite in the electricity mix. However, depleting onshore reserves make offshore development inevitable.
- For the period from 2000 to 2020, natural gas production reached plateau around 15 bcm per annum. Export constitutes 5 bcm, however, export revenues provide 75% of the overall gas sector profits. The outlook envisages further growth rates in domestic gas demand, especially in the power sector. To cover the consumption development of offshore fields will be necessary.

2 Burabarrian government-provided analysis on gas sector potential

- According to the Institute's information, by 2030 new gas production could replace depleting fields and increase towards 35 bcm a year by 2040. With shale gas development on higher cost the production and export capabilities may further increase to 45 bcm. Due to the global fossil fuels phase out plans by 2050 the external demand is unclear.
- Rentable levels of gas extraction will still allow maintaining a production level of 30-40 bcm per annum until 2050.
- The Institute also provided some data on shale gas deposits in Burabarra. It was highlighted that production costs are significantly higher, as each well might cost at least 10 million USD, compared to around 1 million for a conventional gas well. Moreover, shale gas requires a larger number of wells, and requires new pipeline capacity development.
 - The shale gas option also needs to take into account subsidies and a price cap, which together make another 10 billion USD. Further public support for the gas sector might represent a serious burden for the state budget.

3 Burabarrian gas sector outlook

Bcm	2030	2040	2050
<i>Export</i>	5	10	15
<i>Domestic market</i>	10	25	30
<i>Total production</i>	15	35	45

A challenge of Burabarra's energy sector consists of a need to increase gas export potential without hindering domestic availability of energy. A rise of export revenues will increase the possibility of investing into electricity grids, increasing access to energy for remote regions and decreasing energy poverty. However, Paris Agreement commitments and constant pressure from environmental NGO's and from abroad makes predictions for 2050 and beyond very difficult.

The Burabarrian government sees an urgent need for climate change mitigation agenda. There is a subsequent need to consider a decrease of energy intensity in the heavy industry sector. According to the Institute of Energy Strategy, there is economically proven potential for up to 10 bcm p.a. of natural gas savings by 2050. In addition, there is also potential for loss reduction in the power grid. Currently, high depreciation rates of the grid and long

distances constitute the main causes for losses. On these grounds, the Energy Strategy considers various decentralised energy options, including RES support mechanisms.

4 Electricity balance, 2012-2022

During the last ten years, there has been a significant decrease in lignite-based electricity generation, growth of natural gas generation, and a slight growth in RES-generated electricity.

Table 1

	2012	2017	2022
Lignite	29 TWh	27 TWh	25 TWh
Gas	5,5 TWh	7,5 TWh	9 TWh
Res	0 TWh	1,5 TWh	3,5 TWh
Hydro	1,5 TWh	1,5 TWh	2 TWh
Total	36 TWh	37,5 TWh	39,5 TWh

Table 2

Relative shares of each fuel in power generation

	2012	2017	2022
Coal	80%	72%	63%
Gas	16%	20%	23%
Res	0%	4%	9%
Hydro	4%	4%	5%
Total	100%	100%	100%

Table 3

Relative share of emissions by fuel

	2012	2017	2022
Coal	90%	85%	80%
Gas	10%	15%	20%
NewRes	0%	0%	0%
Hydro	0%	0%	0%
Total	100%	100%	100%

5 Baseline scenario according to the Institute of Energy Strategy of Burabarra

In accordance with the Institute of Energy Strategy, there is expected growth in electricity production. RES-generated electricity growth will be significant, and can reach 25% by 2050. Most of RES growth potential will come from offshore wind, and to a lesser extent of onshore wind. The share of natural gas will increase, compensating for a decline in lignite-generated power production.

Table 4a

Outlook for electricity generation for 2030-2050 in TWh (baseline scenario)

	2030	2040	2050

Lignite	20 Twh	15 Twh	10 Twh
Gas	20 Twh	25 Twh	25 Twh
NewRes	5 Twh	10 Twh	20 Twh
Hydro	2 Twh	2 Twh	2 Twh
Total	47Twh	52 Twh	57 Twh

Table 4b

Outlook for electricity generation for 2030-2050 in Twh (total phase out of lignite by 2035)

	2030	2040	2050
Lignite	15 Twh	0 Twh	0 Twh
Gas	22 Twh	30 Twh	30 Twh
NewRes	8 Twh	20 Twh	25 Twh
Hydro	2 Twh	2 Twh	2 Twh
Total	47 Twh	52 Twh	57 Twh

Table 5

Electricity mix outlook for the period till 2050 (baseline scenario)

	2030	2040	2050
Coal	42,5%	29%	17,5%
Gas	42,5%	48%	44%
NewRes	10,5%	19,2%	35%
Hydro	4,5%	3,8%	3,5%
Total	100%	100%	100%

Table 6

Baseline scenario for GHG emissions per fuel

	2020	2025	2030	2040
Coal	70%	60%	50%	30%
Gas	30%	40%	50%	70%
Hydro	0%	0%	0%	0%
NweRES	0%	0%	0%	0%