



PROJECT

Transboundary water management adaptation in the Amudarya basin to climate change uncertainties

Report

2.2. Analysis of country development programs

2.2a. Review of development of economic sectors and forecast of agricultural development of Turkmenistan until 2055 in the planning zones in the Amudarya basin

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TABLE OF CONTENTS

I. Rating of planning zones in the Amudarya basin in the development of economic sectors of Turkmenistan	3
1.1. Akhal planning zone	3
1.2. Maryh planning zone	6
1.3. Lebap planning zone	9
1.4. Dashoguz planning zone	12
II. Forecast indicators of agricultural development of Turkmenistan until 2055 in the planning zones in the Amudarya River basin	15
2.1. Basic methods to calculate forecast indicators	15
2.2. Akhal planning zone	16
2.3. Dashoguz planning zone	18
2.4. Lebap planning zone	20
2.5. Maryh planning zone	22
REFERENCES	24

I. Rating of planning zones in the Amudarya basin in the development of economic sectors of Turkmenistan

1.1. Akhal planning zone

Economics in the Akhal planning zone is represented by industry and agriculture. Its development depends not only on the rating of the zone in the interregional specialization of labor, but also on the fact that the country's capital is located here. In terms of the size (19.7%), the Akhal planning zone is ranked second after the Balkan province.

Investments. In 2015, 11% of the total country investments were allocated for industrial development, infrastructure and social development in the Akhal planning zone (fourth place). 55% of investments in fixed capital were allocated for production facilities in the Akhal planning zone (Table 1).

Table 1

Investment attraction in the Akhal planning zone

Indicator	2015	Rating of Akhal PZ in the country
Share of investments in the Akhal PZ in the total country investments	11.0%	4
Share of investments in fixed capital in production facilities	55.0%	-

Source: prepared by author based on data from <http://www.stat.gov.tm/ru/main/info/turkmenistan/turkmenistan/>.

Industry. In 2015, the Akhal planning zone accounted for 13.0% of the total industrial production of the country (fourth place). Gas industry is highly developed here. At year-end 2015, the planning zone was ranked third in gas production (20.9%). Moreover, chemical (fertilizer production), textile, food, and construction material industries are developed here. The Akhal planning zone is ranked second in national fertilizer production (24.3%) and first in footwear production (49.2%). Enterprises of construction material industry are the leading producers of cement (38.3%) and non-metallic construction materials (30.4%) in the country (Table 2).

Table 2

Industrial development in the Akhal planning zone

Indicator	2015	Rating of Akhal PZ in the country
Share of industrial production	13.0%	4
Share of gas production	20.9%	4
Share of fertilizer production	24.3%	2
Share of footwear production	49.2%	1
Share of cement production	38.3%	1
Share of non-metallic construction materials	30.4%	1

Source: prepared by author based on data from <http://www.stat.gov.tm/ru/main/info/turkmenistan/turkmenistan/>.

Agriculture. In the Akhal planning zone, farming is developed, particularly urban farming to a large extent. The main farming areas are wheat and cotton production, vegetable and grape growing, meat and dairy production, animal husbandry and silk farming.

The Akhal planning zone is ranked second in growing vegetables (25.7% of the total growing in the country) and cucurbits (28.1%), and first in grape growing (67.8%) (Table 3).

Table 3

Agricultural development in the Akhal planning zone

Indicator	2015	Rating of Akhal PZ in the country
Share of vegetable growing	25.7%	2
Share of melon growing	28.1%	2
Share of grape growing	67.8%	1
Share of camel population	34.0%	1
Share of small ruminant population	25.0%	2
Share of cattle population	11.6%	4

Source: prepared by author based on data from <http://www.stat.gov.tm/ru/main/info/turkmenistan/turkmenistan/>.

The planning zone is ranked first in camel population (34%) and third in poultry population; the share of small ruminant population was 25% (second place) and cattle population – 11.6% of the total population in 2015. Akhal is an ancestral home for the Akhalteke horses.

Transport sector. The transport network of the Akhal planning zone is represented by automobile, railway, and pipeline transport. In 2015, the planning zone accounted for 17.4% of the total cargo turnover and 11.5% of the total passenger turnover (fourth and sixths places, respectively) (Table 4).

Table 4

Transport sector development in the Akhal planning zone

Indicator	2015	Rating of Akhal PZ in the country
Share of cargo turnover	17.4%	4
Share of passenger turnover	11.5%	6

Source: prepared by author based on data from <http://www.stat.gov.tm/ru/main/info/turkmenistan/turkmenistan/>.

Consumer market. The Akhal planning zone was ranked fifth in retail turnover volume among other regions of the country in 2015 (8.0%) (Table 5).

Table 5

Consumer market development in the Akhal planning zone

Indicator	2015	Rating of Akhal PZ in the country
Share of retail turnover volume	8.0%	5

Source: prepared by author based on data from <http://www.stat.gov.tm/ru/main/info/turkmenistan/turkmenistan/>.

Social sector. In the academic year 2015-2016, 134,500 children attended 224 secondary schools in the Akhal planning zone. Based on the system of the Ministry of Health and Medical Industry, the number of family doctors was 261 and middle medical personnel amounted to 2,300 people in 2015. The number of hospital beds was 2,100. Availability of the total residential space per person was 20.8 sq.m in 2015 (fifth place) (Table 6).

Table 6

Social sector development in the Akhal planning zone

Indicators	2015
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Number of secondary schools, pcs.	224
Number of pupils in schools, ths people	134.5
Number of family doctors, people	261
Number of middle medical personnel, ths people	2.3
Number of hospital beds, ths	2.1
Availability of the total residential space per person, sq.m	20.8

Source: prepared by author based on data from <http://www.stat.gov.tm/ru/main/info/turkmenistan/turkmenistan/>.

1.2. Maryh planning zone

Economics of the Maryh planning zone is represented by industry and agriculture.

Investments. In 2015, 9.8% of the total investments were allocated for economic development in the Maryh planning zone (fifth place). 75% of investments in fixed capital were allocated for production facilities in the Maryh planning zone (Table 7).

Table 7

Investment attraction in the Maryh planning zone

Indicator	2015	Rating of Maryh PZ in the country
Share of investments in the Maryh PZ in the total investments in the country	9.8%	5
Share of investments in fixed capital in production facilities	75.0%	-

Source: prepared by author based on data from <http://www.stat.gov.tm/ru/main/info/turkmenistan/turkmenistan/>.

Industry. In 2015, the Maryh planning zone was ranked fifth in industrial development (18.2%) (Table 8).

Table 8

Industrial development in the Maryh planning zone

Indicator	2015	Rating of Maryh PZ in the country
Share of industrial production	18.2%	2
Share of gas production	21.3%	2
Share of fertilizer production	64.4%	1
Share of electrical energy production	41.3%	1
Share of brick production	31.8%	2
Share of building blocks for concrete construction	15.9%	3
Share of cotton fiber production	30.7%	1
Share of cotton fabric production	24.7%	2
Share of hosiery production	15.1%	3
Share of vegetable oil production	33.3%	1
Share of whole-milk products	37.4%	1
Share of meat production	26.6%	1
Share of butter production	23.9%	3
Share of candy production	17.2%	3
Share of fruit and vegetable preserves	15.3%	4

Source: prepared by author based on data from <http://www.stat.gov.tm/ru/main/info/turkmenistan/turkmenistan/>.

Gas and electrical energy production, chemical, light and food production are the leading industrial sectors.

The Maryh planning zone is the main producer of electrical energy (41.3%) and fertilizers (64.4%) in the country. The planning zone accounts for 21.3% of the total gas production (second place).

The planning zone accounts for 31.8% of the total brick production (second place) and 15.9% of the building blocks for concrete construction (third place).

Light industry enterprises are specialized in production of cotton fiber, cotton fabric, knitted wear, carpets and shoes. In 2015, the Maryh planning zone was ranked first in cotton fiber production (30.7%), second – cotton fabric production (24.7%), and third – hosiery production (15.1%).

At year-end 2015, Maryh was ranked first in vegetable oil production (33.3%), whole-milk products (37.4%) and meat production (26.6%), third in butter (23.9%) and candy (17.2%) production, and fourth in fruit and vegetable preserves (15.3%).

Agriculture. The Maryh planning zone is one of the largest regions in the country, with cotton production, grain-growing, vegetable and melon growing, and fruits and berries growing. The planning zone was ranked first in harvesting raw cotton (31.1%), vegetables (20.6%) – third, and wheat (23.4) and grapes (9.3)– second (Table 9).

Table 9

Agricultural development in the Maryh planning zone

Indicator	2015	Rating of Maryh PZ in the country
Share of raw cotton production	31.1%	1
Share of wheat production	23.4%	2
Share of vegetable growing	20.6%	3
Share of grape growing	9.3%	2
Share of small ruminant population	27.2%	1
Share of cattle population	19.9%	3
Share of poultry population	24.4%	1
Share of dairy production	22.8%	3
Share of egg production	23.4%	3
Share of wool production	30.2%	1

Source: prepared by author based on data from <http://www.stat.gov.tm/ru/main/info/turkmenistan/turkmenistan/>.

Animal husbandry is highly developed in the Maryh planning zone. The region is ranked first in small ruminant population (27.2% of the total small ruminants in the country). The planning zone accounts for 24.4% of the total poultry population in the country (first place) and 19.9% of the total cattle population (third place). Farms in the Maryh planning zone are ranked first in meat (25.3%) and wool (30.2%) production, and third – in egg (23.4%) and dairy (22.8%) production.

Transport sector. The transport network of the Maryh planning zone is an integral part of the transport system in Turkmenistan. Main transport corridors are passing through its territory. This allows encouraging economic ties between regions of the country, with access to external market. At year-end 2015, the Maryh planning zone accounted for 23.2% of cargo turnover (first place) and 15.8% of passenger turnover (third place) (Table 10).

Table 10

Transport sector development in the Maryh planning zone

Indicator	2015	Rating of Maryh PZ in the country
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Share of cargo turnover	23.2%	1
Share of passenger turnover	15.8%	3

Source: prepared by author based on data from <http://www.stat.gov.tm/ru/main/info/turkmenistan/turkmenistan/>.

Consumer market. The specific weight of the Maryh planning zone was 11.8% in the total retail trade in 2015 (second place by sales volume) (Table 11). This shows dynamic development of the consumer market.

Table 11

Consumer market development in the Maryh planning zone

Indicator	2015	Rating of Marhy PZ in the country
Share of retail trade volume	11.8%	2

Source: prepared by author based on data from <http://www.stat.gov.tm/ru/main/info/turkmenistan/turkmenistan/>.

Social sector. In the academic year 2015-2016, 257,600 children attended 398 secondary schools in the Maryh planning zone. There is the State Energy Institute of Turkmenistan in the Maryh planning zone. In the academic year 2015-2016, 1,300 students attended the Institute. Based on the system of the Ministry of Health and Medical Industry, the number of family doctors was 503 and middle medical personnel – 5,200 people in 2015. The number of hospital beds was 5,100. Availability of the total residential space per person was 20.8 sq.m in 2015 (fifth in the country) (Table 12).

Table 12

Social development in the Maryh planning zone

Indicator	2015
Number of secondary schools, pcs.	398
Number of pupils in schools, ths people	257.6
Number of students in the State Energy Institute of Turkmenistan	1.3
Number of family doctors, persons	503
Number of middle medical personnel, ths people	5.2
Number of hospital beds, ths	5.1
Availability of the total residential space per person, sq.m	20.8

Source: prepared by author based on data from <http://www.stat.gov.tm/ru/main/info/turkmenistan/turkmenistan/>.

1.3. Lebap planning zone

In term of territory's size, the Lebap planning zone is ranked third in the country (19.1%).

Investments. In 2015, 14.9% of the total investments were allocated for economic development in the Lebap planning zone (third place). 87.9% of investments in fixed capital were allocated for production facilities in the Lebap planning zone (Table 13).

Table 13

Investment attraction in the Lebap planning zone

Indicator	2015	Rating of Lebap PZ in the country
Share of investments in the Lebap PZ in the total country investments	14.9%	3
Share of investments in fixed capital in production facilities	87.9%	-

Source: prepared by author based on data from <http://www.stat.gov.tm/ru/main/info/turkmenistan/turkmenistan/>.

Industry. The development in the Lebap planning zone relies on significant mineral reserves and rich land and water resources. In 2015, 27.1% of industrial products were produced in the planning zone (second place) (Table 14).

Table 14

Industrial development in the Lebap planning zone

Indicator	2015	Rating of Lebap PZ in the country
Share of industrial production	27.1%	2
Share of gas production	41.0%	1
Share of fertilizer production	11.3%	3
Share of electrical energy production	4.3%	-
Share of cement production	30.5%	-
Share of brick production	40.4%	1
Share of building blocks for concrete construction	18.6%	2
Share of cotton fiber production	25.8%	2
Share of cotton fabric production	6.0%	-
Share of knitted wear production	21.3%	-
Share of hosiery production	36.4%	1
Share of vegetable oil production	28.0%	2
Share of whole-milk products	20.8%	2
Share of meat production	26.5%	2
Share of butter production	25.8%	2
Share of candy production	28.3%	2

Source: prepared by author based on data from <http://www.stat.gov.tm/ru/main/info/turkmenistan/turkmenistan/>.

The reserves of fuel and mineral resources speak in favor of intensive industrial development in the Lebap planning zone. The planning zone is specialized in gas and oil production and processing, chemical, light and food production, as well as in construction material industry. At year-end 2015, Lebap was ranked

first in gas production in Turkmenistan. It accounts for 41% of the total gas production and 4.3% of the total energy production in the country.

The leading economic sectors are also light and food industry in the Lebap planning zone. The entire nonwoven fabric is produced here, as well as 25.8% of cotton fiber (second place), 36.4% of hosiery products (first place), 6% of cotton fabric, and 21.3% of knitted wear. At year-end 2015, the planning zone was ranked second in production of meat (26.5%), butter (25.8%), whole-milk products (20.8%), candy (28.3), and vegetable oil (28%).

As to chemical industry, mineral fertilizers are produced from local resources. Lebap is ranked third in the region in their production (11.3%). There are enough local raw materials for construction material industry, which has favorable prospects to further increase its production. Enterprises in this sector are ranked first in brick production (40.4%) and second in the total production of building blocks for concrete construction (18.6%). Lebap produces 30.5% of cement in the country.

Agriculture. Traditionally, farming is highly developed in the Lebap planning zone. Cotton production, grain-growing (wheat, rice), and vegetable growing are the main areas of farming. At year-end 2015, Lebap was ranked first in rice growing (64.4%), second in harvesting raw cotton (27.3%), potato (23.1%), vegetables (21.3%), and fruits and berries (20.8%), and third in wheat (22.3%) and melon (16.7%) production (Table 15).

Table 15

Agricultural development in the Lebap planning zone

Indicator	2015	Rating of Lebap PZ in the country
Share of raw cotton production	27.3%	2
Share of wheat production	22.3%	3
Share of rice growing	64.4%	1
Share of potato production	23.1%	2
Share of vegetable growing	21.3%	2
Share of fruits and berries growing	20.8%	2
Share of melon growing	16.7%	3
Share of cattle population	20.8%	2
Share of poultry population	18.1%	4
Share of dairy production	23.5%	2
Share of wool production	14.0%	5

Source: prepared by author based on data from <http://www.stat.gov.tm/ru/main/info/turkmenistan/turkmenistan/>.

Animal husbandry accounts for a substantial share in the gross agricultural output. The Lebap planning zone is ranked second in cattle population (20.8%) and fourth in poultry population (18.1%) in the country. Among the regions, Lebap is ranked second in dairy production (23.5%) and fifth in wool production (14%).

Transport sector. Closer contacts with the Central Asia countries explain the peculiarities of transport and economic connectivity of the Lebap planning zone. It is ranked first in the length of railway and automobile roads. Moreover, air, river, and pipeline transports are developed here.

At year-end 2015, Lebap accounted for 14.5% (fifth place) of the total cargo turnover and 16% (second place) of the total passenger turnover. Gas pipeline Turkmenistan-China originates in the Lebap

planning zone (Table 16).

Table 16

Transport sector development in the Lebap planning zone

Indicator	2015	Rating of Lebap PZ in the country
Share of cargo turnover	14.5%	5
Share of passenger turnover	16.0%	2

Source: prepared by author based on data from <http://www.stat.gov.tm/ru/main/info/turkmenistan/turkmenistan/>.

Consumer market. Consumer market is intensively developed. The specific weight of the Lebap planning zone was 10.8% in the total goods turnover in 2015 (third place by sales volume in the country) (Table 17).

Table 17

Consumer market development in the Lebap planning zone

Indicator	2015	Rating of Lebap PZ in the country
Share of retail turnover volume	10.8%	3

Source: prepared by author based on data from <http://www.stat.gov.tm/ru/main/info/turkmenistan/turkmenistan/>.

Social sector. In the academic year 2015-2016, 248 001 pupils studied in 380 secondary schools in the Lebap planning zone.

There is the Turkmen State Pedagogical Institute named after Seyyidi in the Lebap planning zone. In the academic year 2015-2016, 1,500 students studied there.

Based on the system of the Ministry of Health and Medical Industry, the number of family doctors was 664 people and middle medical personnel – 4,600 people in 2015. The number of hospital beds was 5,600.

Availability of the total residential space per person was 25.3 sq.m in 2015 (second place in the country) (Table 18).

Table 18

Social sector development in the Lebap planning zone

Indicator	2015
Number of secondary schools, pcs	380
Number of pupils in secondary schools, ths pupils	248.1
Number of students in the Turkmen State Pedagogical Institute named after Seyyidi, ths students	1.5
Number of family doctors, people	664
Number of middle medical personnel, ths people	4.6
Number of hospital beds, ths	5.6
Availability of the total residential space per person, sq.m	25.3

Source: prepared by author based on data from <http://www.stat.gov.tm/ru/main/info/turkmenistan/turkmenistan/>.

1.4. Dashoguz planning zone

Investments. In 2015, 5.1% of the total investments were allocated for economic development in the Dashoguz planning zone (sixth place). 47% of investments in fixed capital were allocated for production facilities (Table 19).

Table 19

Investment attraction in the Dashoguz planning zone

Indicator	2015	Rating of Dashoguz PZ in country
Share of investments in the Dashoguz PZ in the total country investments	5.1%	6
Share of investments in fixed capital in production facilities	47.0%	-

Source: prepared by author based on data from <http://www.stat.gov.tm/ru/main/info/turkmenistan/turkmenistan/>.

Industry. At year-end 2015, the planning zone accounted for 3.3% of the total industrial production (sixth place). Processing industry is developed here; light and food industries are leading.

In the planning zone, hosiery production is 28.4% (second place), cotton fiber production – 23.6% (third place), meat production – 9.3% (fourth place), and whole-milk products – 15.9%. The Dashoguz planning zone is ranked third and first in production of vegetable oil (19.8%) and butter (42%), respectively (Table 20).

Table 20

Industrial development in the Dashoguz planning zone

Indicator	2015	Rating of Dashoguz PZ in country
Share of industrial production	3.3%	6
Share of brick production	14.4%	3
Share of non-metallic construction materials	2.4%	6
Share of building blocks for concrete construction	10.1%	4
Share of cotton fiber production	23.6%	3
Share of hosiery production	28.4%	2
Share of vegetable oil production	19.8%	3
Share of whole-milk products	15.9%	4
Share of meat production	9.3%	4
Share of butter production	42.0%	1

Source: prepared by author based on data from <http://www.stat.gov.tm/ru/main/info/turkmenistan/turkmenistan/>.

In the planning zone, engineering works are specialized in the repair of agricultural equipment and production facilities. Constructing material industry accounted for 14.4% of the total brick production (third place), 2.4% of the total non-metallic constructing materials (sixth place), and 10.1% of the total building blocks for concrete construction (fourth place).

Agriculture. Agricultural development in the Dashoguz planning zone is based on traditional methods. In 2015, raw cotton production was 21% of the total production in the country (fourth place). Dashoguz is the main producer of rice (35.6%), fruits and berries (41.8%), potato (32.4%), and cucurbits

(30.2%). Of oil crops, sesame is grown here (Table 21).

Table 21

Agricultural development in the Dashoguz planning zone

Indicator	2015	Rating of Dashoguz PZ in country
Share of raw cotton production	21.0%	4
Share of rice growing	35.6%	2
Share of potato production	32.4%	2
Share of melon production	30.2%	1
Share of fruits and berries growing	41.8%	1
Share of cattle population	44.1%	1
Share of dairy production	41.7%	1
Share of egg production	25.5%	1
Share of wool production	23.3%	2

Source: prepared by author based on data from <http://www.stat.gov.tm/ru/main/info/turkmenistan/turkmenistan/>.

Animal husbandry is the main agricultural sector. The planning zone is ranked first in cattle population (44.1%), dairy (41.7%), and egg (25.5%) production, and second in poultry population (23.3%).

Transport sector. The Dashoguz planning zone plays an important role in the transport system of the country providing entrance to external market for Turkmenistan. It has a well-developed system of internal automobile roads and pipeline transport.

At year-end 2015, Dashoguz accounted for 22.9% (second place) of the total cargo turnover and 15.2% (fourth place) of the total passenger turnover (Table 22).

Table 22

Transport sector development in the Dashoguz planning zone

Indicator	2015	Rating of Dashoguz PZ in country
Share of cargo turnover	22.9%	2
Share of passenger turnover	15.2%	4

Source: prepared by author based on data from <http://www.stat.gov.tm/ru/main/info/turkmenistan/turkmenistan/>.

Consumer market. The Dashoguz planning zone accounts for 9.3% of the total goods turnover in the country (fourth place) (Table 23).

Table 23

Consumer market development in the Dashoguz planning zone

Indicator	2015	Rating of Dashoguz PZ in country
Share of retail turnover volume	9.3%	4

Source: prepared by author based on data from <http://www.stat.gov.tm/ru/main/info/turkmenistan/turkmenistan/>.

Social sector. In the academic year 2015-2016, 241,007 pupils studied at 530 secondary schools in the Dashoguz planning zone. Based on the system of the Ministry of Health and Medical Industry, the number of family doctors was 372 people and middle medical personnel – 3,900 people in 2015. The

number of hospital beds was 3,900. Availability of the total residential space per person was 26.7 sq.m in 2015 (first place).

There is the Dashoguz Agricultural Institute, where 1,100 students studied in 2015-2016 (Table 24).

Table 24

Social sector development in the Dashoguz planning zone

Indicator	2015
Number of secondary schools, pcs	530
Number of pupils in secondary schools, ths pupils	241.7
Number of students in the Dashoguz Agricultural Institute, ths students	1.1
Number of family doctors, people	372
Number of middle medical personnel, ths people	3.9
Number of hospital beds, ths	3.9
Availability of the total residential space per person, sq.m	26.7

Source: prepared by author based on data from <http://www.stat.gov.tm/ru/main/info/turkmenistan/turkmenistan/>.

II. Forecast indicators of agricultural development of Turkmenistan until 2055 in the planning zones in the Amudarya River basin

2.1. Basic methods to calculate forecast indicators

The methodology is based on systematic approach and dialectical method, which in dynamics allow considering patterns and processes related to state regulation, as well as to the long-term country agricultural development strategy.

In the research, various methods were applied: abstract-logical one, systematization and classification, expert evaluation, analysis and synthesis, statistical analysis, comparison, plotting time series, and plotting trend lines (approximation and smoothing).

Basic methods to calculate forecast indicators are:

- *population trend line until 2055* is constructed based on population growth for the last decade in all planning zones in the Amudarya basin;
- forecast *irrigated area* is equal to the total irrigated area for recent years, excluding the development of new irrigated areas;
- trend lines for *cropping patterns, yield and crop gross output in the BAU scenario until 2055* are constructed based on the current trends for the last decade;
- trend lines for *cropping patterns, yield and crop gross output in the FSD scenario until 2055* are constructed based on FSD scenario criteria and long-term target parameters adopted in the National Program of Turkmenistan on Socio-Economic Development for the period 2011-2030. Substantial increase in agricultural areas (excluding under wheat), yield and food crop gross output (potato, vegetables, rice, and wheat), as well as forage and maize for grain to feed animals are considered in the ESA scenario.
- trend lines for *cropping patterns, yield and crop gross output in the ESA scenario until 2055* are constructed based on ESA scenario criteria and long-term target parameters adopted in the National Program of Turkmenistan on Socio-Economic Development for the period 2011-2030. Substantial increase in agricultural areas (excluding under cotton), yield and cash crop gross output (fruits and berries, grapes, cucurbits and vegetables) are considered in the ESA scenario.
- trend lines for *livestock population and production in the BAU scenario until 2055* are constructed based on current trends for the last decade;
- trend lines for *livestock population and production in the FSD scenario until 2055* are constructed based on FSD scenario criteria and long-term target parameters adopted in the National Program of Turkmenistan on Socio-Economic Development for the period 2011-2030, including improved self-sufficiency of livestock products (meat, milk, and eggs).

2.2. Akhal planning zone

Population

			BAU		FSD		ESA	
	2010	2015	2020	2055	2020	2055	2020	2055
Total population, ths people	1,371	1,462	1,531	1,990	1,531	1,990	1,531	1,990

Irrigated areas under crops, ths ha

			BAU		FSD		ESA	
	2010	2015	2020	2055	2020	2055	2020	2055
Irrigated area	402.0	400.3	397.2	383.4	400.0	400.0	400.0	400.0
of which under: cotton	120.0	120.0	121.7	123.9	119.9	80.0	119.9	100.0
forage	19.7	19.6	19.6	20.0	19.7	32.0	19.7	24.4
orchard	3.7	4.4	4.5	5.4	8.4	16.4	8.4	36.4
wheat	240.7	230.0	223.9	200.9	230.1	184.0	230.1	136.0
maize	1.1	1.4	1.6	2.2	1.5	20.4	1.5	12.4
cucurbits	4.1	6.5	6.6	8.5	6.6	12.4	6.6	24.4
potato	1.6	2.8	3.0	3.6	2.9	20.4	2.9	14.4
rice	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
vegetables	6.0	9.0	9.6	11.4	9.1	24.0	9.1	28.0
grapes	5.2	6.6	6.7	7.4	7.8	10.4	7.8	24.0

Crop gross output, ths tones

			BAU		FSD		ESA	
	2010	2015	2020	2055	2020	2055	2020	2055
cotton	281.4	251.9	274.8	322.1	276.9	218.4	289.5	336.0
forage	306.9	219.1	142.8	129.6	174.1	416.1	171.0	230.7
fruits and berries	32.8	34.5	35.2	38.9	71.4	174.5	72.7	487.6
wheat	392.7	480.7	519.2	502.2	529.1	576.8	529.1	383.7
maize	63.0	61.4	56.0	53.8	73.6	1 431.6	73.6	707.0
cucurbits	105.1	113.2	107.2	113.6	127.0	280.8	138.5	722.6
potato	54.2	55.8	55.4	52.4	63.0	609.9	64.1	373.1
rice	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
vegetables	243.1	260.0	261.1	249.2	290.0	1 109.4	290.0	1,415.6
grapes	128.5	240.0	246.3	332.4	298.9	531.0	327.4	1,312.9

Crop yield, t/ha

			BAU		FSD		ESA	
	2010	2015	2020	2055	2020	2055	2020	2055
cotton	2.4	2.1	2.3	2.6	2.3	2.7	2.4	3.4
forage	9.0	7.9	7.3	6.5	8.8	13.0	8.7	9.5
fruits and berries	9.0	7.9	7.8	7.1	8.5	10.6	8.7	13.4
wheat	1.6	2.1	2.3	2.5	2.3	3.1	2.3	2.8
maize	57.3	43.9	34.3	24.5	48.2	70.2	48.2	57.0
cucurbits	25.6	17.4	16.1	13.3	19.2	22.6	20.9	29.6
potato	33.3	19.9	18.8	14.6	21.5	29.9	21.9	25.9
rice	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
vegetables	40.5	28.9	27.3	21.8	31.8	46.2	31.8	50.6
grapes	25.0	36.5	36.8	45.0	38.3	51.1	41.9	54.7

Livestock and poultry population, ths heads

			BAU		FSD		ESA	
	2010	2015	2020	2055	2020	2055	2020	2055
Cattle population	273.8	287.4	289.3	298.9	330.5	480.0	321.9	436.9
Cows	138.5	126.6	131.1	137.4	141.8	205.1	139.3	183.6
Sheep and goats	4,334.7	4,570.4	4,666.3	5,407.2	5,301.6	7,861.0	5,255.9	7,175.5

Livestock production, ths tones

			BAU		FSD		ESA	
	2010	2015	2020	2055	2020	2055	2020	2055
Meat (slaughter weight)	58.5	84.1	81.9	106.9	96.7	135.4	92.5	119.4
Dairy	276.5	255.1	284.8	293.5	301.0	428.6	285.7	395.4
Eggs, million	270.2	262.5	262.2	255.0	294.0	385.9	288.8	354.4

Main food production per capita, kg/person/year

			BAU		FSD		ESA	
	2010	2015	2020	2055	2020	2055	2020	2055
Meat and meat products converted into meat	28.7	38.7	36.0	36.1	42.5	45.7	40.6	40.3
Milk and dairy products converted into milk	32.8	28.4	30.3	24.0	32.0	35.0	30.4	32.3
Eggs, pcs	197.1	179.5	171.3	128.2	192.1	194.0	188.6	178.1
Potato	39.5	38.2	36.2	26.3	41.1	306.5	41.9	187.5
Vegetables and cucurbits	254.0	255.2	240.6	182.4	272.4	698.8	280.0	1074.7
Fruits and berries	23.9	23.6	23.0	19.5	46.6	87.7	47.5	245.1
Sugar	NA	NA	NA	NA	NA	NA	NA	NA
Oil	NA	NA	NA	NA	NA	NA	NA	NA
Bread products (bread and pasta converted into flour, flour, cereal, and legumes)	314.1	360.5	371.9	276.8	379.0	317.9	379.0	211.5
Fish and fish products	NA	NA	NA	NA	NA	NA	NA	NA

2.3. Dashoguz planning zone

Population

			BAU		FSD		ESA	
	2010	2015	2020	2055	2020	2055	2020	2055
Total population, ths people	1,059	1,135	1,139	1,354	1,139	1,354	1,139	1,354

Irrigated areas under crops, ths ha

			BAU		FSD		ESA	
	2010	2015	2020	2055	2020	2055	2020	2055
Irrigated area	374.7	392.6	366.7	353.4	395.0	395.0	395.0	395.0
of which under: cotton	140.2	140.8	120.1	85.7	140.7	79.0	140.7	98.8
forage	13.4	12.9	12.8	12.7	13.0	24.1	13.0	16.6
orchard	3.7	4.4	4.4	5.2	8.4	16.6	8.4	35.9
wheat	187.9	201.2	194.2	206.2	201.3	175.8	201.3	134.3
maize	3.5	3.5	3.7	4.1	3.6	17.8	3.6	7.9
cucurbits	3.5	4.9	5.4	7.4	5.0	10.3	5.0	25.7
potato	3.3	3.1	3.7	4.4	3.2	20.5	3.2	12.2
rice	9.0	9.0	7.5	5.5	9.0	16.2	9.0	7.9
vegetables	5.1	6.2	7.4	10.5	6.3	24.5	6.3	29.6
grapes	5.2	6.6	7.5	11.7	7.8	10.3	7.8	26.1

Crop gross output, ths tones

			BAU		FSD		ESA	
	2010	2015	2020	2055	2020	2055	2020	2055
cotton	243.8	270.0	205.7	154.3	297.1	197.2	310.6	303.4
forage	122.0	122.0	123.0	124.6	138.0	376.1	135.5	188.3
fruits and berries	24.6	60.5	61.6	93.5	125.1	320.8	127.4	843.9
wheat	298.5	310.0	227.6	185.4	341.0	406.0	341.0	279.2
maize	19.0	21.1	21.0	21.1	23.9	170.6	23.9	61.6
cucurbits	83.6	88.6	81.6	65.0	100.1	241.7	109.2	790.0
potato	70.3	73.5	73.3	71.2	82.1	724.0	83.6	374.1
rice	11.2	10.9	9.7	10.4	12.5	35.3	12.0	16.3
vegetables	128.3	135.0	141.5	156.8	151.5	853.0	151.5	1,128.6
grapes	18.3	20.0	24.1	47.0	24.9	46.8	27.3	134.7

Crop yield, t/ha

			BAU		FSD		ESA	
	2010	2015	2020	2055	2020	2055	2020	2055
cotton	1.7	1.9	1.7	1.8	2.1	2.5	2.2	3.1
forage	9.1	9.5	9.6	9.8	10.6	15.6	10.4	11.4
fruits and berries	6.7	13.8	14.0	18.0	14.9	19.3	15.2	23.5
wheat	1.6	1.5	1.2	0.9	1.7	2.3	1.7	2.1
maize	5.4	6.0	5.7	5.1	6.6	9.6	6.6	7.8
cucurbits	23.9	18.1	15.2	8.8	19.9	23.5	21.7	30.8
potato	21.4	23.5	20.1	16.4	25.4	35.3	25.9	30.6
rice	1.2	1.2	1.3	1.9	1.4	2.2	1.3	2.1
vegetables	25.2	21.8	19.2	14.9	23.9	34.8	23.9	38.1
grapes	3.6	3.0	3.2	4.0	3.2	4.6	3.5	5.2

Livestock and poultry population, ths heads

			BAU		FSD		ESA	
	2010	2015	2020	2055	2020	2055	2020	2055
Cattle population	909.1	940.9	963.4	1,033.4	1,082.0	1,552.5	1,053.8	1,411.4
Cows	398.6	427.0	428.7	443.0	478.3	683.2	469.7	597.8
Sheep and goats	2,768.3	2,872.5	2,999.0	3,398.7	3,332.1	4,825.8	3,303.4	4,452.4

Livestock production, ths tones

			BAU		FSD		ESA	
	2010	2015	2020	2055	2020	2055	2020	2055
Meat (slaughter weight)	75.2	52.9	56.8	43.3	60.8	84.6	58.1	74.0
Dairy	737.4	999.2	1,016.4	1,472.7	1,179.1	1,748.6	1,119.1	1,598.7
Eggs, million	209.5	189.5	195.7	183.1	212.3	284.3	208.5	246.4

Main food production per capita, kg/person/year

			BAU		FSD		ESA	
	2010	2015	2020	2055	2020	2055	2020	2055
Meat and meat products converted into meat	47.7	31.3	33.5	21.5	35.9	42.0	34.3	36.7
Milk and dairy products converted into milk	113.3	143.3	145.2	177.0	168.4	210.1	159.9	192.1
Eggs	197.8	167.0	171.8	135.3	186.4	210.0	183.0	182.0
Potato	66.4	64.7	64.3	52.6	72.1	534.7	73.4	276.3
Vegetables and cucurbits	200.1	197.0	195.9	163.8	220.8	808.5	228.8	1417.0
Fruits and berries	23.2	53.3	54.1	69.0	109.8	236.9	111.8	623.3
Sugar	NA	NA	NA	NA	NA	NA	NA	NA
Oil	NA	NA	NA	NA	NA	NA	NA	NA
Bread products (bread and pasta converted into flour, flour, cereal, and legumes)	309.1	299.5	219.1	150.2	328.3	328.8	328.3	226.1
Fish and fish products	NA	NA	NA	NA	NA	NA	NA	NA

2.4. Lebap planning zone

Population

			BAU		FSD		ESA	
	2010	2015	2020	2055	2020	2055	2020	2055
Total population, ths people	1,033	1,102	1,151	1,483	1,151	1,483	1,151	1,483

Irrigated areas under crops, ths ha

			BAU		FSD		ESA	
	2010 r.	2015 r.	2020 r.	2055 r.	2020 r.	2055 r.	2020 r.	2055 r.
Irrigated area	360.6	362.3	432.0	440.0	365.0	365.0	365.0	365.0
of which under: cotton	120.0	120.0	116.7	108.6	119.9	73.0	119.9	91.3
forage	10.6	11.0	11.0	11.9	11.1	22.3	11.1	15.3
orchard	3.7	4.4	4.4	5.9	8.4	15.3	8.4	33.2
wheat	190.1	189.3	194.7	217.3	189.4	160.6	189.4	124.1
maize	2.8	3.0	3.0	3.1	3.1	16.4	3.1	7.3
cucurbits	3.0	2.9	3.3	3.6	3.0	11.0	3.0	23.7
potato	6.6	6.5	7.5	9.4	6.6	18.3	6.6	11.3
rice	9.0	8.2	71.8	56.4	8.2	15.0	8.2	7.3
vegetables	9.7	10.4	11.9	14.3	10.5	22.3	10.5	27.4
grapes	5.2	6.6	7.7	9.6	7.8	11.0	7.8	24.1

Crop gross output, ths tones

			BAU		FSD		ESA	
	2010	2015	2020	2055	2020	2055	2020	2055
cotton	324.5	301.6	314.0	317.7	331.0	262.0	346.0	384.8
forage	176.2	181.0	181.1	185.0	205.0	604.3	201.3	315.2
fruits and berries	15.3	37.1	35.2	64.8	76.7	188.3	78.1	478.3
wheat	410.1	416.3	476.0	654.1	458.4	600.6	458.4	409.5
maize	16.0	16.0	16.8	17.8	18.3	135.7	18.3	54.5
cucurbits	49.8	54.1	64.3	86.4	62.1	306.5	67.8	752.6
potato	59.2	61.0	71.0	90.1	67.2	274.5	68.4	159.5
rice	11.2	10.9	106.6	92.7	12.5	31.8	12.0	14.1
vegetables	138.2	145.8	151.7	155.3	162.3	499.4	162.3	652.5
grapes	27.9	11.4	13.7	10.8	14.2	22.7	15.5	72.9

Crop yield, t/ ha

			BAU		FSD		ESA	
	2010	2015	2020	2055	2020	2055	2020	2055
cotton	2.7	2.5	2.7	2.9	2.8	3.6	2.9	4.2
forage	16.6	16.5	16.5	15.5	18.4	27.1	18.1	20.6
fruits and berries	4.2	8.5	8.1	11.0	9.1	12.3	9.3	14.4
wheat	2.2	2.2	2.4	3.0	2.4	3.7	2.4	3.3
maize	5.7	5.3	5.6	5.8	5.9	8.3	5.9	7.5
cucurbits	16.6	18.7	19.4	24.3	20.5	28.0	22.4	31.7
potato	8.9	9.4	9.5	9.6	10.2	15.0	10.3	14.1
rice	1.2	1.3	1.5	1.6	1.5	2.1	1.5	1.9
vegetables	14.3	14.0	12.7	10.9	15.4	22.4	15.4	23.8
grapes	5.4	1.7	1.8	1.1	1.8	2.1	2.0	3.0

Livestock and poultry production, ths heads

			BAU		FSD		ESA	
	2010	2015	2020	2055	2020	2055	2020	2055
Cattle number	461.6	479.4	490.1	510.5	551.3	776.6	536.9	709.5
Cows	271.6	284.0	294.5	311.1	318.1	448.7	312.4	394.8
Sheep and goats	2,083.2	2,160.6	2,232.5	2,335.9	2,506.3	3,608.2	2,484.7	3,284.1

Livestock production, ths tones

			BAU		FSD		ESA	
	2010	2015	2020	2055	2020	2055	2020	2055
Meat (slaughter weight)	68.6	76.9	77.4	88.8	88.4	120.7	86.1	107.7
Dairy	472.4	616.6	625.1	862.1	727.6	1,048.2	702.9	955.7
Eggs, million	190.1	182.3	182.0	174.6	204.2	269.8	202.4	237.0

Production of main food per capita, kg/person/year

			BAU		FSD		ESA	
	2010	2015	2020	2055	2020	2055	2020	2055
Meat and meat products converted into meat	44.6	46.9	45.2	40.2	51.7	54.7	50.3	48.8
Milk and dairy products converted into milk	74.4	91.0	88.4	94.6	102.9	115.0	99.4	104.9
Eggs	184.0	165.4	158.2	117.7	177.5	181.9	175.9	159.8
Potato	57.3	55.4	61.7	60.8	58.4	185.1	59.5	107.6
Vegetables and cucurbits	182.0	181.4	187.7	163.0	195.1	543.5	200.0	947.4
Fruits and berries	14.8	33.7	30.6	43.7	66.7	127.0	67.9	322.5
Sugar	NA	NA	NA	NA	NA	NA	NA	NA
Oil	NA	NA	NA	NA	NA	NA	NA	NA
Bread products (bread and pasta converted into flour. flour. cereal. and legumes)	435.3	414.2	453.7	483.6	436.9	444.1	436.9	302.8
Fish and fish products	NA	NA	NA	NA	NA	NA	NA	NA

2.5. Maryh planning zone

Population

			BAU		FSD		ESA	
	2010	2015	2020	2055	2020	2055	2020	2055
Total population, ths people	1.149	1.220	1.247	1.581	1.247	1.581	1.247	1.581

Irrigated areas under crops, ths ha

			BAU		FSD		ESA	
	2010	2015	2020	2055	2020	2055	2020	2055
Irrigated area	415.1	418.8	385.6	331.2	420.0	420.0	420.0	420.0
of which under: cotton	165.0	165.0	145.0	114.0	164.9	84.0	164.9	105.0
forage	7.4	8.2	8.3	8.4	8.3	25.2	8.3	15.5
orchard	3.7	4.4	3.7	3.1	8.4	16.8	8.4	38.2
wheat	205.1	203.6	190.1	160.7	203.7	178.1	203.7	142.8
maize	5.3	5.7	5.7	5.9	5.8	21.8	5.8	13.0
cucurbits	1.6	2.9	2.9	4.1	3.0	10.9	3.0	25.2
potato	2.3	2.5	2.6	2.9	2.6	21.4	2.6	13.0
rice	15.0	14.9	15.1	15.9	14.9	25.6	14.9	13.9
vegetables	4.6	5.0	4.8	4.6	5.1	25.6	5.1	31.5
grapes	5.2	6.6	7.5	11.7	7.8	10.5	7.8	21.8

Crop gross output, ths tones

			BAU		FSD		ESA	
	2010	2015	2020	2055	2020	2055	2020	2055
cotton	428.7	394.1	362.5	376.1	433.5	301.1	453.2	414.1
forage	126.5	126.5	119.9	77.1	143.9	633.8	141.3	287.7
fruits and berries	41.5	27.8	22.2	12.8	57.5	144.0	58.6	400.5
wheat	380.2	436.5	419.6	482.0	479.6	628.8	479.6	458.4
maize	21.0	21.0	22.0	23.4	23.6	120.6	23.6	62.3
cucurbits	43.3	50.1	49.7	47.3	57.5	254.7	62.7	718.5
potato	53.4	54.4	56.0	57.2	61.7	675.8	62.9	368.3
rice	200.0	200.0	198.6	195.3	230.0	550.1	220.0	251.1
vegetables	140.3	150.3	135.9	124.3	169.5	1.270.7	169.5	1.657.1
grapes	37.1	25.5	28.7	34.3	31.8	46.9	34.8	144.1

Crop yield, t/ha

			BAU		FSD		ESA	
	2010	2015	2020	2055	2020	2055	2020	2055
cotton	2.6	2.4	2.5	3.3	2.6	3.6	2.7	3.9
forage	17.1	15.4	14.5	9.2	17.3	25.2	17.0	18.5
fruits and berries	11.4	6.4	6.0	4.1	6.9	8.6	7.0	10.5
wheat	1.9	2.1	2.2	3.0	2.4	3.5	2.4	3.2
maize	4.0	3.7	3.8	4.0	4.0	5.5	4.0	4.8
cucurbits	27.1	17.3	17.4	11.4	19.0	23.3	20.7	28.5
potato	23.0	21.8	21.3	19.8	23.5	31.6	23.9	28.3
rice	13.3	13.4	13.2	12.3	15.4	21.5	14.8	18.1
vegetables	30.5	30.1	28.6	27.1	33.1	49.6	33.1	52.6
grapes	7.2	3.9	3.8	2.9	4.1	4.5	4.5	6.6

Livestock and poultry population, ths heads

			BAU		FSD		ESA	
	2010	2015	2020	2055	2020	2055	2020	2055
Cattle population	450.3	461.8	505.3	502.1	531.1	738.9	517.2	669.6
Cows	200.3	195.8	196.6	190.0	219.3	303.6	215.4	264.4
Sheep and goats	4.703.0	4.850.0	4.693.0	5.038.5	5.626.1	8.002.6	5.577.6	7.275.1

Livestock production, ths tones

			BAU		FSD		ESA	
	2010	2015	2020	2055	2020	2055	2020	2055
Meat (slaughter weight)	71.5	87.0	87.4	109.7	100.1	139.2	95.7	121.8
Dairy	421.3	609.3	623.3	986.1	719.0	1.096.7	682.4	1.005.3
Eggs, million	244.0	277.2	277.8	315.2	310.5	401.9	304.9	346.5

Main food production per capita, kg/person/year

			BAU		FSD		ESA	
	2010	2015	2020	2055	2020	2055	2020	2055
Meat and meat products converted into meat	41.8	47.9	47.1	46.7	53.9	59.2	51.6	51.8
Milk and dairy products converted into milk	59.7	81.3	81.3	101.5	93.8	112.9	89.0	103.5
Eggs	212.4	227.2	222.8	199.4	249.0	254.3	244.5	219.2
Potato	46.5	44.6	44.9	36.2	49.5	427.6	50.4	233.0
Vegetables and cucurbits	159.8	164.3	148.9	108.6	182.0	965.1	186.2	1502.9
Fruits and berries	36.1	22.8	17.8	8.1	46.1	91.1	47.0	253.4
Sugar	NA	NA	NA	NA	NA	NA	NA	NA
Oil	NA	NA	NA	NA	NA	NA	NA	NA
Bread products (bread and pasta converted into flour, flour, cereal, and legumes)	362.8	392.3	368.9	334.3	421.7	436.2	421.7	318.0
Fish and fish products	NA	NA	NA	NA	NA	NA	NA	NA

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