THE EURO-MEDITERRANEAN BLUE TRANSITION SCENARIO 2050

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ABOUT THIS STUDY

EMEA-EMNES STUDY – JUNE 2021

This study aims to provide a quantified projection of <u>the Blue Transition scenario</u> (the study published by EMEA in 2020) using a CGE (computable general equilibrium) model (GEM-E3-MENA) that is calibrated to the latest available data. The model-based analysis aims at providing a consistent projection of the energy and economic systems for the Euro-Mediterranean (EU-MED) countries within the Blue Transition narrative. The analysis takes into account the capacity constraints and the comparative advantages for growth of each country. The key contribution of the model, used for this study, lies in its capacity to combine the different set of assumptions regarding: technical progress; population growth; bilateral trade; development of skilled labour; climate-change and energy related policies, in an integrated manner that ensures the consistency of the socio-economic projection. An important result of the analysis is the decomposition of growth into specific factors and sectors for each country.

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The study is accessible on: **www.emnes.org** , **www.euromed-economists.org**

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1   INTRODUCTION

The Blue Transition scenario, as described by Ayadi et al. (2020), provides a theoretical framework regarding the socio-economic development of the "Euro-Mediterranean" region, that builds upon four pillars: i) Transparent Governance; ii) Responsible Living; iii) Inclusive Economy; and iv) Sustainable Energy and Environment. The scenario develops within a socio-economic context that includes the main mega-trends, i.e., climate change; digitalisation/automation; labour migration; and trade integration/globalisation.

This study aims to provide a quantified projection of the Blue Transition scenario, using a CGE (computable general equilibrium) model (GEM-E3-MENA) that is calibrated to the latest available data. The model-based analysis aims at providing a consistent projection of the energy and economic systems for the Euro-Mediterranean (EU-MED) countries within the Blue Transition narrative. The analysis takes into account the capacity constraints and the comparative advantages for growth of each country. The key contribution of the model, used for this study, lies in its capacity to combine the different set of assumptions regarding: technical progress; population growth; bilateral trade; development of skilled labour; climate-change and energy related policies, in an integrated manner that ensures the consistency of the socio-economic projection. An important result of the analysis is the decomposition of growth into specific factors and sectors for each country.

Calibrating the model to the most recent data is a significant task, as many of the countries do not compile and regularly publish IO (input-output) tables, whilst in some countries, significant structural changes have taken place over the course of recent years. By combining data from the national statistical offices, international databases and by using indirect methods to fill in the gaps, it is possible to construct a full dataset for all countries for a common base year (2011). This dataset mainly includes the IO tables; energy balances; employment and bilateral trade data.

The quantification of the Blue Transition scenario until 2050 was made using explicit country and sectoral level assumptions on technical progress; population; investments in infrastructure; bilateral trade duties; carbon prices; and foreign direct investments. The resulting economic outlook provides details on the GDP, sectoral production, employment and GHG emissions by country.

The report is organised as follows: i) The first section provides a methodological representation of the model and its main properties; ii) Section two provides a starting point for the economic analysis regarding the economic structure of the EU-MED region and iii) Section three discusses how the Blue Transition will be implemented in modelling terms.

2 THE MODELLING TOOLS

This section provides an overview of the GEM-E3-MENA CGE model version used in this study. The model description focusses on the key model features and on its data requirements.

The GEM-E3-MENA model is a multi-regional, multi-sectoral, recursive dynamic computable general equilibrium (CGE) model, which provides details on the macro-economy and its interaction with the environment and the energy system. It is an empirical, large scale model, written entirely in structural form. GEM-E3-MENA allows for a consistent comparative analysis of policy scenarios, since it ensures that in all scenarios the economic system remains in general equilibrium. In addition, it incorporates micro-economic mechanisms and institutional features within a consistent macro-economic framework and avoids the representation of behaviour in reduced form. Particularly valuable are the insights the model provides regarding the distributional aspects of long-term structural adjustments. The GEM-E3-MENA model is extensively used as a tool of policy and impact assessment analyses.

The model is modularly built allowing the user to select among several alternative closure options and market institutional regimes, depending on the issue under study. The GEM-E3-MENA model includes projections of: full IO tables by country/region; national accounts; employment by economic activity; unemployment rate; balance of payments; public finance and revenues; household consumption; as well as energy use and supply.

The model includes all simultaneously interrelated markets and represents the system at the appropriate level, with respect to geography, the sub-system (energy, environment, economy) and the dynamic mechanisms of agents' behaviour.

Additionally, the model formulates separately the supply and demand behaviour of the economic agents. These agents optimise their objective, individually, whilst market-derived prices guarantee global equilibrium, allowing the consistent evaluation of distributional effects of policies.

Furthermore, it explicitly considers the market clearing mechanism and the related price formation in the energy, environment, and economy markets. The prices are computed by the model as a result of supply and demand interactions in the markets and different market clearing mechanisms, in addition to perfect competition.

Moreover, the model formulates production technologies in an endogenous manner, allowing for a price-driven derivation of all intermediate consumption and services from capital and labour. In the electricity sector, a bottom-up approach is adopted for the representation of the different power-producing technologies.

The model is dynamic, recursive over time, driven by the accumulation of capital and equipment. Technological progress is explicitly represented in the production function, either

exogenously or endogenously, depending on R&D expenditure of the private and public sector, taking into account spill-over effects. On top of that, the model is based on the myopic expectations of the participant agents.

The model supports the defining of several alternative regimes and closure rules (without having to re-specify or re-calibrate the model) such as alternative assumptions on capital mobility (e.g., at the sectoral level or at the country level), on the flexibility of labour supply, current account balance and public deficits (i.e., these can be either fixed or flexible).

The model is not limited to comparative static evaluation of policies. The model is dynamic in the sense that projections change over time. Its properties are mainly manifested through stock/flow relationships, technical progress, capital accumulation and agents' (myopic) expectations.

The model is calibrated to a base year data set, that comprises full Social Accounting Matrices for each country/region represented in the model. Bilateral trade flows are also calibrated for each sector represented in the model, considering trade margins and transport costs. The initial starting point of the model, therefore, includes a detailed treatment of taxation and trade.

In the GEM-E3-MENA model, all markets clear simultaneously by the adjustment of the respective prices (e.g., wages clear the labour market, return on capital clears the capital market and the interest rate clears the financial market). All countries are linked through endogenous bilateral trade amongst firms and households that produce and consume goods and services.

Once the model is calibrated, the next step is to define a reference case scenario. The reference case scenario includes all already decided policies. The key drivers of economic growth in the model are labour force, total factor productivity and the expectations on sectoral growth. The "counterfactual" equilibria can be computed by running the model under assumptions that diverge from those of the reference scenario. This corresponds to scenario building. In this case, a scenario is defined as a set of exogenous variables changes, for example a change in the tax rates. Changes of institutional regimes, that are expected to occur in the future, may be reflected by changing values of the appropriate elasticities and other model parameters that allow structural shifts (e.g., market regime). These changes are imposed on top of the assumptions of the reference scenario, thereby modifying it. To perform a counterfactual simulation, it is not necessary to re-calibrate the model. The different steps for performing a counterfactual simulation in GEM-E3 are depicted in the figure above.

A counterfactual simulation is characterised by its impact on consumers' welfare or through the equivalent variation of their welfare function. The equivalent variation can be, under reasonable assumptions, directly mapped to some of the endogenous variables of the

model, such as consumption, employment, and price levels. The sign of the change of the equivalent variation then gives a measure of a policy's impact and burden sharing implications.

2.1 PRODUCTION

Firms operate under a perfect competition market regime and maximise their profits using a nested CES production technology. Production is modelled through a KLEM (capital, labour, energy, and materials) production function involving many factors (all intermediate products and three primary factors: capital; natural resources; and labour).

2.2 HOUSEHOLDS

Representative households, by country/region, endogenously decide the structure of their demand for goods and services by maximising a Stone-Geary utility function. Their consumption mix is decided through a flexible linear expenditure system.

2.3 TRADE

Total demand (final and intermediate) in each country is optimally allocated between domestic and imported goods, under the hypothesis that these are considered as imperfect substitutes (the "Armington" assumption). Firms and households decide upon the optimal mix of imported and domestic goods through cost minimisation. Bilateral trade is endogenous for each country and activity represented by the model.

2.4 INVESTMENTS

Firms choose their optimal investment level in order to replace depreciate capital and to satisfy future potential demand. The investment function in GEM-E3-MENA draws from the Accelerator Model, Tobin's q and Hayashi (1982). The investment decision is influenced by capital prices, the cost of investment goods (or replacement cost), as well as by the installation costs and future profitability, capital productivity etc. Investments in infrastructure are exogenously defined and do not influence the productive capacity of the economy. Instead, they yield productivity improvements (endogenously determined, depending on the stock of infrastructure). Finally, investments in automatisation and digitalisation are exogenously determined.

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3 CURRENT ECONOMIC STRUCTURE AND TRENDS

Countries that belong to the EU-MED region are quite diverse in terms of structural development, governance, wealth, environmental priorities, political stability and the characteristics of their labour market. Representative indicators of these differences are the GDP per capita; Unemployment rate; Interest rates; and NDC targets set for 2030.

A key aspect of the Blue Transition scenario is to identify a consistent socio-economic, climate, energy, and technological pathway under which regional inequalities (e.g., income, social etc.) can be reduced to the mutual benefit of the participants.

Table 1 Socio economic indicators

	GDP ($2010)	GDP per capita	Labour force	Unemployment rate (%)
Algeria	202.3	4700	12716	11.8
Egypt	302.2	3010	29778	9.7
Israel	319.4	35279	3914	3.8
Jordan	33.6	3326	2650	16.9
Lebanon	39.7	5792	2424	6.0
Morocco	126.3	3462	12085	9.0
Tunisia	51.5	4405	4115	15.1
Turkey	1261.9	15125	33319	13.7
EU28	16605.4	37106	251779	6.3

Source: World Bank, ILO.

Historically, GDP growth in these countries has been characterised by high rates and volatility (see Figure 1). Algeria and Israel have made significant improvements in reducing unemployment (Israel is close to the natural unemployment rate), whereas Jordan, Turkey and Tunisia have recorded increasing unemployment - despite positive GDP growth rates, indicating a non-inclusive pattern of economic growth.

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Figure 1: GDP time series
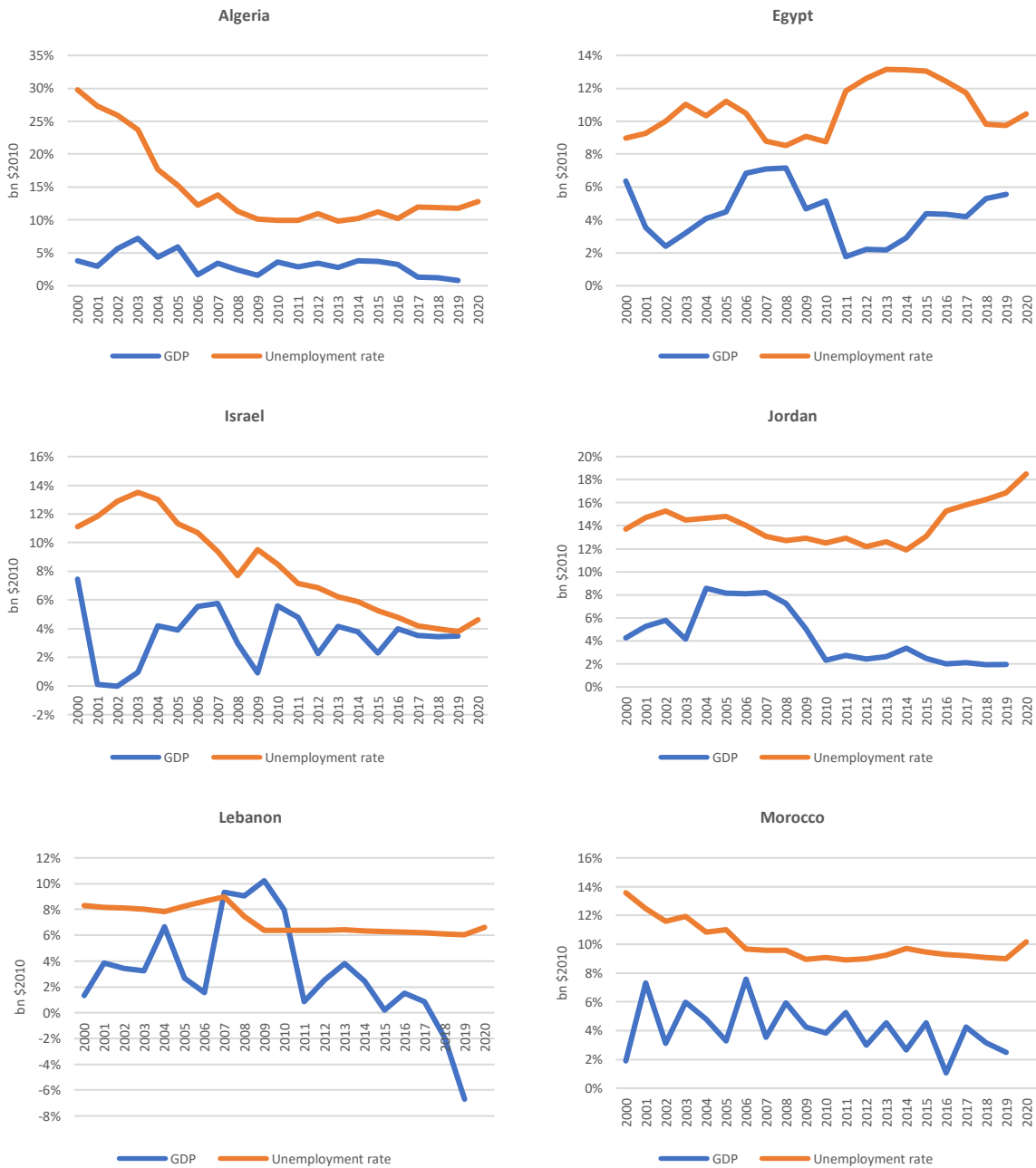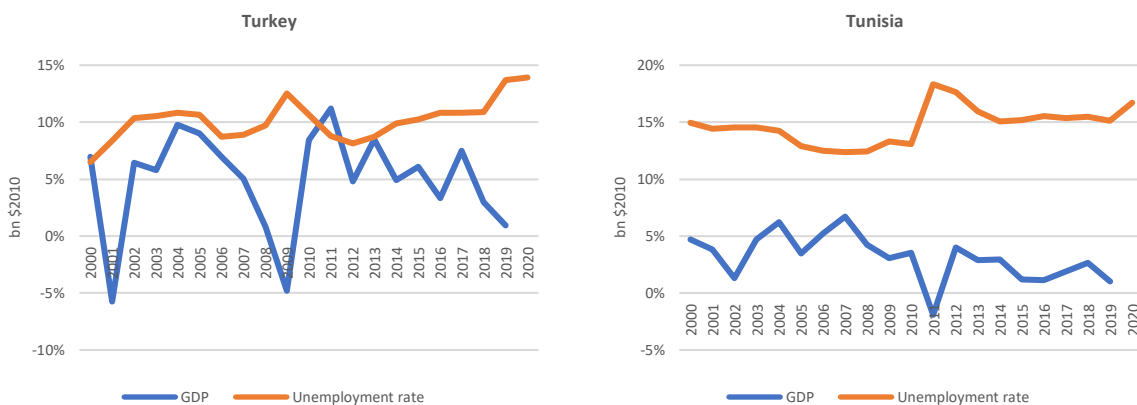
Source: ILO, World Bank

The countries in the region are characterised by trade and public budget deficits over a prolonged period. Historically, it is observed that the high GDP growth rates recorded by most of the countries are mainly driven by high consumption expenditures and, to a lesser extent, by investment. Radulescu et al.[1] (2019), Abua[2] (2010), Misztal[3] (2011) have shown that consumption-led growth can only be sustained in the short-term and is usually linked to high unemployment rates.

Figure 2: GDP components (shares in total GDP) and public deficit (% of GDP)
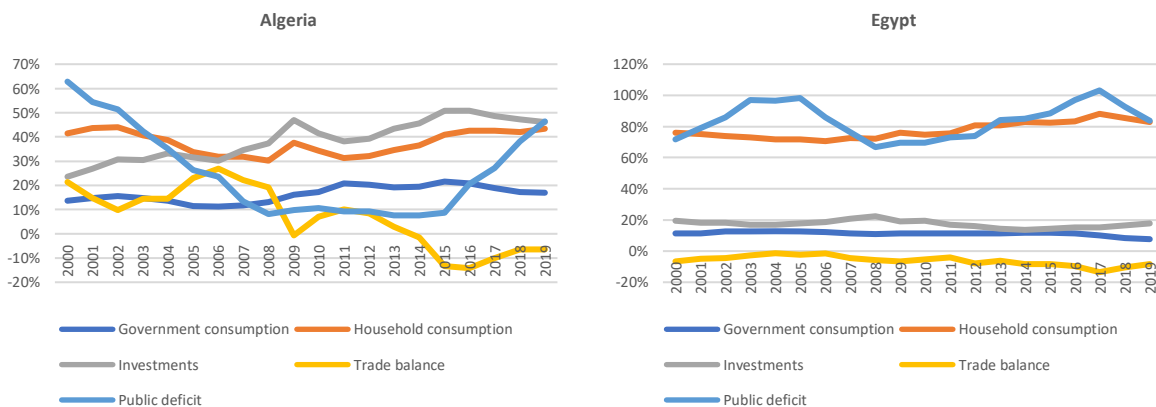
1: Radulescu, M.; Serbanescu, L. & Sinisi, C. I. (2019), 'Consumption vs. Investments for stimulating economic growth and employment in the CEE Countries - a panel analysis', Economic Research-Ekonomska Istraživanja 32(1), 2329-2353.
2: B., A.-F. (2010), 'The causal relation between savings and economic growth: Some evidence from MENA Countries', Topics in Middle Eastern and African Economies 12, 1.
3: Misztal, P. (2011), 'The relationship between savings and economic growth in countries with different level of economic development', E-Finanse 7, 17.
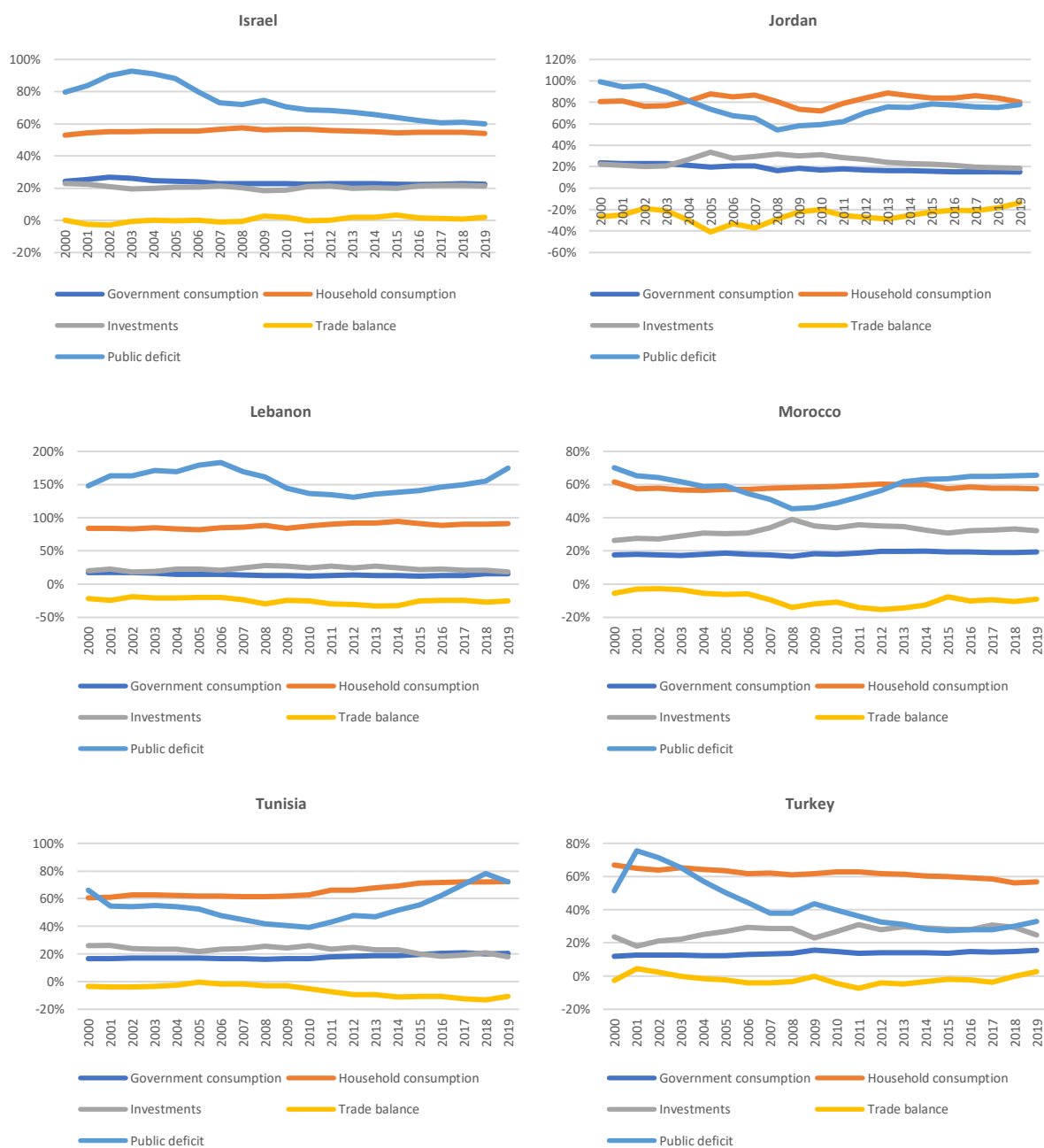
Source: World Bank, IMF

The EU is a key trade partner (see Table 2) for many of these countries and, in some cases, it represents more than 50% of total trade transactions. Jordan and Egypt are integrated in the region, presenting high shares of internal trade.

Table 2: Main trading partners

	EMEA	EU	ROW
Algeria	7.8%	50.9%	41.2%
Egypt	16.9%	31.7%	51.4%
Israel	7.2%	32.5%	60.3%
Jordan	26.4%	21.3%	52.3%
Lebanon	24.7%	26.2%	49.1%
Morocco	12.1%	47.2%	40.6%
Tunisia	11.5%	61.2%	27.3%
Turkey	18.0%	41.8%	40.2%

Source: IMF, GTAP, EUROSTAT

Turkey and Israel produce high value-added goods and services, and their exports are diversified across many categories - whereas other countries such as Algeria, Egypt, Jordan, and Lebanon are largely dependent on the exploitation of domestic resources (e.g., gold and fossil fuels), making their economies vulnerable to price fluctuations. This is indicated in Table 4 which presents the key exporting products and partners of the MED countries. The recent trend in trade transactions in these countries is to increase their exposure to domestic and international trade (increase in trade openness see Table 5).

Table 3: Key exporting goods and trading partners of the EU-MED countries

	Key Exporting good	Key Importing good	Main Export Partners	Main Import Partners
Algeria	Oil	Quite diversified	Spain, Italy, USA	China, France
Egypt	Crude Oil, Gold	Refined Oil, Wheat, Cars	Saudi Arabia, Italy, Turkey	China, Germany, Russia
Israel	Diamonds, Integrated Circuits	Cars	USA, Honk Kong, China	USA, China, Belgium
Jordan	Fertilisers	Cars, Fuel	USA, Saudi Arabia, India	USA, Saudi Arabia, India
Lebanon	Gold, Diamonds	Oil, Cars	South Africa, Arab Emirates, S. Arabia	China, Italy, USA
Morocco	Wire, Fertilisers	Oil, Cars, Wheat	Spain, France, Turkey	Spain, France, China
Tunisia	Wires, Textiles	Oil, Cars	France, Italy, Germany	France, Italy, China
Turkey	Gold, Equipment	Oil, Cars	Germany, USA, Italy	China, Germany, Russia

Source: the Observatory of Economic Complexity[4]

Table 4: Trade Openness ((Imports + Exports)/GDP)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Algeria	64.6	64.6	66.9	66.3	67.8	67.7	66.4	67.2	69.3	70.0	69.9	67.4	68.9	69.8	70.7	71.1	66.5	
Egypt	27.5	26.3	27.0	28.5	33.9	40.2	47.0	55.0	66.1	51.7	47.9	48.9	49.8	49.9	46.7	44.6	39.8	63.3
Israel	69.0	62.8	61.8	63.4	69.3	69.4	68.4	71.1	72.0	62.1	67.9	71.0	69.5	67.8	67.4	64.8	66.3	
Jordan	133.1	129.4	132.8	130.0	142.5	147.9	146.2	140.7	127.8	113.4	117.3	112.5	111.5	112.5	111.4	102.3	94.3	97.4
Lebanon	71.9	87.2	82.1	85.1	94.4	91.1	87.3	91.1	92.9	97.0	96.0	91.0	90.3	91.2	86.2	91.4	88.2	87.4
Morocco	64.5	64.0	65.9	64.2	66.5	72.1	73.7	78.8	79.4	69.4	74.9	76.5	76.6	73.3	75.8	74.0	80.7	83.2
Tunisia	92.5	98.4	94.5	90.5	89.0	87.8	93.8	99.5	106.1	103.7	104.8	103.8	109.3	106.2				
Turkey	39.0	37.2	39.7	43.0	45.7	46.2	46.0	47.6	47.3	45.0	45.9	47.3	48.4	46.7	46.0	44.6	43.6	45.2
EU28	61,8	62,4	62,8	63,6	66,9	69,6	73,8	76,0	76,6	70,8	76,4	79,2	80,3	81,6	84,2	87,4	89,3	91,5

Source: the Observatory of Economic Complexity

Algeria, Egypt and Tunisia produce their electricity using locally produced natural gas, whereas Israel, Morocco and Turkey have a more diversified power generation system, albeit greatly dependent on coal-fired power plants. Lebanon is largely dependent on expensive and carbon-intensive, oil-fired power plants as no other fossil resources are available. RES deployment in the region is still small.

Table 5: Power generation mix

	Algeria	Egypt	Israel	Jordan	Lebanon	Morocco	Tunisia	Turkey	EU28
Coal			58.9%			46.7%		28.3%	26.0%
Oil Products	5.5%	11.0%	7.3%	72.5%	95.1%	26.3%	0.1%	0.6%	2.5%
Natural Gas	93.5%	79.7%	33.1%	27.0%		16.2%	98.9%	45.6%	21.7%
Nuclear									28.1%
Hydro	1.0%	8.2%	0.0%	0.4%	4.9%	8.0%	0.3%	22.9%	9.6%
Geothermal								0.3%	0.2%
Solar		0.1%	0.3%				0.0%		1.5%
Wind		1.0%	0.0%	0.0%		2.8%	0.7%	2.1%	5.6%
Biofuels			0.1%	0.1%				0.2%	3.5%
Waste			0.1%					0.1%	1.3%

Satellite power module of GEM-E3-MENA

Figure 3: Historical greenhouse gas emissions by country (mtCO2e)

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[4] https://oec.world/
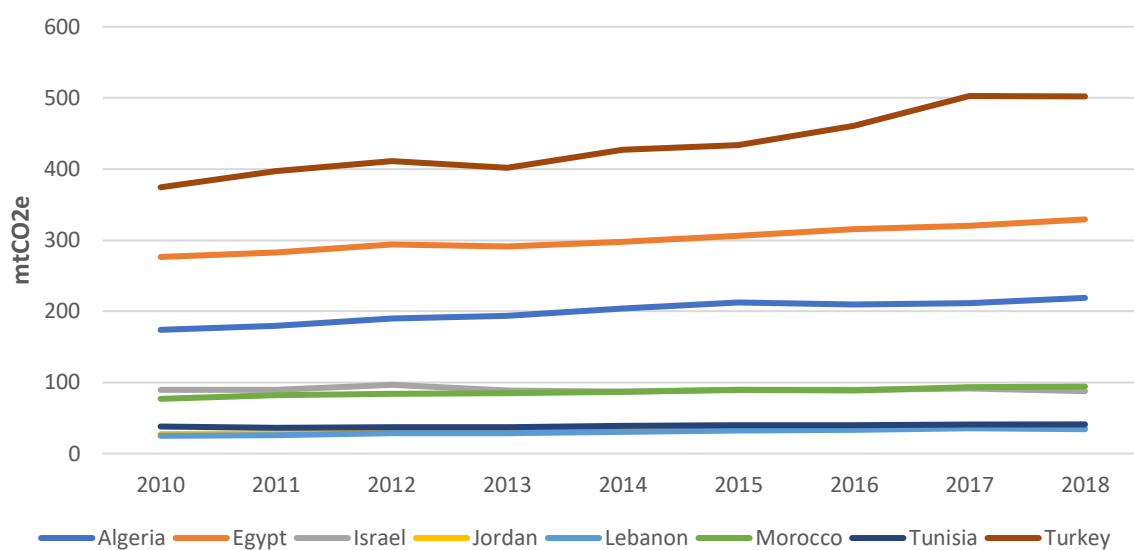
Source: CAIT database

Table 6: Greenhouse gas emissions by source – 2018 (mtCO2e)

	Algeria	Egypt	Israel	Jordan	Lebanon	Morocco	Tunisia	Turkey
Electricity/Heat	48.6	108.9	35.7	9.5	15.3	22.5	9.5	159.0
Agriculture	12.3	30.6	1.6	1.2	0.8	15.4	4.6	49.6
Manufacturing and Construction	12.7	41.1	4.2	1.6	1.2	8.1	5.0	72.1
Transport	45.5	53.9	18.0	9.0	8.1	18.3	7.6	83.4
Buildings	26.3	17.0	0.7	2.0	0.7	7.2	2.9	50.1
Industrial processes	17.4	30.9	14.6	5.6	5.0	8.3	5.1	47.9
Other (fugitive, waste, bunkers etc.)	56.1	46.8	13.0	6.9	3.3	14.6	6.5	40.4

Source: CAIT database

4 THE BASELINE SCENARIO

The baseline scenario serves as the basis upon which the Blue Transition scenario builds. The baseline scenario is a continuation of current policies in a context of sustainable development, where high deficits or surpluses diminish over time and GDP per capita follows a convergence trajectory. The scenario assumptions, regarding the evolution of main macroeconomics variables, are based on exogenous forecasts, e.g., the (short- to medium-term) GDP growth which is based on IMF publications and the OECD, whilst population and labour-force projections are based on UN and ILO data. In terms of power system developments, the current policies and commitments are considered without assuming intensification of efforts to mitigate climate change impacts in the long-term.

In terms of GDP, the baseline projects an average annual growth rate of 3.7% in the MENA (Middle East and North Africa) region:

Figure 4: Baseline scenario - GDP annual growth rates
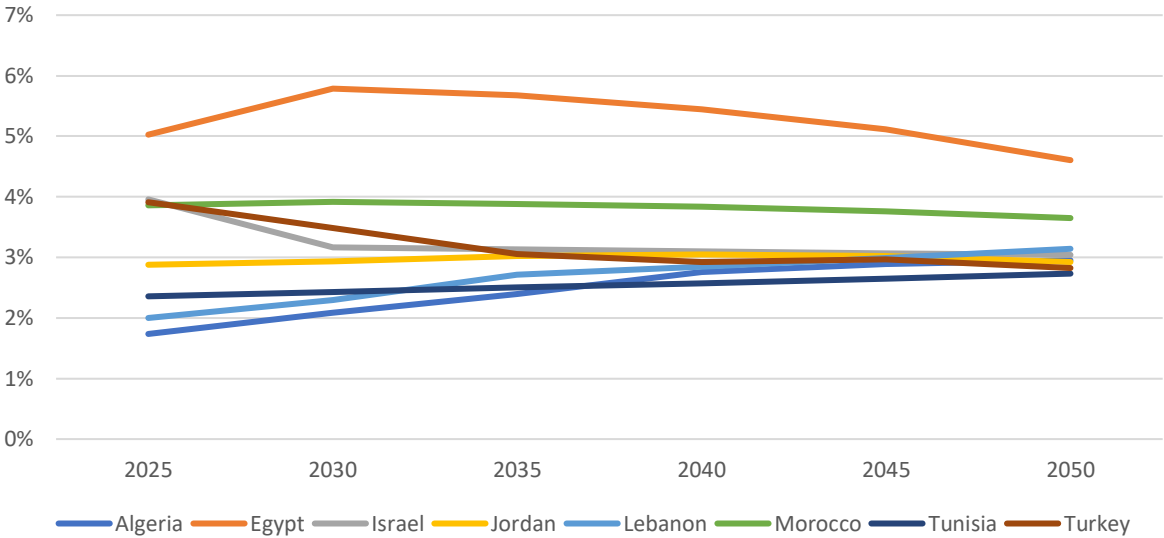
The average investment on infrastructure equates to 3.4% of GDP on average over the projection period.

Figure 5: Baseline scenario – Infrastructure investments (% GDP)
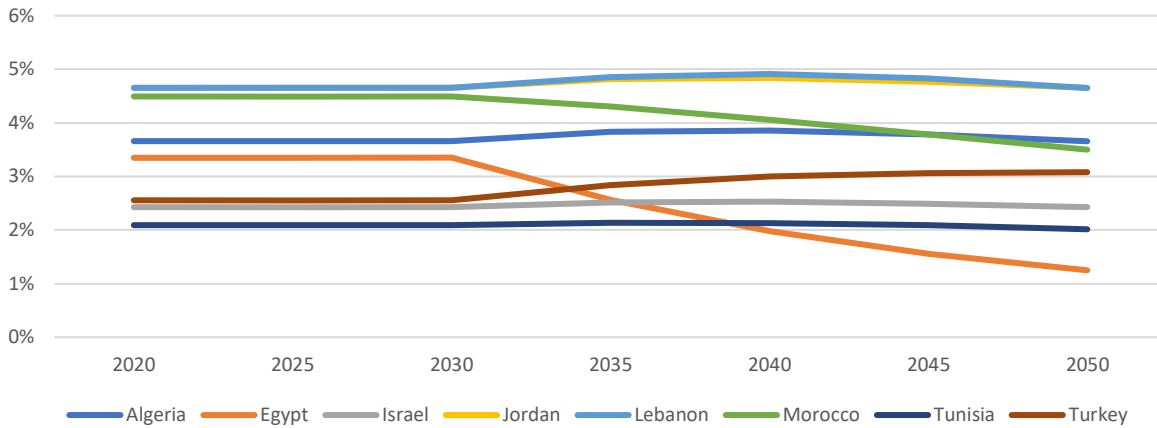
The growth rates of population and labour force diminish over time, according to the UN population projections and labour force participation rates provided by ILO statistics.

Figure 6: Baseline scenario - population annual growth rates
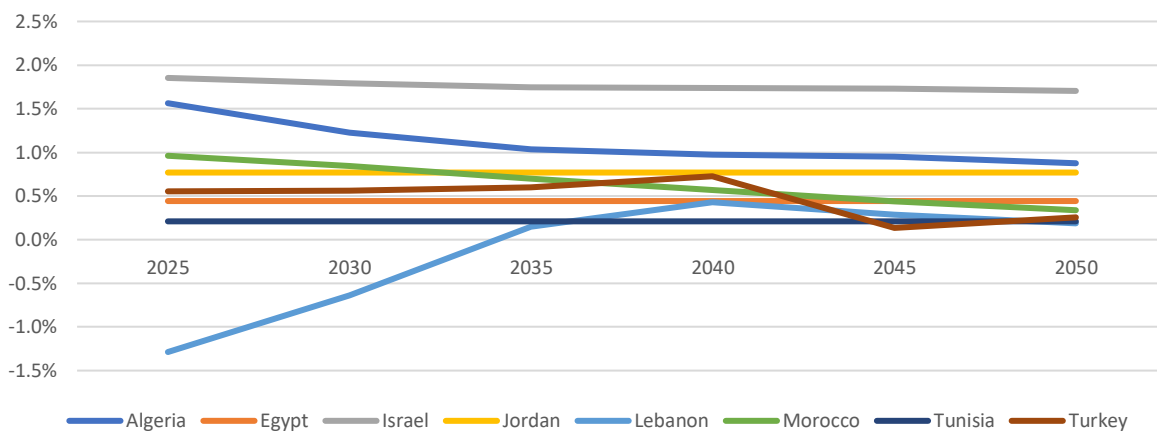
Figure 7: Baseline scenario – labour-force annual growth rates
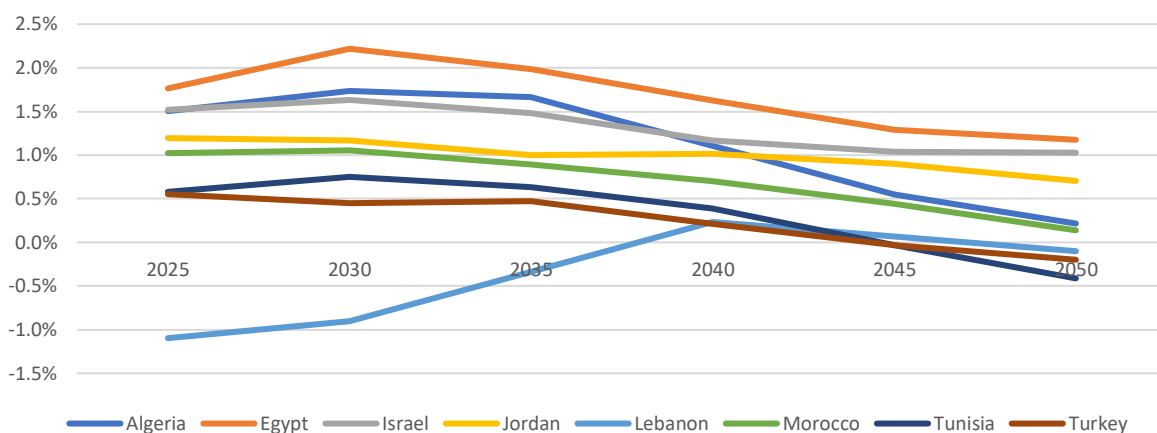
Figure 8: Baseline scenario - unemployment rate
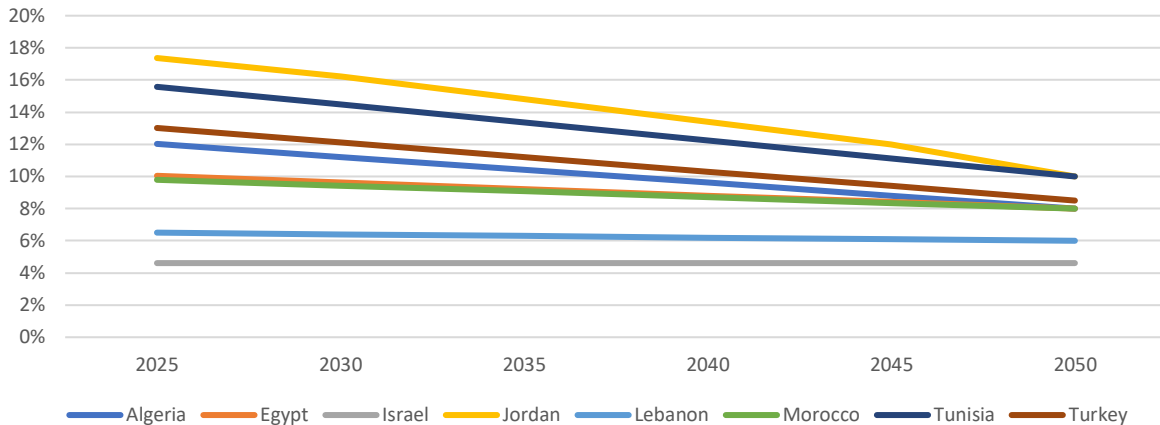
The power generation mix is dominated by fossil-fuelled plants throughout the projection period, as the NDCs are not ambitious enough to initiate the decarbonisation process of the energy system.

Figure 9: Baseline scenario – power generation mix
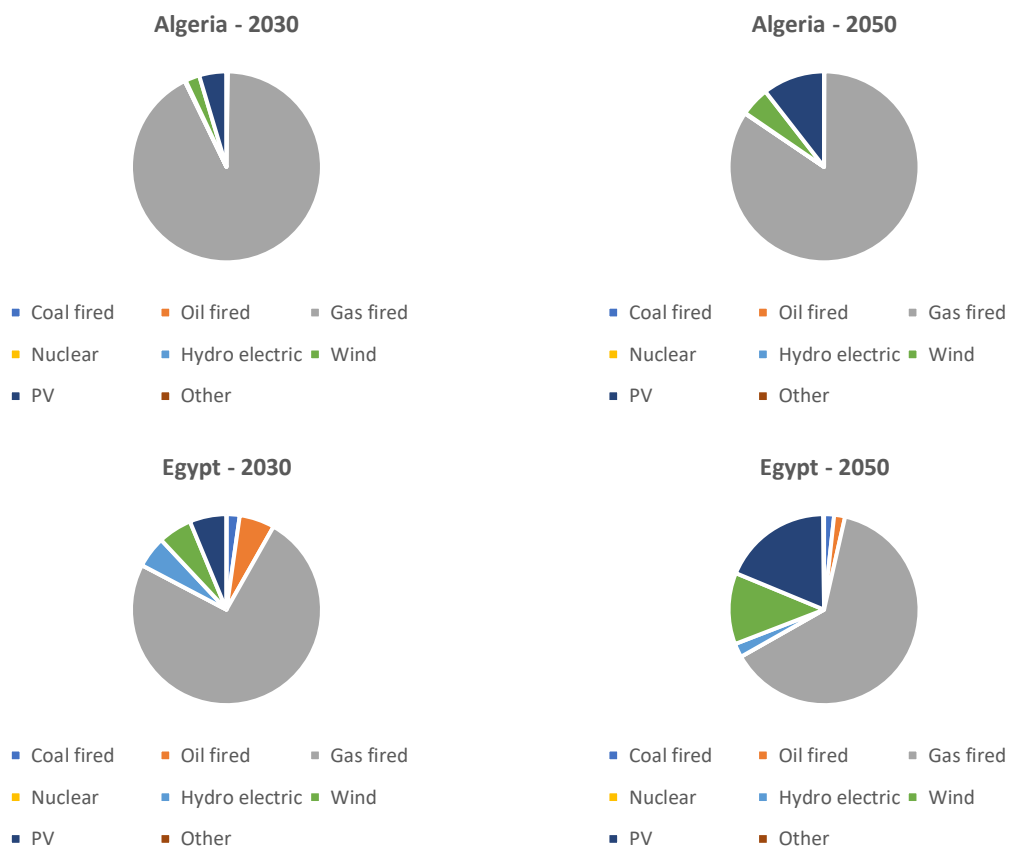
Israel - 2030
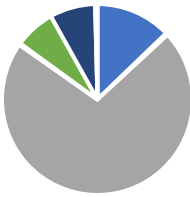
- Coal fired
- Oil fired
- Gas fired
- Nuclear
- Hydro electric
- Wind
- PV
- Other

Israel - 2050
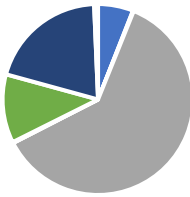
- Coal fired
- Oil fired
- Gas fired
- Nuclear
- Hydro electric
- Wind
- PV
- Other

Jordan - 2030
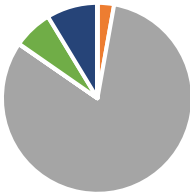
- Coal fired
- Oil fired
- Gas fired
- Nuclear
- Hydro electric
- Wind
- PV
- Other

Jordan - 2050
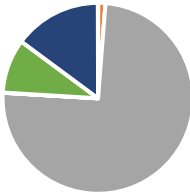
- Coal fired
- Oil fired
- Gas fired
- Nuclear
- Hydro electric
- Wind
- PV
- Other

Lebanon - 2030
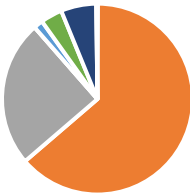
- Coal fired
- Oil fired
- Gas fired
- Nuclear
- Hydro electric
- Wind
- PV
- Other

Lebanon - 2050

- Coal fired
- Oil fired
- Gas fired
- Nuclear
- Hydro electric
- Wind
- PV
- Other

Morocco - 2030

- Coal fired
- Oil fired
- Gas fired
- Nuclear
- Hydro electric
- Wind
- PV
- Other

Morocco - 2050

- Coal fired
- Oil fired
- Gas fired
- Nuclear
- Hydro electric
- Wind
- PV
- Other

Tunisia - 2030

- Coal fired
- Oil fired
- Gas fired
- Nuclear
- Hydro electric
- Wind
- PV
- Other

Tunisia - 2050

- Coal fired
- Oil fired
- Gas fired
- Nuclear
- Hydro electric
- Wind
- PV
- Other

Turkey - 2050

- Coal fired
- Oil fired
- Gas fired
- Nuclear
- Hydro electric
- Wind
- Solar
- Other

Turkey - 2030

- Coal fired
- Oil fired
- Gas fired
- Nuclear
- Hydro electric
- Wind
- Solar
- Other

Satellite power module of GEM-E3-MENA

5   The Blue Transition scenario

The key aspects of the Blue Transition scenario quantified by the model are climate change mitigation and transition to clean energy; upgrades and extension of infrastructure; the labour market; trade integration; and automation. Each of these components has also been unilaterally assessed to disentangle the driving forces of economic impacts of the Blue Transition scenario.

5.1   CLIMATE CHANGE AND CLEAN ENERGY TRANSITION SCENARIO

Reducing GHG emissions and gradually decarbonising the energy system of the EMEA (Europe, Middle East, Africa) countries is one of the main pillars of the Blue Transition scenario. The clean energy scenario foresees a decoupling of Mediterranean economies from fossil-fuels, both in consumption and production. Reducing the use of fossil-fuels, both for primary energy and secondary energy uses, is in line with environmental objectives. However, this undertaking might be costly, particularly for countries that are heavily dependent on fossil-fuels (both as producers and consumers). Fossil fuel-based electricity is projected to decrease and to be substituted by electricity from renewable sources in the future, driven by carbon prices and national policies. The electrification of the energy system advances rapidly (compared to the baseline). Firms and households invest in energy efficiency equipment and appliances which, in turn, reduce average energy consumption.

The power generation mix, which is compatible with the NDC targets[5], is presented below:

Figure 10: Power generation mix in 2030
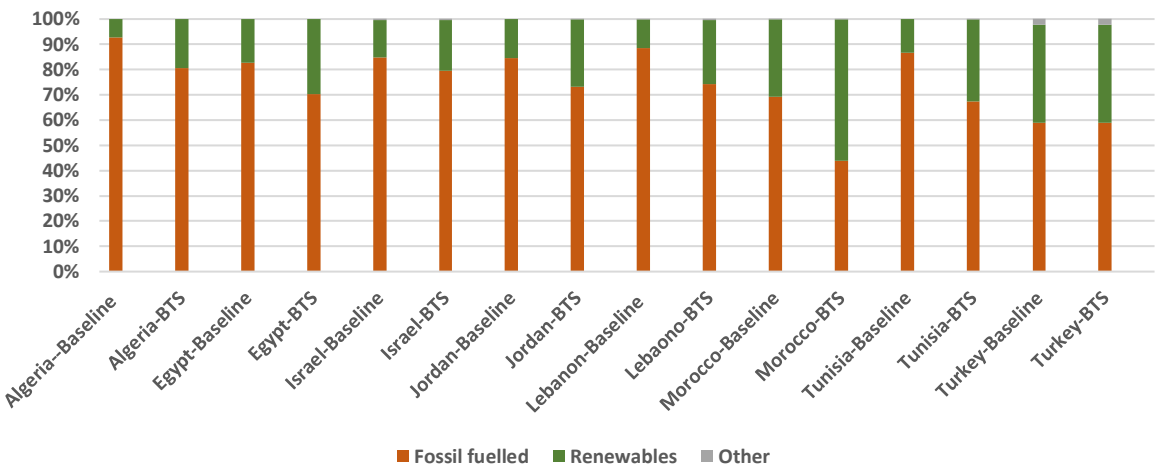
Source: Satellite power module of GEM-E3-MENA

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[5] For the period after 2030 we assume a continuation of efforts similar to the period up to 2030.

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Figure 11: Power generation mix in 2050
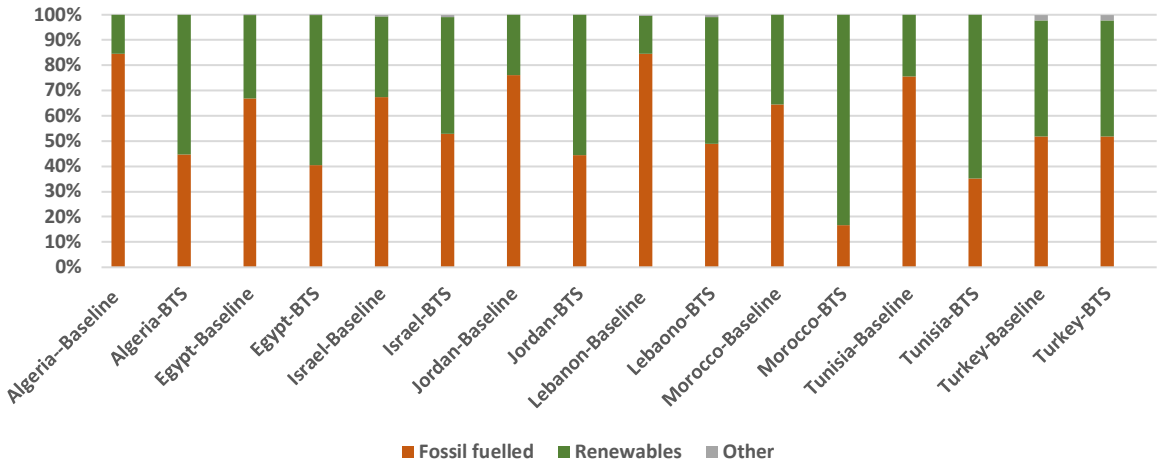
Source: Satellite power module of GEM-E3-MENA

The increased share of green electricity comes at a higher cost for the economy. The cost of producing electricity from renewables is higher than conventional sources and furthermore the electrification of the economy exerts pressure on the electricity markets, driving prices upwards. On average, the cost of electricity increases by 17.6% in 2030 and by 42% in 2050.

The effect of higher electricity prices yields losses in competitiveness for energy intensive industries, which can be alleviated if energy efficiency improvements are taken up. Another aspect of higher electricity prices is their effect on household's energy poverty. Lower income households will have to spend a relatively larger share of their income on energy goods, and they may not be able to afford energy efficiency improvements (e.g., insulation, advanced electrical appliances). Hence, in the absence of policies to support low-income households during the energy transition, energy poverty in the region may worsen.

In terms of GDP, impacts are higher in the long-term, in Morocco, Egypt and Tunisia. The clean energy transition context implies an intensification of efforts to mitigate climate change impacts for the MENA countries and the EU; we assume that all other regions take no action. This assumption eases the impacts for energy producing countries, like Algeria, since part of the production is re-orientated (compared to the baseline) from MENA countries and the EU to the rest of the world. For Morocco, Tunisia, and Egypt, the impacts are higher due to the importance of manufacturing industries for the local economies. Higher electricity costs lead to losses in competitiveness, which are translated into lower production and lower disposable income.

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Table 7: Clean energy transition – main macroeconomic aggregates in 2030 (% changes from baseline)

		GDP	Investments	Private consumption	Exports	Imports
2030	**Algeria**	-0.07	-0.01	0.33	-0.54	-0.10
	Egypt	-1.65	-0.05	0.80	-2.53	0.99
	Israel	0.29	0.19	0.83	-0.19	0.76
	Jordan	-0.46	0.22	0.98	-1.64	0.68
	Lebanon	-0.61	0.06	0.43	-0.76	0.94
	Morocco	-2.66	0.33	1.02	-4.21	1.08
	Tunisia	-2.73	0.23	1.18	-3.04	1.20
	Turkey	0.01	-0.01	0.00	0.08	0.02
2050	**Algeria**	-1.11	-0.21	0.33	-1.36	-0.10
	Egypt	-3.56	-0.32	0.80	-5.92	0.99
	Israel	-0.40	0.29	0.83	-1.76	0.76
	Jordan	-2.66	0.35	0.98	-4.95	0.68
	Lebanon	-1.75	0.01	0.43	-1.87	0.94
	Morocco	-5.45	0.32	1.02	-8.28	1.08
	Tunisia	-5.74	0.06	1.18	-6.19	1.20
	Turkey	0.01	-0.02	0.00	0.15	0.02

Source: GEM-E3-MENA

Table 8: Clean energy transition – cumulative GDP impacts (% changes from baseline)

	2020-2030	2020-2050
Algeria	0.03	-0.47
Egypt	-0.45	-2.27
Israel	0.22	0.02
Jordan	-0.22	-1.18
Lebanon	-0.37	-0.91
Morocco	-0.89	-3.10
Tunisia	-0.70	-3.34
Turkey	0.00	0.01

Source: GEM-E3-MENA

The sectors that record the highest decreases in terms of output are those producing chemical products, energy intensive and the consumer goods industries (mostly food and clothing industries). The sectors that contribute to the GHG mitigation (mostly equipment goods and, to a lesser extent, transport equipment) benefit from the transition.

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Table 9: Clean energy transition – production changes (% from baseline)

		Chemical products	Other energy-intensive	Electrical goods - Other equipment goods	Transport equipment	Consumer goods industries - Food	Consumer goods industries - Rest	Textiles and clothing
2030	**Algeria**	1.53	0.54	1.00	-0.62	1.92	-0.23	1.97
	Egypt	-0.98	-2.09	6.64	-2.01	-1.95	-0.91	-1.83
	Israel	3.23	-0.69	2.23	-1.19	-0.03	0.45	-0.75
	Jordan	-1.54	-1.00	11.15	-0.68	-0.89	-0.46	-1.57
	Lebanon	-0.68	-0.01	5.54	13.00	-0.27	-0.14	-0.35
	Morocco	-3.24	-3.20	2.20	4.28	-3.14	-2.48	-4.79
	Tunisia	-4.37	-3.60	1.92	-0.26	-4.68	-1.66	-4.29
	Turkey	0.06	0.10	0.13	0.23	-0.03	0.01	0.09
2050	**Algeria**	0.82	-3.12	-7.05	-5.37	0.91	-0.95	1.54
	Egypt	-9.12	-7.25	8.60	-3.54	-3.65	-1.86	-3.24
	Israel	0.61	-1.89	3.90	-2.66	-0.91	-0.17	-2.50
	Jordan	-4.58	-4.50	18.76	-2.86	-3.26	-1.98	-4.48
	Lebanon	-1.34	-0.42	9.03	28.79	-1.29	-0.86	-1.22
	Morocco	-6.52	-6.63	7.64	12.93	-5.07	-3.99	-7.95
	Tunisia	-11.03	-8.94	4.19	3.21	-8.13	-3.22	-7.21
	Turkey	0.26	0.23	0.14	0.35	-0.10	-0.05	0.05

Source: GEM-E3-MENA

The impacts on employment by the energy transition are affected by: i) the dependence of the domestic economy on fossil fuels; ii) the import dependence of domestic manufacturing (i.e., does the local economy have the capability to produce clean energy equipment and to what extent? Morocco, Turkey and Egypt's productive capacities in electrical and other equipment goods, as well as in transport equipment, imply that these countries can benefit at the sectoral level from the clean energy transition). The net effect is determined by the relative magnitude of the two forces. For economies which depend heavily on hydrocarbon production, the employment effects are expected to be lower, since job losses from the green transition are associated not only with the power generation plants, but also with the extraction and the refining sector. These will be partly compensated by an increase in jobs related to renewables. Employment impacts are presented below:

Table 10: Clean energy transition – employment impacts (% change from baseline)

	2030	2050
Algeria	-0.34	-1.19
Egypt	-1.55	-2.47
Jordan	0.02	-0.21
Israel	-0.10	-1.26
Lebanon	0.10	-0.51
Morocco	-1.28	-2.11
Tunisia	-1.34	-1.84
Turkey	0.01	0.00

Source: GEM-E3-MENA

5.2   INFRASTRUCTURE UPGRADE

Infrastructure developments are essential for the countries under consideration, in order to improve their integration to global value chains and to achieve the SDGs. Infrastructure developments may refer to social aspects, such as: electricity for all; access to clean water; and sanitation for all, but they also have a significant repercussion on the economic performance of domestic firms. Stable and undisrupted electricity supply, communication networks which would allow the adoption of automated technologies and e-services, extended road and rail networks which will increase transport efficiency (e.g., reduction in travel times, decrease in accidents and disruption), are essential in the context of globalisation and automation.

Figure 12: Infrastructure investments (% GDP)
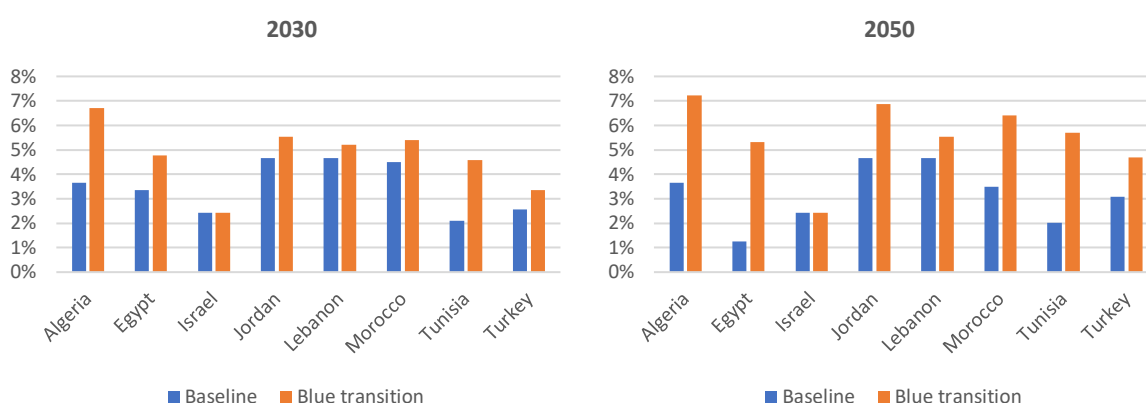
Source: Global Infrastructure Outlook, authors' calculations

Infrastructure development has a positive impact on domestic activity and especially construction (which has limited trade openness), boosting employment and income. However, infrastructure investments may put a strain on capital markets as they come on top of firms'

capital requirements, hence creating a crowding out effect. Furthermore, infrastructure developments yield productivity improvements, e.g., due to time-savings and they positively influence overall economic performance. The impact of investments in infrastructure on GDP differs across time. The short-term effects are mainly driven by the construction and installation of the necessary equipment. As the equipment is largely imported, this may act to the detriment of the trade balance. In addition, in the case of self-financing, the upgrades of infrastructure may have a crowding-out effect on other investments. In the long-term, the impacts are mostly driven by the permanent positive effects on productivity. The assessed impacts of infrastructure developments on GDP is presented in the following table:

Table 11: Infrastructure – main macroeconomic aggregates (% change from baseline)

		GDP	Investments	Private consumption	Exports	Imports
2030	**Algeria**	-0.98	0.22	0.37	-0.56	2.03
	Egypt	2.15	0.50	0.58	0.95	4.79
	Israel	0.33	0.16	0.13	0.38	0.87
	Jordan	0.51	0.38	0.37	0.61	1.13
	Morocco	0.41	0.10	-0.02	0.44	-0.04
	Tunisia	1.62	0.39	0.31	1.74	1.71
	Turkey	0.66	0.77	0.42	1.21	2.06
2050	**Algeria**	-0.01	0.20	0.13	-0.67	0.79
	Egypt	2.34	0.92	0.37	1.44	2.03
	Israel	5.98	1.46	0.58	0.94	4.79
	Jordan	1.22	0.30	0.13	1.88	0.87
	Morocco	0.14	0.70	0.37	0.70	1.13
	Tunisia	0.92	0.21	-0.02	1.20	-0.04
	Turkey	2.57	1.15	0.31	2.20	1.71

Source: GEM-E3-MENA

Table 12: Infrastructure– cumulative GDP impacts (% changes from baseline)

	2020-2030	2020-2050
Algeria	-0.86	0.56
Egypt	-0.19	2.55
Israel	-0.11	0.71
Jordan	-0.45	0.22
Lebanon	0.12	0.53
Morocco	-0.10	1.32
Tunisia	-0.57	2.05
Turkey	-0.13	0.87

Source: GEM-E3-MENA

5.3 TRADE INTEGRATION

The Blue Transition scenario describes a situation where regional markets integrate. This allows the sharing of benefits in specialisation and resource endowments. Trade integration is achieved by removing tariff and non-tariff barriers (such as regulations, rules of origin etc.). In modelling terms, this is equivalent to removing duties and increasing Armington elasticities (i.e., to model the removal of non-tariff barriers, such as regulations, rules of origin etc.). Cheaper imports are a double-edged sword for domestic activities. On the one hand, firms that are not operating efficiently will stop being protected and their competitiveness disadvantage will lead them to shrink. On the other hand, cheaper imports will be beneficial for the competitiveness of other industries, which will see cost reductions in their intermediate inputs. Another repercussion of trade liberalisation is that household income, ceteris paribus, will increase given the substitution of more expensive domestic goods with imports. This will direct households to other consumption categories and /or savings. The impacts of higher trade integration on GDP are presented in the following table:

Table 13: Trade integration – main macroeconomic aggregates ($ change from baseline)

		GDP	Investments	Private consumption	Exports	Imports
2030	**Algeria**	1.38	0.30	1.92	0.55	2.53
	Egypt	0.92	0.49	2.23	-3.54	7.77
	Israel	0.73	0.09	0.21	-6.04	-1.01
	Jordan	0.85	0.40	1.26	-3.07	1.76
	Lebanon	0.56	0.19	1.44	-1.85	2.78
	Morocco	0.93	0.23	0.68	-5.73	0.43
	Tunisia	0.98	0.39	1.39	-0.44	3.39
	Turkey	1.32	0.42	0.64	-4.19	0.53
2050	**Algeria**	1.62	0.50	1.92	-1.77	2.53
	Egypt	2.34	0.84	2.23	-9.61	7.77
	Israel	1.38	0.25	0.21	-10.01	-1.01
	Jordan	1.49	0.44	1.26	-6.35	1.76
	Lebanon	0.68	0.11	1.44	-5.04	2.78
	Morocco	1.85	0.51	0.68	-10.57	0.43
	Tunisia	1.59	0.59	1.39	-2.82	3.39
	Turkey	2.15	0.76	0.64	-7.53	0.53

Source: GEM-E3-MENA

Table 14: Trade integration – cumulative GDP impacts (% changes from baseline)

	2020-2030	2020-2050
Algeria	0.99	1.31
Egypt	0.19	1.12
Israel	0.30	0.75
Jordan	0.39	0.81
Lebanon	0.35	0.48
Morocco	0.34	0.98
Tunisia	0.44	0.91
Turkey	0.56	1.25

Source: GEM-E3-MENA

All regions benefit from the removal of tariffs, through increased exports and household consumption. In terms of losses in government revenue, the removal of tariff barriers implies decreased revenues for most of the countries, whilst there are cases where the duty revenues increase. As household consumption increases, there is also an increase in the consumption of goods and services originating from the rest of the world (ROW) and the rest of the energy producing countries (ENP), for which duties are not removed from imports. The increase in imports from these countries may counterbalance the loss implied by the deeper integration within the EMEA region.

Table 15: Change in revenues from duties (in bn. USD)

	2025	2030	2035	2040	2045	2050
Algeria	-0.12	-0.19	-0.20	-0.22	-0.23	-0.27
Egypt	-0.56	-0.79	-0.84	-0.94	-1.00	-1.15
Israel	-0.02	-0.09	-0.09	-0.10	-0.10	-0.13
Jordan	-0.03	-0.06	-0.07	-0.07	-0.07	-0.09
Lebanon	-0.02	-0.04	-0.04	-0.05	-0.05	-0.06
Morocco	-0.01	-0.10	-0.11	-0.13	-0.14	-0.19
Tunisia	-0.02	-0.07	-0.06	-0.07	-0.07	-0.09
Turkey	0.01	-0.26	-0.27	-0.34	-0.33	-0.46

Source: GEM-E3-MENA

The main sector benefitting from the removal of trade barriers is the primary sector as well as sectors related to the manufacturing of consumer goods and other energy intensive goods.

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Table 16: Manufacturing - Changes compared to the baseline scenario (%)

		Chemical products	Other energy-intensive	Electrical goods - Other equipment goods	Transport equipment	Consumer goods industries - Food	Consumer goods industries - Rest	Textiles and clothing
2030	Algeria	-1.5	-6.5	1.6	-7.5	1.2	0.6	-7.3
	Egypt	-4.4	0.2	4.3	0.9	1.4	-7.8	2.4
	Israel	-2.1	-1.2	-2.8	-2.7	1.6	1.1	1.6
	Jordan	1.1	-1.2	5.6	-3.8	1.4	-11.6	-0.7
	Lebanon	1.5	0.8	3.1	4.4	-1.7	-1.4	-1.1
	Morocco	-0.5	0.5	2.7	-1.7	0.2	1.5	2.9
	Tunisia	-0.1	-1.3	2.6	-1.4	3.3	0.4	1.9
	Turkey	2.0	0.8	2.8	-2.0	-0.5	1.0	2.7
2050	Algeria	-5.1	-4.6	-1.5	-13.0	4.2	1.1	-6.5
	Egypt	-1.9	1.5	4.7	3.7	3.0	-2.3	3.0
	Israel	-3.3	-1.3	-5.2	-5.9	3.3	2.4	2.4
	Jordan	0.9	-0.4	9.1	-4.8	3.2	-10.3	-0.7
	Lebanon	2.5	1.9	6.7	5.6	0.3	-1.8	3.6
	Morocco	0.1	1.8	5.3	0.1	1.7	2.6	5.3
	Tunisia	0.1	-1.2	4.1	-2.0	3.7	1.1	3.0
	Turkey	3.2	1.4	4.2	-2.6	0.4	2.1	3.8

Source: GEM-E3-MENA

5.4 AUTOMATION

Rapid technology advancements, in the fields of robotics and computer science, are expected to increase the automation of production processes. Ergo, in the future, we will witness a capital-intensive transformation of the economy. Job losses and the consequent decrease in wage income, are one side of the story. However, the net impact of automation in the GEM-E3-MENA model is also determined by other factors, such as capital market tightness; productivity gains; accumulation of capital; and jobs creation relevant to automation. These mechanisms are described in Acemoglou, Restrepo (2019).

The effects on employment vary between countries, depending on their level of development and the production structure of their economy. Acemoglou, Restrepo (2019) find that, in the US, for each additional robot per 1000 employees, 3.3 jobs are lost at the national level. Carbonero et al (2018), find that the effects on employment vary between developed and developing counties. For the former, the employment impacts are -0.43% at the national level whilst, for the latter, the effect can be as high as -11%.

In our specification, we assume varying rates of automation. The following table presents the amount of workers who are to be substituted by automation (direct effect). We assume varying rates of automatisation by sector and by country.

Table 17: Jobs replaced due to automatisation/digitalisation

	2025	2030	2035	2040	2045	2050
Algeria	0.04%	0.10%	0.19%	0.26%	0.34%	0.45%
Egypt	0.05%	0.14%	0.26%	0.39%	0.55%	0.79%
Israel	0.05%	0.11%	0.20%	0.27%	0.36%	0.47%
Jordan	0.00%	0.01%	0.02%	0.03%	0.04%	0.06%
Lebanon	0.01%	0.02%	0.03%	0.04%	0.05%	0.07%
Morocco	0.02%	0.05%	0.09%	0.13%	0.17%	0.24%
Tunisia	0.01%	0.02%	0.04%	0.06%	0.08%	0.11%
Turkey	0.14%	0.36%	0.66%	0.89%	1.12%	1.39%
EU	2.79%	6.30%	10.37%	13.03%	15.64%	19.13%
Rest of energy producers	0.92%	2.08%	3.42%	4.30%	5.16%	6.31%
Rest of the world	2.79%	6.30%	10.37%	13.03%	15.64%	19.13%

Source: GEM-E3-MENA

The scenario assessment implies GDP gains for all countries, which are higher in 2050 compared to 2030. This suggests that increased capital costs, employment losses, as well as increased imports, do not overshoot the positive impact of productivity gains in the economy.

Table 18: Automation - main macroeconomic indicators (% changes from baseline)

		GDP	Investments	Private consumption	Exports	Imports
2030	**Algeria**	0.12	1.65	-0.87	0.73	0.44
	Egypt	0.28	1.79	-0.52	0.93	-0.14
	Israel	0.25	1.50	-0.83	1.42	0.02
	Jordan	0.40	2.08	-0.75	0.36	-0.28
	Lebanon	0.32	3.21	-0.03	0.30	0.49
	Morocco	0.29	1.17	-1.57	0.71	-0.76
	Tunisia	0.26	2.68	-0.59	0.44	0.02
	Turkey	0.16	1.95	-0.76	0.24	-0.47
2050	**Algeria**	1.60	4.38	-0.87	2.39	0.44
	Egypt	1.68	3.10	-0.52	3.41	-0.14
	Israel	1.02	2.60	-0.83	2.05	0.02
	Jordan	1.76	3.46	-0.75	1.87	-0.28
	Lebanon	1.54	3.94	-0.03	2.20	0.49
	Morocco	1.08	2.31	-1.57	1.08	-0.76

Tunisia	1.55	4.27	-0.59	1.84	0.02
Turkey	1.36	2.97	-0.76	2.30	-0.47

Source: GEM-E3-MENA

Table 19: Automation – cumulative GDP impacts (% changes from baseline)

	2020-2030	2020-2050
Algeria	0.01	0.56
Egypt	0.12	0.79
Israel	0.13	0.48
Jordan	0.19	0.80
Lebanon	0.15	0.67
Morocco	0.15	0.54
Tunisia	0.10	0.64
Turkey	0.05	0.54

Source: GEM-E3-MENA

In terms of manufacturing output, the sector that benefits from the increased automation of the economy is that of Electrical goods – Other equipment goods, since it is responsible for the delivery of goods that are necessary for the transformation. In 2050, other manufacturing sectors also benefit from the capital accumulation during the automatisation process and from lower production costs (attributed to productivity gains and lower wage costs, as the replacement of labour exerts negative pressure on the labour market). Finally, the sectoral impacts are influenced by changes in relative competitiveness, which lead to increased imports and, hence, to lower domestic production.

Table 20: Automation- production of manufacturing sectors (% changes from baseline)

		Chemical products	Other energy-intensive	Electrical goods - Other equipment goods	Transport equipment	Consumer goods industries - Food	Consumer goods industries - Rest	Textiles and clothing
2030	**Algeria**	-0.27	-0.77	6.87	-1.87	-0.32	-0.46	-0.82
	Egypt	0.35	0.03	11.13	-0.61	-0.28	-0.29	-0.59
	Israel	0.85	0.86	14.48	-0.77	-0.32	-0.60	-0.50
	Jordan	0.94	0.22	9.71	-1.94	0.38	0.13	-0.71
	Lebanon	0.84	0.47	15.32	-1.06	0.41	0.34	-0.23
	Morocco	0.90	0.56	9.42	-0.07	-0.74	-0.42	-0.05
	Tunisia	0.37	-0.20	15.07	-1.28	-0.12	-0.41	-1.11
	Turkey	0.51	0.36	10.62	-0.96	-0.49	-0.48	-0.66

2050	Country							
	Algeria	-0.43	-2.57	4.61	-5.03	0.87	2.12	-2.01
	Egypt	1.12	0.63	12.19	0.17	1.50	1.67	0.36
	Israel	1.24	1.49	9.77	-3.05	1.59	1.65	-1.09
	Jordan	2.47	1.06	8.18	-4.42	3.09	2.48	-1.39
	Lebanon	2.36	1.74	13.31	-1.45	2.63	2.72	-0.41
	Morocco	1.83	0.70	9.34	-0.84	1.28	0.41	0.08
	Tunisia	1.96	0.51	15.62	-1.88	2.22	1.39	-0.58
	Turkey	1.91	1.60	9.10	-1.01	1.29	1.47	0.64

Source: GEM-E3-MENA

In terms of employment, the effects are found to be negative and more pronounced for countries that rely on labour abundance (e.g., Morocco, Turkey, Egypt, Algeria). At the country level, the total impact on jobs is found to be lower in 2030 than the direct impacts, (see Table 17: Jobs replaced due to automatisation/digitalisation) suggesting that the secondary impact effects (productivity, new jobs in other sectors) are positive and alleviate the initial impact of labour on capital substitution. In 2050, the effects are positive implying that the transformation of the economy and the creation of new jobs is beneficial for overall employment.

Table 21: Automation - employment (% changes from baseline):

	2030	2050
Algeria	0.01	0.56
Egypt	0.12	0.79
Israel	0.13	0.48
Jordan	0.19	0.80
Lebanon	0.15	0.68
Morocco	0.14	0.51
Tunisia	0.10	0.64
Turkey	0.05	0.54

Source: GEM-E3-MENA

5.5   LABOUR MARKET DEVELOPMENTS

The participation of women in the labour market is particularly low in the MENA region (OECD 2017). Apart from Israel, female participation in the labour market is quite limited, compared to the EU27. On average, 22% of women of age 15+ are actively engaged in the labour market, compared to 50.8% in the EU6 (see Table 22). The Blue Transition scenario also includes social aspects of development for the MENA regions. Gender equality and increased

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[6] ILO data

participation of women in the labour force can boost economic growth and reduce inequalities and poverty. Our assumption, regarding the evolution of female labour force participation rates, implies higher participation throughout the projection period and a convergence towards the EU27 average rate (see Figure 13). The benefits from increased female labour force participation on economic growth in the MENA region has been highlighted by Tsani et al. (2013), and Tasseven (2017).

Table 22:Female labour force participation rates (%)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Algeria	14.4	15.2	16.2	16.9	15.3	16.1	16.8	17.6	17.3	17.0
Egypt	22.6	22.0	22.4	23.3	23.6	22.5	22.8	21.8	18.5	18.5
Israel	57.0	56.8	58.0	58.1	59.0	59.0	59.4	59.2	59.7	59.6
Jordan	15.3	15.2	14.8	13.9	13.9	14.0	14.1	14.3	14.4	14.6
Lebanon	22.5	22.7	22.7	22.6	22.6	22.5	22.6	22.7	22.9	23.1
Morocco	25.6	25.5	24.8	24.6	23.8	23.0	22.3	21.5	21.6	21.6
Tunisia	24.5	24.4	25.2	25.1	25.4	25.8	25.6	25.3	25.1	24.9
Turkey	27.0	28.3	28.9	30.1	30.2	31.5	32.5	33.5	34.1	34.3
EU27	49.4	49.6	50.0	50.1	50.2	50.2	50.4	50.6	50.7	50.8

Source: ILO

Figure 13: Female labour force participation rate
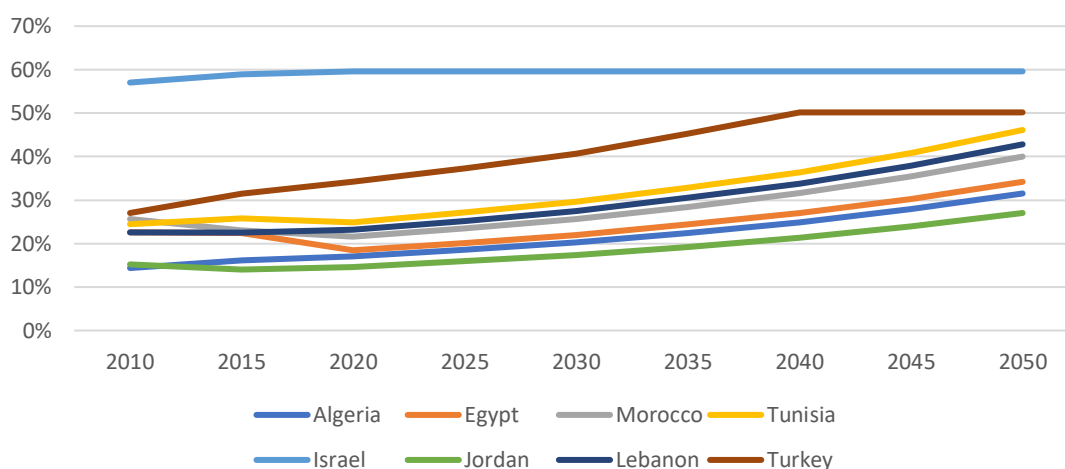
Source: Authors' assumptions

Increased labour supply allows for a better allocation of skills across activities (increasing productivity) and for lower labour costs. Given that some countries in the region are under economic development and their proximity to European markets, abundant low-cost labour is a significant factor that can boost confidence in domestic activities. Low, cost–competitive, domestically produced goods will substitute reliance on imported goods and services in favour of those that are locally produced, leading to higher overall demand and production.

Figure 14: Labour market developments (% change from baseline)[7]
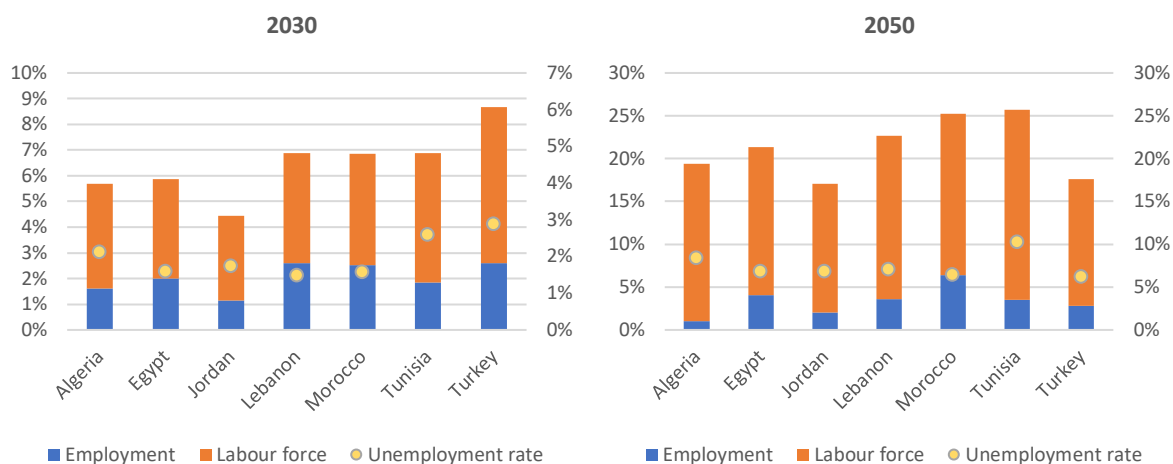
Source: GEM-E3-MENA

In terms of macroeconomic performance, the increased participation of women in the labour force yields gains both in terms of GDP and in the trade surplus of the MENA region:

Table 23: Labour market - main macroeconomic indicators (% changes from baseline)

		GDP	Investments	Private consumption	Exports	Imports
2030	Algeria	0.21	0.05	0.09	0.12	-0.05
	Egypt	0.91	0.15	0.34	1.05	-0.21
	Israel	0.00	0.01	0.01	0.01	0.02
	Jordan	0.38	0.10	0.13	0.40	0.03
	Lebanon	0.89	0.21	0.27	0.97	0.06
	Morocco	1.52	0.24	0.51	1.81	-0.18
	Tunisia	0.77	0.17	0.17	0.82	-0.03
	Turkey	0.99	0.22	0.28	1.45	-0.38
2050	Algeria	1.02	0.36	0.09	0.49	-0.05
	Egypt	4.05	0.61	0.34	5.67	-0.21
	Israel	0.01	0.02	0.01	0.03	0.02
	Jordan	2.07	0.43	0.13	2.24	0.03
	Lebanon	3.57	0.65	0.27	3.95	0.06
	Morocco	6.38	1.14	0.51	8.30	-0.18
	Tunisia	3.54	0.69	0.17	4.01	-0.03
	Turkey	2.82	0.69	0.28	4.75	-0.38

Source: GEM-E3-MENA

[7] Israel is not included in the analysis as it has a high rate of labour force participation.

Table 24: Labour market – cumulative GDP impacts (% changes from baseline)

	2020-2030	2020-2050
Algeria	0.11	0.42
Egypt	0.51	2.00
Israel	0.00	0.00
Jordan	0.20	0.83
Lebanon	0.48	1.65
Morocco	0.84	3.00
Tunisia	0.41	1.52
Turkey	0.55	1.70

Source: GEM-E3-MENA

In terms of sectoral production, the sectors that benefit the most from the higher participation rates are those that are labour intensive, namely the primary and tertiary sectors. However, significant benefits are also recorded for the manufacturing industries, which are the most important for regional exports.

Table 25: Labour market - production of manufacturing sectors (% changes from baseline)

		Chemical products	Other energy-intensive	Electrical goods - Other equipment goods	Transport equipment	Consumer goods industries - Food	Consumer goods industries - Rest	Textiles and clothing
2030	Algeria	0.59	0.58	1.64	1.21	0.37	0.20	0.93
	Egypt	0.87	0.95	1.04	0.82	1.25	0.48	0.89
	Israel	0.00	0.00	0.01	-0.04	0.01	0.02	-0.04
	Jordan	0.39	0.37	0.51	0.42	0.38	0.33	0.49
	Lebanon	0.98	0.92	1.05	1.09	1.04	0.80	1.12
	Morocco	1.43	1.35	1.81	1.85	1.53	1.23	2.42
	Tunisia	0.73	0.70	0.85	0.88	0.98	0.44	0.90
	Turkey	1.21	1.05	0.97	1.19	0.96	0.69	1.26
2050	Algeria	2.81	2.91	8.02	5.82	1.63	1.07	4.33
	Egypt	4.04	4.15	4.80	3.51	5.41	1.95	3.90
	Israel	-0.01	-0.02	0.03	-0.17	0.05	0.08	-0.15
	Jordan	2.18	2.11	3.03	2.50	2.23	1.84	2.75
	Lebanon	3.89	3.58	3.96	4.32	4.07	3.29	4.17
	Morocco	6.24	5.84	7.61	8.21	6.65	5.36	10.63
	Tunisia	3.39	3.24	4.20	4.19	4.48	2.03	4.26
	Turkey	3.68	3.19	3.01	3.78	2.80	1.91	3.81

Source: GEM-E3-MENA

5.6   THE BLUE TRANSITION SCENARIO

The Blue Transition scenario is a combination of climate policies that promote trade integration, changes in the labour market allowing for the enhanced participation of females, upgrades in infrastructure and the adoption of processes that increase automation and digitalisation of production. The analysis provided in the previous sections shows that almost all aspects of the Blue Transition scenario are beneficial for the countries.

Table 26: Blue transition scenario – main macroeconomic aggregates for the MENA region (% changes from baseline)

	2030	2050
Gross domestic product	2.09	8.64
Investments	2.60	5.39
Private consumption	3.90	13.74
Exports	-2.93	-2.00
Imports	0.23	1.89

Source: GEM-E3

The combined effect of these policies on GDP growth rate in the Blue Transition scenario ranges from 6% in Egypt to 3.1% in Israel but leads to higher unemployment rates (as well as as higher employment levels) due to the increased female participation in the labour market. Positive effects on employment stem from increased competitiveness and extroversion, through the adoption of new technologies and production processes, the upgrade of human capital, access to low-cost labour and better infrastructure that increases productivity.

Figure 15: Blue Transition scenario - GDP growth rates and unemployment rates

Morocco

Tunisia

Turkey

Algeria

Egypt

Israel
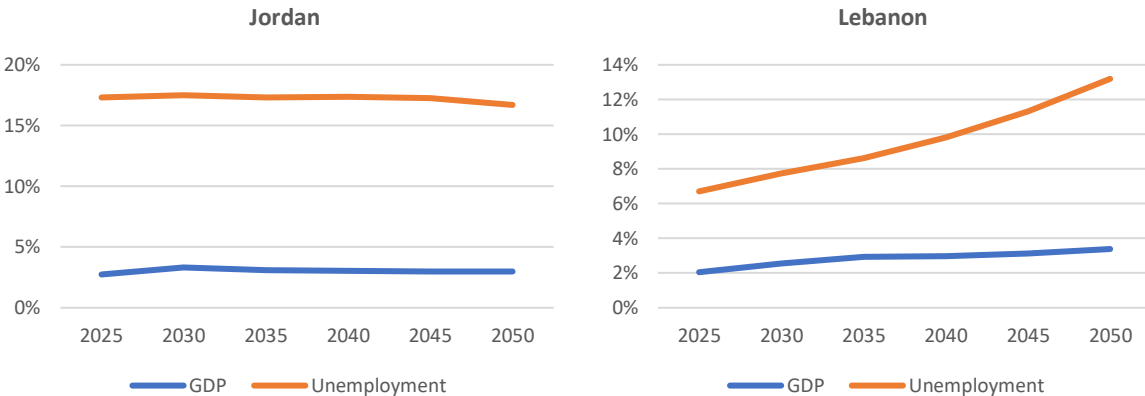
Source: GEM-E3-MENA

The positive, long-term economic growth is driven by different factors in each country. For all countries under consideration reforms in the labour market are a significant driver of growth, particularly in Morocco, Lebanon, Algeria, whereas in Egypt, Israel and Tunisia the upgrade of infrastructure has a significant share in boosting growth. In Turkey, trade is also significant factor in economic growth.

Table 27: Blue Transition scenario – cumulative GDP impacts (% changes from baseline)

	2020-2030	2020-2050
Algeria	0.32	2.60
Egypt	0.23	4.87
Israel	0.56	1.99
Jordan	0.12	1.45
Lebanon	0.73	2.45
Morocco	0.36	3.01
Tunisia	-0.30	2.04
Turkey	1.06	4.69

Source: GEM-E3-MENA

Figure 16: Decomposition of GDP changes

2030 - Egypt

2050 - Egypt

2030 - Israel

2050 - Israel

2030 - Morocco

2050 - Morocco

2030 - Tunisia

2050 - Tunisia

2030 - Turkey

2050 - Turkey
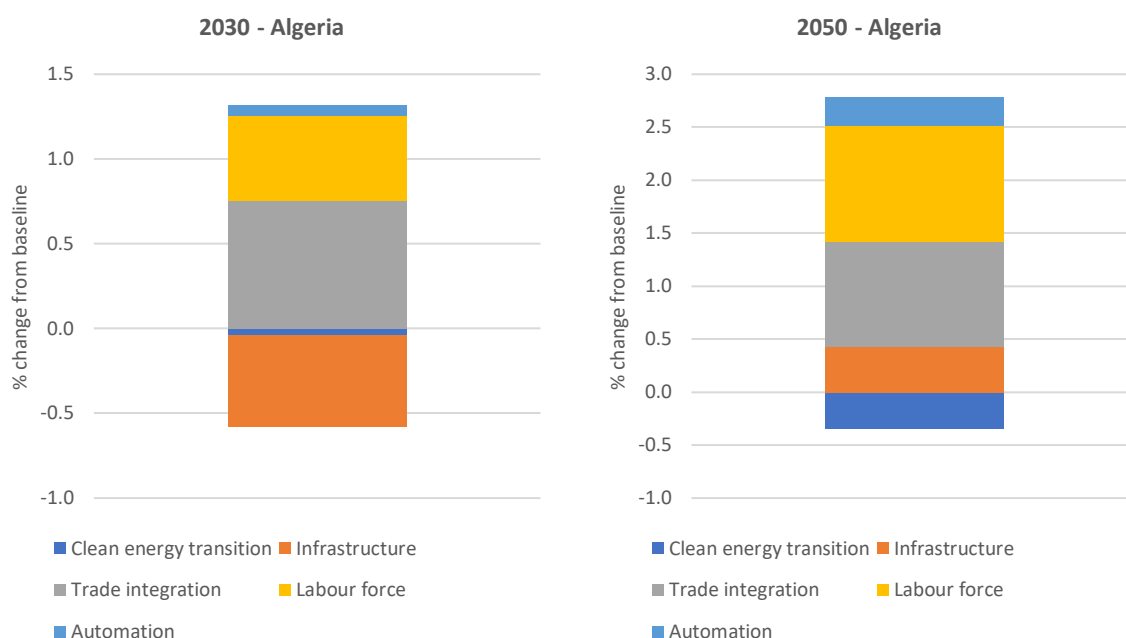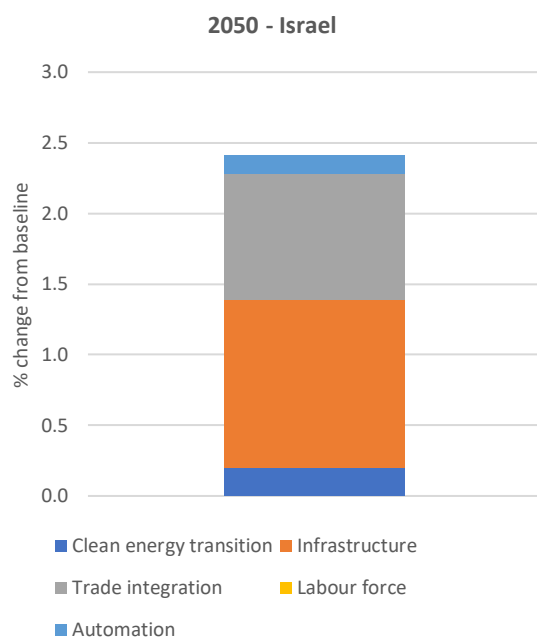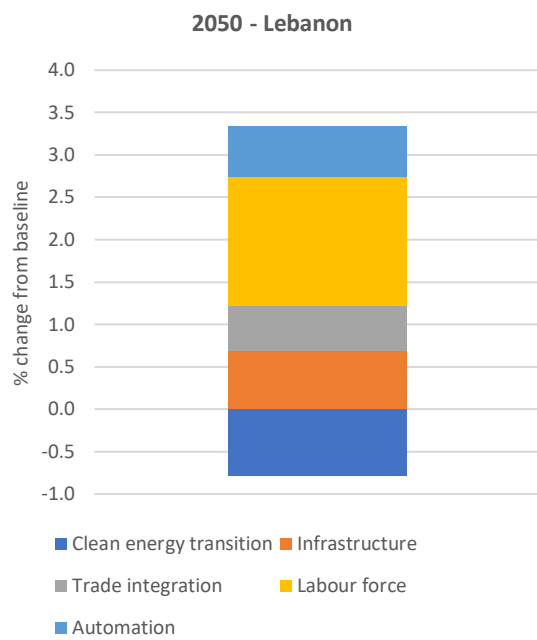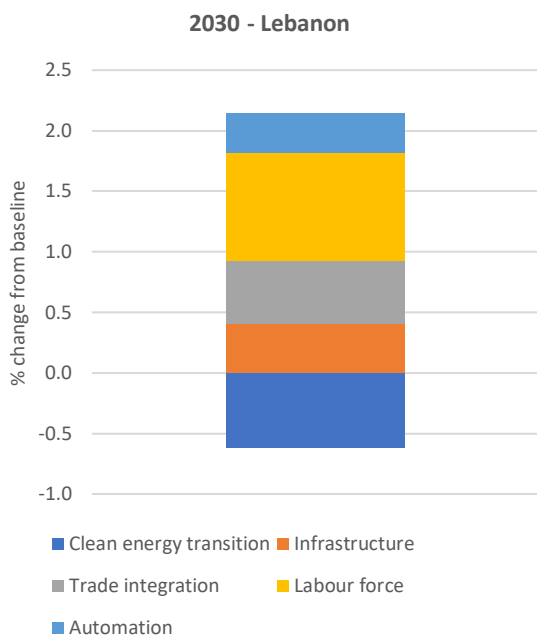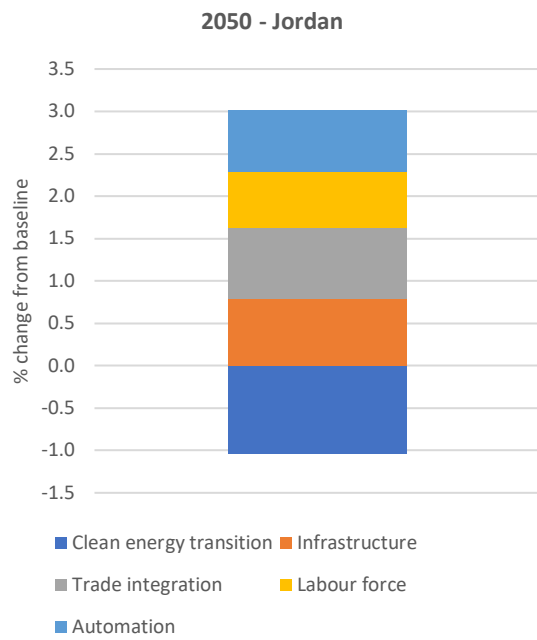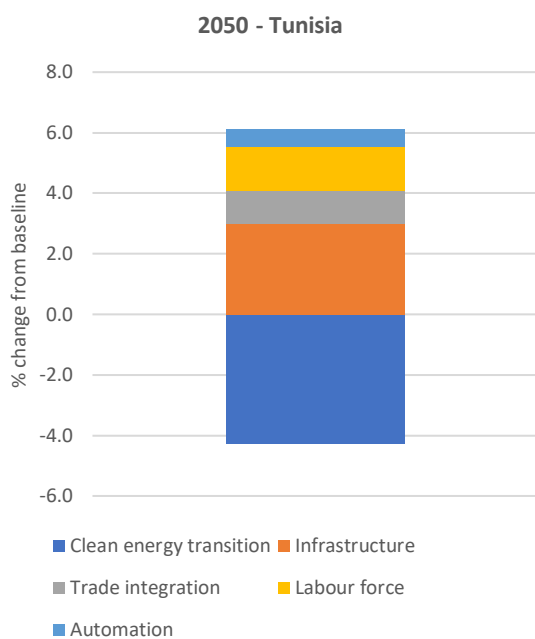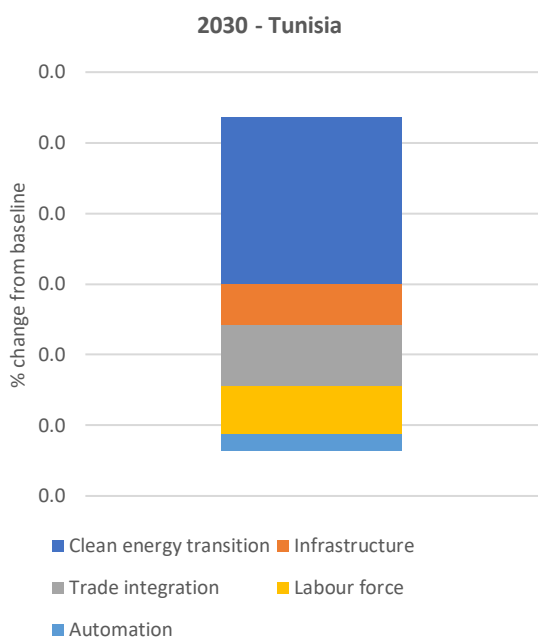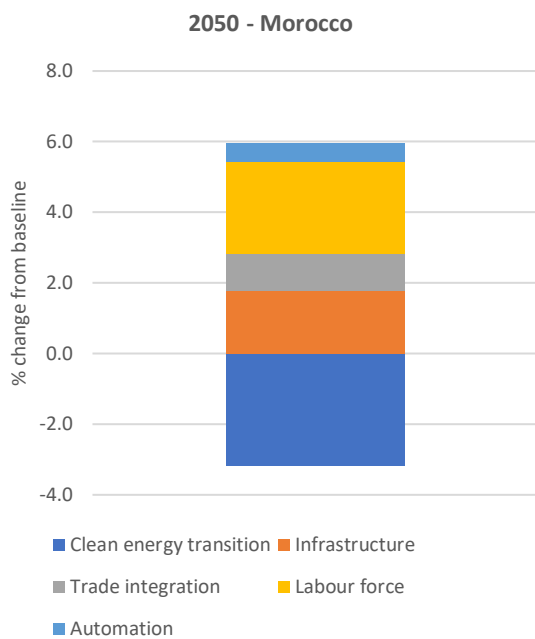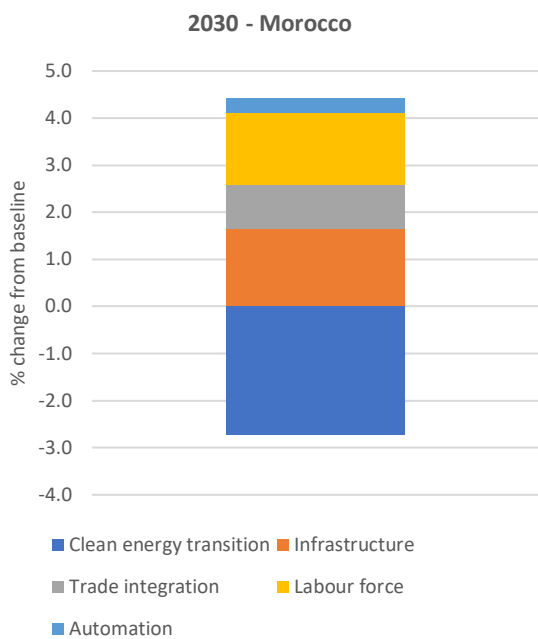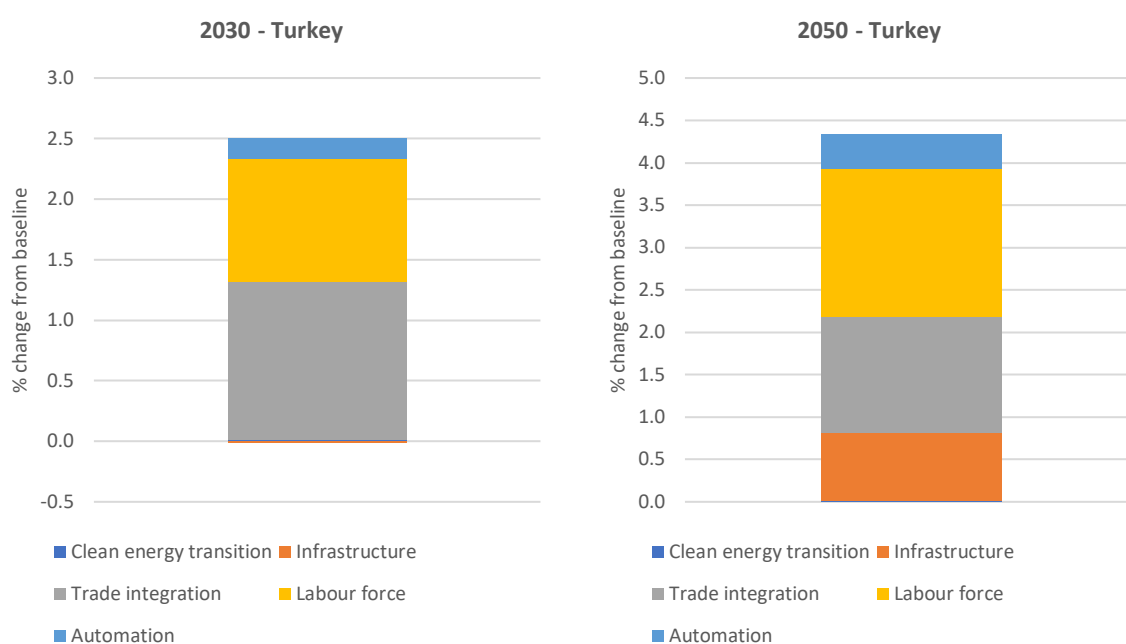
Source: GEM-E3-MENA

Table 27 and Table 28 below shows the cumulative GDP impacts for the period examined and the GDP impacts for 2030 and 2050 by country. The model results indicate that, for some countries, the Blue Transition scenario may bring costs in the short term (2020-2030) and in all cases the positive effects are lower in magnitude than in the longer term. This is due to the expenditures required to change the economy and the energy system. To the extent that these expenditures address imported goods and put a strain on capital markets (limited financing availability), in the short term the economy is negatively affected by trade and public deficits. However, in the long term, the effects of permanent productivity drive economic growth and these benefits more than counterbalance the short-term losses.

Table 28: Blue Transition scenario – main macroeconomic aggregates
(% change from baseline)

		GDP	Investments	Private consumption	Exports	Imports
2030	**Algeria**	0.74	2.22	1.83	0.31	4.82
	Egypt	2.69	2.89	3.45	-3.16	13.28
	Israel	1.61	1.96	0.36	-4.55	0.65
	Jordan	1.64	3.19	1.99	-3.35	3.33
	Lebanon	1.53	3.79	2.04	-0.95	4.18
	Morocco	1.72	2.37	0.95	-5.77	2.26
	Tunisia	-0.05	4.24	2.59	-0.92	6.63
	Turkey	2.49	2.79	0.28	-3.08	0.48

	Algeria	6.10	6.14	1.83	1.23	4.82
	Egypt	12.57	5.94	3.45	-4.66	13.28
	Israel	3.29	3.54	0.36	-8.29	0.65
2050	Jordan	2.66	5.44	1.99	-6.64	3.33
	Lebanon	4.91	5.00	2.04	0.24	4.18
	Morocco	7.39	5.66	0.95	-7.73	2.26
	Tunisia	6.27	7.58	2.59	2.67	6.63
	Turkey	9.51	5.45	0.28	1.74	0.48

Source: GEM-E3-MENA

The key sectors contributing to the economic transition are the equipment goods that register a significant boost in their production in all the countries examined. Equipment goods are an essential part of the infrastructure upgrade, but also to the restructuring of production processes towards automation and digitalisation.

Table 29: Blue Transition scenario – production (% change from baseline)

		Chemical products	Other energy-intensive	Electrical goods - Other equipment goods	Transport equipment	Consumer goods industries - Food	Consumer goods industries - Rest	Textiles and clothing
	Algeria	3.18	0.98	31.77	-4.63	7.65	2.70	-0.27
	Egypt	1.39	5.13	41.91	4.63	5.53	-5.43	4.51
	Israel	2.84	-0.10	15.94	-4.25	2.71	2.34	1.43
2030	Jordan	1.59	-0.26	37.62	-4.09	2.44	-10.58	-1.61
	Lebanon	3.28	2.81	27.42	17.74	0.05	0.09	0.11
	Morocco	1.70	2.45	25.12	8.23	0.48	2.07	3.26
	Tunisia	1.16	0.45	31.33	1.54	3.67	1.86	0.02
	Turkey	4.39	3.02	21.52	-1.79	0.81	2.24	3.72
	Algeria	9.07	9.67	46.64	-1.21	24.07	11.87	15.63
	Egypt	11.37	18.33	95.30	21.75	24.47	10.35	16.92
	Israel	0.98	0.48	11.85	-10.22	7.20	6.97	1.30
2050	Jordan	1.81	0.27	61.37	-6.62	6.98	-6.23	-2.74
	Lebanon	9.20	8.56	39.53	39.02	7.15	4.55	7.66
	Morocco	9.33	10.48	60.76	32.69	11.86	10.56	14.45
	Tunisia	8.29	6.97	55.57	17.20	16.18	10.06	9.26
	Turkey	15.82	12.54	33.71	4.65	10.01	10.85	13.95

Source: GEM-E3-MENA

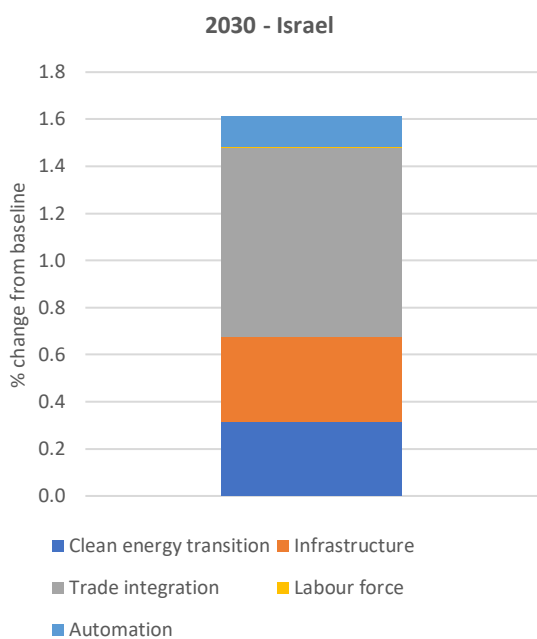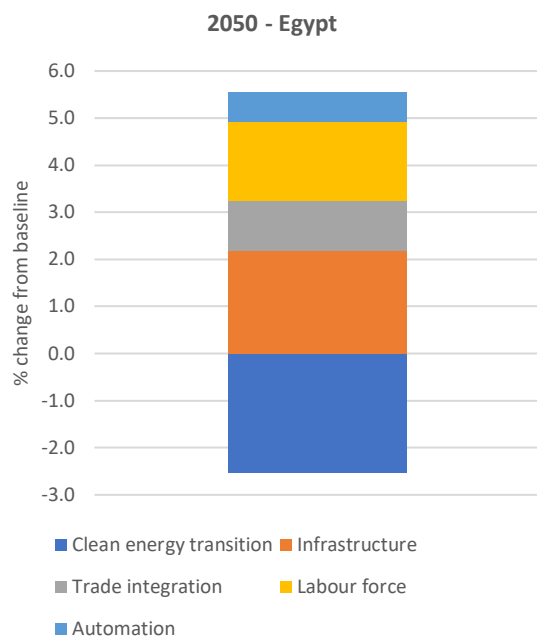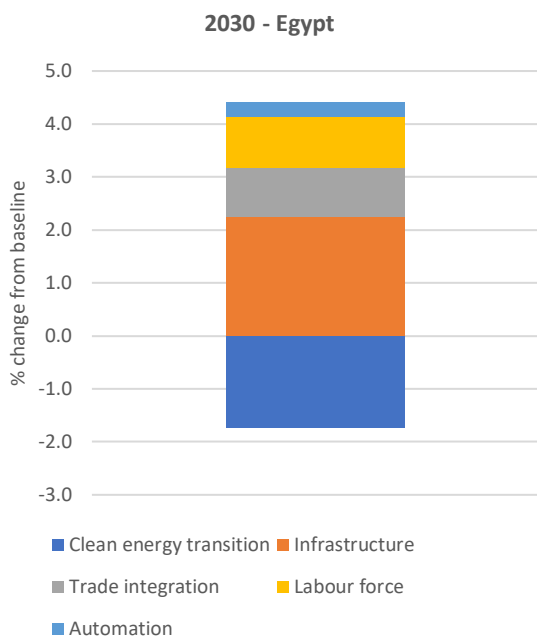**Table 30: Blue Transition scenario – employment impacts (% change from baseline)**

	2030	2050
Algeria	4.2	13.7
Egypt	3.5	15.5
Jordan	0.2	0.4
Israel	1.7	6.4
Lebanon	2.8	10.0
Morocco	2.7	13.2
Tunisia	3.2	13.2
Turkey	3.4	10.7

Source: GEM-E3-MENA

6 BLUE TRANSITION COUNTRY FICHES

6.1 MOROCCO

6.1.1 Economy

Morocco, with a population of 35.5 million people, covers an area of 710,850 km2 and ranks 61st amongst global economies with a GDP of 123 bn. USD. The economy of Morocco is substantially diversified, as services may constitute the largest sector in the economy, but behind that, there is a fast-growing manufacturing sector and a relatively strong agricultural sector which contributes approximately 14% of national GDP and employs more than 39% of the country's total workforce.

Service wise, a large share of activities is directly associated with the public sector (education, administration services, security) whilst the rest of the service activities are concentrated around tourism which, according to latest REF reports (2019)8, contributes circa 7.1% of the country's GDP. Services have a prominent position amongst productive activities, accounting for approximately 57% of national GDP.

With respect to manufacturing, industrial activity is concentrated around the production of chemical products (e.g., fertilisers and phosphoric acid) and transport equipment. Morocco is currently the largest producer and exporter of vehicles in Africa, producing approximately 360 thousand vehicles per annum (2019)9. Major automotive industries are already located in Morocco, e.g., the PSA gro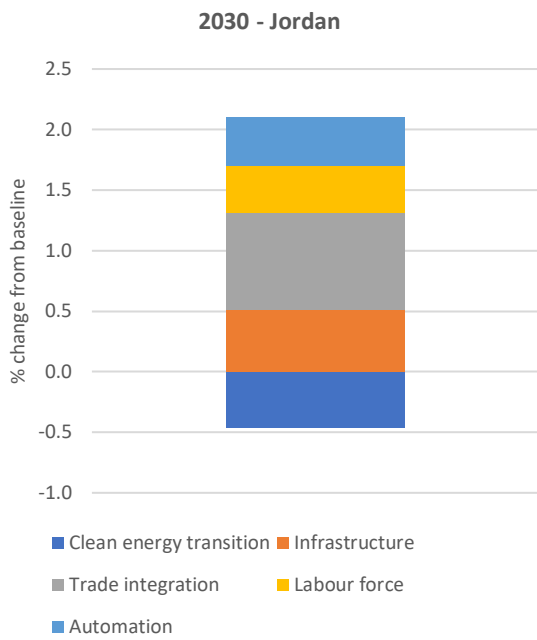up, with a manufacturing capacity of 200,000 cars in Kentira, the Renault-Nissan "Zero CO2 emission" plant in Tangier, with a production capacity of 340,000 vehicles and employing approximately 8,000 employees. Meanwhile other companies are currently located in Morocco, whilst plans for developing additional production facilities are already in place, with the Chinese BYD (producer of electric vehicle) committing to an investment project of 1bn. USD for the construction of a 50-hectare production site in Tangier (with an estimated employment of 2,000 people). Furthermore, the aeronautical industry, with more than 140 companies mostly located in Casablanca, is one of the main developing industries in Morocco.

Morocco's economy has been growing at an average rate of approximately 4.2% per annum over the past 50 years. During this period, the economy has undergone major restructuring, adopting measures for the liberalisation of its economy in co-operation with international organisations, such as the IMF.

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8 https://www.hcp.ma/Direction-de-la-statistique_a716.html
9 2019 Statistics | www.oica.net

The Blue Transition scenario projects an average growth rate for the Moroccan economy of approximately 4.1% until 2050, continuing its upward trend after an abrupt decrease in the acceleration of the economy between 2015-2018 resulting from the fiscal imbalances and the appreciation of the Moroccan dinar, which hurt the competitiveness of Moroccan products leading to a worsening of the trade account. Economic growth is fostered by the government's continuous efforts towards liberalisation and modernisation of the country's economy. Improvements in transport and communications (mainly those related to the internet) infrastructure, as well as labour market developments, are expected to drive Moroccan growth over the period up to 2050.

Figure 17: Morocco – GDP components
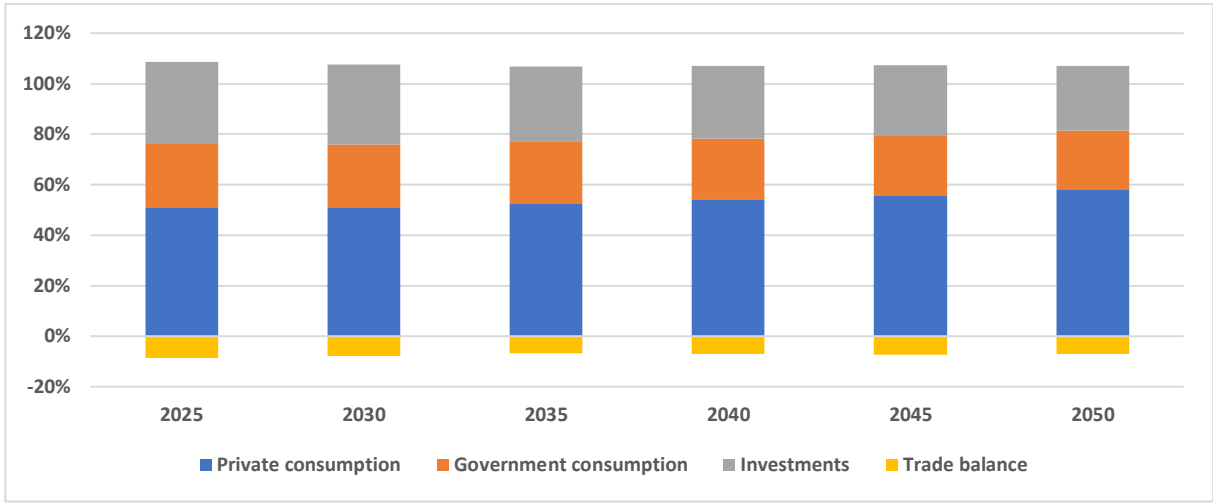
Source: GEM-E3-MENA

6.1.2 Energy

The power generation in Morocco relies strongly on fossil fuels (84% in 2015). However, in the Blue Transition scenario, a strong deployment of renewables is projected both in 2030 and in 2050, hence, electricity generation from renewable sources surpasses electricity generation from fossil fuel sources (56% vs. 44% in 2030 and 83% vs. 17% in 2050). The installed capacity of wind and solar are projected to increase significantly compared to 2020 (by 5 and 6 times respectively in 2030 and by 15 and 25 times in 2050), whilst the projected increase in the installed capacity of hydro is more limited compared to the other two main renewable sources (capacity increases by a factor of 1.2). In addition to the de-coupling of electricity production from hydrocarbons, the Blue Transition scenario envisages other measures such as the electrification of transport and energy efficiency improvements in buildings (e.g., thermal insulation, energy saving appliances etc.) and finally, improvements in the energy used for production purposes. The total amount of investment needed is

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approximately 454 bn. USD cumulatively over the period 2020-2050 (or 6% of GDP). These investments will be allocated between investments in electricity generation (17%), transport electrification (70%) and energy efficiency improvements (13%) in buildings and industrial processes.

Table 31: Morocco - power generation mix in the Blue Transition scenario

	2020	2025	2030	2035	2040	2045	2050
Solids	54%	38%	18%	13%	8%	4%	3%
Oil	4%	2%	1%	0%	0%	0%	0%
Gas	17%	26%	24%	24%	23%	16%	14%
Hydro electric	6%	5%	4%	2%	2%	2%	1%
Wind	12%	17%	29%	29%	29%	35%	37%
Solar	7%	11%	23%	31%	38%	43%	45%

Source: Satellite power module of GEM-E3-MENA

6.2 ALGERIA

6.2.1 Economy

Algeria, with a population of 43 million people, covers an area of 2,382 thousand km2 and ranks 32nd amongst global economies with a GDP of 181 bn. USD. The country's fossil fuel proven reserves, (12.2 bn. barrels of oil and 4.5 trillion cubic metres of natural gas) are the 4th biggest in Africa with respect to crude oil and the 2nd with respect to natural gas. Hydrocarbons are a particularly important source of income for the Algerian economy, as they contribute more than 25% of the Algerian GDP - providing around 40% of public revenues and accounting for 90% of Algerian exports. Economic activity is, to a large extent, tied to the public sector, as public activities in total account for 33% of the economy's gross value added; for oil, 80% of production is attributed to the public held company Sonatrach, whilst the rest is attributed to foreign investors.

The decoupling of the economy from fossil fuel production is a challenging task. It is a long-term process, which requires major legislative interventions to accelerate the liberalisation of the economy, the limitation of bureaucracy and of other impediments, such as corruption, a fluid regulatory system that increases investors' uncertainty, capital, and ownership restrictions - in other words, all those indexes that affect the ease of doing business. Other factors, which affect the country's performance, which has been sluggish recently, include political instability and trade restrictions in order to protect local companies. Nevertheless, some progress has been made recently, e.g., with the announcement of its new

law for oil and gas exploitation10, but further action is needed in order to secure the transformation of the Algerian economy to meet sustainable targets.

Furthermore, the country lags behind as a tourism attractor, in comparison to neighbouring Morocco. Strict regulations for issuing of visas, lack of quality accommodation and reliable transport connections undermine the country's prospects to attract more tourists. It is important for the country to be able to secure the influx of tourists, which will allow the development of tourism related service sectors and will increase the country's financial stability.

The country's labour force is characterised by the prevalence of medium and low-skilled workers. In 2014, according to the most recent ILO statistics, the share of people with advanced education was equal to 23%. %. Similarly, the latest available ILO estimates (for 2020) reveal that the share of low skilled jobs11 in the economy is approximately 78%, medium-skilled jobs12 is 7% and 15% highly-skilled13 jobs.   The participation rate of the population active in the labour market is approximately 20% (2019). The unemployment rate of the highest educated people was 3 p.p. higher p. than the national average. In 2019, the estimated unemployment rate in Algeria was 12.5%14. With respect to education, the available statistics (UIS) for graduates by field of study indicate that, in 2018, approximately 34% of annual university graduates have a degree that is relative to the clean energy transition, such as in Engineering, Informatics and Physical Sciences.

The Blue Transition scenario predicts an annual growth rate of 2.6% for the period up to 2050. Low private spending needs to increase in the coming years to stimulate domestic production and to provide investment incentives for sectors other than extraction industries. Although total investments in the economy are quite high in respect to GDP, investment resources must be gradually re-oriented away from fossil fuel production and towards other sectors, to increase the diversification of Algeria's economy and to ensure its de-coupling from natural resources.

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[10] The Hydrocarbon Law which was passed in November 2019
[11] corresponding to ISCO-08 codes: 5, 7, 8, 9
[12] corresponding to ISCO-08 codes: 3, 4
[13] corresponding to ISCO-08 codes: 1, 2
[14] IMF estimates as reported in the World Economic Outlook of 2019 (October edition)

Figure 18: Algeria – GDP components
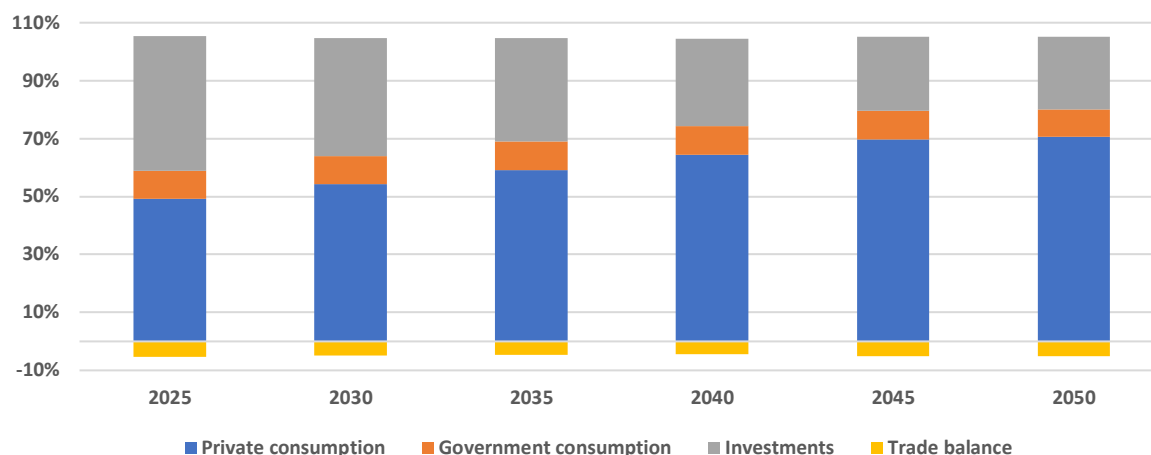
The projected growth rates are supported mainly by the increased capital gains stemming from its re-allocation away from hydrocarbons and by productivity gains induced by the upgrade of transport and communications infrastructure. These developments will turn into gains in competitiveness for Algerian products, which will increase their demand both in domestic and foreign markets, improving their competitiveness with respect to neighbouring countries.

6.2.2 Energy

Power generation in Algeria depends exclusively on fossil fuels (98% in 2020). Under the Blue Transition scenario, the deployment of renewables is projected to moderately increase by 2030; electricity generation from renewable sources is expected to reach approximately 20%, from 2% in 2020. However, in 2050, electricity from renewable sources surpasses that of fossil fuels, reaching 55% of the total electricity produced. The installed capacity of wind and solar are projected to reach 11GW and 21GW respectively in 2050. In addition to the de-coupling of electricity production from hydrocarbons, the Blue Transition scenario envisages other measures, such as the electrification of transport and energy efficiency improvements in buildings (e.g., thermal insulation, energy saving appliances etc.) and finally, improvements in the energy used for production purposes. The total amount of investment needed is approximately 136 bn. $ cumulatively over the period 2020-2050 (or 1.6% of GDP). These investments will be allocated between investments in electricity generation (31%), transport electrification (35%) and energy efficiency improvements (34%) in buildings and industrial processes.

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Table 32: Algeria - power generation mix in the Blue Transition scenario

	2020	2025	2030	2035	2040	2045	2050
Solids	0%	0%	0%	0%	0%	0%	0%
Oil	1%	1%	1%	0%	0%	0%	0%
Gas	97%	91%	80%	66%	57%	50%	45%
Hydro electric	0%	0%	0%	0%	0%	0%	0%
Wind	1%	4%	7%	13%	15%	17%	18%
Solar	1%	4%	12%	21%	27%	33%	38%

Source: Satellite power module of GEM-E3-MENA

6.3 TUNISIA

6.3.1 Economy

Tunisia has a population of 11.7 million people, covering an area of 164 thousand km2 and ranks 92nd amongst global economies, with a GDP of 39 bn. USD. The economy of Tunisia is oriented towards services; however, the economy is quite diversified, with other sources of income including the export-oriented manufacturing sector and agriculture.

Service-wise, the most developed activities include telecommunication services and tourism. The former contributes approximately 7.5% of GDP and employs approximately 86 thousand people[15]. Infrastructure developments are pushing in the direction of ICT services, with the creation of cyberparks and technoparks, whilst the (good) quality of the labour force and low wages is a significant advantage for accomplishing the government's goals, as described in "Tunisia 2020". The latter is responsible for almost 8% of national GDP, whilst around 400 thousand people are working in tourism related activities. Tunisia recorded a tourist influx of approximately 9.5 million in 2019; this number is expected to increase in the following years, as political stability increases (and many European countries have lifted their warnings for travelling to Tunisia), accessibility eases (the airports of Tunisia have come to an agreement with low-cost airlines) and infrastructure developments targeting the improvement of tourism facilities and services intensify.

The manufacturing sector employs approximately 530 thousand people, mostly employed in the textile and wearing apparel industry (31%), the manufacture of electrical equipment and electronics (18%), agro-food products (15%) and chemical products (11%).

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[15]https://www.tradecommissioner.gc.ca/tunisia-tunisie/market-reports-etudes-de-marches/0002801.aspx?lang=eng&wbdisable=true

However, the textile industries have been showing signs of decline recently, with chemical products and electrical products having the fastest sectoral growth. With respect to agriculture, improved cultivation methods and the sector's modernisation have boosted agricultural output and increased the share of agricultural activities in the economy.

The Tunisian labour market includes a relatively high share of educated workers (compared to the regional average). According to the latest available statistics (ILO), in 2015, almost 21% of the overall labour force had advanced education. The share of workers with an academic degree in overall employment was 18% and their unemployment rate was approximately 27%. The latest available ILO statistics (for 2020) estimate the share of low skilled jobs[16] in the economy to be approximately 72%, of medium-skilled jobs[17] 13% and highly-skilled[18] jobs 15%. Furthermore, the share of people with a degree relative to the skills required for the clean energy transition, such as a degree in Engineering, Informatics and Physical Sciences, is estimated to be 11.2% of the total labour force for 2020.

The Blue Transition scenario projects an annual growth rate of 2.3% for the period 2020-2050. High private spending is projected to decrease and the additional savings will be used to finance investment expenditures, easing the strain on capital markets and decreasing the cost of capital in the economy. Trade deficits, although they remain high throughout the projection period to finance the sustainable growth path, are projected to shrink, falling to 14% in 2050, as product competitiveness is expected to increase and tourism's contribution to GDP increases.

Figure 19: Tunisia – GDP components
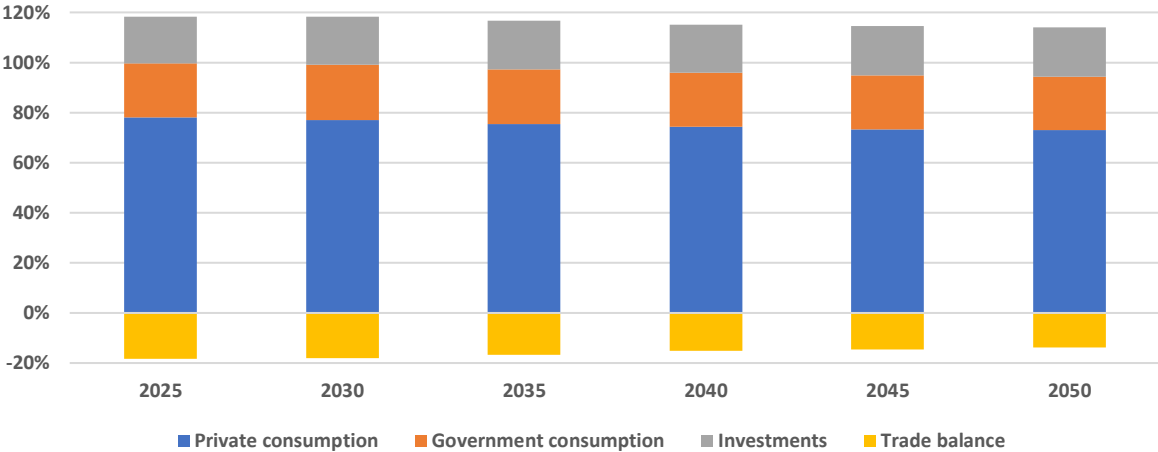
Source: GEM-E3-MENA

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[16] corresponding to ISCO-08 codes: 5, 7, 8, 9
[17] corresponding to ISCO-08 codes: 3, 4
[18] corresponding to ISCO-08 codes: 1, 2

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The projected growth rates are supported mainly by productivity gains stemming from infrastructure investments (the most recent available statistics on public investments 19 place Tunisia well below (3.6% of GDP) the global average (5% of GDP) and expenditures in R&D are around 0.6%), the increased female labour force participation and from the decoupling of the economy from fossil fuels.

6.3.2 Energy

Power generation in Tunisia is dominated by fossil fuels (94% in 2020). Under the Blue Transition scenario, the deployment of renewables is accelerated and electricity generation from renewable sources out of total electricity supply is projected to reach 32% in 2030 and 65% in 2050. This development is mainly attributed to the deployment of wind turbines and solar cells, whose total capacity reaches 10GW and 9.6GW respectively in 2050. In addition to the de-coupling of electricity production from hydrocarbons, the Blue Transition scenario envisages other measures, such as the electrification of transport and energy efficiency improvements in buildings (e.g., thermal insulation, energy saving appliances etc.) and finally, improvements to energy used for production purposes. The total amount of investment required is approximately 256 bn. USD cumulatively over the period 2020-2050 (or 11% of GDP). These investments will be allocated between investments in electricity generation (11%), transport electrification (77%) and energy efficiency improvements (12%) in buildings and industrial processes.

Table 33: Tunisia - power generation mix in the Blue Transition scenario

	2020	2025	2030	2035	2040	2045	2050
Solids	0%	0%	0%	0%	0%	0%	0%
Oil	0%	0%	0%	0%	0%	0%	0%
Gas	94%	85%	67%	54%	45%	37%	35%
Hydro electric	0%	0%	0%	0%	0%	0%	0%
Wind	5%	9%	15%	19%	22%	29%	33%
Solar	1%	5%	17%	27%	32%	34%	32%
Biomass and Waste	0%	0%	0%	0%	0%	0%	0%

Source: Satellite power module of GEM-E3-MENA

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[19] IMF https://data.imf.org/?sk=1CE8A55F-CFA7-4BC0-BCE2-256EE65AC0E4&sId=1390030341854

6.4 JORDAN

6.4.1 Economy

Jordan has a population of 10.4 million people, covering an area of 8.9 thousand km2 and ranks 89th amongst global economies with a GDP of 44.4 bn. USD. Jordan is one of the few countries of Middle East that is characterised by resource scarcity; the country has no reserves of crude oil or natural gas and even water is scarce in a country that is characterised by droughts and where arable land is limited. The economy of Jordan has been greatly affected from geopolitical turmoil in neighbouring countries, such as Iraq and Syria which, along with the financial crisis of 2008, has thrown the country's growth path off track, as major trade routes were disrupted and the large influx of refugees has put a strain on the public finances. Persistent, high unemployment rates are one of the main problems the country faces in terms of its socioeconomic development.

Service-wise, the most developed activities are financial services; the Jordanian banking system is considered as one of the most advanced both regionally and internationally, as well as real estate activities. These sectors together account for approximately 22% of the country's GDP and employ more than 70 thousand persons. Meanwhile, revenues from tourism activities remain above 10% of GDP.

The manufacturing sector has contributed to the increase of GDP during the previous period, which was export led growth spearheaded by garments and chemicals. The above-mentioned regional turmoil, along with the financial crisis, have restrained the dynamics of manufacturing activities, which peaked in 2008 and from then on have shown a relative decrease in their contribution to the national economy.

The labour market of Jordan includes a relatively high share of educated workers. According to the latest available statistics, provided by the Jordanian Department of Statistics, in 2019 the share of university graduates of the total labour force was equal to 33.4% (or 569 thousand). The share of workers with tertiary education out of the   overall employment number was 31.2% with approximately 25% (or 139 thousand) of those with tertiary education out of work. The share of low skilled jobs in the economy in 2019 is approximately 60%, with an unemployment rate of 17%, and the share of medium-skilled jobs is 10%. Available education statistics for graduates by field of study indicate that approximately 11% of annual university graduates have a degree relative to the clean energy transition, such as in Engineering, Informatics and Physical Sciences.

The Blue Transition scenario projects an annual growth rate of 3.0% both for the period 2020-2030 and for the period 2030-2050. Private spending is projected to decrease over the period until 2050; the additional savings will be used to finance investment expenditures easing the strain on capital markets due to the increased investments needs (either from

infrastructure expansion or for the energy transition) and decreasing the cost of capital in the economy. Trade deficits remain almost constant throughout the projection period, at approximately 12% of GDP. One would expect the trade deficit to reduce in light of the lower private consumption, but the relatively small size of the domestic manufacturing industries implies that the investment goods required, either for infrastructure development or for energy efficiency and automation, will need to be imported.

Figure 20: Jordan - GDP components
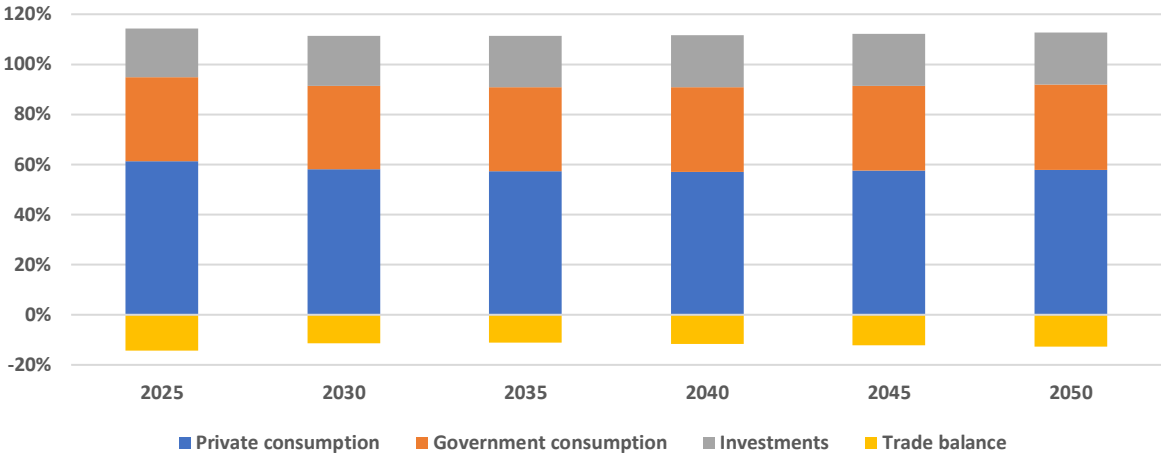
Source: GEM-E3-MENA

The projected growth rates are supported mainly by the increased labour force participation followed by automatisation and digitalisation growth in the period up to 2030, whilst in the period after 2030 and up to 2050, a significant role in supporting growth will be played by infrastructure developments and productivity gains.

6.4.2 Energy

Power generation in Jordan depends heavily on imported fossil fuels (89% in 2020). Under the Blue Transition scenario, the deployment of renewables is projected to increase throughout the projection period and electricity generation from renewable sources climbs from 11% in 2020 to almost 56% in 2050. This development is attributed mainly to the deployment of wind turbines and solar cells, whose total capacity reaches 6.7GW and 10.9GW respectively; hydro is not an option in Jordan, due to water scarcity and the non-existence of untapped potential. In addition to the de-coupling of electricity production from hydrocarbons, the Blue Transition scenario envisages other measures, such as the electrification of transport and energy efficiency improvements in buildings (e.g., thermal insulation, energy saving appliances etc.) and finally, improvements to energy used for production purposes. The total

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amount of investment needed is approximately 66 bn. USD cumulatively over the period 2020-2050 (or 4.1% of GDP). These investments will be allocated between investments in electricity generation (36%), transport electrification (31%) and energy efficiency improvements (33%) in buildings and industrial processes.

Table 34: Jordan - power generation mix in the Blue Transition scenario

	2020	2025	2030	2035	2040	2045	2050
Solids	0%	0%	0%	0%	0%	0%	0%
Oil	7%	3%	2%	1%	1%	0%	0%
Gas	82%	81%	71%	61%	52%	47%	44%
Hydro electric	0%	0%	0%	0%	0%	0%	0%
Wind	5%	7%	12%	16%	20%	22%	22%
Solar	6%	8%	15%	22%	27%	31%	33%
Biomass and Waste	0%	0%	0%	0%	0%	0%	0%

Source: Satellite power module of GEM-E3-MENA

6.5 LEBANON

6.5.1 Economy

Lebanon has a population of 6.9 million people, covering an area of 10.5 thousand km2 and ranking 81st amongst global economies with a GDP of 58 bn. USD. Lebanon is a service-oriented economy, with tertiary activities accounting for more than 80% of gross national value added, whilst agricultural and manufacturing activities account for just a mere 13%. The economy of Lebanon has been put to the test over the last decade, with weakening economic growth, as the implications of the financial crisis have been significant for the domestic banking sector and public finances after years of unsustainable policies and practices[20], whilst the war in Syria has resulted in a major influx of refugees, which put a strain on the public finances.

Service-wise, the most developed activities are the financial sector (10% of GDP[21]), tourism and public administration activities (accounting for 11% of GDP, whilst the broader public sector, including education and other social and community services, account for 25% of GDP). The direct contribution of tourism-related activities is estimated to be approximately 3.8

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[20]file:///C:/Users/user/Downloads/Lebanons-Economy-An-analysis-and-some-recommendations.pdf , https://ec.europa.eu/info/sites/info/files/economy-finance/eb046_en_lebanon.pdf, for a full report on the Lebanese economy please consult https://www.economy.gov.lb/media/11893/20181022-1228full-report-en.pdf and https://blog.blominvestbank.com/wp-content/uploads/2019/02/template-focus-Final.pdf
[21] For the financial year 2018

bn. USD, or 7% of GDP, whereas these figures almost triple if we also take into account the indirect effects (10.4 bn USD or 19% of GDP)[22]. The tourism sector has taken a significant blow after the war in Syria, but recent statistics imply that the sector is slowly but steadily recovering and hasn't yet reached its full potential yet. In terms of employment, the sector employed (directly and indirectly) more than 394 thousand people in 2018 (or 18.4% of the total workforce).

The manufacturing sector is rather limited (7% of GDP); poor productivity and high capital costs, high fuel costs, an unstable electricity supply and poor transport infrastructure undermine sectoral performance. Most of the manufacturing activities are concentrated around consumer goods industries (food, beverages etc.) accounting for approximately 2.4% of the national value added, or 35% of total manufacturing gross value added, followed by the production of machinery and equipment (1.8% of GDP or 26% of manufacturing gross value added).

The share of people with higher education is rather limited in Lebanon. Education statistics are scarce and the latest date back to 2009, where the number of people with university degree was reported to be 16% of total population, whilst when analysing the fields of study of Lebanese graduates, we find that in 2017, 50% of graduates had a degree relative to physical sciences, mathematics, and engineering (UIS database). The unemployment rate of people with advanced educational attainment in 2007 was 11%, according to ILO published statistics. The latest available ILO statistics (for 2020) estimate the share of low skilled jobs[23] in the economy to be approximately 67%, of medium-skilled jobs[24] 18% and highly-skilled[25] jobs 25%.

The Blue Transition scenario projects an annual growth rate of 2.3% for the period 2020-2030 and a growth rate of 2.8% for the period 2030-2050. High private spending is projected to decrease over the period until 2050; the additional savings will be used to finance investment expenditures and to alleviate high capital costs. With respect to public spending, although the projected share of public related activities to GDP is projected to remain the same throughout the period, a structural change in the government's expenditure is foreseen. More investments in infrastructure developments (e.g., road network, airport capacity) are required and less expenditure on non-productive public activities[26]. Trade deficits are projected to fall from 22% of GDP in 2020 to 16% in 2030 and 8% in 2050, as product competitiveness is expected to increase and private consumption decreases (as % of GDP).

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[22] https://investinlebanon.gov.lb/Content/uploads/IDAL-Tourism_factbook_2019.pdf
[23] corresponding to ISCO-08 codes: 5, 7, 8, 9
[24] corresponding to ISCO-08 codes: 3, 4
[25] corresponding to ISCO-08 codes: 1, 2
[26] excluding health services and education which are important for population's well-being and the development of a high-quality labour force.

Figure 21: Lebanon GDP components
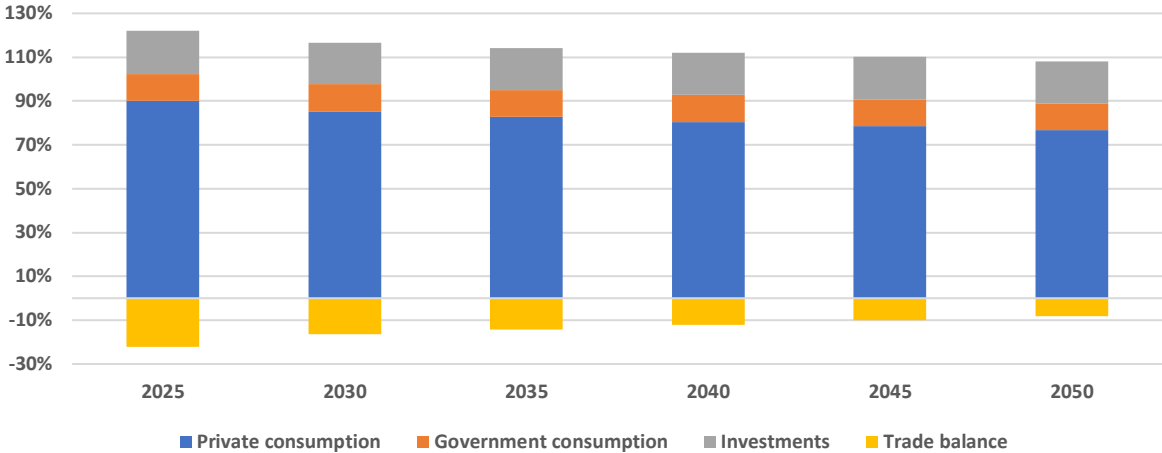
The most recent available statistics on public investments 27 placed Lebanon below (2.67% of GDP) the global average (5% of GDP). Public investments are essential for countries at this stage of development, as they increase the accessibility of firms to intermediate inputs and international markets and incentivise the efficient allocation of resources within the country's borders. In summary, the Lebanese economy has important unexploited productivity potential, which can be beneficial for economic growth through infrastructure developments and the re-allocation of resources (capital and labour) to productive activities.

6.5.2 Energy

Power generation in Lebanon is dominated by fossil fuels (94% in 2020). Under the Blue Transition scenario, the deployment of renewables is projected to increase significantly by 2050 and electricity generation from renewable sources climbs from 6% in 2020 to 25% in 2030 and 50% in 2050. This development is attributed mainly to the deployment of wind turbines and solar cells, whose total capacity reaches 6.6GW and 8.9GW, respectively. In addition to the de-coupling of electricity production from hydrocarbons, the Blue Transition scenario envisages other measures, such as the electrification of transport and energy efficiency improvements in buildings (e.g., thermal insulation, energy saving appliances etc.) and finally, improvements to energy used for production purposes. The total amount of investment needed is approximately 95 bn. USD over the period 2020-2030 (or 5.9% of GDP). These investments will be allocated between investments in electricity generation (22%), transport electrification (68%) and energy efficiency improvements (10%) in buildings and industrial processes.

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27 IMF https://data.imf.org/?sk=1CE8A55F-CFA7-4BC0-BCE2-256EE65AC0E4&sId=1390030341854

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Table 35: Lebanon - power generation mix in the Blue Transition scenario

	2020	2025	2030	2035	2040	2045	2050
Solids	0%	0%	0%	0%	0%	0%	0%
Oil	83%	66%	47%	29%	17%	12%	8%
Gas	11%	23%	27%	34%	39%	39%	41%
Hydro electric	2%	2%	2%	1%	1%	1%	1%
Wind	3%	4%	10%	13%	15%	18%	20%
Solar	1%	5%	14%	22%	27%	30%	29%
Biomass and Waste	0%	0%	0%	0%	1%	1%	1%

Source: Satellite power module of GEM-E3-MENA

6.6 EGYPT

6.6.1 Economy

Egypt has a population of 100 million people, covering an area of 1.010 thousand km2 and ranks 40th amongst global economies with a GDP of 302 bn. USD. The Egyptian economy is diversified, with a substantial income accruing from agricultural activities (25%) and services (50%), but it is also very centralised. The country is rich in natural resources, as it ranks 25th in terms of crude oil reserves and 16th in terms of natural gas reserves. However, domestic production is insufficient to meet domestic demand and the country is a net importer of oil products. Other mineral resources include gold and iron ore, with the former having important prospects and the fastest growing extraction activities. The Egyptian economy has lately benefitted from increased privatisation and the opening up of regulated markets.

Service-wise, the most developed activities are communications and tourism. The estimated revenue generated by tourism activities is estimated to be 15%-20% of GDP (2019) and the sector is quickly recovering from a slowdown caused by the political unrest of 2011 and other incidents (e.g., an airplane crush in 2015) that resulted in a deterioration in tourist confidence. The ICT sector contributes approximately 4% to the country's GDP and has significant potential for further improvement, since the level of digitalisation overall is quite small (17% of the total population in 2013[28]) and as the government finances important investments for its expansion[29] aimed at doubling the contribution of the sector to the Egyptian economy.

In terms of manufacturing, the country hosts major facilities to produce chemicals, garments and vehicles. The automotive industry in Egypt is at a crossroads, as the reduction in

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[28] https://opentoexport.com/article/ict-sector-in-egypt/
[29] https://ww.dailynewssegypt.com/2019/09/10/egypt-to-establish-7-technological-parks-with-egp-1bn-investments-ict-minister/

tariffs of imported vehicles under the Euro-Mediterranean Free Trade Agreement30 and the fluctuations in Egyptian pound have reduced the competitiveness of domestically produced vehicles. Furthermore, the country's production facilities are dispersed and their small size does not allow them to fully capitalise from economies of scale. Nevertheless, installed capacity in combination with its cheap labour force, logistical capacity and high natural gas reserves, along with its strategic position, can lead the automotive industry to flourish under targeted policies and incentives31. The country is also one of the biggest producers of fertilisers in the MENA region, whilst investments are in place to increase the country's production of pharmaceuticals and petrochemical products32.

The labour market in Egypt includes a relatively (to the overall region) high share of educated workers. According to the latest available statistics (ILO), in 2017, 19.2% of the overall labour force had advanced education. The number of skilled workers within the overall employment figure was 17.2% and the unemployment rate of people with tertiary education was approximately 21%. The latest available ILO statistics (for 2020) estimate the share of low skilled jobs33 in the economy to be approximately 67%, of medium-skilled jobs34 10% and highly-skilled35 jobs 23%. Available education statistics for graduates by field of study indicate that approximately 11% of annual university graduates have a degree relative to the clean energy transition, such as a degree in Engineering, Informatics and Physical Sciences.

The Blue Transition scenario projects an annual growth rate of 5.7% for the up to 2050. Private spending (as % of GDP) remains relatively stable throughout the projection period; infrastructure developments and automatization modernise and expand production facilities, in turn increasing the competitiveness of Egyptian products and services. This development will alleviate the pressure on the trade balance, due to the increased demand for investment goods (for automation and digitalisation, energy efficiency and infrastructure) and trade deficits remain almost constant throughout the projection period.

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[30] https://unctad.org/en/PublicationsLibrary/aldcafrica2019_en.pdf
[31] http://enterprise.press/wp-content/uploads/2019/09/LYNX-INDUSTRY-NOTE-SEPTEMBER-2019-TAKING-EGYPTS-AUTOMOTIVE-INDUSTRY-TO-THE-NEXT-LEVEL-1.pdf
[32] https://www.globalmarketsinternational.com/latestmarketpost/egypt-chemical-industry-companies-projects-petrochemical-agrochemical-pharmaceutical/
[33] corresponding to ISCO-08 codes: 5, 7, 8, 9
[34] corresponding to ISCO-08 codes: 3, 4
[35] corresponding to ISCO-08 codes: 1, 2

Figure 22: Egypt – GDP components
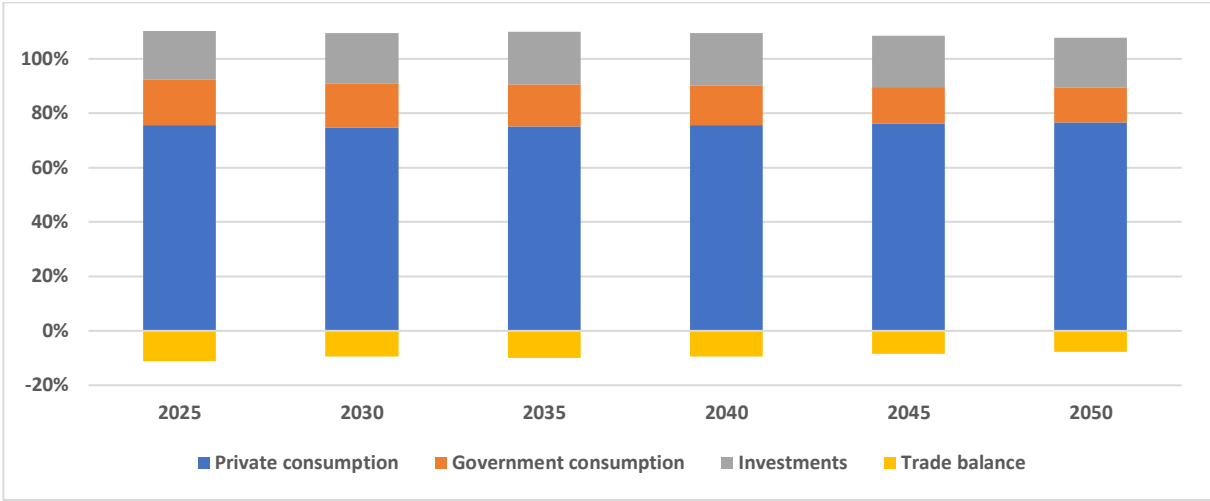
The projected growth in the medium-term (up to 2030) is supported mainly by productivity gains, stemming from infrastructure developments, whilst in 2050, significant driver of growth is the increased female participation in the labour market. Strong population growth and increased participation rates will sustain increased demand for labour at a relatively reasonable cost, alleviating upward pressures in the labour market.

6.6.2 Energy

The penetration of renewables in power generation is quite limited and most electricity is produced by fossil fuels (10% vs. 90% in 2020). Under the Blue Transition scenario, the penetration of renewables is projected to increase, with electricity generation attributed to renewable sources expected to reach almost 30% in 2030 and 60% in 2050. This development is mainly attributed to the deployment of wind turbines and solar cells, whose total capacity reaches 53GW and 85GW, respectively. In addition to the de-coupling of electricity production from hydrocarbons, the Blue Transition scenario envisages other measures, such as the electrification of transport and energy efficiency improvements in buildings (e.g., thermal insulation, energy saving appliances etc.) and finally, improvements to energy used for production purposes. The total amount of investment needed is approximately 471 bn USD over the period 2020-2050 (or 1.3% of GDP). These investments will be allocated between investments in electricity generation (48%), transport electrification (19%) and energy efficiency improvements (33%) in buildings and industrial processes.

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Table 36: Egypt - power generation mix in the Blue Transition scenario

	2020	2025	2030	2035	2040	2045	2050
Solids	0%	0%	1%	1%	1%	0%	0%
Oil	10%	9%	4%	2%	1%	0%	0%
Gas	80%	78%	65%	58%	50%	44%	40%
Hydro electric	7%	7%	6%	5%	4%	4%	3%
Wind	2%	4%	11%	15%	19%	21%	22%
Solar	1%	3%	13%	19%	25%	30%	34%
Biomass and Waste	0%	0%	0%	1%	0%	0%	0%

Source: Satellite power module of GEM-E3-MENA

6.7 TURKEY

6.7.1 Economy

Turkey has a population of 83.6 million people, covering an area of 783 thousand km2 and ranks 19th amongst global economies with a GDP of 761 bn. USD. The Turkish economy is service oriented; services account for approximately 67% of the gross national value added, followed by manufacturing which is responsible for approximately 20% of the generated value added, whilst the contribution of the agricultural sector and that of extraction industries is generally low (7.1% and 1.2% respectively). Turkey's geographical position, as well as several structural reforms adopted by the government, has led to particularly high growth rates over the past decades. Currently, the country faces significant challenges that hinder its economic prospects, such as persistent, high inflation, rising unemployment rates and currency devaluations.

Service-wise, the sectors that stand out are wholesale and retail activities (14%), real estate activities (10%) and transport (7%). The contribution of the tourism industry is also significant for the national economy, as in 2019 it was estimated to account for approximately 11.3%-12.1% of GDP.[36] Turkey has a strong export-oriented manufacturing sector, which includes transport equipment (16% of total exports in 2019[37]), textiles and wearing apparel (16%), food products (8%) and basic metals (10%). Several major international companies have production facilities established in Turkey, such as Siemens, Nestle, Microsoft etc. Major

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[36] https://knoema.com/atlas/Turkey/topics/Tourism/Travel-and-Tourism-Total-Contribution-to-GDP/Contribution-of-travel-and-tourism-to-GDP-percent-of-GDP#:~:text=In%202019%2C%20contribution%20of%20travel,)%20for%20Turkey%20was%2012.7%20%25. , https://ftnnews.com/news-from-turkey/39492-wttc-travel-tourism-sector-will-be-critical-to-powering-turkey-s-economic-recovery

[37] TURKSTAT

automotive industries located in Turkey include Hyundai, Toyota, Volkswagen etc. and the annual production of vehicles reached 1.46 million (2019)38, most of them exported to Europe.

The Turkish labour market includes a relatively (to the overall region) high share of educated workers. According to the latest available statistics (ILO), in 2019, 18% of the overall labour force had advanced education and the unemployment rate of people with tertiary education was approximately 12%. The latest available ILO statistics (for 2020) estimate the share of low skilled jobs39 in the economy to be approximately 70.3%, of medium-skilled jobs40 13.7% and highly-skilled41 jobs 16.6%. Available education statistics for graduates by field of study indicate that approximately 19.44% of annual university graduates have a degree relative to the clean energy transition, such as a degree in Engineering, Informatics and Physical Sciences.

The Blue Transition scenario projects an annual growth rate of 3.9% for the period 2020-2030 and a growth rate of 3.35 for the period up to 2050. Private spending (as % of GDP) is projected to increase over the period until 2050, whilst trade surpluses are projected to slightly decrease. The country is expected to benefit from the Blue Transition due to its advanced manufacturing potential (particularly with respect to vehicles and electronics production). Productivity gains from automatisation and labour market developments yield cost benefits for domestically produced goods, and along with trade integration, sustain high exports throughout the projection period.

Figure 23: Turkey – GDP components

Source: GEM-E3-MENA

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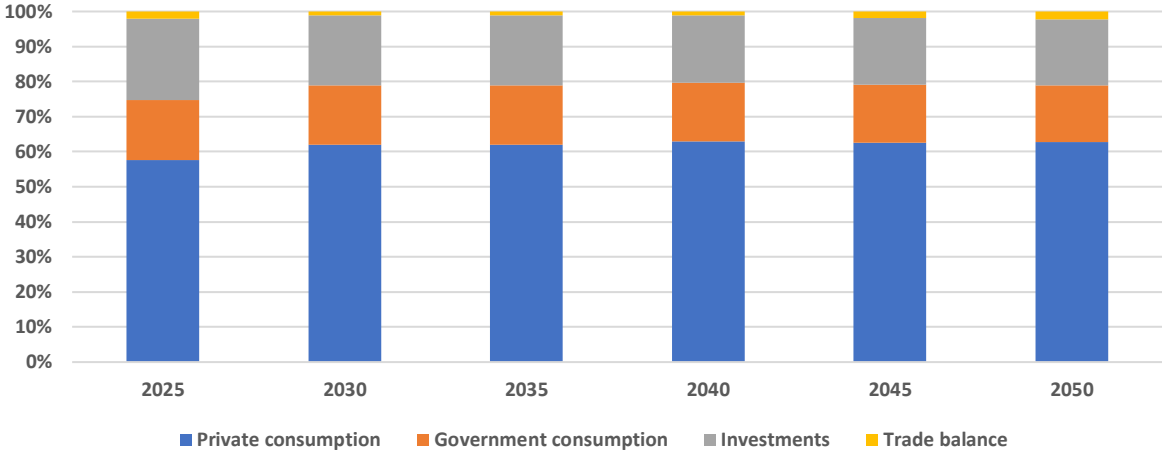
[38] https://www.oica.net/category/production-statistics/2019-statistics/
[39] corresponding to ISCO-08 codes: 5, 7, 8, 9
[40] corresponding to ISCO-08 codes: 3, 4
[41] corresponding to ISCO-08 codes: 1, 2

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6.7.2   Energy

The penetration of renewables in power generation is quite limited and most electricity is produced by fossil fuels (10% compared to 90% in 2020). Under the Blue Transition scenario, no change in the electricity production is foreseen, as the country has no clear commitments regarding the penetration of renewables in the power generation mix.

Table 37: Turkey - power generation mix in the Blue Transition scenario

	2020	2025	2030	2035	2040	2045	2050
Solids	37%	36%	44%	46%	40%	39%	35%
Oil	0%	0%	0%	0%	0%	0%	0%
Gas	31%	32%	18%	19%	20%	20%	21%
Nuclear	0%	0%	1%	1%	1%	1%	1%
Hydro electric	20%	15%	12%	9%	6%	5%	3%
Wind	7%	11%	13%	14%	17%	18%	21%
Solar	3%	3%	8%	8%	13%	14%	16%
Biomass and Waste	4%	3%	4%	4%	4%	3%	4%

Source: Satellite power module of GEM-E3-MENA

6.8   ISRAEL

6.8.1 Economy

Israel has a population of 9.3 million people, covering an area of one thousand km2 and ranks 32nd amongst global economies with a GDP of 395 bn. USD. The Israeli economy is service oriented, focussed on high-tech sectors; services account for approximately 77% of the gross national value added, followed by manufacturing which is responsible for approximately 13% of the generated value added (the respective share of agriculture is 1%). Israel's share of R&D expenditure, with respect to GDP, is the highest in the world (4.5%), whilst high-tech industries (e.g., electronics, pharmaceutical products, biotechnologies, software etc.) account for approximately 40%[42] of GDP and are responsible for 46%[43] of Israel's exports. In terms of employment, high-tech sectors are responsible for approximately 10% of total employment of which 32%[44] of people are engaged in high-tech manufacturing sectors and 67% in service-related sectors. Another important sector for the economy is the diamond industry, which

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[42] https://www.nordeatrade.com/dk/explore-new-market/israel/economical-context

[43] https://innovationisrael.org.il/en/reportchapter/israeli-high-tech-2019

[44] https://www.cbs.gov.il/en/publications/Pages/2020/Science-Technology-and-Communications-Statistical-Abstract-of-Israel-2020-No-71.aspx

employs around 20 thousand people45 and its exports reached 860 million USD (or approximately 9% of exported goods46).

Service-wise, the most important market-related sectors are real estate and wholesale and retail trade activities (with 15.3% and 15% of GDP respectively), followed by professional and scientific activities and ICT services (11.1% and 9.2% respectively). The latter holds a significant share in the country's exports, accounting for approximately 19%.

The labour force of Israel is highly qualified. Almost 49% (2 million people) of the total labour force has completed some stage of the tertiary level with 36% (1.5 million citizens) holding at least a bachelor's degree (ILO, 2018). The unemployment rate in Israel is quite low, approximately 4% in 2018; for those with higher education, the unemployment rate equates to 2.5%. The latest available ILO statistics (for 2020) estimate the share of low skilled jobs in the economy to be approximately 40%, of medium-skilled jobs 21% and highly-skilled jobs 39%.

The Blue Transition scenario projects an annual growth rate of 3.7% for the period 2020-2030 and a growth rate of 3.3% for the period up to 2050. The GDP composition is not projected to significantly alter over the projected period; private consumption spending (as % of GDP) is projected to slightly increase, whilst small trade deficits are recorded throughout the projection period. Growth is sustained by productivity gains, stemming from infrastructure developments (mainly associated with the development of transport infrastructure) and trade integration.

Figure 24: Israel – GDP components

Source: GEM-E3-MENA

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45 https://en.israelidiamond.co.il/about-the-israeli-diamond-industry/
46 https://www.reuters.com/article/us-health-coronavirus-israel-diamonds-idUSKBN22R1EJ

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6.8.2   Energy

The penetration of renewables in power generation is quite limited and most of the electricity is produced by fossil fuels (7% vs. 93% in 2020). Under the Blue Transition scenario, the penetration of renewables is projected to increase and electricity generation attributed to renewable sources is expected to reach almost 20% in 2030 and 46% in 2050, whilst power generation from natural gas remains the main source of electricity generation throughout the projection period. The increase of RES related electricity is attributed mainly to the deployment of solar and, to a smaller extent, the expansion of wind capacity. The installed capacity of solar is projected to reach 19.1GW in 2050, whilst the capacity of wind is projected to reach 10.6GW in 2050. In addition to the de-coupling of electricity production from hydrocarbons, the Blue Transition scenario envisages other measures, such as the electrification of transport and energy efficiency improvements in buildings (e.g., thermal insulation, energy saving appliances etc.) and finally, improvements to energy used for production purposes. The total amount of investment needed is approximately 279bn $ over the period 2020-2050 (or 1.36% of GDP). These investments will be allocated between investments in electricity generation (20%), transport electrification (36%) and energy efficiency improvements (44%) in buildings and industrial processes.

Table 38: Israel - power generation mix in the Blue Transition scenario

	2020	2025	2030	2035	2040	2045	2050
Solids	27%	12%	5%	3%	2%	2%	1%
Oil	1%	0%	0%	0%	0%	0%	0%
Gas	65%	75%	74%	67%	60%	55%	51%
Hydro electric	0%	0%	0%	0%	0%	0%	0%
Wind	3%	6%	9%	12%	15%	16%	17%
Solar	3%	5%	11%	17%	22%	26%	29%
Biomass and Waste	0%	0%	0%	1%	1%	1%	1%

Source: Satellite power module of GEM-E3-MENA

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8   ANNEXE I: LIST OF COUNTRIES

Israel
Jordan
Turkey
Egypt
Tunisia
Lebanon
Algeria
Morocco
EU28
Energy producers
Rest of the world

9   ANNEXE II: LIST OF SECTORS

Agriculture
Animal products
Coal
Crude oil
Oil refining
Natural gas extraction
Gas distribution
Transmission and distribution of electricity
Water
Chemical products
Other energy-intensive
Electrical goods - Other equipment goods
Transport equipment
Consumer goods industries – Food
Consumer goods industries – Rest
Textiles and clothing
Construction
Transport
Communication
Business - Financial services
Public services
Recreational and other services
Dwellings
Electricity Generation - Coal fired
Electricity Generation - Oil fired
Electricity Generation - Gas fired
Electricity Generation – Nuclear
Electricity Generation - Hydro electric
Electricity Generation – Wind
Electricity Generation – PV
Electricity Generation – Other

10 ANNEXE III: OUTPUT & EMPLOYMENT MULTIPLIERS BY COUNTRY

10.1 ALGERIA

	Output		Employment	
	Type-I	Type-II	Type-I	Type-II
Agriculture	1.23	1.31	1.22	1.31
Animal products	1.27	1.36	1.18	1.27
Coal	1.30	1.40	1.28	1.38
Crude oil	2.53	2.88	2.07	2.23
Oil refining	1.19	1.22	1.48	1.59
Natural gas extraction	2.21	2.51	1.65	1.78
Gas distribution	1.38	1.54	1.39	1.49
Transmission and distribution of electricity	2.20	2.37	2.51	2.70
Water	1.63	2.12	1.10	1.18
Chemical products	1.20	1.24	1.41	1.51
Other energy-intensive	1.32	1.42	1.37	1.47
Electrical goods - Other equipment goods	1.30	1.39	1.34	1.44
Transport equipment	1.11	1.13	1.47	1.58
Consumer goods industries - Food	1.60	1.65	3.87	4.16
Consumer goods industries - Rest	1.61	1.73	1.61	1.74
Textiles and clothing	1.39	1.47	1.46	1.57
Construction	1.62	1.87	1.19	1.28
Transport	1.41	1.55	1.25	1.35
Communication	1.40	1.53	1.43	1.54
Business - Financial services	1.18	1.27	1.15	1.24
Public services	1.27	1.49	1.14	1.23
Recreational and other services	1.25	1.43	1.09	1.18
Dwellings	1.18	1.30	1.18	1.26
Electricity Generation - Coal fired	1.92	2.08	1.98	2.13
Electricity Generation - Oil fired	2.10	2.30	1.71	1.84
Electricity Generation - Gas fired	2.10	2.30	1.71	1.84
Electricity Generation - Nuclear	1.57	1.79	1.32	1.42
Electricity Generation - Hydro electric	2.10	2.30	1.71	1.84
Electricity Generation - Wind	2.10	2.30	1.71	1.84
Electricity Generation - PV	2.10	2.30	1.71	1.84
Electricity Generation - Other	1.58	1.72	1.38	1.49

10.2 EGYPT

	Output		Employment	
	Type-I	Type-II	Type-I	Type-II
Agriculture	1.35	2.06	1.15	1.54
Animal products	2.21	2.92	7.83	10.55
Coal	1.15	1.18	NA	NA
Crude oil	1.14	1.23	1.60	2.15
Oil refining	1.79	1.87	13.05	17.60
Natural gas extraction	1.18	1.26	1.50	2.03
Gas distribution	2.05	2.17	4.38	5.90
Transmission and distribution of electricity	2.95	3.08	4.21	5.68
Water	1.24	1.45	1.59	2.15
Chemical products	1.83	2.08	2.37	3.20
Other energy-intensive	1.74	2.10	2.09	2.81
Electrical goods - Other equipment goods	1.87	2.33	1.93	2.60
Transport equipment	1.75	1.93	7.41	9.99
Consumer goods industries - Food	1.99	2.59	2.96	3.99
Consumer goods industries - Rest	1.52	1.77	2.14	2.89
Textiles and clothing	1.91	2.48	2.46	3.32
Construction	2.00	2.58	1.73	2.34
Transport	1.79	2.22	1.36	1.84
Communication	1.26	1.70	1.25	1.69
Business - Financial services	1.38	2.42	1.17	1.57
Public services	1.95	2.90	1.41	1.90
Recreational and other services	1.86	2.64	1.47	1.98
Dwellings	1.13	1.32	1.32	1.78
Electricity Generation - Coal fired	1.99	2.28	2.14	2.89
Electricity Generation - Oil fired	2.75	2.85	6.83	9.20
Electricity Generation - Gas fired	2.21	2.30	10.45	14.09
Electricity Generation - Nuclear	1.73	2.24	1.83	2.46
Electricity Generation - Hydro electric	1.24	1.36	1.71	2.31
Electricity Generation - Wind	1.31	1.55	1.50	2.02
Electricity Generation - PV	1.17	1.28	1.70	2.30
Electricity Generation - Other	1.79	2.15	2.03	2.73

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10.3 ISRAEL

	Output		Employment	
	Type-I	Type-II	Type-I	Type-II
Agriculture	1.67	2.17	1.77	2.41
Animal products	2.01	2.64	2.02	2.75
Coal	1.16	1.20	30.62	41.80
Crude oil	1.07	1.09	16.76	22.88
Oil refining	1.64	1.69	3.74	5.11
Natural gas extraction	1.14	1.27	1.70	2.31
Gas distribution	1.80	2.76	1.45	1.99
Transmission and distribution of electricity	3.06	3.55	2.93	3.99
Water	2.16	2.81	1.94	2.65
Chemical products	1.91	2.49	1.97	2.69
Other energy-intensive	1.78	2.34	1.88	2.56
Electrical goods - Other equipment goods	1.52	2.11	1.51	2.06
Transport equipment	1.18	1.39	1.35	1.85
Consumer goods industries - Food	1.85	2.34	2.24	3.06
Consumer goods industries - Rest	1.82	2.23	3.13	4.27
Textiles and clothing	1.49	1.86	1.66	2.27
Construction	1.81	2.55	1.65	2.26
Transport	1.82	2.25	1.96	2.67
Communication	1.74	2.49	1.69	2.31
Business - Financial services	1.71	2.52	1.59	2.17
Public services	1.70	2.64	1.45	1.98
Recreational and other services	1.71	2.31	1.78	2.43
Dwellings	1.12	1.60	1.12	1.53
Electricity Generation - Coal fired	2.24	2.48	1.84	2.52
Electricity Generation - Oil fired	2.57	2.72	1.94	2.65
Electricity Generation - Gas fired	2.70	3.28	19.04	25.99
Electricity Generation - Nuclear	1.78	2.28	2.04	2.78
Electricity Generation - Hydro electric	1.62	1.99	1.50	2.04
Electricity Generation - Wind	1.61	2.17	1.33	1.81
Electricity Generation - PV	1.31	1.64	1.32	1.81
Electricity Generation - Other	2.10	2.55	1.38	1.88

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10.4 JORDAN

	Output		Employment	
	Type-I	Type-II	Type-I	Type-II
Agriculture	1.88	2.28	1.58	1.86
Animal products	2.30	2.91	1.58	1.87
Coal	2.16	2.52	2.89	3.42
Crude oil	1.08	1.09	21.76	25.74
Oil refining	1.60	1.65	2.43	2.88
Natural gas extraction	1.18	1.25	2.37	2.81
Gas distribution	1.62	1.90	2.07	2.45
Transmission and distribution of electricity	3.22	3.32	4.00	4.73
Water	2.29	2.85	2.00	2.37
Chemical products	1.81	2.17	1.95	2.31
Other energy-intensive	1.68	1.94	2.01	2.38
Electrical goods - Other equipment goods	1.50	1.69	1.99	2.35
Transport equipment	1.12	1.15	2.78	3.28
Consumer goods industries - Food	1.73	2.08	1.93	2.28
Consumer goods industries - Rest	1.68	2.05	1.70	2.01
Textiles and clothing	1.80	2.19	1.80	2.13
Construction	2.17	2.75	1.87	2.21
Transport	1.92	2.26	1.86	2.20
Communication	2.29	2.81	2.10	2.48
Business - Financial services	2.15	2.64	1.96	2.32
Public services	1.67	2.41	1.24	1.46
Recreational and other services	2.16	2.64	2.10	2.49
Dwellings	1.62	1.79	NA	NA
Electricity Generation - Coal fired	2.45	2.84	2.32	2.75
Electricity Generation - Oil fired	2.57	2.63	9.24	10.93
Electricity Generation - Gas fired	2.27	2.34	36.23	42.86
Electricity Generation - Nuclear	1.85	2.35	1.41	1.67
Electricity Generation - Hydro electric	1.31	1.39	2.10	2.48
Electricity Generation - Wind	1.41	1.58	1.83	2.17
Electricity Generation - PV	1.40	1.64	1.52	1.79
Electricity Generation - Other	2.02	2.14	2.43	2.88

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10.5 LEBANON

	Output		Employment	
	Type-I	Type-II	Type-I	Type-II
Agriculture	1.46	1.78	1.36	1.66
Animal products	1.50	1.83	1.36	1.66
Coal	1.01	1.02	1.47	1.80
Crude oil	1.16	1.30	1.23	1.51
Oil refining	1.86	1.95	8.32	10.17
Natural gas extraction	1.14	1.27	1.19	1.45
Gas distribution	1.57	2.23	1.19	1.45
Transmission and distribution of electricity	2.01	2.24	1.82	2.22
Water	1.72	2.01	1.70	2.08
Chemical products	1.44	1.54	6.37	7.79
Other energy-intensive	1.55	1.69	2.83	3.46
Electrical goods - Other equipment goods	1.82	2.01	4.31	5.27
Transport equipment	1.34	1.45	2.76	3.38
Consumer goods industries - Food	1.84	2.07	3.86	4.72
Consumer goods industries - Rest	1.57	1.77	2.11	2.57
Textiles and clothing	1.91	2.12	8.32	10.17
Construction	2.16	2.46	1.87	2.28
Transport	1.62	1.90	1.57	1.91
Communication	1.47	1.73	1.53	1.87
Business - Financial services	1.48	1.81	1.37	1.67
Public services	1.43	2.32	1.10	1.34
Recreational and other services	1.82	2.26	1.52	1.85
Dwellings	1.23	1.63	1.11	1.35
Electricity Generation - Coal fired	1.85	2.08	1.56	1.91
Electricity Generation - Oil fired	2.64	2.75	10.56	12.91
Electricity Generation - Gas fired	2.40	2.79	22.87	27.96
Electricity Generation - Nuclear	1.65	2.07	1.36	1.67
Electricity Generation - Hydro electric	2.12	2.38	2.30	2.82
Electricity Generation - Wind	1.44	1.76	1.38	1.69
Electricity Generation - PV	1.31	1.51	1.46	1.78
Electricity Generation - Other	1.75	2.04	1.50	1.83

10.6 MOROCCO

	Output		Employment	
	Type-I	Type-II	Type-I	Type-II
Agriculture	1.53	2.19	1.27	1.68
Animal products	1.95	2.74	1.76	2.33
Coal	1.19	1.25	58.72	77.66
Crude oil	1.04	1.06	67.43	89.18
Oil refining	1.72	1.79	3.20	4.23
Natural gas extraction	1.15	1.18	NA	NA
Gas distribution	2.19	2.30	5.27	6.97
Transmission and distribution of electricity	2.56	2.75	1.65	2.19
Water	1.00	1.73	1.00	1.32
Chemical products	2.23	2.68	3.33	4.40
Other energy-intensive	2.00	2.46	2.30	3.05
Electrical goods - Other equipment goods	2.06	2.53	3.16	4.18
Transport equipment	1.71	2.00	2.26	2.99
Consumer goods industries - Food	2.10	2.72	2.66	3.52
Consumer goods industries - Rest	2.41	3.04	3.25	4.30
Textiles and clothing	2.07	2.77	2.13	2.81
Construction	2.19	2.94	1.75	2.31
Transport	1.68	2.25	1.27	1.68
Communication	1.77	2.50	1.64	2.17
Business - Financial services	1.80	2.61	1.52	2.01
Public services	2.26	3.13	1.85	2.44
Recreational and other services	2.05	2.77	1.83	2.43
Dwellings	1.00	1.32	1.00	1.32
Electricity Generation - Coal fired	1.86	1.97	1.83	2.42
Electricity Generation - Oil fired	2.60	2.71	2.85	3.77
Electricity Generation - Gas fired	2.30	2.37	4.19	5.55
Electricity Generation - Nuclear	1.80	2.28	1.93	2.55
Electricity Generation - Hydro electric	1.02	1.09	1.05	1.38
Electricity Generation - Wind	1.02	1.15	1.03	1.36
Electricity Generation - PV	1.39	1.62	2.14	2.83
Electricity Generation - Other	1.83	2.17	2.14	2.83

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10.7 TUNISIA

	Output		Employment	
	Type-I	Type-II	Type-I	Type-II
Agriculture	1.61	2.07	1.46	1.77
Animal products	1.78	2.35	1.50	1.82
Coal	1.43	1.55	2.67	3.23
Crude oil	1.26	1.35	2.35	2.85
Oil refining	1.25	1.28	29.74	36.03
Natural gas extraction	1.12	1.18	1.75	2.12
Gas distribution	1.11	1.17	1.65	2.00
Transmission and distribution of electricity	2.64	2.85	2.62	3.18
Water	1.63	2.14	1.18	1.43
Chemical products	1.90	2.08	2.69	3.26
Other energy-intensive	1.85	2.05	2.83	3.43
Electrical goods - Other equipment goods	1.76	1.97	2.25	2.73
Transport equipment	1.61	1.76	2.79	3.38
Consumer goods industries - Food	2.11	2.42	8.17	9.89
Consumer goods industries - Rest	1.81	2.16	1.89	2.29
Textiles and clothing	1.88	2.13	2.25	2.73
Construction	2.08	2.52	1.42	1.73
Transport	1.50	1.80	1.22	1.48
Communication	1.25	1.66	1.21	1.47
Business - Financial services	1.52	1.93	1.33	1.61
Public services	1.38	2.40	1.06	1.29
Recreational and other services	2.28	2.57	5.92	7.17
Dwellings	2.20	2.47	79.46	96.25
Electricity Generation - Coal fired	2.08	2.33	2.17	2.63
Electricity Generation - Oil fired	2.08	2.32	1.30	1.57
Electricity Generation - Gas fired	2.01	2.15	1.94	2.35
Electricity Generation - Nuclear	1.73	2.10	1.55	1.87
Electricity Generation - Hydro electric	1.27	1.42	1.26	1.52
Electricity Generation - Wind	1.34	1.61	1.18	1.42
Electricity Generation - PV	1.19	1.33	1.21	1.47
Electricity Generation - Other	1.52	1.80	1.22	1.48

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10.8 TURKEY

	Output		Employment	
	Type-I	Type-II	Type-I	Type-II
Agriculture	1.49	2.18	1.17	1.51
Animal products	1.74	2.46	1.45	1.86
Coal	1.30	1.44	1.77	2.28
Crude oil	1.09	1.15	1.81	2.33
Oil refining	1.47	1.51	35.58	45.81
Natural gas extraction	1.07	1.09	NA	NA
Gas distribution	1.07	1.12	1.24	1.60
Transmission and distribution of electricity	2.34	2.64	2.38	3.06
Water	1.38	2.02	1.15	1.48
Chemical products	1.86	2.09	3.49	4.49
Other energy-intensive	1.94	2.20	2.78	3.58
Electrical goods - Other equipment goods	1.98	2.28	2.94	3.78
Transport equipment	1.75	1.93	3.33	4.29
Consumer goods industries - Food	2.15	2.66	3.72	4.79
Consumer goods industries - Rest	1.57	1.81	2.89	3.71
Textiles and clothing	2.26	2.62	3.25	4.18
Construction	2.04	2.83	1.36	1.75
Transport	1.80	2.09	1.91	2.46
Communication	1.63	2.01	2.19	2.82
Business - Financial services	1.56	2.30	1.29	1.66
Public services	1.62	2.87	1.17	1.50
Recreational and other services	1.80	2.44	1.63	2.10
Dwellings	1.01	1.74	1.01	1.30
Electricity Generation - Coal fired	2.08	2.42	1.75	2.25
Electricity Generation - Oil fired	2.31	2.57	1.32	1.69
Electricity Generation - Gas fired	2.12	2.25	1.52	1.96
Electricity Generation - Nuclear	1.73	2.22	1.71	2.20
Electricity Generation - Hydro electric	1.35	1.64	1.28	1.65
Electricity Generation - Wind	1.42	1.92	1.21	1.55
Electricity Generation - PV	1.35	1.59	1.88	2.42
Electricity Generation - Other	1.70	2.18	1.25	1.61

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11 ANNEXE IV MACROECONOMIC BASELINE RESULTS

11.1 ALGERIA

Macroeconomic Aggregates (in b.$)	2020	2025	2030	2035	2040	2045	2050
Gross Domestic Product	173	158	152	149	149	150	150
Investment	75	67	55	47	41	35	35
Public Consumption	16	15	14	14	14	14	14
Private Consumption	88	79	82	87	94	101	101
Exports	74	72	69	66	64	62	60
Imports	81	73	68	65	63	61	60
Balance of Trade (% of GDP)	-4.0%	-1.1%	0.7%	0.8%	0.6%	0.3%	-0.1%

	2020	2025	2030	2035	2040	2045	2050
Employment (in m. persons)	10.4	10.9	11.8	13.0	14.3	15.2	15.8
Unemployment rate	11.2%	12.8%	12.0%	11.2%	10.4%	9.6%	8.8%

Domestic Production (in b$)	2020	2025	2030	2035	2040	2045	2050
Agriculture	20	21	25	31	39	49	58
Animal products	4	4	5	5	7	9	11
Coal	0	0	0	0	0	0	0
Crude oil	1	1	1	1	1	1	1
Oil refining	80	92	104	115	129	143	162
Natural gas extraction	0	0	0	0	1	1	1
Gas distribution	1	1	2	2	2	3	3
Transmission and distribution of electricity	64	63	67	75	86	99	111
Water	1	1	1	1	1	1	1
Chemical products	2	2	2	2	2	3	3
Other energy-intensive	7	7	6	7	7	8	10
Electrical goods - Other equipment goods	2	2	1	1	1	1	2
Transport equipment	1	1	1	1	1	1	1
Consumer goods industries - Food	6	6	6	7	10	13	17
Consumer goods industries - Rest	3	4	4	5	6	8	9
Textiles and clothing	1	1	1	1	2	2	3
Construction	54	59	58	59	59	60	68
Transport	22	23	27	32	39	48	56
Communication	2	2	3	3	4	5	6
Business - Financial services	30	32	38	44	54	65	76
Public services	3	3	3	4	5	6	7
Recreational and other services	2	3	3	4	4	5	6
Dwellings	0	0	0	0	0	0	0

Electricity Generation - Coal fired	0	0	0	0	0	0	0
Electricity Generation - Oil fired	0	0	0	0	0	0	0
Electricity Generation - Gas fired	82	86	94	106	117	127	133
Electricity Generation - Nuclear	0	0	0	0	0	0	0
Electricity Generation - Hydro electric	0	0	0	0	0	0	0
Electricity Generation - Wind	1	2	2	3	5	6	8
Electricity Generation - PV	1	2	5	6	9	12	17
Electricity Generation - Other	0	0	0	0	0	0	0

11.2 EGYPT

Macroeconomic Aggregates (in b.$)	2020	2025	2030	2035	2040	2045	2050
Gross Domestic Product	259	275	309	349	389	431	466
Investment	52	57	69	85	99	115	128
Public Consumption	43	45	50	53	57	61	64
Private Consumption	191	198	219	245	269	295	315
Exports	63	64	65	66	68	69	70
Imports	89	89	94	100	104	109	112
Balance of Trade (% of GDP)	-10.1%	-9.3%	-9.5%	-9.6%	-9.3%	-9.2%	-9.0%

	2020	2025	2030	2035	2040	2045	2050
Employment (in m. persons)	27.4	30.0	33.6	37.3	40.6	43.5	46.3
Unemployment rate	10.5%	10.0%	9.6%	9.2%	8.8%	8.4%	8.0%

Domestic Production (in b$)	2020	2025	2030	2035	2040	2045	2050
Agriculture	74	94	121	156	198	248	301
Animal products	6	8	11	16	22	29	38
Coal	0	0	0	0	0	0	1
Crude oil	22	25	29	34	42	53	68
Oil refining	23	29	39	52	70	96	128
Natural gas extraction	12	13	13	15	17	21	25
Gas distribution	1	1	2	2	3	4	6
Transmission and distribution of electricity	187	232	271	327	395	482	583
Water	0	0	0	0	0	0	1
Chemical products	22	30	44	63	90	125	168
Other energy-intensive	62	83	118	164	225	303	394
Electrical goods - Other equipment goods	10	13	17	22	27	34	42
Transport equipment	9	13	19	29	42	59	80
Consumer goods industries - Food	58	77	108	151	204	270	344
Consumer goods industries - Rest	10	13	16	21	27	35	44
Textiles and clothing	51	64	85	113	149	193	245

Construction	51	65	86	112	142	180	221
Transport	37	47	62	82	107	138	174
Communication	18	22	27	34	41	51	63
Business - Financial services	72	88	112	141	174	212	252
Public services	61	79	105	138	180	231	287
Recreational and other services	13	17	22	28	37	46	57
Dwellings	13	15	18	23	28	34	43
Electricity Generation - Coal fired	0	0	5	9	8	7	6
Electricity Generation - Oil fired	18	18	13	11	9	8	7
Electricity Generation - Gas fired	141	161	162	173	189	213	240
Electricity Generation - Nuclear	0	0	0	0	0	0	0
Electricity Generation - Hydro electric	11	14	12	10	10	9	9
Electricity Generation - Wind	4	6	12	19	27	36	46
Electricity Generation - PV	2	4	14	23	35	51	71
Electricity Generation - Other	0	0	0	1	1	1	1

11.3 ISRAEL

Macroeconomic Aggregates (in b.$)	2020	2025	2030	2035	2040	2045	2050
Gross Domestic Product	277	285	289	296	302	309	314
Investment	60	63	65	66	68	70	72
Public Consumption	74	76	78	80	82	85	87
Private Consumption	152	155	157	160	163	166	168
Exports	88	86	83	82	81	80	79
Imports	96	95	93	93	93	92	91
Balance of Trade (% of GDP)	-3.1%	-3.3%	-3.5%	-3.6%	-3.7%	-3.9%	-4.0%

	2020	2025	2030	2035	2040	2045	2050
Employment (in m. persons)	3.7	4.0	4.3	4.6	4.9	5.1	5.4
Unemployment rate	4.6%	4.6%	4.6%	4.6%	4.6%	4.6%	4.6%

Domestic Production (in b$)	2020	2025	2030	2035	2040	2045	2050
Agriculture	11	15	18	21	25	30	36
Animal products	4	5	6	7	8	9	11
Coal	0	0	0	0	0	0	0
Crude oil	1	1	2	3	5	7	11
Oil refining	14	18	21	25	30	37	46
Natural gas extraction	0	0	0	0	0	0	0
Gas distribution	2	3	3	3	3	3	3
Transmission and distribution of electricity	65	79	89	99	112	127	144
Water	4	5	5	6	8	9	10

Chemical products	33	40	46	53	62	71	82
Other energy-intensive	77	93	108	126	146	168	195
Electric algoods - Other equipment goods	10	10	11	11	12	13	13
Transport equipment	3	4	4	4	5	5	6
Consumer goods industries - Food	19	23	28	33	40	48	57
Consumer goods industries - Rest	2	3	3	4	5	6	7
Textiles and clothing	5	6	6	7	9	10	11
Construction	46	56	65	75	86	99	113
Transport	34	43	52	62	74	90	108
Communication	15	18	21	25	29	33	39
Business - Financial services	150	180	209	242	280	323	373
Public services	103	125	147	171	199	231	268
Recreational and other services	19	23	27	31	36	42	49
Dwellings	26	31	36	41	47	54	62
Electricity Generation - Coal fired	18	14	11	8	8	8	7
Electricity Generation - Oil fired	0	0	0	0	0	0	0
Electricity Generation - Gas fired	41	53	60	63	66	70	75
Electricity Generation - Nuclear	0	0	0	0	0	0	0
Electricity Generation - Hydro electric	0	0	0	0	0	0	0
Electricity Generation - Wind	2	4	6	8	10	12	14
Electricity Generation - PV	2	3	6	11	15	20	25
Electricity Generation - Other	0	0	0	0	1	1	1

11.4 JORDAN

Macroeconomic Aggregates (in b.$)	2020	2025	2030	2035	2040	2045	2050
Gross Domestic Product	24	23	23	23	23	24	24
Investment	5	5	5	5	5	5	5
Public Consumption	8	8	8	8	8	8	8
Private Consumption	16	15	14	14	14	14	14
Exports	15	14	14	14	14	14	13
Imports	20	19	18	18	17	17	17
Balance of Trade (% of GDP)	-21.9%	-19.1%	-17.1%	-16.2%	-15.6%	-15.1%	-14.5%

	2020	2025	2030	2035	2040	2045	2050
Employment (in m. persons)	2.4	2.6	2.8	3.0	3.2	3.4	3.6
Unemployment rate	18.5%	17.4%	16.2%	14.8%	13.4%	12.0%	10.0%

Domestic Production (in b$)	2020	2025	2030	2035	2040	2045	2050
Agriculture	3	4	5	6	7	8	10
Animal products	1	2	2	2	3	3	4

Coal	0	0	0	0	0	0	0
Crude oil	0	0	0	1	1	1	2
Oil refining	3	3	3	4	5	6	7
Natural gas extraction	1	1	2	2	2	2	2
Gas distribution	0	0	0	0	0	0	0
Transmission and distribution of electricity	16	19	22	26	30	35	41
Water	1	1	1	1	1	1	1
Chemical products	8	9	10	11	13	14	16
Other energy-intensive	8	9	11	12	14	16	19
Electrical goods - Other equipment goods	1	1	1	1	1	1	1
Transport equipment	0	0	0	0	0	0	1
Consumer goods industries - Food	4	4	5	5	6	7	8
Consumer goods industries - Rest	1	1	1	1	1	1	1
Textiles and clothing	4	5	5	6	7	8	9
Construction	10	11	12	14	16	18	20
Transport	8	9	11	13	15	18	21
Communication	3	3	4	4	5	6	7
Business - Financial services	10	12	13	16	18	22	25
Public services	9	10	11	13	15	17	19
Recreational and other services	1	2	2	2	2	3	3
Dwellings	2	3	3	3	4	4	5
Electricity Generation - Coal fired	0	0	0	0	0	0	0
Electricity Generation - Oil fired	0	0	0	0	0	0	0
Electricity Generation - Gas fired	2	2	2	3	3	3	4
Electricity Generation - Nuclear	0	0	0	0	0	0	0
Electricity Generation - Hydro electric	0	0	0	0	0	0	0
Electricity Generation - Wind	0	0	0	0	0	0	0
Electricity Generation - PV	0	0	0	0	0	1	1
Electricity Generation - Other	0	0	0	0	0	0	0

11.5 LEBANON

Macroeconomic Aggregates (in b.$)	2020	2025	2030	2035	2040	2045	2050
Gross Domestic Product	31	30	29	29	30	30	30
Investment	5	5	5	5	5	5	5
Public Consumption	3	3	3	3	4	4	4
Private Consumption	27	25	23	22	22	21	21
Exports	14	14	14	14	14	14	14
Imports	18	17	16	15	15	15	14
Balance of Trade (% of GDP)	-15.5%	-11.8%	-7.3%	-4.9%	-2.9%	-1.3%	-0.2%

	2020	2025	2030	2035	2040	2045	2050
Employment (in m. persons)	2.3	2.2	2.1	2.0	2.1	2.1	2.1
Unemployment rate	6.6%	6.5%	6.4%	6.3%	6.2%	6.1%	6.0%

Domestic Production (in b$)	2020	2025	2030	2035	2040	2045	2050
Agriculture	2	2	3	3	3	4	5
Animal products	1	1	1	1	2	2	2
Coal	0	0	0	0	0	0	0
Crude oil	0	0	0	0	0	0	0
Oil refining	0	0	0	0	0	0	0
Natural gas extraction	0	0	0	0	0	0	0
Gas distribution	0	0	0	0	0	0	0
Transmission and distribution of electricity	15	16	17	19	22	25	30
Water	1	1	1	1	1	1	1
Chemical products	2	2	2	3	3	4	5
Other energy-intensive	5	5	6	8	9	11	14
Electrical goods - Other equipment goods	1	1	1	1	1	1	2
Transport equipment	0	0	0	0	0	0	0
Consumer goods industries - Food	3	3	3	4	5	6	7
Consumer goods industries - Rest	1	1	1	1	1	2	2
Textiles and clothing	1	1	1	2	2	2	3
Construction	5	6	6	7	8	9	11
Transport	2	3	3	3	4	4	5
Communication	2	3	3	3	4	5	5
Business - Financial services	22	24	27	30	34	38	44
Public services	10	11	13	14	16	18	20
Recreational and other services	4	5	5	6	7	8	10
Dwellings	0	0	0	0	0	0	0
Electricity Generation - Coal fired	0	0	0	0	0	0	0
Electricity Generation - Oil fired	16	14	13	13	11	10	9
Electricity Generation - Gas fired	2	4	5	7	10	13	17
Electricity Generation - Nuclear	0	0	0	0	0	0	0
Electricity Generation - Hydro electric	0	0	0	0	0	0	0
Electricity Generation - Wind	1	1	1	1	1	1	2
Electricity Generation - PV	0	1	1	2	2	3	3
Electricity Generation - Other	0	0	0	0	0	0	0

11.6 MOROCCO

Macroeconomic Aggregates (in b.$)	2020	2025	2030	2035	2040	2045	2050
Gross Domestic Product	93	94	99	103	108	114	118
Investment	32	32	34	34	35	36	36
Public Consumption	25	25	26	27	28	29	30
Private Consumption	48	47	49	52	55	58	62
Exports	39	39	39	39	39	39	39
Imports	49	48	48	48	48	48	48
Balance of Trade (% of GDP)	-11.6%	-10.1%	-9.6%	-9.1%	-8.8%	-8.5%	-8.2%

	2020	2025	2030	2035	2040	2045	2050
Employment (in m. persons)	11.5	12.2	12.9	13.5	14.1	14.5	14.6
Unemployment rate	10.2%	9.8%	9.4%	9.1%	8.7%	8.4%	8.0%

Domestic Production (in b$)	2020	2025	2030	2035	2040	2045	2050
Agriculture	25	30	36	43	52	62	75
Animal products	10	12	14	17	21	25	30
Coal	0	0	0	0	0	0	0
Crude oil	0	0	0	1	1	1	2
Oil refining	9	10	13	17	21	27	35
Natural gas extraction	0	0	0	0	0	1	1
Gas distribution	0	0	0	0	0	0	0
Transmission and distribution of electricity	24	29	33	39	46	55	65
Water	0	0	0	0	0	0	0
Chemical products	16	20	25	31	38	48	59
Other energy-intensive	39	48	59	71	87	106	127
Electrical goods - Other equipment goods	5	6	7	9	10	13	15
Transport equipment	4	5	7	9	11	14	17
Consumer goods industries - Food	20	23	28	35	43	52	64
Consumer goods industries - Rest	2	2	3	3	4	5	6
Textiles and clothing	18	21	26	30	35	42	49
Construction	21	26	31	35	41	47	53
Transport	18	21	25	29	34	39	45
Communication	2	2	3	3	3	4	5
Business - Financial services	27	31	37	43	51	59	68
Public services	58	70	85	103	125	150	180
Recreational and other services	3	3	4	5	5	7	8
Dwellings	3	4	4	5	6	7	9
Electricity Generation - Coal fired	14	14	13	12	13	14	15
Electricity Generation - Oil fired	1	0	0	0	0	0	0

Electricity Generation - Gas fired	4	7	10	12	14	17	21
Electricity Generation - Nuclear	0	0	0	0	0	0	0
Electricity Generation - Hydro electric	2	1	1	1	1	1	1
Electricity Generation - Wind	3	4	5	6	7	8	10
Electricity Generation - PV	2	2	4	5	7	8	9
Electricity Generation - Other	0	0	0	0	0	0	0

11.7 TUNISIA

Macroeconomic Aggregates (in b.$)	2020	2025	2030	2035	2040	2045	2050
Gross Domestic Product	42	40	40	39	39	39	40
Investment	8	7	7	7	7	8	8
Public Consumption	9	9	8	8	9	9	10
Private Consumption	32	29	28	27	26	26	25
Exports	22	21	21	20	20	20	20
Imports	28	26	25	24	23	23	22
Balance of Trade (% of GDP)	-14.1%	-11.1%	-9.7%	-9.0%	-7.9%	-7.2%	-7.0%

	2020	2025	2030	2035	2040	2045	2050
Employment (in m. persons)	3.4	3.6	3.8	3.9	4.1	4.1	4.1
Unemployment rate	16.7%	15.6%	14.5%	13.3%	12.2%	11.1%	10.0%

Domestic Production (in b$ 2011)	2020	2025	2030	2035	2040	2045	2050
Agriculture	13	14	16	18	20	23	25
Animal products	3	3	4	4	5	5	6
Coal	0	0	0	0	0	0	0
Crude oil	2	2	3	3	3	3	3
Oil refining	1	1	1	1	1	1	2
Natural gas extraction	0	0	0	0	0	0	0
Gas distribution	1	1	1	1	1	1	1
Transmission and distribution of electricity	15	15	16	16	17	19	21
Water	0	0	0	0	0	0	1
Chemical products	5	5	6	7	8	10	12
Other energy-intensive	12	14	16	18	22	26	31
Electrical goods - Other equipment goods	2	2	2	3	3	3	4
Transport equipment	2	2	2	2	3	3	4
Consumer goods industries - Food	6	7	8	9	10	12	14
Consumer goods industries - Rest	2	2	2	3	3	3	4
Textiles and clothing	7	9	10	11	13	15	18
Construction	6	7	8	9	10	12	13
Transport	6	7	8	9	10	11	12

Communication	1	1	1	1	1	2	2
Business - Financial services	20	22	25	28	31	35	40
Public services	12	13	15	17	19	21	24
Recreational and other services	0	0	0	0	0	1	1
Dwellings	0	0	0	0	0	0	0
Electricity Generation - Coal fired	0	0	0	0	0	0	0
Electricity Generation - Oil fired	0	0	0	0	0	0	0
Electricity Generation - Gas fired	15	15	15	14	14	15	16
Electricity Generation - Nuclear	0	0	0	0	0	0	0
Electricity Generation - Hydro electric	0	0	0	0	0	0	0
Electricity Generation - Wind	1	1	1	1	2	2	2
Electricity Generation - PV	0	0	1	2	2	3	3
Electricity Generation - Other	0	0	0	0	0	0	0

11.8 TURKEY

Macroeconomic Aggregates (in b.$)	2020	2025	2030	2035	2040	2045	2050
Gross Domestic Product	677	716	760	783	805	832	853
Investment	178	173	161	167	168	176	182
Public Consumption	117	128	139	150	160	172	183
Private Consumption	383	422	473	485	495	505	510
Exports	193	189	185	180	178	176	174
Imports	195	196	198	198	197	197	196
Balance of Trade (% of GDP)	-0.2%	-0.9%	-1.7%	-2.3%	-2.3%	-2.5%	-2.6%

	2020	2025	2030	2035	2040	2045	2050
Employment (in m. persons)	29.3	30.4	31.5	32.5	33.2	33.5	33.5
Unemployment rate	13.9%	13.0%	12.1%	11.2%	10.3%	9.4%	8.5%

Domestic Production (in b$)	2020	2025	2030	2035	2040	2045	2050
Agriculture	64	77	90	102	114	127	140
Animal products	16	19	23	26	29	33	37
Coal	3	4	4	5	5	6	6
Crude oil	5	6	7	8	8	10	11
Oil refining	33	42	52	63	76	92	111
Natural gas extraction	5	12	14	19	23	27	32
Gas distribution	0	0	0	1	1	1	1
Transmission and distribution of electricity	286	350	422	500	564	653	738
Water	6	7	9	10	11	13	14
Chemical products	89	109	132	156	186	223	265
Other energy-intensive	302	357	410	486	571	680	806

Electrical goods - Other equipment goods	43	50	57	67	79	92	107
Transport equipment	59	69	81	94	111	132	156
Consumer goods industries - Food	95	119	149	175	204	238	275
Consumer goods industries - Rest	10	12	16	18	21	25	29
Textiles and clothing	128	160	195	227	269	319	377
Construction	135	152	161	189	216	250	287
Transport	182	224	267	311	362	422	490
Communication	25	31	37	43	50	57	65
Business - Financial services	369	441	519	591	669	755	847
Public services	140	170	202	234	269	310	353
Recreational and other services	65	81	99	114	131	150	169
Dwellings	3	4	5	5	6	7	8
Electricity Generation - Coal fired	102	115	164	193	183	194	190
Electricity Generation - Oil fired	0	0	0	0	0	1	1
Electricity Generation - Gas fired	87	103	67	80	89	101	112
Electricity Generation - Nuclear	0	0	3	3	3	3	3
Electricity Generation - Hydro electric	55	50	44	36	28	24	19
Electricity Generation - Wind	18	36	49	57	76	91	114
Electricity Generation - PV	7	8	29	35	57	72	85
Electricity Generation - Other	10	11	14	15	16	17	22

12 ANNEXE V: MACROECONOMIC RESULTS BLUE TRANSITION SCENARIO

12.1 ALGERIA

Macroeconomic Aggregates (in b.$)	2020	2025	2030	2035	2040	2045	2050
Gross Domestic Product	173	159	153	153	155	158	159
Investment	75	67	56	49	42	37	37
Public Consumption	16	15	14	14	14	14	14
Private Consumption	88	80	86	93	102	111	113
Exports	74	73	69	68	65	63	61
Imports	81	77	72	70	68	67	66
Balance of Trade (% of GDP)	-4.0%	-2.3%	-1.6%	-1.4%	-1.7%	-2.6%	-3.2%

	2020	2025	2030	2035	2040	2045	2050
Employment (in m. persons)	10.9	12.1	13.6	15.1	16.5	17.5	18.3
Unemployment rate	12.8%	12.1%	11.1%	11.0%	11.1%	11.3%	11.6%

Domestic Production (in b$)	2020	2025	2030	2035	2040	2045	2050
Agriculture	20	21	27	34	43	55	67
Animal products	4	4	5	6	8	10	13
Coal	0	0	0	0	0	0	0
Crude oil	1	1	1	1	1	1	1
Oil refining	80	94	104	117	131	146	164
Natural gas extraction	0	0	0	1	1	1	1
Gas distribution	1	1	1	2	2	3	3
Transmission and distribution of electricity	64	69	76	83	94	107	121
Water	1	1	1	1	1	1	1
Chemical products	2	2	2	2	2	3	3
Other energy-intensive	7	6	6	7	8	9	11
Electrical goods - Other equipment goods	2	2	2	2	2	2	3
Transport equipment	1	1	1	1	1	1	1
Consumer goods industries - Food	6	6	7	8	11	16	21
Consumer goods industries - Rest	3	4	4	5	7	8	10
Textiles and clothing	1	1	1	2	2	3	4
Construction	54	61	64	66	68	70	81
Transport	22	23	28	34	42	53	63
Communication	2	2	3	3	4	5	6
Business - Financial services	30	33	40	48	59	72	86
Public services	3	3	3	4	5	6	7

Recreational and other services	2	3	3	4	5	6	7
Dwellings	0	0	0	0	0	0	0
Electricity Generation - Coal fired	0	0	0	0	0	0	0
Electricity Generation - Oil fired	0	0	1	1	0	0	0
Electricity Generation - Gas fired	82	95	90	82	78	75	74
Electricity Generation - Nuclear	0	0	0	0	0	0	0
Electricity Generation - Hydro electric	0	0	0	0	0	0	0
Electricity Generation - Wind	1	2	8	16	21	26	29
Electricity Generation - PV	1	3	13	26	38	50	62
Electricity Generation - Other	0	0	0	0	0	0	0

12.2 EGYPT

Macroeconomic Aggregates (in b.$)	2020	2025	2030	2035	2040	2045	2050
Gross Domestic Product	259	271	317	360	408	466	525
Investment	52	59	71	88	103	121	136
Public Consumption	43	45	50	53	57	61	64
Private Consumption	191	205	235	267	303	345	389
Exports	63	64	63	64	64	67	67
Imports	89	101	102	112	120	128	132
Balance of Trade (% of GDP)	-10.1%	-13.7%	-12.5%	-13.4%	-13.6%	-13.1%	-12.3%

	2020	2025	2030	2035	2040	2045	2050
Employment (in m. persons)	27.4	30.8	34.8	39.2	43.7	48.3	53.5
Unemployment rate	10.5%	9.4%	9.9%	10.4%	10.2%	9.9%	9.4%

Domestic Production (in b$)	2020	2025	2030	2035	2040	2045	2050
Agriculture	74	95	127	165	215	279	357
Animal products	6	8	12	17	25	35	47
Coal	0	0	0	0	0	0	1
Crude oil	22	25	28	33	40	50	65
Oil refining	23	29	38	50	68	93	127
Natural gas extraction	12	13	12	14	16	20	26
Gas distribution	1	1	2	3	4	7	10
Transmission and distribution of electricity	187	239	247	293	354	448	570
Water	0	0	0	0	0	1	1
Chemical products	22	29	45	64	93	134	187
Other energy-intensive	62	85	124	174	245	342	467
Electrical goods - Other equipment goods	10	17	24	33	45	61	82
Transport equipment	9	13	20	31	46	68	97

Consumer goods industries - Food	58	77	114	161	227	316	428
Consumer goods industries - Rest	10	12	16	20	27	36	48
Textiles and clothing	51	64	89	119	160	216	286
Construction	51	70	93	125	165	215	274
Transport	37	49	66	89	118	157	205
Communication	18	22	28	35	44	56	71
Business - Financial services	72	91	118	151	193	243	304
Public services	61	79	106	141	185	240	305
Recreational and other services	13	17	23	30	40	53	69
Dwellings	13	15	19	23	29	37	47
Electricity Generation - Coal fired	0	0	1	2	1	1	1
Electricity Generation - Oil fired	18	19	9	5	2	1	1
Electricity Generation - Gas fired	141	165	126	124	121	128	140
Electricity Generation - Nuclear	0	0	0	0	0	0	0
Electricity Generation - Hydro electric	11	14	13	12	11	11	11
Electricity Generation - Wind	4	7	21	31	45	60	78
Electricity Generation - PV	2	4	25	40	61	86	120
Electricity Generation - Other	0	0	0	1	1	0	0

12.3 ISRAEL

Macroeconomic Aggregates (in b.$)	2020	2025	2030	2035	2040	2045	2050
Gross Domestic Product	277	285	294	303	310	318	325
Investment	60	64	66	68	70	73	75
Public Consumption	74	76	78	80	82	85	87
Private Consumption	152	156	160	164	169	173	178
Exports	88	85	80	80	77	76	72
Imports	96	96	90	89	88	89	87
Balance of Trade (% of GDP)	-3.1%	-3.6%	-3.4%	-3.2%	-3.6%	-4.1%	-4.6%

	2020	2025	2030	2035	2040	2045	2050
Employment (in m. persons)	3.7	4.0	4.3	4.6	4.9	5.2	5.4
Unemployment rate	4.6%	4.5%	4.4%	4.4%	4.3%	4.3%	4.2%

Domestic Production (in b$)	2020	2025	2030	2035	2040	2045	2050
Agriculture	11	15	18	21	26	31	37
Animal products	4	5	6	7	8	10	11
Coal	0	0	0	0	0	0	0
Crude oil	1	1	2	4	7	11	18
Oil refining	14	17	20	24	29	36	44
Natural gas extraction	0	0	0	0	0	0	0

Gas distribution	2	3	3	3	2	2	2
Transmission and distribution of electricity	65	79	88	96	107	121	137
Water	4	5	6	7	8	9	11
Chemical products	33	40	47	56	64	73	83
Other energy-intensive	77	93	108	127	147	170	196
Electrical goods - Other equipment goods	10	12	12	14	14	14	15
Transport equipment	3	4	4	4	5	5	5
Consumer goods industries - Food	19	23	29	35	42	51	61
Consumer goods industries - Rest	2	3	3	4	5	6	8
Textiles and clothing	5	6	6	8	9	10	12
Construction	46	57	68	78	91	105	121
Transport	34	43	53	65	79	96	116
Communication	15	18	22	25	30	35	40
Business - Financial services	150	181	213	248	288	333	386
Public services	103	125	146	171	199	231	268
Recreational and other services	19	23	27	32	37	43	51
Dwellings	26	31	36	41	48	55	64
Electricity Generation - Coal fired	18	14	4	3	2	2	2
Electricity Generation - Oil fired	0	0	0	0	0	0	0
Electricity Generation - Gas fired	41	53	60	58	57	57	59
Electricity Generation - Nuclear	0	0	0	0	0	0	0
Electricity Generation - Hydro electric	0	0	0	0	0	0	0
Electricity Generation - Wind	2	4	8	11	14	17	20
Electricity Generation - PV	2	3	9	15	21	27	34
Electricity Generation - Other	0	0	0	1	1	1	1

12.4 JORDAN

Macroeconomic Aggregates (in b.$)	2020	2025	2030	2035	2040	2045	2050
Gross Domestic Product	24	23	23	24	24	24	24
Investment	5	5	5	5	5	5	5
Public Consumption	8	8	8	8	8	8	8
Private Consumption	16	15	15	15	15	15	15
Exports	15	14	13	13	13	13	13
Imports	20	19	18	18	17	17	17
Balance of Trade (% of GDP)	-21.9%	-21.7%	-18.0%	-17.4%	-17.4%	-18.1%	-18.3%

	2020	2025	2030	2035	2040	2045	2050
Employment (in m. persons)	2.4	2.6	2.8	3.0	3.3	3.5	3.8
Unemployment rate	18.5%	17.3%	17.5%	17.3%	17.4%	17.3%	16.7%

Domestic Production (in b$)	2020	2025	2030	2035	2040	2045	2050
Agriculture	3	4	5	6	7	8	10
Animal products	1	2	2	2	3	3	4
Coal	0	0	0	0	0	0	0
Crude oil	0	0	0	1	1	2	3
Oil refining	3	3	3	4	4	5	6
Natural gas extraction	1	1	1	1	1	1	1
Gas distribution	0	0	0	0	0	0	0
Transmission and distribution of electricity	16	19	22	26	31	36	41
Water	1	1	1	1	1	1	1
Chemical products	8	9	10	11	13	14	16
Other energy-intensive	8	9	11	12	14	16	19
Electrical goods - Other equipment goods	1	1	1	1	2	2	2
Transport equipment	0	0	0	0	0	0	1
Consumer goods industries - Food	4	4	5	5	6	7	8
Consumer goods industries - Rest	1	1	1	1	1	1	1
Textiles and clothing	4	5	5	6	7	7	8
Construction	10	12	13	15	17	20	23
Transport	8	9	11	13	16	18	22
Communication	3	3	4	4	5	6	7
Business - Financial services	10	12	14	16	19	22	26
Public services	9	10	11	13	15	17	20
Recreational and other services	1	2	2	2	2	3	3
Dwellings	2	3	3	3	4	4	5
Electricity Generation - Coal fired	0	0	0	0	0	0	0
Electricity Generation - Oil fired	0	0	0	0	0	0	0
Electricity Generation - Gas fired	2	2	2	2	2	2	2
Electricity Generation - Nuclear	0	0	0	0	0	0	0
Electricity Generation - Hydro electric	0	0	0	0	0	0	0
Electricity Generation - Wind	0	0	0	1	1	1	1
Electricity Generation - PV	0	0	0	1	1	1	2
Electricity Generation - Other	0	0	0	0	0	0	0

12.5 LEBANON

Macroeconomic Aggregates (in b.$)	2020	2025	2030	2035	2040	2045	2050
Gross Domestic Product	31	30	30	30	30	31	32
Investment	5	5	5	5	5	5	6
Public Consumption	3	3	3	3	4	4	4
Private Consumption	27	25	24	23	23	22	22

Exports	14	14	14	14	14	14	14
Imports	18	18	16	15	15	15	14
Balance of Trade (% of GDP)	-15.5%	-13.4%	-7.6%	-4.9%	-2.9%	-1.4%	0.0%

	2020	2025	2030	2035	2040	2045	2050
Employment (in m. persons)	2.3	2.2	2.1	2.1	2.2	2.2	2.3
Unemployment rate	6.6%	6.7%	7.8%	8.6%	9.8%	11.3%	13.2%

Domestic Production (in b$)	2020	2025	2030	2035	2040	2045	2050
Agriculture	2	2	3	3	4	4	5
Animal products	1	1	1	1	2	2	2
Coal	0	0	0	0	0	0	0
Crude oil	0	0	0	0	0	0	0
Oil refining	0	0	0	0	0	0	0
Natural gas extraction	0	0	0	0	0	0	0
Gas distribution	0	0	0	0	0	0	0
Transmission and distribution of electricity	15	16	17	19	21	24	28
Water	1	1	1	1	1	1	1
Chemical products	2	2	2	3	4	4	6
Other energy-intensive	5	5	6	8	10	12	15
Electrical goods - Other equipment goods	1	1	1	1	1	2	2
Transport equipment	0	0	0	0	0	0	0
Consumer goods industries - Food	3	3	3	4	5	6	7
Consumer goods industries - Rest	1	1	1	1	1	2	2
Textiles and clothing	1	1	1	2	2	2	3
Construction	5	6	6	7	9	10	12
Transport	2	3	3	4	4	5	5
Communication	2	3	3	4	4	5	6
Business - Financial services	22	24	27	31	35	40	46
Public services	10	12	13	14	16	18	21
Recreational and other services	4	5	5	6	7	9	10
Dwellings	0	0	0	0	0	0	0
Electricity Generation - Coal fired	0	0	0	0	0	0	0
Electricity Generation - Oil fired	16	14	10	6	4	3	2
Electricity Generation - Gas fired	2	4	6	7	9	10	12
Electricity Generation - Nuclear	0	0	0	0	0	0	0
Electricity Generation - Hydro electric	0	0	0	0	0	0	0
Electricity Generation - Wind	1	1	2	3	4	5	6
Electricity Generation - PV	0	1	3	5	7	8	9
Electricity Generation - Other	0	0	0	0	0	0	0

12.6 MOROCCO

Macroeconomic Aggregates (in b.$)	2020	2025	2030	2035	2040	2045	2050
Gross Domestic Product	93	94	101	106	113	119	127
Investment	32	33	35	35	36	38	38
Public Consumption	25	25	26	27	28	29	30
Private Consumption	48	47	50	54	59	64	71
Exports	39	39	37	37	36	36	36
Imports	49	49	47	47	47	49	48
Balance of Trade (% of GDP)	-11.6%	-11.4%	-10.2%	-9.5%	-9.7%	-10.2%	-9.8%

	2020	2025	2030	2035	2040	2045	2050
Employment (in m. persons)	11.5	12.4	13.3	14.2	15.1	15.8	16.5
Unemployment rate	10.2%	9.9%	10.9%	11.4%	11.6%	12.3%	12.4%

Domestic Production (in b$)	2020	2025	2030	2035	2040	2045	2050
Agriculture	25	31	37	45	54	66	82
Animal products	10	12	14	17	21	26	33
Coal	0	0	0	0	0	0	0
Crude oil	0	0	0	1	1	2	4
Oil refining	9	10	13	16	20	26	35
Natural gas extraction	0	0	0	0	0	0	0
Gas distribution	0	0	0	0	0	0	0
Transmission and distribution of electricity	24	29	30	35	41	46	54
Water	0	0	0	0	0	0	0
Chemical products	16	20	25	32	40	51	65
Other energy-intensive	39	48	60	73	91	113	141
Electrical goods - Other equipment goods	5	7	9	12	15	18	24
Transport equipment	4	6	8	10	13	17	22
Consumer goods industries - Food	20	23	28	36	45	55	71
Consumer goods industries - Rest	2	2	3	3	4	5	7
Textiles and clothing	18	21	26	31	38	46	56
Construction	21	27	33	38	46	55	64
Transport	18	21	25	30	36	42	51
Communication	2	2	2	3	3	4	5
Business - Financial services	27	32	38	45	54	64	76
Public services	58	70	84	103	126	153	186
Recreational and other services	3	3	4	5	6	7	8
Dwellings	3	4	4	5	6	7	9
Electricity Generation - Coal fired	14	15	5	4	3	2	1
Electricity Generation - Oil fired	1	0	0	0	0	0	0
Electricity Generation - Gas fired	4	7	7	8	9	6	6

Electricity Generation - Nuclear	0	0	0	0	0	0	0
Electricity Generation - Hydro electric	2	1	1	1	1	1	1
Electricity Generation - Wind	3	4	9	10	11	14	17
Electricity Generation - PV	2	2	7	10	14	17	21
Electricity Generation - Other	0	0	0	0	0	0	0

12.7 TUNISIA

Macroeconomic Aggregates (in b.$)	2020	2025	2030	2035	2040	2045	2050
Gross Domestic Product	42	40	40	40	40	41	43
Investment	8	7	8	8	8	8	9
Public Consumption	9	9	8	8	9	9	10
Private Consumption	32	30	29	29	28	28	29
Exports	22	22	21	20	20	20	20
Imports	28	28	26	25	25	25	25
Balance of Trade (% of GDP)	-14.1%	-14.1%	-13.8%	-12.6%	-11.4%	-11.0%	-10.4%

	2020	2025	2030	2035	2040	2045	2050
Employment (in m. persons)	3.4	3.7	3.9	4.1	4.4	4.5	4.6
Unemployment rate	16.7%	15.5%	15.9%	15.9%	16.0%	16.3%	16.6%

Domestic Production (in b$)	2020	2025	2030	2035	2040	2045	2050
Agriculture	13	14	16	18	21	24	28
Animal products	3	3	4	4	5	6	7
Coal	0	0	0	0	0	0	0
Crude oil	2	2	2	3	3	3	3
Oil refining	1	1	1	1	1	1	1
Natural gas extraction	0	0	0	0	0	0	0
Gas distribution	1	1	0	0	0	0	0
Transmission and distribution of electricity	15	16	14	14	14	15	17
Water	0	0	0	0	0	0	1
Chemical products	5	5	6	7	9	10	13
Other energy-intensive	12	14	16	19	22	27	33
Electrical goods - Other equipment goods	2	2	3	4	4	5	6
Transport equipment	2	2	2	3	3	4	4
Consumer goods industries - Food	6	7	8	9	11	13	16
Consumer goods industries - Rest	2	2	2	3	3	4	4
Textiles and clothing	7	9	10	11	13	16	19
Construction	6	7	9	11	13	15	17
Transport	6	7	8	9	11	12	14
Communication	1	1	1	1	1	2	2

Business - Financial services	20	23	25	29	33	38	44
Public services	12	13	15	16	19	21	24
Recreational and other services	0	0	0	0	0	1	1
Dwellings	0	0	0	0	0	0	0
Electricity Generation - Coal fired	0	0	0	0	0	0	0
Electricity Generation - Oil fired	0	0	0	0	0	0	0
Electricity Generation - Gas fired	15	16	10	8	7	6	6
Electricity Generation - Nuclear	0	0	0	0	0	0	0
Electricity Generation - Hydro electric	0	0	0	0	0	0	0
Electricity Generation - Wind	1	1	2	3	3	4	5
Electricity Generation - PV	0	0	2	4	5	5	5
Electricity Generation - Other	0	0	0	0	0	0	0

12.8 TURKEY

Macroeconomic Aggregates (in b.$)	2020	2025	2030	2035	2040	2045	2050
Gross Domestic Product	677	720	779	817	853	898	934
Investment	178	176	165	173	175	184	192
Public Consumption	117	128	139	150	160	172	183
Private Consumption	383	423	486	507	531	550	565
Exports	193	191	179	179	177	181	177
Imports	195	197	191	191	191	189	183
Balance of Trade (% of GDP)	-0.2%	-0.9%	-1.6%	-1.5%	-1.6%	-1.0%	-0.7%

	2020	2025	2030	2035	2040	2045	2050
Employment (in m. persons)	29.3	30.8	32.5	34.5	36.2	36.8	37.1
Unemployment rate	13.9%	14.5%	14.3%	14.7%	14.9%	13.3%	11.8%

Domestic Production (in b$)	2020	2025	2030	2035	2040	2045	2050
Agriculture	64	76	92	106	122	138	156
Animal products	16	18	22	26	30	35	40
Coal	3	4	5	6	6	7	7
Crude oil	5	6	7	9	10	13	16
Oil refining	33	42	53	65	80	99	121
Natural gas extraction	5	13	16	20	25	30	36
Gas distribution	0	0	0	1	1	1	1
Transmission and distribution of electricity	286	353	432	524	602	709	812
Water	6	7	9	10	12	13	15
Chemical products	89	111	138	168	205	252	307
Other energy-intensive	302	361	422	514	618	754	907
Electrical goods - Other equipment goods	43	56	69	86	105	123	144

Transport equipment	59	69	80	94	112	137	163
Consumer goods industries - Food	95	118	150	180	216	257	302
Consumer goods industries - Rest	10	12	16	19	23	27	32
Textiles and clothing	128	162	202	241	292	357	429
Construction	135	154	168	203	241	278	320
Transport	182	226	273	323	381	451	531
Communication	25	31	38	44	52	60	70
Business - Financial services	369	444	532	618	715	818	929
Public services	140	170	202	234	270	312	356
Recreational and other services	65	81	100	118	138	160	183
Dwellings	3	4	5	6	6	7	8
Electricity Generation - Coal fired	102	115	167	200	193	207	205
Electricity Generation - Oil fired	0	0	0	0	1	1	1
Electricity Generation - Gas fired	87	103	68	83	94	108	121
Electricity Generation - Nuclear	0	0	4	3	3	3	3
Electricity Generation - Hydro electric	55	50	45	38	30	26	20
Electricity Generation - Wind	18	37	50	59	80	97	123
Electricity Generation - PV	7	8	29	36	61	77	92
Electricity Generation - Other	10	11	14	16	17	18	23

ABOUT EMEA

The Euro-Mediterranean Economists Association (EMEA) is a Barcelona-based regional think-tank established in 2012 that serves as a leading independent and innovative policy research institution; a forum for debate on the political and socio-economic reforms in Mediterranean and Africa; and promoter of actions and initiatives that fulfill objectives of sustainability, inclusiveness, regional integration and prosperity. It strives to contribute to the rethinking of the Euro-Mediterranean and Africa partnerships in view of the new dynamics of an emerging multi-polar world and amidst of protracted crises. EMEA has a large network of economists, high-level experts and institutional partners (research institutes, think tanks and universities) in the Euro-Mediterranean and Africa. EMEA builds on the collaborative research network MEDPRO (funded by the EU's Seventh Framework Programme (2009-13) and provides forward-looking thinking and political and socio-economic integrated analyses on the Euro-Mediterranean region. EMEA is also the promoter and co-funder of the Euro-Mediterranean Network for Economic Studies (EMNES), co-funded by the European Commission (DG NEAR) between 2015 and 2019. EMNES is a regional network composed of 30 institutions and more than 100 experts and researchers in the Mediterranean region. From January 2020, EMEA coordinates EMNES.

The Euro-Mediterranean Network for Economic Studies (EMNES) aims to provide a renewed vision for socio-economic development in the Mediterranean region, mainly focussing on employment creation, social inclusion, sustainable development and regional integration. It performs economic and policy research, exploring the pillars of inclusive and sustainable economic models in the Euro-Mediterranean region, along the following **research areas**:

1. Institutions and institutional reforms;
2. Private sector, micro, small and medium sized enterprises and social business development;
3. Entrepreneurship and innovation;
4. Human capital development, education, labour markets and migration;
5. Demographics, health and social protection;
6. Macroeconomic policy , inequality and social inclusion;
7. Inclusive and sustainable finance;
8. Regional integration, trade, investment and infrastructure;
9. Energy, water, environment and sustainable development;
10. Euro-Mediterranean partnership;
11. Scenario analysis and foresight;
12. Other evolving research areas.

EMNES is a network of research institutions and think tanks from Algeria, Belgium, Egypt, France, Germany, Greece, Italy, Jordan, Morocco, Slovenia, Spain, Tunisia, Turkey and the UK. Between 2014-2019, EMNES was co-funded by the European Commission – under Grant Contract N° ENPI/2014/354-488 and EMNES Partners and Associates. EMNES is built on four core principles: independence, excellence, policy relevance and a deep knowledge of Euro-Mediterranean affairs.