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Energetics of Arab Countries in the Light of the Green Economy Challenges

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ABSTRACT

Renewable/alternative energy sources (RES), which are often referred to as “green energy” and are intended to create a new generation base, are now the object of close attention in almost all countries of the world. The growing effect of the use of these sources is noted in Europe, the USA, China, India and in a few other countries, but with varying degrees of success. The Arab region does not remain aloof from this direction, although, for obvious reasons, it is more committed to hydrocarbons and conventional energy than others. But persistent conservatism in relation to fossil fuels is inherent not only in Arab society. Even countries that do not have vast oil and gas fields find it difficult to part with traditional energy sources. And yet, the Arab world receives a very serious competitor in the form of green energy, which in the future will have to win back its niche in electricity generation in the Arab part of the international economic space in a rather tough confrontation. Against this background, the alleged rivalry in the Arab region still looks more nominative than real and does not cause much concern in the Arab East, which is now experiencing much more complex political and socio-economic problems.

Keywords: arab countries; renewable/alternative energy sources; green economy; solar and wind energy; nuclear power station; hydrogen energy; hydropower

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EMERGENCE OF GREEN ECONOMY CHALLENGES AND MODERNITY

The idea of global modernization of production assets, socio-economic relations and environmental support of this highly spatial process (which proved to be extremely topical over time) was born as a response to the dangerous challenges of different etiology. They have emerged as the aftermath of serious causes that have provoked imbalances, contradictions and conflicts in the most sensitive points of socio-economic growth of various States and were originally built as hotbeds. Then they began to merge into a whole phenomenon, until they were actualized so that they evolved indeed (of course, in one way or another) into a clear threat to all humankind.

The need to take measures against the spread of extremely negative manifestations of economic and other forms of activity of different genesis is now being pointed out by multiple warning signs, which indicated, above all, the increasing pressure on natural resources. Pressure is exerted on them by excessive consumption and the wide use of techniques and methods of work, inherent in an industrial technological order, which today is becoming increasingly hostile to wildlife.

This model, however, continues to exist, despite the fact that the material carriers of industrial ideology in the world's scientific literature are often seen as leaving. But warnings about the dangers of such order are quite loud today in the advanced industrial states, the potential of which allows, one

way or another, to stop particularly acute undesirable consequences in areas of critical contact between the interests of man and nature. This moment, however, should not be exaggerated, as here there is also no full balance, and global change affects the leaders of the industrial world, forcing them to participate actively in efforts to defuse environmental issues.

Therefore, the whole topic, in the big scheme of things, continues to be an undisputed maxim. The situation is such that the paradigm shift of development occurs not at once, but has a length in time and space, occupying for a relatively long period. After all, the previously intensively accumulated economic potential of the morally obsolete extractive and processing industries is now gradually receding only in industrialized states, providing free space for the material and technical base of the future technological order. In developing countries, including the Arab ones, the inertia of the past continues to accumulate, which remains dominant.

Under such circumstances, it is unlikely that in the foreseeable future (5–10 years) the global process of modernization will be able to become universal, in terms of the accumulation of quantitative and qualitative indicators. Most probably, another kind of development is more likely, in which this process will gradually evolve from sporadic to frontal, extending to developing countries, which currently operate mainly in the mode of “catching-up development” and still stay rather far away from approving new and latest achievements of science and technology.

Against this background, the degradation of various components of the ecosphere and biosphere is becoming increasingly visible and aggressive so, that there is no doubt that, how advancement is being made in global processes under the influence of antagonism between human and natural factors.

Environmental degradation observed in some niches and becoming persistent is the result of many causes, but the main generators

of threats to a balanced regime of interaction between nature and human communities have become at least three. The first is the growth of demographic indicators, very rapidly increasing since the second half of the last century, which, in turn, put the survival of human society on the global agenda in the context of the enormous impact of the anthropogenic factor on the condition and internal dynamics of the environment. The second represents accumulation of negative “charge” generated by “black” industry in all its manifestations, so as a result, the wildlife has approached a critical threshold. The third one is manifested in atmospheric anomalies that threaten the normal functioning of human capital, and reproduction in the agricultural sector, especially in areas most prone to heat or freshwater scarcity.

There are other reasons that contribute to the destabilization of conditions, necessary to maintain the environment already at the local level, and varying in their impact on the natural environment. Some, for example, spread to relatively small areas of water, as happens from time to time with “red tides” in the Persian Gulf area, when living organisms die from lack of oxygen due to the growth of microscopic algae. Others have wider impacts on land, with long-term impacts associated with the rapid movement of thousands of tons of sand by wind, and as a result, large agricultural areas in a number of Arab countries are taken out of circulation.

It is clear that reliable funds have not yet been found to relieve painful trends on a global and local scale. There is no panacea for natural disasters, which are increasingly showing their strength in different parts of the world. No State or society can be protected from severe shocks due to natural disasters, which are capable of inflicting hard-to-recover damage on the material production, physical assets and population of any country.

Besides natural phenomena, arising spontaneously and unregulated, there are phenomena of a different order. The role of



the anthropogenic factor mentioned above is common knowledge. It acts no less stringent than natural, due to the well-established nature of modern production forces with a hydrocarbon component, and cannot be instantaneously supplanted to the far periphery of the modern interests of human society.

Even States with advanced technological capabilities, although more advanced than others, now have significant assets in the industry, running on oil, gas and its derivatives. Therefore, their aspiration to new energy sources is relevant, as they consume huge masses of fossil fuel and other minerals, which habitat hazards are already beginning lessened, but not eliminated in all manifestations.

This is likely to explain the emergence of the green growth theory in the Western countries, which is directly related to the appeal to cleaner energy sources, the invention of innovative materials with predetermined properties and implementation of more knowledge-intensive and less costly ways of interacting with natural potential in the economy and elsewhere in order to provide at the same time the most gentle attitude to the outside world and the environment.

MODERN ARAB SOCIETY AND GREEN GROWTH

Understood that without a change in the energy base, the transition to new technology model and green growth is unlikely. In any case, it is unlikely that this growth will be as dynamic even for industrialized nations, which relatively quickly managed in the mid-1970s to switch to energy-saving technologies, caused by, as is known, sharp increase of soaring hydrocarbon prices (that followed the fourth Arab-Israeli war) and nationalization by Arab oil-exporting countries of extractive industries in their countries. Then through difficult negotiations between OPEC and the International Energy Agency, by improving the elements of the productive forces of the

industrial stage, the urgent measures taken by the Western States to save energy, etc., developed countries have generally managed to tackle the problem of energy costs and have even established a framework for their post-industrial development.

As a result of optimization of liquid hydrocarbon use, the environmental situation in the West has improved significantly, which raised hopes for the invention of new, non-standard approaches and technologies, which are now being implemented, of course, with varying degrees of success, in green economy concepts. Some of these developments can be seen quite clearly in the advanced economies, which are very active in promoting the latest technologies in some sectors of their economic activity.

In the Arab region, this process is not yet very visible, even if the Arab monarchies of the Persian Gulf are consider initiating with some success, rather bold experiments, which could serve as a basis for further development of new economic models, based on innovations in agricultural technology and tools, that used to reformat the production machinery of this group of Arab States. But their example is extraordinary, because they have so-called excessive financial savings, allowing them to maneuver capital simultaneously in agriculture, industry and tools, which other Arab countries lack, even those that also produce oil and gas.

Movement in the green corridor in the Arab region depends on many factors, the combination of which is different even for those of its countries that have roughly the same development parameters, characteristics of the economic structure, views on modernization, depth of participation in the globalization processes etc. All this creates individuality in approaches to decisions that determine their future well-being. This means that there will be a widening gap between the countries of the Arab region in the move towards green technologies, and the survivors of the recent Arab Spring, a number

of countries, were accompanied by devastating civil wars. And their more fortunate neighbors, that survived the Arab Spring without extra economic losses and maintained production, while establishing new economic assets and supporting sustained economic growth in these difficult circumstances. For the other Arab countries with average level of development (e.g., Syria) and even more so for the poorest ones (e.g., Yemen, Sudan, or Somalia), losses are proving to be a huge problem today. Before developing the subtle and expensive technologies of green growth, such states will have to focus their efforts on bridging the gap even from their decades-long Arab neighbors, because on this and, according to some estimates, for an even greater period, they have been set back in their social and economic development by the dramatic events of their recent history, and only then can they get opportunity to catch up with the far ahead neighbors in the region.

Unlike the hard-to-calculate Arab losses (due to the events of the Arab Spring and then the attack of the Islamic terrorists) a related group States (mostly from the Arabian Peninsula) were able to achieve notable success in the initial introduction of innovative industrial and agrarian technologies. It is clear that even in this advanced group of countries in the Arab region, technological advances are still not beyond the scope of pilot projects, which, of course, operate, but are difficult to take root in the long-standing reality of a number of countries. This happens for many reasons, from the difficulty of mastering the latest technologies to the shortage of qualified personnel and from management problems to pricing policy and so on.

It is no wonder, therefore, that indicators of Green Economy has remained relatively unchanged throughout the Arab region over the past 10–15 years, staying at about 1% of the world (corresponding figure for the USA — 6%, China — 5%, the EU — 11%). This is in contrast to the fact that the Arab

region loses 95 billion dollars annually due to environmental degradation [1]. If these funds could be mobilized by the Arab countries to create, at least, the basic pillars of green growth, they would significantly raise their authority in this area.

The Arab Governments are well aware that the achievement of sustainable socio-economic development and green growth depends on the effectiveness of investment and the national economy as a whole, the quality of human potential and the ability to mobilize creative energies in it, inculcating culture and scientific knowledge, introducing modern skills and competencies, increasing productivity and competitiveness of the economy as a whole. However, these theoretical considerations have not been adequately addressed in Arab society, staying in a situation, which have traditionally impeded economic and social progress in the region allowing economic stall, problems with quality management at different levels, “wild” globalization, and corruption, etc.

Meanwhile, everything related to the ecology and the problem of the survival of society in a fragile ecosphere, remains a contentious issue for a number of Arab countries, especially those in armed conflict. These circumstances are equally painful in terms of resolving both socio-economic and natural problems. Both require huge financial investments to modernize productive forces and prevent further habitat decline, not only by improving the environment itself, but also by introducing modern “clean” technologies, capable to guarantee the safety of Arab society as a whole.

This aspect has assumed considerable importance precisely at the current stage of development of the Arab region, because it had suffered that time severe damage to agricultural land and desert areas, which, in their natural fragility, are very sensitive to mechanical impacts from the movement of heavy military equipment, carpet bombing,



when partially or completely lost already not very abundant greenery, freshwater sources, coastal marine waters, etc.

In these circumstances it becomes clear that just borrowing and copying pioneer processes, emerging among the leaders of the industrial world are unlikely to create such a stimulus in the Arab region, that would help it confidently enter the area of modern innovative green practices, relying only on its own strength, which also has serious traditional and inertial potential. It is clear that the latter could not help but affect the social and economic order of the entire Arab society. With such a background, the society has for decades (since the first wave of energy and raw materials crisis in the early 1970s), been accustomed to the situation when some countries (mainly large oil and gas exporters) use their revenues from the export of hydrocarbon raw materials to secure the basis of their financial well-being and successful economic development, while the others (e.g., Egypt, Syria, Tunisia) consider them as a significant part of their national budget incomes.

ARAB REGION: TRADITIONAL AND GREEN ENERGY

For objective reasons of world development, Arab region became one of the important units that intertwining the global processes in the world economy, that closely related to the increasing importance of energy, growing role of the Arab countries in the world fuel and energy complex, as well as its enormous impact on their industrial system of productive forces and transformation of socio-economic structures. It maintains its position today as the world's main fuel tank. Almost 50% of proven and up to half of projected liquid fuel resources in the Arab countries are focused, as well as nearly a quarter of the world's natural gas reserves, with the lowest extraction costs due to the unusually high natural returns of these minerals. Even with the forced exploitation of shale oil and gas, Arab countries still produce almost one third

of the world's oil production and about half of the world's oil exports.¹

However, modern trends towards green habitats and environmental protection based on a qualitatively new state of the productive forces are introducing the world in an era of profound changes in technics, technology, economy and other spheres. Signs of these shifts are visible not only in the newest green ways of production, but also in contradictions, created by traditional energy, which, while remaining one of the pillars of modern economic growth, at the same time has the status of the most "dirty" production agent, harmful to the environment and undermining biodiversity. This problem is extremely relevant to the entire Arab region, and especially to the part of the Persian Gulf region that is overburdened with mining infrastructure and exists as a complex of nature-hazardous industries related to the industrial extraction and processing of hydrocarbon raw materials, whose harmful properties are further exacerbated by adverse climatic conditions.

Attention to alternative sources of energy for the new generation base is now being given in practically all Arab countries, and not only in the Persian Gulf area, but also in Morocco, Egypt, Tunisia, Jordan, etc., where new realities meet understanding, although they take root not without difficulties. After all, the Arab space is not uniform, and the countries are markedly differentiated by a set of indicators, including energy supply, composition of generation capacities and energy policy tasks.

In recent years, however, many Arab countries have seen a marked increase in green economy activity, that, in the future, could help to defuse the current situation, which is really threatening the very viability of the region. From this point of view, it repeats the world dynamic, although with some differences. So, 51% of electricity in

¹ Calculated at: BP Statistical Review of World Energy 2020.

the world from renewable energy comes from wind, while almost 25% is produced by solar equipment[2]. Meanwhile the Arab countries have focused on solar power, that irradiates the Arab region excessively, with the potential to generate green energy and use it to replace chemically harmful fuels.

The Arabian monarchies are at the forefront of the process of acquiring solar and wind energy, oil and gas-related financial well-being remains the mainstay of socio-economic progress. The transition to solar and wind power successfully falls on their desire to radically modify their economic model, without, of course, losing the image of the energy storage of the world. It is therefore clear that the latest green technologies are attractive to this group of Arab countries, on the one hand, highly dependent on oil and gas sales and on the other, not interested in depleting their reserves. Because they understand that, the demand for natural hydrocarbons will be sustained in the world in any case, then not in the form of fuel, but as raw materials for petrochemical and oil refineries.

SOLAR AND WIND ENERGY IN ARAB COUNTRIES: HOPES AND PROBLEMS

The above considerations have led Arab countries to adopt in 2013 The Pan-Arab Strategy for the Development of Renewable Energy by 2010–2030, that was to be a road map by which they would be able to bring together all the countries of the region in three strategic directions, the main of which aims at development of alternative energy that could provide two others, including maintenance of environmental viability and prevention of contamination of groundwater and terrestrial freshwater sources.²

As planned by 2030, absolute leaders in terms of installed capacity are expected to be Algiers — 5 thous. MW, Kuwait — 9.3 thous.

MW, Dubai — 5 thous. MW, Morocco — 4.6 thous. MW, Tunis — 1.5 thous. MW, Jordan — 0.9 thous. MW. Saudi Arabia, really, has set a peak of 2040 with 41 thous. MW which is the height, staying apparently beyond the reach of all other countries. Against this background, the figures for Syria is modest and represented by 3.3 thous. MW to 2030, especially given the decade-long war with ISIS (banned in Russia terrorist organization), depletion of the country's resources and the need for extensive reconstruction. The same applies to Libya (1.2 thous. MW), Sudan (1.1 thous. MW), which are not socio-economic and politically successful States, and are "the face of daunting challenges". Iraq's relatively low performance is also questionable — 0.3 thous. MW, Yemen — 0.1 thous. MW, Palestine and Mauritania — less 0.1 thous. MW, in which the situation remains very difficult, and sometimes crisis.³

Understandably, the figures reflected inflated goals, which were established at the very beginning of the Arab Spring and the subsequent catastrophe for a number of countries. However, to date, there is no indication that any adjustments have been made. However, if something like this happens tomorrow, then even minimal upward changes in the above road map are unlikely to be fully realized, because these countries are constantly having trouble in filling their budgets, and obtaining foreign aid is irregular and problematic.

In addition, the enthusiasm of most Arab countries for the development of solar and wind power has waned as technological and financial problems arise and become tangible for them during the real development of renewable energy. So, firstly, the fact that, for example, the capacities for obtaining solar energy are relatively small, can be perceived as a serious limiter (the average solar power plant is about 20 times smaller than the

² Pan Arab Strategy for Development of Renewable Energy Applications 2010–2030.

³ Pan Arab Renewable Energy Strategy 2030. Roadmap of Actions for Implementation/IREMA; 2014.



average TPP). Secondly, solar panels occupy large areas with low efficiency (CPA) (1 sq. km of solar “farm” on average for a year produces electricity, the amount of which is equivalent to the use of only 1 million barrels of oil, i.e. 158.7 thous. tons of oil) [3].

And therefore, they are unable to meet the energy needs of large energy-intensive industries (what is, for example, typical for Arabian monarchies, Algeria, Egypt or Iraq), and also “occupy” too large territories from the so-called small countries (for example, Kuwait, Qatar, Bahrain, Jordan, Lebanon or Djibouti), that simply cannot afford “luxury” to allocate tens, or even hundreds of square kilometers of their territory for solar panels.

It has also been experimentally found that the energy efficiency of solar panels decreases by 0.45% with each additional degree of heating from sunlight (the optimum heating temperature of the solar panel is 25°C) and may lose up to 10% at temperatures above 40°C. In this case, special cooling equipment is required, which, in turn, consumes some of the electricity generated by these panels, which reduces their efficiency by another 0.6%.⁴

Remind that in most Arab countries, especially those located on the Arabian Peninsula, even in the winter months, the daily temperature rarely drops lower 25°C, and in summer, even in the shadows, often comes 45–48 °C and is annually accompanied by winds “khamsin” (from the Arabic word “fifty”). This wind blows from the rocky Arabian deserts for 50 days, lifting thousands of tons of minute sandy dust containing massive amounts of silicon particles, which damage the working surfaces of solar panels, clogged in microscopic gaps of mechanisms, as well as requiring daily and labor-intensive cleaning of the working surfaces of these panels. Given that it is only cost-effective to use the latter on an industrial scale if they

are installed in large areas, such operations require significant additional costs.

It is not surprising, therefore, that today’s boom in solar energy in the Arab region says more of intentions than of the Arab transition to this new energy source. It seems obvious that in 10–15 years the solar energy in the region will not be able to compete with the traditional energy source. It is more realistic to assume that it may increase its share in total electricity generation in the region a little, but only as a complement to the existing fuel capacity, not to displace the latter from its positions.

Less attention has been paid in the Arab countries to the development of wind energy, whose share of total electricity generation in the region has been steady at less than 0.1% and even has a certain downward trend. The reasons for this are many, but the main ones include, for example, the high cost and low efficiency of the production of this type of energy. Thus, installation of one well in an oil or gas field or the construction of two wind turbines costs about the same, but if the latter produce only 0.7 barrels of oil per hour (in energy equivalent), a field of even relatively expensive shale gas gives 10 barrels per hour. In addition, if it costs 0.5 dollars to store 1 barrel of oil or its equivalent in natural gas, that storage of energy from windmills in batteries costs 200 dollars.⁵

In addition, the above-mentioned “khamsins” lead to accelerated wear of windmill mechanisms/, and the burning sun causes overheating of the power lines, making them less profitable. Another major barrier to the use of wind turbines, particularly in the small Arab States, is that infrasound noise that they produce during their work negatively affects the health of people, and therefore it is prohibited to install them near population centers.⁶

⁴ Institut de la Francophonie pour le Développement durable. La Planification énergétique sectorielle; 2020.

⁵ Vesti. Finance. 25.09.2019.

⁶ “UNIDO in Russia” Bulletin. 2020;(4).

For these and a number of other reasons, wind power is gaining a niche in the overall energy mix of the Arab region with a high degree of uncertainty, despite the fact that the total wind balance of the region is considered to be one of the largest in the world, thanks above all to Egypt, Morocco and Tunisia, which are world leaders in the potential of wind energy [4].

Another reason why the introduction of solar and wind power is rather slow, not only in the Arab region but also in many other countries of the world, are long payback periods, equal to 6 years on average for solar and 1 year for wind. But, if we take into account the need to install additional systems on them to stabilize generation and compensate for drawdowns (lack of sunlight at night or calm, etc.), then these periods increase for solar power plants up to 16 years, and for wind power plants — up to 6 years (for comparison: a power plant operating on natural gas pays off in 2 weeks of continuous operation, on coal — in 2 months, hydroelectric power plants — in 2–3 years)

DO THE ARAB COUNTRIES HAVE A “HYDROGEN FUTURE”?

Given the problems of solar and wind energy, Arab countries past few years placed expectations on hydrogen, which, due to its high reactivity, is easily bonded to other elements, and therefore occurs almost everywhere on Earth. Although hydrogen is not yet considered a renewable energy source, it can be a practical energy host. Thus, it allows eliminating the main shortcomings of renewable energies, i.e. dependence of the latter on external conditions and their inability to store energy. In addition, environmental protection is considered the main argument for the introduction of hydrogen into modern energy, since only water vapor is emitted to the atmosphere at the sites of the energy use of hydrogen produced by hydrolysis. In addition, hydrogen can be used for direct electric current generation by fuel elements.

Despite these positive aspects of the introduction of hydrogen (which is also 2.57 times the calorific value of methane), using of the latter deters its use in a compressed or liquid state, exceptional ability to penetrate the structure of various materials (causing them to crack, which creates additional requirements to the conditions for its safe storage), and cost of obtaining.⁷ The ability of hydrogen atoms to penetrate any micro fracture is extremely dangerous, as it explodes at the slightest contact with air, and therefore the risk in any accident is extremely high, which limits its use as a substitute for gasoline in internal combustion engines, gas turbines and heating systems. Transporting hydrogen through conventional trunk pipelines is also impossible because of its ability to destroy their walls.

Its limitations in large-scale use of hydrogen bring up-to-date scientific and technological progress: currently 96% of hydrogen is derived from fossil fuels (methane is the most suitable raw material) and only 4% obtained from water electrolysis.⁸ As a result, hydrogen (other than hydrolysis) is not yet able to solve the climate problem because it requires the extraction and processing of natural gas, why 5.5 tons of greenhouse gas are emitted to the atmosphere to produce only 1 ton of hydrogen from methane, which should be captured and recycled of in some way. For example, by injection into geological formations, which increases the cost of hydrogen-based energy by 20–40%.⁹

However, as mentioned above, hydrogen is convenient to use as a reservoir of excess energy produced by all known types of its generation. This is the reason why the rich Arab countries (especially the Arabian monarchies) are interested in investments in hydrogen experiments, currently underway

⁷ URL: cyberleninka.ru/article/n/vodorod-kak-dobavka-v-toplivo/viewe

⁸ URL: proatom.ru/modules.php?name=News&file=article&sid=9770

⁹ URL: gasprom.ru/press/news/report/2020/pure=hydrogen/



mainly with hydrogen fuel elements in industrialized States, in the hope (if such experiments succeed) of benefiting from them.

OTHER TYPES OF ARAB ENERGY

Arab countries have not ignored their attention to nuclear energy, the advantages of which lie in the huge energy intensity of uranium raw materials, potential for reuse after regeneration and the absence of a greenhouse effect. Of course, there are serious concerns about this type of energy in the Arab region because of the tragedies in Chernobyl and Fukushima.

The first Arab country to attempt to establish a nuclear power plant was Libya, which, as early as 1977, concluded an agreement with the USSR to construct and equip a Nuclear Research Centre in Tadjoura, where the Soviet reactor with highly enriched uranium of 10 MW was delivered, and then became operational in 1981. Libya also negotiated the construction of two nuclear power plants with the Soviet Union, but unsuccessfully, because of US and UK sanctions, feared that Libya would use Soviet technology to build nuclear weapons.¹⁰

In 2009, with the assistance of South Korea, work on the construction of a nuclear power plant began in the UAE, equipped with four power units with third generation reactors, each with a capacity of 1,400 MW. The first power unit was launched in April 2021. The UAE authorities plan that after the commissioning of all power units, this NPP will be able to provide at least 25% of the country's electricity needs.¹¹

In November 2015, the governments of Egypt and Russia signed an agreement on the construction of a NPP, equipped with the four power units with capacities of 1200 MW each with generation reactors "3+". Planned construction deadlines end was 2028, then

were moved to 2030 due to disruptions caused by coronavirus.¹²

While nuclear power in the Arab region is still in its early stages of development, hydropower has been developing there for a long time, and today its share in the general Arab generation is 4.5–4.6%.¹³ However, this figure is almost entirely the result of the work of such large hydropower stations as the Aswan High Dam in Egypt and the Euphrates in Syria, built with the assistance of the USSR. Other Nile or Euphrates and Tigris HPP projects since the mid-1980s are blocked by the contradictions between Egypt, Ethiopia and the Sudan over the distribution of the Nile water, as well as the disagreement between Turkey, Syria and Iraq, which are not yet in a position to agree on the distribution of the river waters of the Euphrates and the Tigris. Therefore, the contribution of hydropower to the green economy of the Arab region as a whole is not increasing, but even tends to decline in relative terms.

THE FUTURE OF GREEN ARAB ENERGY

It should be noted that the energy market in the Arab region remains heterogeneous in terms of organization to date, depth and breadth of reform and structuring of its segments, established priorities and the degree of State intervention in governance processes. The same applies to the RES market, especially as their proportion is still very low. In other words, alternative electricity generation in the Arab countries has yet to become a stand-alone industry and operates under conditions determined by the conventional energy market.

In a number of Arab States, the conventional electricity market is fully liberalized. Others are in an extended privatization process. Third limit themselves to partial deregulation, leaving the function

¹⁰ URL: tvzvezda.ru/news/201709200924-89gw.htm

¹¹ URL: news.myseldon.com/ru/news/index/248648603

¹² URL: news.myseldon.com/ru/news/index/257563844

¹³ IRENA. International Renewable Energy Agency. League of the Arab States. Overview of Development.

of electricity producer, but freeing from the obligation to maintain distribution networks and do transport energy. Of all the Arab countries, in fact, only Morocco legislates private generation based on renewable energy. In Abu Dhabi and Dubai, despite their very vigorous promotion of green energy projects, the issue of making its producers “independent” is still under consideration. It seems appropriate, however, to believe that expansion of the alternative energy “niche” will eventually lead the Arab countries to the need to give this market a clearer organizational form.

It is understandable that the Arab region is reasonably well endowed with a more than sufficient range of renewable energies and has ample opportunities to use them for its socio-economic development. Positive momentum for green energy upturn is the state interest in such projects, the availability of credit in Arab and international banks, the gradual reduction of prices for green technologies. The emergence of local medium- and small-scale entrepreneurs and investors is now providing an additional stimulus, who have started to deal with simple technical tasks, for example, installation and maintenance of home solar panels, construction of simple single-source power grids with the prospect of embedding them in a more integrated cycle, etc.¹⁴

But can't discount counter-constraints, for example, limited access to microfinance, government's unwillingness to work with small and medium-sized energy businesses, adverse impact of oil prices on the competitiveness of renewable energy, low market demand to recent, etc. In the Arab countries the lack of long-term marketing plans for the promotion of green energy products is an urgent problem on domestic, commercial and industrial markets and insufficient government support for green

energy in its fight against conventional competition [5].

It is clear that the development of the energy green component of the Arab energy cannot be uniform in all directions. It is also clear that major oil exporters and some relatively advanced economies will be closer to the final destination in other Arab countries (Egypt, Algeria, Morocco), who have made the difficult transition to a market economy in previous decades and operates with defined flawed. Nevertheless, such countries had a chance to start diversifying their energy systems.

Other, less prosperous, Arab countries are unlikely to meet the green energy targets, because it is unlikely that the severe social and economic problems of the present and future stages of development will be overcome within a short historical time-frame, improve macroeconomic efficiency, implement structural economic reforms, laying the groundwork for the transition to innovative energy technologies.

Other obstacles stand in the way of reformatting the Arab energy sector, for example, a general heightened internal political turbulence, capable, as the events of the Arab Spring have shown, of escalate into violent political and armed conflicts at any moment. If something like this were to happen in the foreseeable future, it would be further proof that the Arab region is not yet able to break away from fragmentation, and each member country develops according to its internal algorithms, which, for historical, economic, social and other reasons, are difficult to defies rational regulation.

Against this background, the development of new types of generation can hardly be considered by the Arab countries as an absolute measure of their socio-economic development. Rather, it is the next task, at least in the initial stages of transforming the national energy sector. Naturally, these countries attach great importance

¹⁴ Pan Arab Strategy for the Development of Renewable Energy Applications 2010–2030. The Secretariat of the Arab Ministerial Council for Electricity.

to borrowing the most advanced green technologies from abroad. But the main challenges for them are not simply to mechanically transpose imported gains to local, highly specific conditions, and adapt them to the environment. Because as interesting as it may seem for the Arab

countries, implementation of green energy principles and such technologies, at the current level of scientific and technological progress, have not yet been able to solve the problems of socio-economic development and environmental conservation, facing the Arab States.

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