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Turning Energy and Water Crisis into opportunities: The creative inventions of Start ups in South Med countries*

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Executive Summary

Energy and water security, two essential resources for human and economic development, are now more interdependent than ever. The impact of the climate change in the South Med region has revealed the need to act quickly and efficiently to mitigate negative effects and to address many challenges associated with increasing water scarcity and inefficient energy consumption. The pandemic provides a strategic opportunity for countries to reassess priorities and in particular to give more space to renewable resources (IEA, 2021). This is all more relevant in the Mediterranean region, which includes some of the most attractive markets in terms of renewable energy (RECAI - Renewable Energy Country Attractiveness Index).

The objective of this policy brief is to assess the status of the water and energy sectors in the South Med region and to highlight the opportunities in terms of entrepreneurship and innovation, through the example of three start-ups from Algeria, Lebanon, and Morocco that benefited from THE NEXT SOCIETY project (funded by the European Commission). The transition to an environmentally and socially responsible model in the energy and water sectors must take advantage of innovative entrepreneurship. This paper analyses the motivations of Mediterranean entrepreneurs to create their start-ups, their innovations, the main challenges they faced and draws recommendations to support innovation and accelerate industrial and technological development in this region.

1. Introduction

In the South Med region, many countries are suffering from shortages in both water and energy. The latest statistics highlight the difficulty of Southern Mediterranean countries in meeting their future demand for electricity, while it is expected that the region will experience a doubling of their energy demand by 2040 (IAE, 2021; IPCC, 2021) and additional challenges

that include demographic pressure, the acceleration of urbanization, the effects of global warming, and the depletion of resources.

Implementing the energy transition thanks to renewable energies and energy savings is thus crucial. Solar energy represents a great opportunity for this region since it is located in desert areas, which offers possibilities for the development of large solar farms (Bhutto et al., 2014; Abdmouleh et al., 2015). Solar electricity, in addition to being the most available and most "sustainable" source, can also meet the demand for the production of drinking water, which represents up to 12% of the current electricity consumption in some countries.

Regional initiatives have emerged to develop renewable energies through public / private partnerships and association agreements. For example, the BENBAN solar park in Egypt is among the largest solar centres in Africa with a total capacity of 1650 [MWp](#) which corresponds to an annual production of approximately 3.8 TWh. In Tunisia, five solar power plants, with a total capacity of 500 MW, are being set up in the Tozeur region. In Algeria, a plan was adopted in 2021 to develop green hydrogen and launch a construction project of 1,000 megawatts of solar energy. Last but not least, Morocco is the most advanced Mediterranean country in terms of renewable energy, with a target of 42% of renewable electricity production in 2020, and 52% in 2030.

Regional cooperation can support the adoption of cleaner technologies and reduce the carbon intensity in electricity production by nearly 30% (IAE, 2021) by allowing the development of renewable energy projects that are too large to be absorbed by the electricity system of a single country.

2. The performance of the South Med region in the energy and water sector

The Covid-19 pandemic has had a predominantly negative effect on the energy market. Its repercussions include reduction in the energy consumption, decrease in investment in this sector, lower fossil fuel prices, and changes in the geopolitical dynamics, which have at least delayed the process of the energy transition. Today, the only energies that have not been negatively impacted are renewable energies. In fact, their global use across all sectors increased by about 1.5 percent in the first quarter of 2020 compared to the first quarter of 2019, and renewable electricity generation in particular increased by nearly 3 percent (IEA, Global Energy Review 2020).

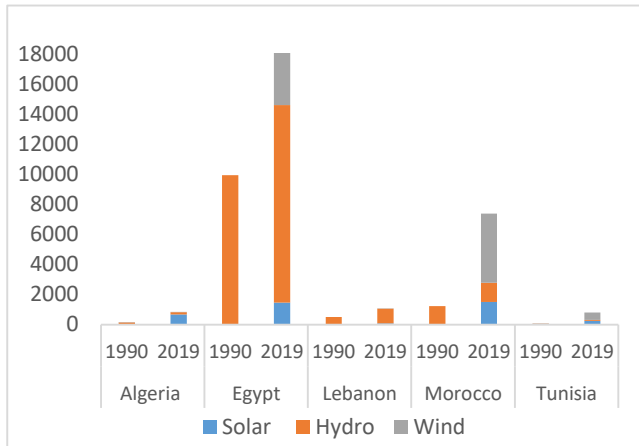
Across the Mediterranean there are strong disparities in the production of renewable energy despite a strong dependence on oil and natural gas (Algeria and Egypt). Egypt, Morocco and Tunisia are the most advanced countries. The vast potential for renewable energy development in this region is beginning to be exploited. Thanks to the fast expansion of wind, solar photovoltaic, and solar thermal (IEA, 2020), renewable electricity production in these countries has increased by more than 40%, over the past decade. Not only have the three countries implemented measures to reduce the carbon intensity of their economies, but they have set renewable energy targets for 2030. Algeria (0.7 GW in 2019) hopes to reach 22 gigawatts (GW) of renewable energy, Morocco (3.74 GW in 2019) 10 GW, Egypt (5.5 GW in 2019) 54 GW by 2035 (IAE, 2021).

Figure 1 shows the evolution of energy supply by source in 1990 and 2019 in some Mediterranean countries. We see the diversification of supply source in countries such as Egypt and Morocco and, to some extent, Algeria and Tunisia.

In addition, investment in the renewable energy sector has increased by 10-20% yearly since 2008 to reach 109.4 million dollars in 2019 (Figure 2). More than 2.6 billion dollars have been invested in renewables over the past decade. While investments in renewables and energy

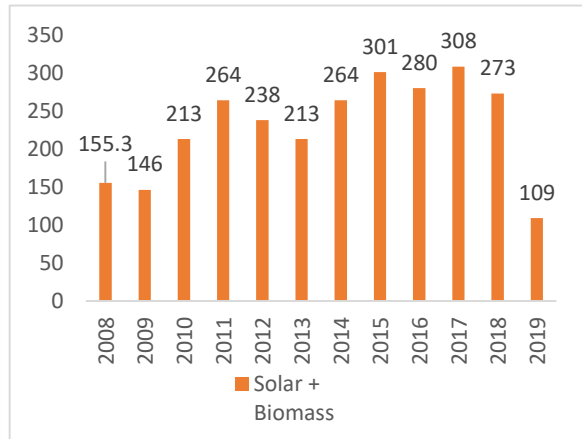
efficiency should suffer less from the Covid-19 crisis than in conventional energy, their decline calls into question the global trajectories of energy transition and access to energy.

Figure 1: Renewable energy supply, by source in GWh (1990-2019)



Source: IEA, 2021.

Figure 2: Renewable energy investment in Mediterranean countries, 2008-2019 (in million of \$)



Source: IEA, 2021.

Code ISO: DZA (Algeria), EGY (Egypt), ISR (Israel), LBN (Lebanon), MAR (Morocco), TUN (Tunisia), TUR (Turkey)

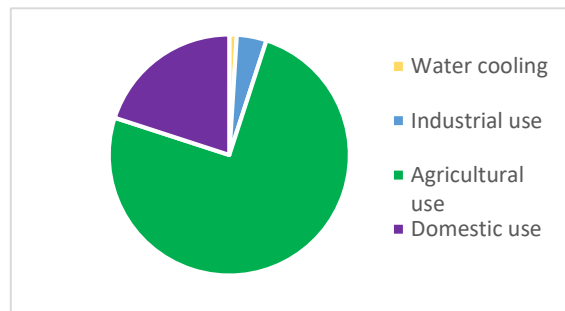
The energy transition journey of Mediterranean countries is influenced by different factors. On the one hand, hydrocarbon-exporting countries (Algeria, Egypt) are exposed to falling prices (Griffiths, 2017) but can gradually reduce fossil fuel subsidies (Coady, Parry, Sears, & Shang, 2015). On the other hand, countries like Egypt, Morocco, and Tunisia are heavily dependent on imports to meet their energy demand. Despite different socio-economic and political contexts, they all share similar challenges in terms of climate change and energy transition.

Water scarcity is another challenge that is faced by the South Med region. The region includes one of the world's water poorest countries: Jordan ranks second in terms of water-poverty (FAO, 2021) with only 125 cubic meters of water available per person per year in 2020. Groundwater reserves are declining in line with population growth and the rising seawater is worrying, especially in the Nile Delta where salt is gaining ground. In Tunisia, almost 95% of arable land is affected to some extent by desertification. Climate change and water scarcity in the Mediterranean will increase the effect of various conflicts and challenges.

Water resources in the Mediterranean are not only rare but also unevenly distributed: in some regions they do not correspond to human and environmental needs. The use of water by sector in the Mediterranean area is heterogeneous (Figure 3). The regional average consumption of the agricultural sector reaches 76%, with differences between countries. The implementation of the United Nations' "Sustainable Development Goals" in the Southern Mediterranean is of crucial importance to make our region sustainable, liveable and long-term resilient. Dynamic entrepreneurial ecosystems can contribute with innovative solutions that can help mitigate the negative impacts of climate change. It is clear that technology,

digitalization and the development of Internet of Things (IoT) will become an important part of the equation. For example, smart homes and with smart devices contribute to the reduction of energy and water consumption. Minimizing the consumption of water, through reducing water losses and optimizing water quality is also essential.

Figure 3: Total water consumption rate among the main sectors in South Med countries (2020)



Source: FAO, 2021.

3. Finding solutions to reduce energy and water consumption and address climate change challenges through IOT

Many entrepreneurs have turned sustainability challenges into opportunities by providing innovative concrete solutions to ongoing problems. From gadgets that reduce energy consumption and water waste to detectors that raise alerts about potential floods, these entrepreneurs have used their knowledge and creative capacity to find solutions to challenges in their communities through their start-ups.

This paper focuses on the experience of three entrepreneurs supported by European Union funded project THE NEXT SOCIETY who have created innovative start-ups in the energy sector with a specific relevance to water issues, as shown in Table 1. The mentoring and the bootcamps provided by this initiative helped them to put their projects into action, expand their networks, establish road maps, improve their business plans and business models, create new partnerships, exchange knowledge and experience with peers, as well as to change their commercialization strategies and improve the brand image of their activities.

Their motivation in the creation of their start-ups is mainly environmental, safety, economic, and cultural. For Q-ZAN, water is becoming scarce and energy consumption strains household budgets in Lebanon. The start-up therefore offers to reimburse and automatically calibrate the temperature for shower water in order to avoid a great loss of both electricity and water. Thanks to this IOT, Q-Zan algorithm allows to heat the water to the desired temperature while eliminating the cooling process and associated wasted water.

GOUTRA, based in Algeria, offers a similar innovation to help consumers reduce their consumption of water. Its products reduce domestic water consumption through a system based on an electromechanical device connected wirelessly to an analysis platform. The analysis platform allows the users to identify their patterns of consumption, by displaying the details of their consumption in real-time and thus get them to eliminate the squander of water by approximating their traditional consumption to an ideal consumption.

Finally, INDAR who is based in Morocco focuses on the impact of floods on populations, economies, and local development. The project enables risk managers to be alerted in advance of upcoming floods and provides them with useful information so that they can take appropriate measures to reduce risks, including alerting people at risk, protecting key infrastructure, and evacuating vulnerable people. This model is based on a mobile technology system very strongly based on hydrological algorithms capable of identifying abnormal rain situations.

The main challenges faced by these can be summarised as follows:

- **Financial:** It is clear that developing new technologies requires fairly substantial financial support. However, procedures and time needed to access funding are still considered a main challenge for many entrepreneurs in the South-Med region. Financial support, when available, is often fragmented. Local or national competitions can help raise the necessary funds in addition to entrepreneurs own savings.

- **Commercial:** Access to locally sophisticated products and machines is still a challenge in some countries of the South-med region as they are still in their early phase of innovation and knowledge-based technology. Some entrepreneurs faced the difficulty of unavailability of certain electrical parts and they had to resort to online orders which generated some delays in the development of the project (e.g. Q-ZAN)

- **Market Access:** As start-ups, it is always difficult to penetrate the market with a new product. To solve this problem GOUTRA, opted for two solutions: developing basic products similar to products already on the market in order to facilitate access to the market, and collaborating with AGIR, the national agency of water resources management, for the implementation of pilot projects.

- **Professional qualification:** Some South Mediterranean countries still seem to be on the sidelines in terms of availability of skills related to new technologies. The Algerian start-up GOUTRA has thus developed skills internally until eventually finding qualified workers.

- **Legal and institutional** issues represent the most important group of obstacles mentioned by entrepreneurs, especially administrative burdens and legislative obstacles. Entrepreneurs have to cope with complexity, uncertainty, lack of communication on new legislative standards, and long administrative deadlines. To overcome these obstacles, Q-ZAN hired a lawyer specializing in patent registration.

All entrepreneurs interviewed have been affected by the Covid-19 pandemic, implying slowness in the process of producing and disseminating information. They all believe that perseverance, having the right connections, being well-prepared, finding synergies with good partners are key conditions for success. They highlight the need for an innovation vision and the need to recognize it as the main factor of accelerating development.



Table 1. List of start-ups interviewed



GOUTRA is a water-saving system based on an electrotechnical device adapted to the output of all types of faucets, to ensure the telemetry and the display of water consumption in real-time on faucets. Connected wirelessly to an analysis platform. This system allows us to learn the ideal consumption. The start-up is based in Algeria.

<https://web.facebook.com/Goutra>

<https://www.linkedin.com/company/goutra/?viewAsMember=true>



Q-ZAN is an IOT device that aims to reduce power and water waste by automating the water heater. The project was implemented using sensors connected to an Esp8266 module by its role connected to Firebase (Google's serverless architecture) in which both communicate with the mobile application. The project is based in Lebanon.

www.facebook.com/qzann



INDAR is an early warning flood system based on mobile technology. The project is a mobile-based system connected to the cloud with models and adapted hydrological algorithms able to survey abnormal rain situations. Once risky situations are predicted, the system alerts people on their mobile phones, risk managers and provides them with key data to screen, on remote mode, the situation. The system also allows the sharing of information and warning with key partners to better manage risky situations. The project is based in Morocco.

www.prev-dev.com

https://www.youtube.com/watch?v=_dgKBVJ5iW0

Conclusion and Policy Recommendations

In a globalized and complex context, meeting energy needs, water scarcity and combating climate change requires cross-border cooperation. If governments are to be successful in promoting affordable and cleaner sustainable energy locally, nationally, and internationally, engaging with partners around the world, especially in the Middle East, is essential.

The Covid-19 pandemic has not created challenges or new trends in the energy sector - it has simply accelerated existing trends through the digital revolution and the development of green energies. This health crisis will make energy transition policies stronger. However, Mediterranean start-ups are faced with significant challenges in terms of competitiveness, sustainability, internationalisation and capacity to innovate, which require new solutions to ensure their growth and their sustainability.

In addition, the greening of the economy and the valuation of natural assets can bring economic benefits and environmental for the Mediterranean region. Several recommendations can thus prove relevant for the Mediterranean countries:

- Acceleration of new initiatives supporting sustainable entrepreneurship and business, to create a favourable environment and facilitate access to new markets. This will create economic opportunities and generate jobs for young people and women especially. The focus

must be on training, financial support, market stimulation, technology transfer and protection of intellectual property.

- Identification and implementation of educational policies and effective measures to support the use of digital technologies and the development of green energy. Indeed, access to digitization is crucial, and the share of the population connected to the Internet significantly impacts the potential of IOT in the energy and water sector.

- Implementation of industrial / technological clusters and cooperation programs (for example exchange programs, internships, close collaboration between educational establishments and foreign investors, etc.) between countries (European Union, Asia, etc.) and sectors (education, administration, energy-water nexus) to accelerate the transfer of technologies, know-how, and skills. This transfer must be at the heart of local content and energy transition policies (Tsani et al, 2021a).

- Development of investment to support traditional and more technological solutions in order to improve the availability of water and the efficient use of water resources. For example, the desalination of seawater is increasingly used to combat the scarcity of water in areas that are arid and semi-arid in South Med countries. However, known disadvantages in terms of environmental impacts, on marine ecosystems close to coasts and energy needs with the associated CO2 emissions needs to be considered. Promising new technologies, particularly solar ones, are being developed which will potentially reduce greenhouse gas emissions and costs.

- Development of dams for the storage of water or hydraulic energy. Indeed, this technique exists in most countries and rivers are diverted for water management purposes in some countries. Even though large dams often generate social and environmental impacts, such as the destruction of river ecosystems or wetlands and the loss of aquatic biodiversity, the forced displacement of people and the loss of cultural resources. These impacts can be reduced, for example through built-up wetland habitat, fisheries management and recreational activities.

- Development of intraregional renewable electricity trade and connectivity. Indeed, these new energy economies essentially need two characteristics, namely the establishment of intraregional electricity connectivity through better regional integration (Euromed for example), in order to maximise the advantage of cost and reliability of its renewable energy, and progress in the export of electricity.

- Establishment of healthy and stable regulatory frameworks. Investors, particularly in Egypt, are concerned about repetitive changes in feed-in tariff regimes and fossil fuel subsidies. In Morocco, their major concern is the lack of an independent regulatory authority. The lack of an evolved regulatory environment adapted to the current economic situation continues to hinder investment in renewable energy.

- Setting up national or regional green investment banks appears to be the best way to incorporate a market multiplier effect and use tools to reduce financial risks. The basic principle is that to reduce financing risks, a green bank relies on the credibility of the state. A given number of long-term capital needs of the renewable electricity market can be met by a growing market segment of green bonds. Other means can also be applied to correct shortcomings in the clean energy financing ecosystem. An Islamic, Shariah-compliant, green debt-like instrument called the green sukuk is particularly relevant to the region, as its characteristics appear to match the renewable energy sector.

References

- Abdmouleh, Z., Alammari, R. A., & Gastli, A. (2015). Recommendations on renewable energy policies for the GCC countries. *Renewable and Sustainable Energy Reviews*, 50, 1181–1191.
- Bhutto, A. W., Bazmi, A. A., Zahedi, G., & Klemes, J. J. (2014). A review of progress in renewable energy implementation in the Gulf Cooperation Council countries. *Journal of Cleaner Production*, 71, 16-180.
- Coady D., Parry I., Sears L., & Shang B. (2015). How Large Are Global Fossil Fuel Subsidies?. *World Development*, 2017, vol. 91, issue C, 11-27.
- FAO (2021). *AQUASTAT Core Database*. Food and Agriculture Organization of the United Nations.
- Griffiths, S. (2017). A review and assessment of energy policy in the Middle East and North Africa region. *Energy Policy* 102, 249–269.
- IEA (2021), World Energy Outlook 2021, IEA, Paris (<https://www.iea.org/reports/world-energy-outlook-2021>)
- IEA (2020). *Global Energy Review 2020*, IEA, Paris (<https://www.iea.org/reports/global-energy-review-2020>)
- IPCC (2021). Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change In Press.
- Kung, C.C., Zhang, L., Chang, M.S., (2017). Promotion policies for renewable energy and their effects in Taiwan. *Journal of Cleaner Production*, 142, 965-975.
- World Bank (2021). *Database online*.

Entrepreneurs who participated in this study

Mustapha Lakhdari – Goutra, Algeria



Mustapha Lakhdari is specialist and certified Windows Embedded Compact with many experiences in embedded systems. He is a public works Engineer with certificate in entrepreneurship. Mustapha is also the founder of Goutra.

Oussama Mallak – Q-zan, Lebanon



Oussama Mallak is a production engineer. He holds a bachelor's degree in engineering from Beirut Arab University. Oussama is extremely enthusiastic about technology and startups, he is the founder of Q-zan. His project aims to decrease the power and water consumption of the regular water heater by automating it

Mohamed Tabyaoui – Indar, Morocco



Laureate of Carnegie Mellon University, Pittsburgh, USA, Mohamed Tabyaoui has more than 16 years of experience in management and public policies upgrading, He is the creator of the INDAR solution, an early warning system for floods. He is also the founder of the PREV DEV the start-up that markets and deploys the INDAR project. INDAR has won many prizes and has been considered as an innovative solution by WIPO, UE, Rolex Enterprise Award, AFD, Swiss Cooperation, CCG ...



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