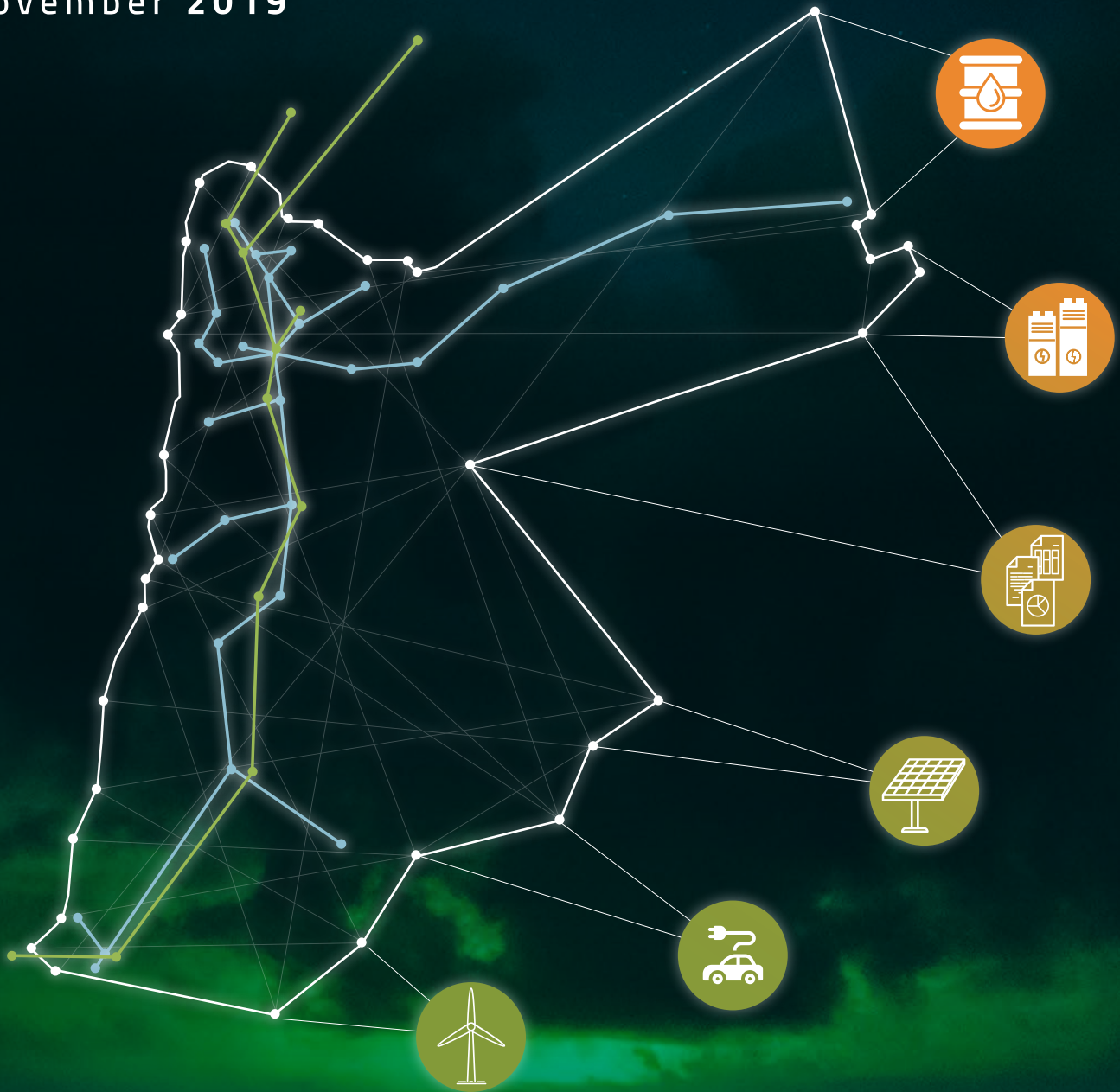


Recommendations for Energy Sector Strategy

November 2019



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In cooperation with



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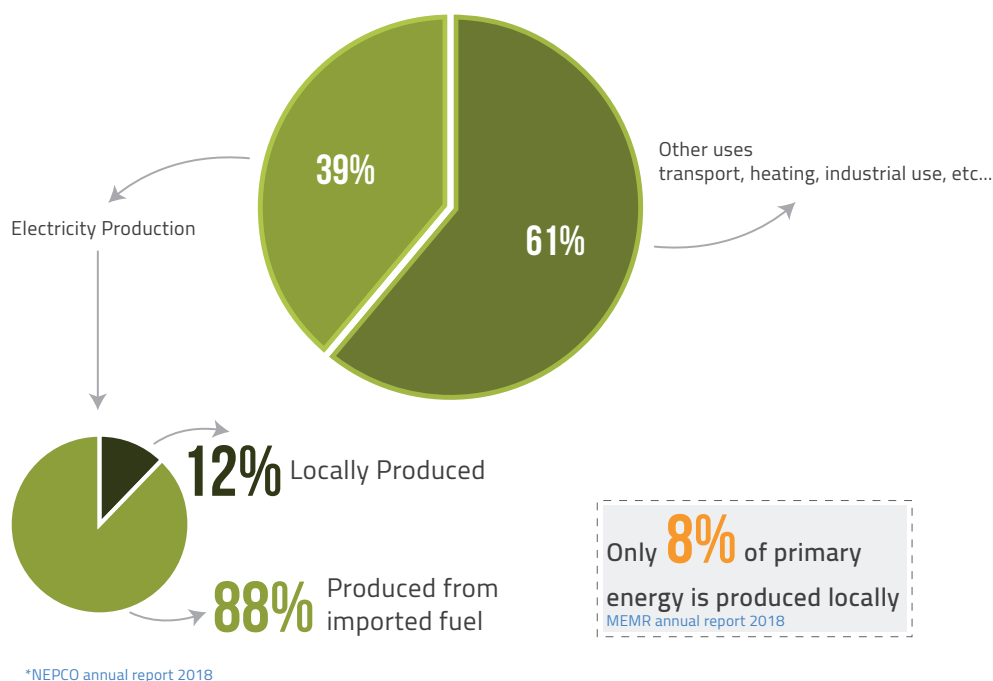
Recommendations for Energy Sector Strategy

This paper presents general reflections and recommendations on the Energy Sector Strategy 2020 - 2030, in an attempt to express different opinions and convey the voices of all those concerned in this sector, from diversified backgrounds, with different experiences and perceptions, a matter that is important in strategic planning that shapes the future of this vital sector. This work is being carried out, as the strategy is being updated, void of real guarantees of reaping benefits from the accumulated experiences of all stakeholders. Hence, it is important to clarify the following, before submitting the recommendations:

Expressing the opinions of the private sector, non-governmental agencies and academic institutions - which this paper namely aims for, is being carried out using a scientific, specialized and scrutinized methodology, whereby stakeholders are included and participate in building scenarios that are preferentially compared through open national discussions, to render a strategy that is truly based on accumulated local experiences, alongside global and scientific trends. We aspire that things will continue to go in this direction, with the concerned agencies.

Strategic direction 2020 - 2030

A strategy should be built according to clear directives, that accommodate all dimensions towards realizing it within its set timeframe. We affirm and based on previous experiences and in accordance with the four strategic pillars (security of supply, self-dependency, diversification of resources, lowering costs), that a strategic directive should aim to **"maximize local resources share in the total energy mix"**. Adopting similar strategic directive will support the achievement of those four pillars, over and above the positive political, economic and social impact manifested by job creation, continued supply, mitigation of financial burdens to citizens and government, while increasing investment opportunities and enhancing the infrastructure.





Status quo

- 39% of the primary energy is being used to generate electricity and the 61% of the remaining energy is going straight to transport, heating and industry, so that the locally produced electricity share is 12% out of the electricity mix, i.e. the local energy share does not exceed 4.7% of the current total primary energy.
- Jordan is committed to long-term agreements to purchase fuel - particularly gas and, produces electricity from electricity generation power plants out of fossil fuel. The electricity grid is going through some complications that are connected to increased capability alongside electricity generation and limited grid capacity.
- Jordan is currently in Phase I of four phases of an energy transition. RE shares are still small and grid expansion and retrofitting has not yet been accomplished, currently the RE sector is not growing much due to investment insecurity due to a lack of clear policy directions.¹

Methodology

Local resources namely represent **renewable energy resources from solar, wind and bioenergy, in addition to energy efficiency and energy saving**, as basic principles to optimally utilize all these resources. Based on the aforementioned, the work to maximize the local resources share, is summarized as follows:

- Increase the electricity generation share from local resources.
- Increase the dependency of electricity on the total energy mix by adapting cross sectoral electrification strategy.
- Increase dependency on renewable energy within heating and industrial applications.
- Work on energy efficiency and energy saving, as a priority across all sectors.

Mobilizing these recommendations from theory to application calls for the following:

1. Dealing with existing problems that are partially standing in the way of going for local energy that currently represents:

1.1 The Excess in Generation Capacity

Dealing with this problem as a temporary one, which will peak in 2020, and can be overcome by committing to these steps:

1.1.1 Incentivizing increased dependency on electricity energy, by:

A. Reviewing electricity tariffs, taking into consideration:

- Imposition of day and night tariffs for the agricultural and industrial sectors to incentivize consumption during production peak times from renewable energy resources.
- Connect the electricity tariffs with the geographical areas to promote and encourage investment in different areas.

B. Work on the level of legislations that contribute in 'electrifying' all sectors, such as transport and housing, by:

¹) Given that Morocco and Jordan have started the energy transition similarly promising and Morocco in Phase II by now. Development of a Phase Model for Categorizing and Supporting the Sustainable Transformation of Energy Systems in the MENA Region, Wuppertal, 2018.



- Lowering or waiving taxes and customs fees for hybrid cars, and all electric technologies that can replace fuel-dependent ones.
- Amend the Government Procurement Policy, to focus on electricity-dependent technologies within the framework public sector electrification.
- Work on facilitating spread of electric vehicles charging stations, while adopting lower tariffs during electricity excess times.

C. Abolish dependency on diesel for heating purposes, particularly across the public sector; replace it with solar-dependent heating systems (photovoltaic cells, solar thermal energy) and electricity.

D. Connect to neighbouring countries electricity grids.

E. Invest in smart grids.

1.1.2 Lower conventional generation capacities by clarifying the basis of preferential economies, among all the different choices of energy, based on economic considerations and strategic goals, inclusive consequent financial impact on expanding the role of the private sector in generating electric energy, while pointing out relative solutions and suggested recommendations.

A. Study traditional and renewable power plants based on cost-benefit analysis and classify them according to least cost in terms of capacity charge.

B. Study economic feasibility to early-retire some of the conventional power plants.

C. Incorporate storage projects into the electricity system, as soon as possible, whether through batteries storage or pump storage, after studying their respective economic feasibilities and environmental impact to such solutions.

D. Abstain from renewing any retired or soon-to-retire station in the next 5 years; replace any retired capability with an equivalent in terms of renewable energy and storage units.

E. Encourage incorporation of concentrated solar energy systems in generating electricity energy (with storage capabilities).

1.2 Unstudied quantities of contracted fuel

A. Give the opportunity to industries to benefit from excess imported gas, at cost, and reduce taxation.

1.3 Restructuring the electricity sector

It is essential and of utmost priority to move from the single-buyer model to a model that increases the competitiveness of the generation and distribution sectors, while mitigating public sector born risks. Whether the upcoming model is dependent on wholesale competitive markets or other models, it is necessary to do the following in order to overcome the negativity of the existing model:

A. Open the market for competitiveness.

B. Increase flexibility within upcoming contracts in a way that increases competitiveness.

C. Work on short-term pricing methodologies, towards operating electricity power plants.



2. Energy efficiency and rationalizing priorities

- Work on activating energy efficiency as an obligatory step in legislations that are related to building and selection of equipment, as a primary requisite to install any energy system.

3. Think further than supply and demand

Moving towards production of energy from decentralized resources² is a matter of time. Many energy markets in the world are witnessing core changes in their electricity systems structures and changing roles of all those concerned. The consumer is a part of the generation matrix, and supplies the grid with energy. The consumer is able to play a proactive role in storage, by charging his electric vehicle battery or home batteries - as an example. This applies to distribution and transmission companies, whose roles are restricted to managing the electric grid, in the next phases, at a time generation, storage and distribution matrix is going to become more complex, so that its management would require reliance on advanced technologies.

This comprehensive change will open new horizons to the industry, information and communication technology, businesses and education. This calls for working on:

- Prior preparation for this change by working on research and development policies across academia, promoting information and communication technology (ICT) across the energy sector and forwarding the support and businesses towards this emerging sector.
- This work calls for anchoring the needed legislative frameworks to deal with this topic within the energy sector, constituting a start to work on across different sectors.
- Study global markets and possibilities that Jordan can benefit from the Carbon Trade Exchange (CTX) and Renewable Energy Certificates (RECs).

4. Cross-sector coordination

Increase institutionalized cooperation across directly related sectors to the energy sector, such as the transport, industry, environment, water and agriculture sectors, to guarantee joint strategic directions and avoid conflicting decisions that do not serve public interest nor advancement in the energy and economy sectors.

2) Decentralized Solar in Jordan: Streamlining administrative procedures to maximize socio-economic benefits, 2019.

Road map						
Dealing with existing problems that partially stands in the way of going for local energy			Energy efficiency and saving priorities	Think further than supply and demand	Cross-sector coordination	
The Excess in Generation Capacity		Unstudied quantities of contracted fuel	Restructuring the electricity sector			
Suggested solutions						
Motivating increased electricity consumptions	Decreasing conventional generating capacities	Incorporate new industries	Converting from the single buyer model	Activating energy efficiency as an obligatory step in the related legislations to building and selection of equipment	Promoting information technology (IT) in the energy sector	Work on increasing institutionalizing cooperation among mainly related sectors to the energy sector
Review the electricity tariffs, taking into consideration: Working on imposing night and day tariffs to the agricultural and industrial sectors to incentivize consumption during production peak times Connecting the electricity tariffs with the geographical areas to promote and encourage investment in different areas.	Study conventional power plans cost-benefit analysis for the purpose of classifying them according to least cost in terms of Capacity Charge	Give industries an opportunity to benefit from imported gas at cost	Open the market for competitiveness	Activate energy efficiency as a primary requirement to installing any energy system	Work on research and development policies in academia / educational institutions	Come out with strategic directives that gathers all the sectors
Work on the legislations that contribute to 'electrifying' all sectors such as transport and housing Increase taxes / customs on non-electrical devices, and reduce same on all electric technologies Change the Government purchasing policies to focus more on electricity-reliant technologies	Work on incorporating storage projects in the electric system, as soon as possible, whether it is storing using batteries or pumping storage		Increase flexibility in contracting		Support and direct businesses towards this emerging sector	
Abolish dependency on diesel, particularly by the government sector, and replace it with accredited solar heating systems						
Connect to neighbouring countries electricity (electric linking).	Abstain from renewing any retired or soon-to-retire station in the next 5 years; replace any retired capability with an equivalent in terms of renewable energy and storage units.		Work on short-term pricing methodologies		Put forth the needed legislative frameworks for the energy sector	
Invest in smart grids.	Study economic feasibility to early-retire some of the traditional power plans.				Study the possibility of Jordan benefiting from scientific trading / Carbon Trade Exchange (CTX) and Renewable Energy Certificates (RECs)	
	Encourage incorporation of concentrated solar systems (with storage capabilities)					



Annex 1: Renewable energy and supporting national economy

This part presents the most important political, economic and social dimensions accompanying entry of renewable energy into the Jordanian energy mix, which we hope will be taken into consideration in case of any decision that is related to this vital sector:

Energy security and self-dependency

The importance of self-dependency lies in its being a real opportunity for not repeating what has happened during the interruption of the Egyptian gas that incurred Jordanian treasury losses of about 5 billion Jordanian Dinars³, since that scenario at that time can happen again as long as sources of energy are coming from outside Jordanian land. Furthermore, the geographical surroundings of Jordan have been witnessing deeply rooted changes that impacted it. The essence of self-dependency is reliant on adopting renewable energy as a strategic option and not a mere phase option, by looking at it as a fully integrated political and economic choice, and not from the perspective of partial technologies, in order to fully and appropriately handle this sector with all that it entails in terms of responsibilities.

Local energy resources

Natural resources such as solar and wind are among the natural Jordanian fortunes; using these resources is no longer a luxury but possible following the reduction of related technologies prices, in addition to successful scientific experiments in this regard.

The question remains on the preferential decisions on energy resources spending. The decisions that seems to choose expenditures on energy resources outside Jordan. Abstaining from converting abundant solar and wind energy natural resources into liquidity assets and national savings by limiting investments in renewable energy, is unacceptable, which stands against the evolution and development of this field.

Structuring the energy sector

Restructuring the energy sector in Jordan has always contributed in one way or another to the existing challenges, so that the energy security crisis is visualized as a financial crisis of the National Electric Power Company (NEPCO), and planning for the future of Jordan is carried out through this narrow perspective.

The accumulated losses of the National Electric Power Company (NEPCO) reached 21 times its paid capital by the end of 2018⁴. It seems that fixing this clear defaulting on the administrative level of the company starts by disconnecting the authorities of this company and delegating some of it to the private sector.

With a political will in place, and by building institutions that forwards incentives in the right direction, it is possible to convert to a model that makes use of these 'blessings of resources.

The National Electric Power Company (NEPCO) has a golden opportunity to play a regional role by becoming a geographic mediator of an electrical interconnection among the countries of the region. By specializing on the grid development, expansion and connection into neighbouring countries, NEPCO could become profitable in

3) 4,963 Billion Jordan Dinars according to NEPCO Annual Report, 2018.

4) National Electric Power Company Annual Report, 2018.



exporting electricity, instead of monopolizing the transmission. It could also change its business model into a service providing electricity company for renewable energy for example, a transformation many National Electricity Company went through in energy transition companies.

Flexibility is a priority

Accelerating energy technologies changes are imposing flexibility on the energy systems operators and managers in the world as a basic principle to increase ability to deal with whatever is new. Our denial and delays to change will not stop it. The smart grids, storage systems and self-dependency - even on the level of small systems, is the strong upcoming trend. We can choose to be ready for it, as opposed to pay the cost of waiting which will increase with time.

Deformity in the electricity tariffs

The electricity tariffs suffer from deformities that do not reflect real costs and give subsidies that are not well studied. Dealing with such deformities requires gradual solutions. Renewable energy may present a starting solution to this problem, unless this is properly addressed by mitigating the size of subsidized segments and supporting them towards adoption of renewable energy systems. The cost of keeping these segments reliant on the electricity grid is far more than supporting them through renewable energy systems.

Using "Fils Al-Rif" to install renewable energy systems to benefiting families from the national social welfare is a step in the right direction. This is the mainly targeted group, from amidst the subsidized segments. This will contribute to their adoption of renewable energy, reduction in subsidies, and indirectly⁵ correct the electricity tariffs deformities, while taking into consideration the physical and technical impact on distribution companies, and working with them to commit to existing agreements.

Renewable energy

The size of local energy in the total energy mix

In mid-2019, Jordan produced about 12% of its electricity from renewable sources; while electricity production represents 39%⁶ of the total primary energy resources in Jordan.

Cost of renewable energy

Despite all that has been said in terms of rise in electricity production costs from renewable energy, recently issued figures in the National Electric Power Company (NEPCO) Annual Report, 2018, showed that the average purchasing price for renewable energy reached 70.25 Fils/kilowatt hour (kWh) for wind energy and 80.14 Fils/kilowatt hour (kWh) for solar energy compared to 81.8 Fils/kilowatt hour (kWh) of produced electricity from fuel and gas. It is expected to have a reduction in the purchase price of renewable energy in upcoming years, coinciding with Connecting direct proposals with lower cost Phases II and III Projects.

5) Renewable Energy Sector in the Context of Solving Electricity Market Challenges, EDAMA, 2018.

6) Fuel consumed in electricity generation in 2018 = 3729.3 thousand tons of oil equivalent (Annual Report, National Electricity Company, 2018), and total primary energy consumed in 2018 = 9712 thousand tons of oil equivalent (Energy Brochure, Ministry of Energy and Mineral Resources, 2019)



Carbon trade and funding opportunities

Jordan has committed to decreasing Greenhouse gases (GHG) emissions that cause global warming at 14% by 2030, out of which 1.5% is a decrease that is not supported by any funding or financial facilities.

Market methodologies and depicted upon carbon trade in Article 6 of Paris Agreement, stipulate the promotion of voluntary cooperation when it comes to Nationally Determined Contributions (NDCs), so that through the usage of international mitigation results (such as: clean development methods, Carbon Trade Exchange / CTX and Renewable Energy Certificates /RECs) whose prices and handling norms are set by global markets, conditional to avoiding duplication in country accounts.

The private sector and attracting investment opportunities

The private sector has worked during the first phase of renewable energy sector development, by forming a local capital in the form of infrastructure, productivity and human capital, through active partnerships with foreign investors and attracting funding from international financing institutions, which was far from being an easy task, given high involved risks. The private sector was therefore able to let go of the technical experience provided by the foreign investor, so that it started to play its aspired role towards more competitiveness.

The direct proposal stages are reliant on transparent policies and clear competitiveness in sharing privileges - so to speak, and here there is a question on the role of the State in economic conversion and long-term development, that every country that does not have conventional energy resources and is affected by fuel prices, should do.

International financing institutions have 70% of the existing renewable energy projects, which makes it necessary for the government to commit to the stipulated provisions in the energy purchasing agreements; this cannot be waived given its impact on the overall investment, international confidence in Jordanian institutions and the latter's earnestness in encouraging investment.

The economic and social dimensions to renewable energy

Employability

The sector cannot be looked at as a black box without looking at the 543⁷ licenced companies, up until October 2019, that are employing more than 7,928 employees, up until end of 2016, over and above 4 times this figure in terms of business, supportive services, banking sectors, legal services, contractors and service industries that were created and connected to this sector, which would be an underestimation of the real role of the sector, and short-sightedness on the level of cost and savings on the socio-economic levels.

Attracting funds and investment

The size of the investment in the renewable energy sector is estimated at 4 Billion US\$ by 2020. This came at a time when Jordan was facing difficulties in attracting capital and creating new job opportunities, given the existing challenge of unemployability.

On the other side, renewable energy contributes to directing the hard currencies reserves towards vital and productive sectors development. In 2018, the National Electric Power Company (NEPCO) purchased 3,729.3 Thousand Equivalent Tons of Oil, out of which 3,402.2 Thousand Equivalent Tons of natural gas constituting

7) According to the Companies Control Department.



91% of used fuel in general and 96% of used fuel for electricity production. The cost was about 244 Million Jordanian Dinars to supply accredited generation companies with fuel to produce about 20,501.8 Gigawatt Hours, whereas producing 2,188 GW Hrs from renewable resources saved about 11% of what was spend to buy fuel.

Local energy resources contribute to direct money savings. renewable energy projects can contribute - in case Renewable Energy Credit Certifications were to be issued to monitor produced energy, to ongoing savings that are linked to produced quantities that can be sold through those certificates.

Development opportunities to all sectors

Renewable energy provides several economic opportunities to sectors where electricity costs are constant burdens. The water sector consumes 14.9% of the total need of electricity of the Kingdom. The operational costs of the water sector are one of the main challenges it faces, to which renewable energy can be the solution. This also applies to the tourism, industrial and transport sectors.

