The Payne Institute for Public Policy
COLORADOSCHOOLOFMINES
EARTH • ENERGY • ENVIRONMENT

PAYNE COMMENTARY SERIES: **COMMENTARY**

Ending Gas Flaring and Powering a Sustainable Economy of the Kurdistan Region of Iraq

By Peri-Khan Aqrawi-Whitcomb

In our latest Payne Institute Commentary in June 2021, we highlighted the various efforts by the Kurdistan Regional Government (KRG) to tackle energy poverty and mitigate climate change through sustainable power generation.

The UN Environment Programme has ranked Iraq (including the Kurdistan Region of Iraq (KRI)), as the fifth most vulnerable country in the world to the effects of climate change, such as water scarcity, desertification and extreme weather variability such as droughts, flooding, and storms. Some regions of Iraq are even expected to become uninhabitable in the coming decades.

Years of conflict, war, poor governance, corruption and industrial pollution, have in addition led to the country's massive environmental decline. Desertification has affected 39% of the region and 54% of agricultural lands have been degraded due to salination caused by a dwindling water flow of the Tigris and Euphrates rivers. About 7 million Iraqis to date are affected by drought, climate change and an ever-growing risk of displacement.

This all occurs considering an already socio-economically strained country. Iraq has a population of around 41million, with a median age of 21 years, a rising poverty rate of 31% and unemployment of above 13%. Paired with political instability, lack of job opportunities, fuelled by a global pandemic and drop in oil prices, many citizens see themselves driven further into poverty and despair. Large numbers of Iraqis, especially the younger generation, are putting their lives in the hands of international human traffickers, risking their entire existence, in hope for a better future. A reoccurring phenomenon over the last decades, culminating too often in human tragedies rather than happy endings, as sadly observed currently at the Belarus-Poland border, with hundreds of Iraqi migrants stranded in limbo.

Even though the autonomous region of Kurdistan is doing much better than the rest of Iraq, it is not immune to rising poverty levels, lack of job opportunities and limited perspectives for its young population.

Energy Poverty, one root cause of the regions socio-economic struggle

In a region that suffers from chronic energy poverty despite abundance of natural resources, the reduction in water supply, is also having a direct impact on the domestic energy sector. According to a UN study, droughts and water scarcity are also increasingly identified as factors behind internal displacement and unplanned urbanization, with unreliable water supplies and declining soil fertility presenting a profound impact on agriculture, food security, and household incomes.

Kurdistan, that generates 15% of its electricity from hydro and enjoys a milder climate and higher percentages of rain and snow than the rest of Iraq, is nevertheless increasingly facing severe droughts with already serious socio-economic impacts. Especially, challenging the regions number one income source, its energy sector. Two of the largest hydropower stations in Dukan and Darbandikhan, with a generation capacity of 400 MW and 249 MW, operated at less than half of their capacity this summer due to low water levels. Other fossil fuelled power plants, which are the main energy generators of the region are facing an even more challenging scenario.

Significant amounts of water are needed in almost all energy generation processes, from generating hydropower to extracting and processing fuels. At the same time does the water sector require access to energy to extract, treat and transport water to its desired destinations. According to the World Bank, in the last years countries such as India, the United States, China and Brazil were forced to shut down or decrease production of power plants due to water shortages. A staggering 93 percent of the Middle East's onshore oil reserves are facing medium to extremely high overall water scarcity risks.

The U-Turn?

In 2019, the parliament of the autonomous region of Kurdistan ratified several related reform laws under the so-called 'Kurdistan Agenda'. The current cabinet set ambitious sustainable development plans in a cross-party effort, attempting to tackle the inefficiency of the public sector, endemic corruption, and the region's heavy economic oil & gas dependency. One of main goals is to work on solutions to establish a reliable and modern electricity sector, through increasing production rates, diversifying energy resources, decreasing electrical waste, and introducing new technologies to generate and distribute clean power.

Despite increased electricity supply in the last decade—which remarkably went from 500 MW in 2007 to almost 3,000 MW in 2020, the KRG still needs to increase the output to more than 5,000 MW in order to provide 24/7 power to its residents.

In the KRI, about 85% of the electricity is generated from fossil fuels with previously mentioned 15% from hydro-power. A staggering 90 percent of residential places in all of Iraq, supplement their electricity needs with generators, with a generation capacity of estimated at about 3 TWh. Testimony to the failures of the country's public energy provision and generation, despite its energy resource abundance.

The Kurdistan Region is no exception to this paradigm. Apart from being quite expensive, costing about $0.25 per kilowatt-hour (kWh), compared to $0.02 that consumers pay for electricity from the national grid, generators are also responsible for 53 percent of the Kurdistan region's Greenhouse Gas emissions. Thus, it is the primary factor for the region's chronic air and noise pollution, followed by the transport sector and fossil fuel industry.

In 2021, the government of Germany started to assess in collaboration with the KRG and Finland the region's poor air quality, and came to the conclusion that the air contains toxic chemicals with potential of devastating health impacts, including sulphur dioxide (SO2), an often mentioned side effect from gas flaring, nitrogen dioxide (NO2), nitrogen oxides (NOx), and inhalable airborne particulate matter called PM10.

Gas Flaring an environmental hazard with potential for good

The Kurdish oil and gas sector, which was established as a key instrument to fuel the regions post-war economic recovery in 2003, is also fuelling a set of environmental hazards and missed opportunities. Due to a lack of developed gas markets and poor infrastructure, natural gas that resurfaces as a side product, is being flared on numerous oil productions sites across the region, instead of being used to generate electricity and revenue. In all of Iraq, almost 70 percent of natural gas is flared, which is responsible for more than 20 million tonnes of CO_2 emissions annually, while costing the domestic economy billions of dollars in lost revenue.

Not only wasting a valuable energy resource that could power a much needed economic growth, but generating emissions that are a major hazard to the populations health and livelihoods. Globally, Iraq has become the second largest gas flaring country after Russia. In a country that suffers from chronic electricity shortages, the gas flared, would be enough to provide 15 million households with electricity.

According to the World Bank valuable natural gas is being flared, during oil production, when barriers to the development of a healthy gas market and infrastructure prevent governments and companies to harness the benefits of using it.

In Iraqi Kurdistan alone, there were 190 sources of flaring with over 19.5 billion cubic meters of gas flared between 2012 and 2019. One flaring site alone can release over 100 tons of sulphur dioxide (SO_2) per day. The sulphur content is particularly high in oil produced in the Kurdistan region. Exposure to SO_2 is associated with respiratory illnesses, and when SO_2 is combined with water vapour in the atmosphere it can form acid rain that not only can be transported over large distances, it can also cause significant damages to ecosystems, such as forests and freshwater habitats.

Hence, given the drastic increase of wasteful flaring and deterioration of air quality, there are a number of steps taken by the Kurdistan Regional Government (KRG) and the private sector towards reducing gas flaring by for example generating electricity instead.

Furthermore, in mid-July 2021, the KRG Minister of Natural Resources, Kamal Atroshi, ordered all oil companies working in the Kurdistan Region to immediately cease environmentally harmful and wasteful practice of gas flaring. Giving them a 18 months grace period to find ways on how to best capture and use, in what he characterizes as often very poisonous gas, due to its high rates of sulphur. Suggesting power generation or even reinjecting the gas back into the ground of oil reservoirs to increases oil production rates again.

At the other end, the central government in Baghdad plans on halting gas flaring only by 2025, though promisingly recently finalizing two major international gas flaring deals, one of them with oil service giant Baker Hughes, planning on capturing up to 200 million cubic feet per day. Hence, according to Baker Hughes, this will have the potential of generating up to 400 MW of household electricity. A much-needed development in a country that witness's chronic energy black outs, especially in the scorching hot summer months, increasingly prompting large scale civil unrest and frustration.

The regional government in Erbil, the KRG's capital, has led the way by announcing the finalized construction of the country's first of its kind power plant in the Garmian district, with a capacity of 165 MW using gas flared from the Hasira Oil wells. The project was launched under the current cabinet of Prime Minister Masrour Barzani in October 2020 and inaugurated in September 2021. The main goals: reducing greenhouse emissions and boosting economic growth, by increasing access to energy and reducing expensive fuel imports.

Prior to that several small scale but also large scale plants were built and operated by the private sector, most strikingly a plant operated by KAR-Group and Siemens in Khormala with the capacity of over 930MW, which can meet almost 30 percent of the power demand targeted by the KRG.

Kurdistan Inaugurating an Energy Transition – between Natural Gas, Solar and Hydro.

The World Bank believes that natural gas resources can support developing countries to move forward to a more sustainable energy transition, not only because it is the fossil fuel with the lowest carbon intensity, but also can be a least-cost source for grid-based systems with flexible electricity supply due to fluctuating demand and supply.

Interestingly in this regard, on June 7th 2021, the KRG's Deputy PM, Qubad Talabani, announced near future government plans on relying 100% on domestic natural gas as a source for power generation.

Natural gas could be a huge game-changer for how the domestic electricity system will operate, with Iraqi Kurdistan having some of the world's biggest untapped natural resource reserves. The KRI holds up to 25 trillion cubic feet of proven gas reserves and a potential to generate an additional 40 billion cubic meters of gas annually until 2035. One huge gas processing plant is located in Khor Mor and is connected to a 180 km pipeline that supplies gas to power stations in Chemchemal, Bazian, and Erbil, generating over 2000 MW of electricity. This project by Dana

Gas, which is the largest gas producer in the KRI, currently produces 440 million cubic feet per day of natural gas. Dana Gas is planning on adding a further 250 million cubic feet a day, which will still be sold to the local power stations, which produce more than 80 percent of the region's electricity to date.

It's obvious that the challenges facing natural gas in the KRI are not because of inadequate resources, but primarily due to the absence of an efficient natural gas infrastructure and management. In addition has the absence of an effective clear gas pricing framework plus a relative high sulphate content found in the region's gas, contributed to limits in midstream investment.

The KRG has committed itself to the Paris Climate Agreement, by pledging to produce 900 MW of its energy from solar power by 2030. Knowing that the region offers many favourable conditions for renewable energy, especially solar. A study shows that the average daily solar radiation in Kurdistan is nearly 5 Kilowatt hours per square meter.

In 2020, a major mile stone was set when the governorate of Duhok cooperated with the EU and UNDP to establish its first solar energy park, that will provide up to 40 MW of clean electricity by 2030. This park will not only stimulate the economy through private sector investments, but also create green jobs and reduce pollution. The project is the first large scale solar energy endeavour of its kind in all of Iraq.

Decentralized renewable electricity is also becoming an increasingly attractive option for local entrepreneurs. Solar photovoltaic installation companies are sprouting in Erbil and Sulaymaniyah, while the international donor community and humanitarian organizations already work with local partners to develop solar photovoltaic and energy storage systems to tackle energy poverty in informal settlements such as refugee and IDP camps.

Meanwhile is the KRG's Ministry of Electricity working on efforts to privatize the electricity sector by providing incentives for investors pioneering more efficient ways to generate, distribute, and sell electricity. At the same , as part of the government's reform and infrastructure plan, is the KRG working on digitalizing its power grid, while enhancing the efficiency of current on-grid power stations.

Conclusion

The World in general is facing unprecedented modern energy challenges exacerbated by climate change and an on-going global socio-economic crisis due to the COVID-19 pandemic. Worldwide, a staggering 789 million people, 1 out of 10, don't have access to reliable and clean electricity, and almost 3 billion still cook or heat with polluting fuels like kerosene or wood. Far too often, developing countries, rich in energy resources, such as oil and gas, are still facing high levels of energy poverty, such in the case of Iraq and the wider region. Meanwhile, environmental degradation, fuelled by conflict, wars and the absence of good governance of the energy sector,

has led to a striking absence of laws and regulations for local and international oil companies to operate even on a minimum of international best practice standards.

In a recent interview with the KRG Minster of Natural Resources, the large amounts of gas flared by international companies were described as criminal misconduct when measured by international standards. He stated that none of international companies would be able to flare a quarter of cubic foot of gas flared in Kurdistan in their respected home countries. Naming countries such as the UK, France, US, or China. Apart from being illegal and having severe effects on air, the soil and the ecosystem in general, the sheer loss in revenue would never be tolerated.

Climate change will continue to add more uncertainty with frequent and severe floods and droughts, amplifying the vulnerability of energy systems, not just in Kurdistan, but globally.
The need of cooperation on all levels of government, the private sector and the civil society to tackle the root causes of global warming and mitigate the effects of climate change on our societies is ever present.

Kurdistan continues to possess an enormous potential to harness its natural resources, to develop a sustainable and resilient energy sector, especially in the fields of natural gas and solar. This will intrinsically help the government to create jobs, promote economic growth, protect and rehabilitate the environment, develop a green industry and economy, and fuel the journey towards a future with low fossil fuel energy dependency.

Critical to this will be the continuation of government efforts in enhancing cross-cutting collaborations between the private- and public sector, while also establishing and implementing best practices for the local fossil fuel industry. Things look promising for the current cabinet to green and grow an inclusive economy, especially for future generations.

"Make lemonade when you are handed lemons", – gas flaring, can represent, like many other areas in a fossil fuel rich developing country, a lemonade or a lemon.

The Payne Institute for Public Policy

COLORADOSCHOOLOFMINES
EARTH • ENERGY • ENVIRONMENT

ABOUT THE AUTHOR

Peri-Khan Aqrawi-Whitcomb
Owner PX Consulting

Peri-Khan Aqrawi-Whitcomb is a specialist in sustainable development policies and international affairs with a focus on the Middle East and the Kurdistan Region of Iraq. In 2018, she was selected by the US based Payne Institute for Public Policy to become a non-resident fellow in a global network of top policy, energy, environmental, and natural resource experts.

The Payne Institute for Public Policy

COLORADOSCHOOLOFMINES
EARTH • ENERGY • ENVIRONMENT

ABOUT THE PAYNE INSTITUTE

The mission of the Payne Institute at Colorado School of Mines is to provide world-class scientific insights, helping to inform and shape public policy on earth resources, energy, and environment. The Institute was established with an endowment from Jim and Arlene Payne, and seeks to link the strong scientific and engineering research and expertise at Mines with issues related to public policy and national security.

The Payne Institute Commentary Series offers independent insights and research on a wide range of topics related to energy, natural resources, and environmental policy. The series accommodates three categories namely: Viewpoints, Essays, and Working Papers.

For more information about the Payne Institute please visit:
https://payneinstitute.mines.edu/

or follow the Payne Institute on Twitter or LinkedIn: