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EDF-GREEN MARKET ASSESSMENT

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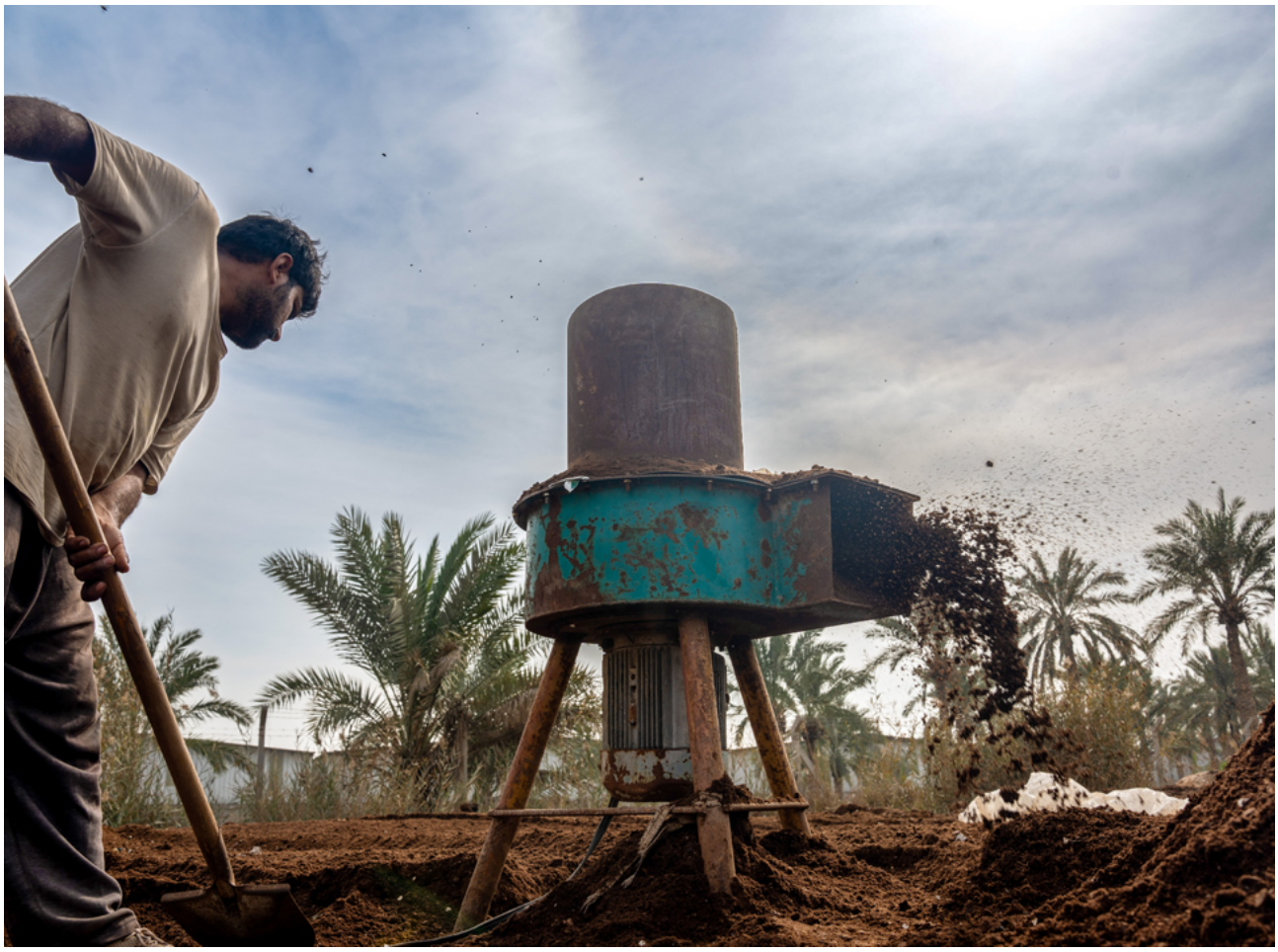
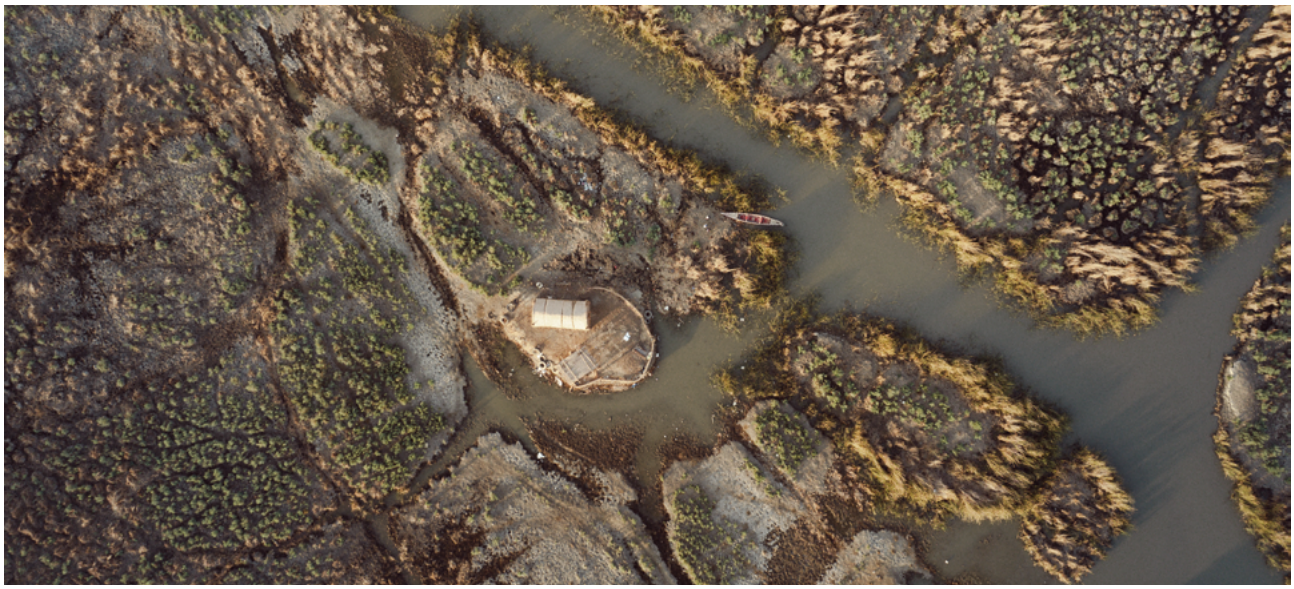
INTRODUCTION

In 2023, IOM proposes to introduce the Enterprise Development Fund-Green, a variation of the EDF that can target innovators in the agricultural sector that are contributing to climate resilience and adaptation in Iraq. EDF-Green will be influenced by lessons learned from the EDF-agriculture, supporting small-scale irrigation infrastructure that is not yet common in Iraq, and from EDF-renewables, encouraging the uptake and use of renewable energy technologies in the production process. EDF-Green will also, importantly, be open to working with start-up companies, given the lack of venture capital available for early-stage businesses in Iraq. Where possible, IOM will work with other incubation programs to provide additional investment readiness programming for granted businesses. The types of businesses that the EDF-green may target include (but will not be exclusive to): firms working on recycled or biodegradable product manufacturing, renewable energy and energy efficiency promoting firms including manufacturers and retailers, firms working on biodiversity conservation, firms promoting the sustainable use of natural resources or land, agricultural technology manufacturers, and (depending on job creation potential) end users who wish to adopt climate smart practices.

The objective of this assessment is to better understand how the EDF could contribute to the adoption of climate mitigation and adaptation measures in Iraq, and the changes to the current EDF modality required to facilitate this goal. The report provides an overview of climate change in Iraq followed by findings related to the current status of the businesses in the green sector, the demand they experience on their products and service, their expansion potential and needs, and some information on the labor market in the green sector.



CLIMATE CHANGE IMPACT IN IRAQ



Iraq is among the top five countries most affected by climate change, and the 39th **most water stressed.**[1] **Temperatures** have been on a steady rise across Iraq since the 1950s.[2] On average, the country is 0.7° C hotter than it was 100 years ago and depending on how the world responds to climate change, average temperatures could rise by a further 2 to 3° C in Iraq over the next 100 years. The frequency of extreme weather events in Iraq have also increased. For example, the middle and southern governorates have witnessed heatwaves of over 50° C in the last decade.

In the North of Iraq, where agricultural production is primarily rain-fed, concerns over **reduced seasonal rainfall** and high **ground water salinity** levels have placed extreme pressure on agricultural producers who face increased difficulties to maintain sufficient levels of cultivation and associated income. North-western and, to a lesser extent, some southern governorates are particularly badly affected with significantly below average levels of rainfall (between 40 and 80%). The impact of this can be seen in below average levels of vegetation that in some cases fall below 50% of established average figures. Parts of central and northern Ninewa governorate have been particularly compromised in terms of agricultural production in an area that has historically maintained high levels of cultivation. For instance, agricultural livelihoods in Sinjar and Al-Baaj rely primarily on extensive rain-fed wheat and barley cultivation, which are now under significant threat due to historically low rainfall levels, associated drought and high levels of ground water salinity. Reports suggest that, as a result, there has been an approximate 70% reduction in wheat production (largely fed into the Government's Public Distribution System (PDS)), and a total loss of the barley harvest (used primarily for animal fodder). The latter, along with a delayed Government payment for procured agricultural products has led many farmers to either leave the agricultural industry completely and seek alternative income generation opportunities, such as moving away from cereal crop production in favor of cash crop cultivation growing fruit and vegetables.

Surface water is rare in the area, occurring only in a few permanent springs at the foot of Sinjar Mountain. Groundwater is present throughout, but its salinity increases generally with distance from Sinjar Mountain, the main source of recharge, and with depth of exploitation. Groundwater was historically drawn from *karez*-es, dug wells and boreholes and used for domestic purposes, however, in the last few decades brackish or saline groundwater has been increasingly pumped by agri-businesses for relatively large-scale irrigation via center-pivot and lateral sprinklers. This practice has exacerbated high soil salinity levels making agricultural production

1 https://iraq.un.org/index.php/en/186697-world-day-combat-desertification-and-drought-un-and-ngos-call-action-support-iraq-managing

2 WB, Climate change Knowledge Portal, https://climateknowledgeportal.worldbank.org/country/iraq/climate-data-historical

difficult[3]. Based on satellite imagery,[4] significant reduction in levels of rainfall during the 2020/2021 rainy season has limited cultivation to only a few areas with center-pivot irrigation capability. With climate change projections suggesting that rainfall will decline over the remainder of the 21st Century, possibly by up to 50%, the increased pressure placed on water sources and agricultural systems will need to be mitigated through improved water resource management.

On the 9th of May 2021, the Diyala Governorate authorities issued a drought and water shortage alert.5 Evidence of drivers behind these growing concerns had been recorded since 2019 when water levels in both the Hamrin and Darbandikhan lakes started to fall dramatically. Between 2019 and 2021, Hamrin Lake has reduced in volume significantly because of both climate change and **damming/water diversionary activity**. Lake volume is currently 30-40% of capacity impacting the availability of irrigation water and supplies of municipal drinking water. The Diyala river, running downstream of the Darbandikhan dam, flowing into Hamrin lake and then on through the Diyala River Barrage continuing southwest to Ba'aqubah and Baghdad, has several tributaries including the Tanjero in Iraq and the Sirwan in Iran. Increased Iranian damming and water diversion of shared water resources in the Sirwan and Zamakan tributary river basins on the Iranian side have led to annual downstream discharge levels from the Hamrin Dam falling from 6.3 billion cubic meters (BCM) in 1981 to 1.5 BCM in 2015. While some Iranian-constructed dams were completed some time ago, many have been operationalized only in the last several years. The storage capacity of all 14 dams is approximately 1.9 BCM while the diversionary tunnels divert approximately 1 BCM per year to areas outside the Diyala river basin.

The Ministry of Water Resources (MoWR) has started implementing precautionary measures including the digging of additional wells and the laying of pipelines for the transfer of drinking water from the Tigris River to water treatment plants in Ba'aqubah. This would reduce pressure on both drinking and irrigation water sources. However, increased population figures and associated higher levels of municipal demand and given the Ministry of Water Resources (MoWR) prioritization system (1. municipal drinking water supplies, 2. irrigation water for perennial fruit crops, 3. irrigation water for seasonal crops including wheat, barley and corn), both farmers and urban populations will continue to struggle as a result of current drought conditions.

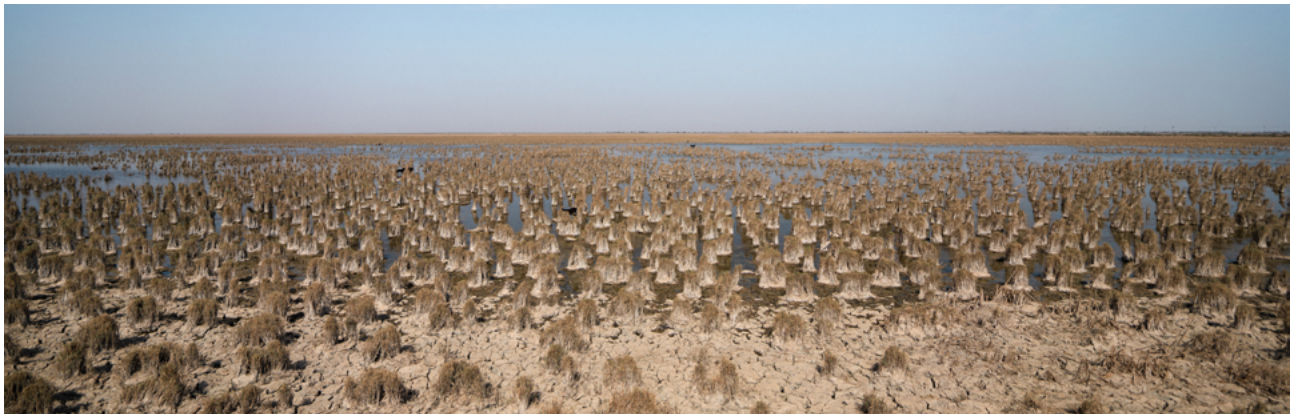
Iraq's water crisis in the central and southern governorates is long standing and expected to persist. Intake from the Tigris and the Euphrates rivers, the country's primary sources of water, is decreasing at an unprecedented rate due to the high buildup of hydraulic infrastructure upstream, outside of Iraq's borders. Increasing average temperatures and decreasing annual rainfall due to climate change further challenge the entire region. Therefore, risk of water shortage-induced displacement of populations in Iraq remains high due to **degrading water availability in both quantity and quality.**[6]

3 NRC. KFW. WRA. 2021. Water Harvesting for Irrigation & Groundwater Recharge Situation Report, April 2021
4 WFP. 2019. Iraq Socio-Economic Atlas أطلس العراق الاقتصادي الاجتماعي, October 2019
5 IFRC. 2021. Emergency Plan of Action (EPoA), Iraq: Drought
6 IOM Iraq. 2020. Water Quantity and Water Quality in Central and South Iraq: A Preliminary Assessment in the Context of Displacement Risk

In 2012, an estimated 20,000 individuals, particularly from agricultural communities, were displaced because of the drought that affected Iraq. In July 2019, IOM identified 21,314 internally displaced persons (IDPs) from the southern and central governorates who were displaced due to the lack of water associated with high salinity content and waterborne disease outbreaks in both urban and rural communities, with approximately 5,300 families displaced from the southern governorates of Missan, Muthanna, Thi-Qar and Basra; and 1,700 from the central governorates of Qadissiya, Wassit, Najaf, Babylon and Kerbala.[7]

Due to the lack of adequate water flowing from the Euphrates and Tigris into the Shatt al-Arab waterway, tests show at least a threefold increase in salt concentration in Iraq's main rivers over the past half century, resulting in severely brackish river water. This is a result of irrigation of highly intensive agriculture upstream in Iraq as well as evaporation. In addition, the lack of sufficient river water has led to the backflow of seawater into the Shatt al-Arab, further increasing Total Dissolved Solid (TDS) levels. This is having a significant impact on people's abilities to remain and farm in their areas of origin.[8] Ground water is generally not used for drinking purposes, fresh water from further north being diverted south for drinking purposes. The Ministry of Water Resources (MoWR) has, for example, constructed a 200 km long canal from the Al-Gharraf river in Thi-Qar taking fresh water supplies (originally sourced from the Tigris) to Basra. They are now considering replacing this with a pipeline ($1bn) to prevent irrigation losses and evaporation.

Dr. Mohsen Disher, a professor in Agricultural Sciences at Basra University, alluded to the problem referring to heavy dependency among Basra's agricultural community on irrigation from rivers and wetlands due to consistently insufficient rainfall that has led to significant salt accumulation in the soil because of high salinity levels in the water being used for irrigation. This has led to plant death, low crop yields, and long-term effects on the sustainability of farmlands for future use.[9] High levels of environmental degradation seen across the region has meant that the agricultural sector, traditionally the main workforce employer in rural areas, is unable to guarantee sufficient and sustainable livelihoods for the communities living there. A direct consequence of this maladaptation is the forced migration of rural populations, oftentimes towards nearby urban areas including Basra, Nassiriya, and Amara in search of better opportunities to sustain their lives.[10]



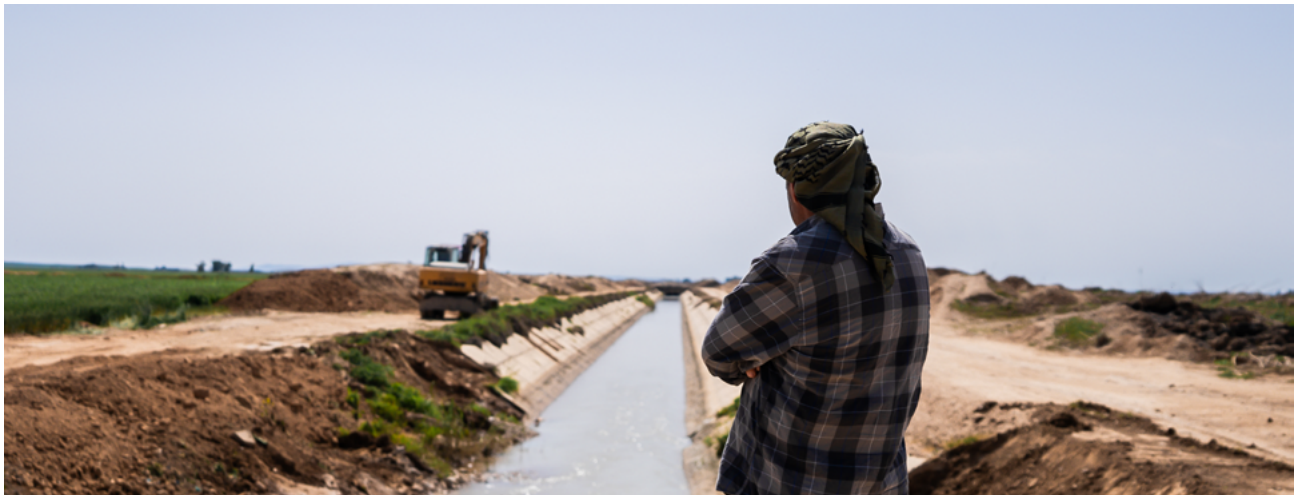
Considering the 5.9 % contribution to GDP and the employment of 9 % of the entire workforce in agriculture, the impact of climate change on agriculture is particularly concerning.[11] Despite the World Bank recent analysis of **climate change impacts shows negative impacts in all sectoral outputs**, whether directly or indirectly, crop production would drop significantly, for 15,9%.[12] Drops in other sectors due to climate change as per World Bank estimates are: food would drop for 6.1% (less than crop production due to imports), industry for 5.5%, forestry for 3.1%, services for 3.4%, and energy for 2.3%.[13] Within agriculture, **the projected negative impact**

7 IOM Iraq. 2020. Water Quantity and Water Quality in Central and South Iraq: A Preliminary Assessment in the Context of Displacement Risk
8 Human Rights Watch. 2019. Barsa is Thirsty Iraq's Failure to Manage the Water Crisis
9 Ibid.
10 IOM. 2021. Migration into a Fragile Setting: Responding to Climate-Induced Informal Urbanization and Inequality in Basra, Iraq
11 World Bank, Country Climate and Development Report Iraq, November 2022.
12 Ibid.
13 World Bank

of water scarcity on jobs is larger than the impact on production, especially for unskilled jobs, the same report found.[14] Estimates indicate that under a 20 % reduction in water availability and temperature impacts on crop yields, the demand for unskilled labor in the agriculture sector would be 11.5 % lower in the medium term than in the base year, and the demand for unskilled labor in other sectors will also fall, by an estimated 4.9 %.[15] In fact, any major permanent reduction in agricultural activities diminishes the demand for both unskilled and skilled labor.[16] Lower agricultural output will affect downstream industries such as food processing and services like food retailers, restaurants and hotels, and associated construction and transport. Because water is a direct input to production in many industries and service sectors, reduced access to water will negatively affect sector output, which in turn can increase poverty rates, unless climate smart transformation of the agri-food sector takes place.[17]

Worker productivity also faces direct risks from climate change through exposure to higher temperatures, especially affecting workers working outside, including in agriculture and construction.[18] Given that jobs in these sectors are rarely formal or salaried and compensation is mostly tied to output, reduced labor productivity translates into lost earnings.[19]

Other major challenges identified include the **neglect and mismanagement of an outdated drinking and irrigation water infrastructure network** prone to leakages that cannot respond to increasing demand from both urban and rural populations. This deficiency is exacerbated by the absence of a transboundary governance agreement for the Tigris-Euphrates River system between Iraq, Syria and Turkey that would ensure the greater inflow currently restricted beyond Iraqi borders. Irrigation efficiency is often as low as 30% and is sustained by insufficient maintenance across the network and insufficient strategic storage capacity in national reservoirs. The unregulated usage of compact water treatment plants in rural areas without planning or consultation with water and irrigation authorities has also led to regular shortages. These management and maintenance concerns are themselves compounded by the continued cultivation of water-intensive crops such as rice and the sustained use of traditional but inefficient flood irrigation methods. Indeed, to cope with water scarcity, the Agriculture Ministry has prohibited summer planting of rice, corn, and vegetables, allowing only water to reach palm trees and fruit orchards[20]. In addition, a general lack of community awareness on the water quantity and quality-related consequences of irrigation system misuse such as the discarding of garbage into irrigation canals only exacerbates the dysfunctional nature of an irrigation water distribution system that is currently not fit for purpose and requires decisive action in order to regain functionality as required by farmers dealing with conditions forcing many to seek alternative livelihood opportunities.



14 World Bank,
15 World Bank
16 World Bank
17 World Bank
18 World Bank
19 World Bank
20 IFRC. 2021. Emergency Plan of Action (EPoA), Iraq: Drought

GOVERNMENT POLICIES

Since ratifying the Paris Agreement in 2021, the Iraqi government has been making some progress towards stepping up its response to the impacts of climate change, through new adaptations and mitigations strategies. With the support of the UNDP, Iraq in the NDC (December, 2021), pledged to voluntarily cut 1 to 2 % of its greenhouse gas emissions by 2030. The plan also includes up to a 15 % emissions reduction, provided that there is international technical and financial support, as well national stability in both the political and security sectors. The focus will be on oil, gas, electricity, and transportation, which collectively produce 75 % of Iraq's total greenhouse gas emissions. Developing the NDC will pave the way for up to USD 100 billion worth of investments to help climate-proof the economy over the next 10 years, a major step forward to strengthen food and water security.[21] To further boost Iraq's climate resilience, the outgoing government has re-established the Ministry of Environment after it had previously been merged with the Ministry of Health in 2015 to cut expenses. Further, the outgoing government has been working on a green paper where a tangible climate change strategy is outlined.[22]

The UN and NGOs in Iraq are currently working with the government and Iraqi universities on smart monitoring systems to track progress or regression on environmental targets, climate, water resources and land use.[23] On the World Day for Combating Desertification held on 17 June 2022, the international community reiterated the importance of stabilizing the soil and protecting its vegetation cover by encouraging efficient water use, replenishing water reservoirs, rehabilitating irrigation infrastructure, planting more trees, bushes and shrubs, developing sustainable green belts around cities, controlling mining activities, improving the quality of the soil and protecting it from salinisation through more sustainable agricultural and farming techniques, provision of eco-friendly irrigation solutions, and re-skilling of farmers (in drip and smart types of irrigation, which saves water and has a transformative positive impact).

Despite the high-level political support that the outgoing government is lending to climate change impacts, several significant challenges remain for Iraq. These include inadequate institutional capacities for translating adaptation policies into projects on the ground, insufficient data and analysis concerning the impacts of climate change on different sectors and communities, poor monitoring and reporting procedures, inefficient funding strategies.[24] The policies in Iraq's NDC related to food and water provision emphasize the importance of making these sectors resilient by developing a comprehensive water and land strategy that runs until 2035. Yet, with the challenges surrounding institutional capacity and funding, establishing an operational comprehensive strategy requires international support and joining forces with other local actors.[25]

21 Yassin M., 2022, https://timep.org/commentary/analysis/iraqs-climate-change-response-the-private-sector-and-civil-society/
22 Ibid.
23 UN, On World Day to Combat Desertification and Drought, UN and NGOs call for action to support Iraq in managing water and adapting to climate change, 17 June 2022, https://iraq.un.org/index.php/en/186697-world-day-combat-desertification-and-drought-un-and-ngos-call-action-support-iraq-managing
24 Yassin M.,
25 Ibid.

BEFORE EDF-GREEN: EDF-R AND EDF-A

IOM already implemented a series of interventions that directly or indirectly addressed climate change-related drivers in Iraq. **EDF-R** awarded grants to a number of businesses that promoted the use of clean energy across Iraq, especially related to solar panels. Lessons learned were not carried out, especially due to the small nature of the intervention.

The **Enterprise Development Fund for agriculture (EDF-a)** looks for opportunities to displace imports, increase production, and create jobs and resilient firms along agricultural value chains, while also seeing if it can correct market failures. Value chains such as eggs, dairy, tomatoes, dates, fish, eggplant, barley, figs, cows and sunflower have all been identified as high potential value chains in different regions, and community engagement processes have identified farmers, processors, and distributors who have an interest in applying to the EDF-a through stakeholder coordination. Grants then address the most salient needs of farmers and processors and can be used according to the needs of each business. Major challenges though characterize the sector since rural to urban migration in Iraq is characterized by a gradual abandoning of agriculture, and 86% of recently surveyed farmers report reducing their production in the previous 5 years, with 76% mentioning the lack of water as a reason. Consequently, the programme has also undertaken a feasibility review of small scale irrigation systems for decision-making.

The feasibility study recommended a variety of entry points for EDF-a support to farmers including in installment of drip irrigation systems (supply of all items, materials of water pipes, fittings, and pumps for farms and greenhouses, including sub-surface drip irrigation; installment of pivot irrigation systems (appropriate for medium and larger farms); fund purchases of water treatment solutions for water salinity; instalment of photovoltaic irrigation pumping systems; instalmmet of drainage systems (such as perforated pipes or channels for drainage), which are as important as irrigation systems; along digital agriculture technologies. For example, in the South of Iraq where value chain analysis suggested targeting the tomato, poultry, date and fish value chains, the EDF-a has been used to fund a number of interventions designed to help farms also adapt to climate change and reduce environmental degradation, including drip irrigation piping for tomato farmers (up to about 9k per farmer), and reverse osmosis machines to treat water for chicken farms (with treatment of the sludge) (about $15,000 per RO machine, for example), and even a manufacturer of a more experimental water treatment equipment, such as magnetic water treatment devices.

The EDF-a mid-term evaluation draft report lamented that climate change was not the focus of the intervention and therefore represented a lost opportunity, especially due to the major impact of climate affecting agriculture in particular. A Climate Risk Assessment was not carried out. Rio markers related to climate change mitigation and climate change adaptation were all zeros ("not targeted"). The EDF-a has not capitalized on its actual and potential actions impacting environment and climate change's effects, despite promising activities (water systems), the evaluation findings stated.

METHODOLOGY

The assessment took a mixed methods and sequenced approach. Interviews with key informants were used for better tailoring the survey questionnaire administered to businesses.

Key informants from different governmental departments, civil society, and incubators were interviewed, 16 in total: 5 in Baghdad, 1 in Erbil, 2 in Thiqar, 3 in Suleimania, 2 in Diyala, 1 in Missan, 1 in Ninewa and 1 in Basra.

Surveys were administered to 144 businesses across Iraq and across different sectors. Eight are owned by women. See the tables below for details.

Table 1: Sectors surveyed

Sector	Number surveyed	Percentage
Agriculture-cultivation	42	29%
Agriculture-trade/retail	11	8%
Carpentry	2	1%
Chemical	26	18%
Construction	8	6%
Food processing and preparation	6	4%
General trade and retail	3	2%
Health	1	1%
Livestock	3	2%
Manufacturing	11	8%
Metal	4	3%
Plastic/other waste collection	5	3%
Services	21	15%
Technology	1	1%
Total	**144**	**100%**

Table 2: Sampling surveys with businesses

Governorate	Number of Businesses Surveyed
Baghdad	20
Basra	10
Diyala	20
Duhok	11
Kirkuk	10
Missan	10
Ninewa	21
Sulaymaniah	21
Thiqar	20
Wasit	1
Total	**144**

Major limitations could be found for the present assessment where the major represents poor survey filling, which greatly impacted analysis.

FINDINGS

This section outlines the findings by first, providing information on SMEs' use of solar power, the general adoption of the latter, self-reported demand, and some information on customer interests in green products. The following section explores supporting businesses, especially through cash injections and the potential for job creation.

BUSINESS BACKGROUND AND DEMAND

Following the ILO definition of green businesses,[26] half of the surveyed enterprises fall into the category of businesses *"providing products or services that are explicitly green, often making use of technological innovation."* Surveyed businesses in this category install solar panels, work in different types of waste collection and different types of waste recycling with other less mentioned examples. The other half, fall into the category of *"businesses with green processes"*, meaning that *"green businesses may operate in "standard" sectors offering mainstream products and services, but may still be green because of the operational choices they have made."*[27] The latter may include using 'green' raw materials; using energy from renewable resources; reducing water consumption in business operations; reducing emissions; reducing, re-using, and recycling waste. The surveyed businesses with green processes reported using solar power, plant trees, reduce water usage, reduce pollution through applying filtering systems, sell water saving irrigation equipment, sell heat resistant trees (along other products), use organic fertilizers. Many among the latter are agricultural businesses. Only three of the surveyed businesses have not taken any measures to become greener.

More than a third of businesses (about 50) self-identified as **agricultural** and among these, about half mentioned that in their area agricultural businesses are slowly adopting greener practices. The most mentioned was the

26 https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---emp_ent/---ifp_seed/documents/publication/wcms_555274.pdf
27 Ibid.

adoption of improved irrigation techniques such as dripping or sprinklers along less mentioned examples such as usage of 'less toxic' fertilizers, adoption of climate-resistant plants, planting of trees as barriers, collecting animal waste to be used as fertilizer, shading, and greenhouse cultivation.[28] These respondents also estimated the percentage of farmers using water efficient technologies, though great variety was reported from very low to very high adoption so an average could not be effectively estimated. Agricultural businesses were also asked what prevents the adoption of greener practices and mostly mentioned the lack of means to do so, either to switch to solar or buying sprinklers. Some already have generators (so the incentive to switch to renewable energy is minimal, if any), they lack knowledge or are unfamiliar with green practices and consequently often distrustful, respondents reported.

Almost 30 % of the business surveyed mentioned using solar power. These mostly self-financed it with almost half, who also mentioned financing it through a loan or grant provided by non-profits (the latter are almost all from Ninewa). Three mentioned receiving a grant from IOM, likely referring to the EDF. A number also provide solar power installation services so they indeed use solar on their own business premises. The remaining - over 70 % of respondents - do not use solar energy. These provided examples or reasons for not using solar powered energy where the major limitation is the lack of capital and the costs for purchasing solar (mentioned by more than a third of all the business surveyed), which is also directly linked to the second major limitation, which are high power requirements, which would require major investments in solar power energy or sun-powered energy not being able to fulfil the power needs of a certain business (for example as mentioned by a brick factory). The third most mentioned reason is lack of knowledge on solar power energy followed by inadequate/small business premises for installing solar panels followed by other less mentioned limitations.

Table 3: Reasons for not adopting solar powered energy reported by businesses

Reasons for not adopting solar energy	Number of mentions (N=144)
Lack of capital/high costs	55
Limitations of solar power; higher needs than offered by solar power (or very high costs for such power needs)	19
Lack of knowledge/experience	15
Inadequate business premises	10
NA (power not needed or very little usage)	3
Other type of power needed (water)	1
Approvals required (governmental)	1
Office premises rented	1

Demand is good, businesses reported with an average of 7 on a scale from 1 to 10, where 1 is very low and 10 very high demand. Overall, no sector or sub-sector experiences particularly low demand though the recycling businesses found in the chemical sector – do not seem to be reporting a particularly high demand either.

28 It was not possible to determine whether greenhouses cultivation was actually sustainable.

Table 4: Average demand reported by SMEs in each sector/sub-sector

Sectors and sub-sectors	Number of businesses in the sector/sub-sector	Average demand on products and services on a scale from 1 to 10, where 1 is very low and 10 is very high demand
Agriculture-cultivation	**42**	**7,5**
Agricultural land for producing pomegranate, palm, fish	1	7,0
Agriculture	20	7,9
Agriculture/livestock	1	9,0
Farming	3	7,0
Fertilizer	1	8,0
Green house cultivation	1	8,0
Nursery	9	7,0
Tomato farming	1	9,0
Vegetable/fruit farming	1	5,0
Wheat and barley cultivation	3	7,0
Wheat cultivation	1	8,0
Agriculture-trade/retail	**11**	**7,5**
Agricultural equipment	6	7,0
Fertilizer	3	9,7
Installation - irrigation	2	5,5
Carpentry	**2**	**5,0**
Carpentry	2	5,0
Chemical	**26**	**6,3**
Asphalt plant	3	7,3
Oil – recycling	1	9,0
Plastic and paint manufacturing	1	4,0
Plastic recycling	13	5,9
Recycling - glass	1	6,0
Recycling -various	2	5,0
Skin care, packaging	1	8,0
Skincare production	1	10,0
Waste water treatment	3	6,0
Construction	**8**	**6,5**
Brick factory	2	9,5
Construction - eco	6	5,5

Sectors and sub-sectors	Number of businesses in the sector/sub-sector	Average demand on products and services on a scale from 1 to 10, where 1 is very low and 10 is very high demand
Food processing and preparation	**6**	**7,9**
Dates packaging	1	10,0
Organic food packaging	1	5,0
Pastries	1	8,0
Rashi	2	9,0
Vegan food preparation	1	6,5
General trade and retail	**3**	**7,0**
Solar – supply	1	8,0
Trade and retail unspecified	1	5,0
Water treatment equipment	1	8,0
Health	**1**	**8,0**
Hospital	1	8,0
Livestock	**3**	**7,0**
Fertilizer	2	7,5
Livestock	1	6,0
Manufacturing	**11**	**7,4**
Aluminium, plastic and carpentry workshop	1	8,0
Cork production	1	6,0
Cups production	1	7,0
Manufacture of covers for electrical wires and water sprinklers	1	8,0
Manufacturing - machines	1	8,0
Paper bags production	1	10,0
Solar - manufacturing	4	6,8
Solar heater manufacturing	1	7,0
Metal	**4**	**7,3**
Blacksmithing	1	6,0
Iron work	1	7,0
Metal	1	8,0
Recycling - aluminum	1	8,0
Plastic/other waste collection	**5**	**6,9**

Sectors and sub-sectors	Number of businesses in the sector/sub-sector	Average demand on products and services on a scale from 1 to 10, where 1 is very low and 10 is very high demand
Plastic - collection	3	6,8
Waste sorting	2	7,0
Services	**21**	**6,5**
Engineering services electricity	1	7,0
Power supply	2	9,5
Solar installation	17	6,2
Solar water heating installation	1	5,0
Technology	**1**	**5,0**
Technology	1	5,0
All	**144**	**7,0**

Twenty-two % of businesses rated their demand between 1 and 5 (the minimum reported was 3), which could be considered low. The main reasons for a low demand lie in the novelty of such products with customers mostly not acquainted with it, respondents commented (mentioned by 7 businesses). Other reasons for lower demand include seasonality of demand, even found among plastic recycling companies (6), cheaper imported products and lack of governmental regulations enforcement to address it (5), the economic situation in general (3), fluctuations in the exchange rate along other less mentioned examples. While these are common complaints among businesses 'novelty' and a 'lack of knowledge' on certain products or services among customers seems mostly related to green businesses only – to date not reported by other market assessments conducted by IOM – pointing to a low awareness (also among businesses).

Respondents were also asked about the general demand in their respective sectors and sub-sectors compared to competitors, who are not green and overall, while there were some examples of how being greener can cost more to end customers – they were mostly positive on how being green is not only good for the environment but also for business by in general reporting good or even better demand compared to less green competitors. Businesses were also asked whether consumers are willing to pay more for products that are environmentally friendly in their opinion and almost half were positive about this with the other half divided between people's unwillingness to pay more or not knowing. See table below.

Table 5: Willingness to pay more for environmentally friendly products as perceived by business owners

Paying more for environmentally friendly products	Number of businesses	Percentage
Yes	70	49%
No	39	27%
Don't know	34	24%

Respondents were also asked to report which type of products were customers willing to pay more if they were more environmentally friendly. While many did not provide a consistent answer, some mentioned solar panels (but also inverters and batteries), solar-powered boilers, environmentally friendly construction products, passive housing construction, organic produce (being local is also important), oil, organic food in general, and improved irrigation systems.

SUPPORTING BUSINESSES

Key informants spoke of the instrumental role of the private sector in mitigating and adapting to climate change in Iraq. Key informants were asked which sectors or type of businesses could contribute to climate adaptation or mitigation in Iraq and placed a great stress on renewable energy such as wind power manufacturing and installation (mentioned by the majority of KIs and currently not available in Iraq some have specified) and solar power installation (a sector currently available and growing) and manufacturing (PV grids and other). Informants also mentioned water extraction from atmosphere businesses, power (and other resources, also not currently available in Iraq some have specified) generation through waste, environmentally friendly construction materials and techniques, drainage and wastewater treatment systems, solid waste and different types of materials (iron, paper, etc.) sorting and/or recycling, green transportation (and public transportation!), car oil recycling, tire recycling, eco-tourism. A major role is played by agriculture KIs also specified and therefore improved irrigation systems retail/installation, technology such as 'smart farming', production and use of organic fertilizer, and organic poultry farms.

Respondents were asked **whether through a grant they would be able to address climate mitigation** (such as reduce green gas emissions) **or climate adaptation** (the specified business would improve resilience to climate change, through increased ability to adapt to, or absorb, climate change stresses, shocks and variability and/or by helping reduce exposure to such risks) and the majority, 75 %, mentioned they would be able to further do so whereas almost a quarter thought they were already contributing to solving the problem.

Table 6: Ability to go greener through a capital injection according to business owners

Ability to address climate change through a capital injection	Number	Percentage
No	2	1,40%
Yes	107	74,83%
Already sufficiently addressing climate change	*34*	*23,78%*
Total	**143**	**100%**

Respondents were also asked about how would a grant either allow or improve (as most businesses already adopted green practices) their ability to either address climate mitigation or climate adaptation concerns. The most mentioned was the ability to reduce green gas emissions, especially through using solar panels – and stopping the usage of generators - or improved machinery equipment with lower consumption, recycling of various types of waste, and the ability to expand to other areas, by increasing green spaces (tree planting mentioned by agricultural businesses), adoption of water efficient irrigation (in agriculture), introduction of more environmentally friendly and biodegradable materials such as recycled paper, using environmentally friendly construction materials, introduction of heat and drought resistant trees, and through adoption of organic fertilizers.

Businesses were asked **what else - besides a grant – would they need to go greener**. While some reiterated the need for financial support (14%) or mentioned not having a need outside financial support (17%), the needs for raising environmental awareness among the public was mentioned by more than a tenth of respondents (12%) and a small number mentioned through media in specific. Business also require some trainings, mostly unspecified and governmental support (mentioned by many farmers).

Table 7: Other types of support required for going greener in Iraq

Support - Other	Number of mentions
Nothing/unsure	24
Financial support, including machinery and equipment purchases	20
Raising community awareness on climate change in general, solar power, waste sorting, planting trees, and reduced water consumption	17
Government support (in general, different types of regulation such as enforcing the usage of waste water in business, provision of fertilizers for farmers, other types of support to farmers)	10
Trainings (climate change, trainings for skilled workers, technology)	7
Media support/advertisement	3
Additional measures enforcement for reducing the impact of businesses on the environment nearby such as planting trees	2
Services (access to higher amperes, loans)	2
Mentorship	1
Establishment of water filters production in Iraq	1

Key informants were specifically asked about the potential role of civil society in addressing climate change. They underscored the importance of civil society in raising awareness, conduct trainings, launching campaigns with some who were sceptical of the role played by civil society. Informants also mentioned the importance of the involvement of the government. Two mentioned the role of social media influencers and environmental activists as being important in supporting the cause especially through their online following. Two key informants also suggested the major role played by women in the protection of the environment and how environmental protection knowledge in a family passes through women.

Respondents were also asked to **estimate the capital needs for such green expansion**. While these should be really considered very approximate numbers, some conclusions could be drawn on whether EDF would be an appropriate mean – and especially – whether its fund range would suffice for such expansion. Food processing and preparation falls on the lower end with an average need of approximately USD 17,000 followed by agriculture (divided into two sub-groups, cultivation and trade/retail). The chemical sectors, comprising different types of recycling seems varied in terms of capital needs but still within EDF funding limitations of USD 30,000 (also assuming that business owners would be in this case able to match the grant amounts with their own contributions). For example, plastic recycling – 17 business were surveyed – appear to require about USD 60,000 on average, which with a matching contribution of USD 30,000 would still fall under the usual EDF parameters. Construction as a sector seems out of scope for an EDF grant with very high needs in terms of capital and a sector to avoid from the outset (coupled with the fact that it mostly generates daily-waged jobs). Private investment also usually flows into construction. In addition, KIs were asked to estimate the costs for a business to go greener and had fairly conservative estimates compared to business owners proposing mostly between USD 5,000 to 40,000 and in one case USD 80,000. Some admitted that it depends on the type or size of the business.

Table 8: Average capital needs for going greener divided per sector and sub-sector

Sector and sub-sector	Number of businesses in the sector/sub-sector	Average green expansion costs in USD
Agriculture-cultivation	**42**	**36.471**
Agricultural land for producing pomegranate, palm, fish	1	30.600
Agriculture	20	25.438
Farming	3	25.000
Fertilizer	1	-
Green house cultivation	1	2.500
Nursery	9	85.620
Tomato farming	1	10.200
Vegetable/fruit farming	1	272
Wheat and barley cultivation	3	23.800
Wheat cultivation	1	18.360
Agriculture/livestock	1	12.240
Agriculture-trade/retail	**11**	**25.743**
Agricultural equipment	6	17.300
Fertilizer	3	50.400
Installation - irrigation	1	-
Solar installation irrigation	1	10.200
Carpentry	**2**	**37.680**
Carpentry	2	37.680
Chemical	**26**	**79.503**
Asphalt plant	3	80.000
Oil - recycling	1	51.000
Plastic and paint manufacturing	1	27.200
Plastic recycling	13	62.915
Recycling - glass	1	136.000
Recycling -various	2	510.000
Skin care, packaging	1	25.000
Waste water treatment	3	36.667
Skincare production	1	54.400
Construction	**8**	**489.017**
Brick factory	2	355.300
Construction - green	6	555.875

Sector and sub-sector	Number of businesses in the sector/sub-sector	Average green expansion costs in USD
Food processing and preparation	**6**	**17.427**
Dates packaging	1	13.600
Organic food packaging	1	17.000
Pastries	1	11.560
Rashi	2	18.700
Vegan food preparation	1	25.000
General trade and retail	**3**	**24.933**
Solar - supply	1	27.200
Water treatment equipment	1	30.600
Trade and retail unspecified	1	17.000
Livestock	3	41.480
Fertilizer	2	45.220
Livestock	**1**	**34.000**
Manufacturing	11	76.115
Aluminum, plastic and carpentry workshop	1	10.200
Cork production	1	102.000
Cups production	1	204.000
Manufacture of covers for electrical wires and water sprinklers	1	183.600
Manufacturing - machines	**1**	**-**
Paper bags production	1	34.000
Solar - manufacturing	4	20.060
Solar heater manufacturing	1	35.000
Metal	**4**	**52.800**
Blacksmithing	1	61.200
Iron work	1	50.000
Metal	1	50.000
Recycling - aluminum	1	50.000
Plastic/other waste collection	**5**	**41.520**
Plastic - collection	3	51.267
Waste sorting	2	26.900
Services	**21**	**93.725**
Engineering services electricity	1	70.000

Sector and sub-sector	Number of businesses in the sector/sub-sector	Average green expansion costs in USD
Power supply	2	8.500
Solar installation	17	116.467
Solar water heating installation	1	15.000
Technology	**1**	**20.000**
Technology	1	20.000
Total	**144**	**76.519**

JOB CREATION

A recent report predicted how investment in climate actions can generate jobs in Iraq.[29] The high levels of investment modelled in the various decarbonization pathways outlined in the report would stimulate new labor demand in renewable energy generation where PV installation and maintenance jobs are especially labor intensive, mostly concentrated in low-skilled construction occupations that require modest upskilling, but also needs in skilled technicians, technical/engineering designers, and management skills likely rising with other renewable energy technologies also requiring a cadre of skilled labor.[30] The proposed policy suggestions outlined in the report to incentivize energy efficiency investments are also very labor intensive, both at the lower skill level as well as in mid- to high-level positions related to energy audits, environmental monitoring services, and green building code enforcement, for example the same report states.[31] In the case of agriculture, incentives to help farmers shift to climate smart crops, drought tolerant varieties, and more sustainable production methods can be supported through training to encourage uptake; these will require new skills, not only related directly to production but along the value chain including packaging, transport, sales and marketing (despite the generally low skilled jobs found in agriculture).[32]

A skill gap was reported by the surveyed SMEs. More than half of the businesses surveyed experience difficulties in finding skilled or experienced workers, which is not common compared to the findings of labor market assessments conducted by IOM in Iraq where skill gaps – while there is variety – are generally low. However, responses were often incomplete, unclear, and the skill was unspecified. While there are a lot of unspecified missed skills in machinery, lack of knowledge and experience in agriculture is high along skills in the renewable energy sector, especially solar panel installation and maintenance. Different types of soft skills are somewhat also missing along electrical skills (though it is unclear whether these refer to renewable energy, for example), and blacksmithing.

29 Word Bank, 2022
30 Word Bank, 2022
31 Word Bank, 2022
32 Word Bank, 2022

Table 9: Skills difficult to find as reported by businesses

Skill difficult to find	Number of mentions
Machine operators, various (unspecified)	13
Agricultural engineers, technicians (for example knowledgeable on sprinklers), knowledge on plant diseases	11
Farmers knowledgeable in specific crops planting, planting palms, greenhouse cultivation, fertilizer/pesticide knowledge and use, planting trees, cattle breeding, dairy production	10
Solar panels - system design, installations	9
Soft skills	7
Electrical technician	7
Blacksmiths	4
Experience in general	2
Accounting, administration	2
Driving	2
Engineering various – paint, manufacturing of pipes	2
Customers care - sale	2
Combustion and drying systems knowledge	1
Water desalinisation devices and systems	1
Nutrition	1
Chemists	1
Carpentry	1
Design (unspecified)	1
Programming/coding	1
Experience in recycling different materials such as oil	1

Almost all the businesses surveyed reported that with such green expansion they would hire new workers. While overall, the average of new hires is approximately 8 new workers, variety within sector could be found. Overall, it could be excluded that going greener would not create new jobs pointing to the fact that job creation would be possible with grants unlikely leading to mostly asset replacement. The cost per job was also calculated, including an adjusted cost per job assuming a 50 % contribution of the business owner to the grant, which at least outside of agriculture, is likely feasible. It seems that the cost per job would then fall within the usual EDF parameters of USD 6,000. Overall, in agriculture the cost per job are very low (however, also mostly seasonal and therefore less stable). Acceptable costs per jobs are also found in the various recycling and waste sorting businesses.

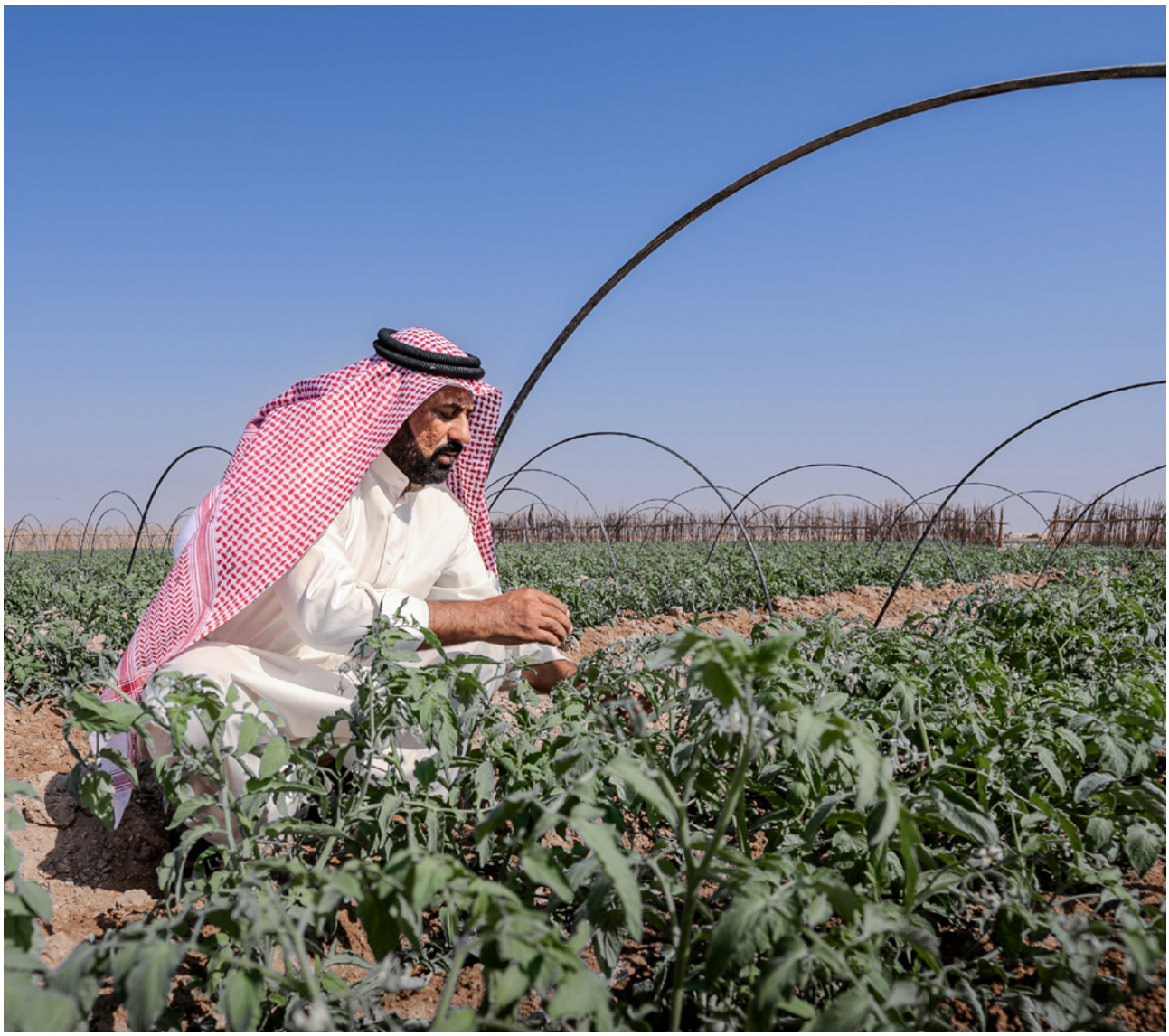
Table 10: Average new hires through green expansion, cost per job, and cost per job assuming a 50 % business owner contribution

Sector and sub-sector	Average number of new workers	Average cost per job	Adjusted cost per job (assuming business owner contribution of at least 50% of the total amount)
Agriculture-cultivation	**7,5**	**4.734**	**2.180**
Vegetable/fruit farming	2,0	136	68
Green house cultivation	6,0	417	208
Agriculture/livestock	5,0	2.448	1.224
Tomato farming	4,0	2.550	1.275
Farming	9,7	3.548	1.774
Wheat cultivation	5,0	3.672	1.836
Agriculture	6,9	4.822	2.411
Wheat and barley cultivation	6,0	4.930	2.465
Nursery	10,6	7.157	2.684
Agricultural land for producing pomegranate, palm, fish	5,0	6.120	3.060
Agriculture-trade/retail	**5,7**	**6.915**	**3.143**
Solar installation farms	7,0	1.457	729
Agricultural equipment	5,7	6.810	3.405
Fertilizer	5,3	8.943	4.471
Carpentry	**3,8**	**13.215**	**6.607**
Carpentry	3,8	13.215	6.607
Chemical	**7,7**	**10.668**	**5.092**
Waste water treatment	8,3	4.333	2.167
Skincare production	10,0	5.440	2.720
Skin care, packaging	4,0	6.250	3.125
Plastic and paint manufacturing	4,0	6.800	3.400
Recycling -various	50,0	10.200	5.100
Plastic recycling	5,5	11.478	5.261
Oil - recycling	4,0	12.750	6.375
Asphalt plant	3,0	21.667	10.833
Construction	**21,3**	**12.644**	**4.742**
Construction - eco	22,2	12.344	4.115
Brick factory	19,0	13.246	6.623
Food processing and preparation	**3,6**	**6.134**	**3.067**

Sector and sub-sector	Average number of new workers	Average cost per job	Adjusted cost per job (assuming business owner contribution of at least 50% of the total amount)
Dates packaging	5,0	2.720	1.360
Vegan food preparation	5,0	5.000	2.500
Rashi	3,0	7.225	3.613
Organic food packaging	2,0	8.500	4.250
General trade and retail	**2,5**	**9.936**	**4.968**
Trade and retail unspecified	2,0	8.500	4.250
Solar - supply	3,0	9.067	4.533
Water treatment equipment	2,5	12.240	6.120
Livestock	**3,7**	**11.503**	**5.752**
Livestock	5,0	6.800	3.400
Fertilizer	3,0	13.855	6.928
Manufacturing	**11,0**	**15.612**	**7.806**
Solar - manufacturing	30,0	1.979	989
Aluminium, plastic and carpentry workshop	4,0	2.550	1.275
Solar heater manufacturing	7,0	5.000	2.500
Paper bags production	4,0	8.500	4.250
Manufacturing - machines	7,0	17.143	8.571
Manufacture of covers for electrical wires and water sprinklers	10,0	18.360	9.180
Cork production	3,0	34.000	17.000
Cups production	4,0	51.000	25.500
Metal	**11,8**	**4.982**	**2.491**
Metal	15,0	3.333	1.667
Recycling - aluminum	15,0	3.333	1.667
Blacksmithing	10,0	6.120	3.060
Iron work	7,0	7.143	3.571
Plastic/other waste collection	**8,8**	**4.980**	**2.490**
Waste sorting	7,0	4.475	2.238
Plastic - collection	10,0	5.317	2.658
Services	**6,5**	**9.791**	**4.161**
Power supply	2,0	4.250	2.125
Solar water heating installation	3,0	5.000	2.500

Sector and sub-sector	Average number of new workers	Average cost per job	Adjusted cost per job (assuming business owner contribution of at least 50% of the total amount)
Solar installation	7,3	10.996	4.467
Engineering services electricity	7,0	10.000	5.000
Technology	**10,0**	**2.000**	**1.000**
Technology	10,0	2.000	1.000
Grand Total	**8,0**	**8.347**	**3.825**

Almost 40 % of the businesses employ women also (63% reported not employing women). Fifteen businesses have at least 50 % (or more) of women among their workforce. While these are agricultural businesses mostly, solar power suppliers, skincare production also employ mostly women along a two eco-friendly construction companies. Key informants think that green businesses represent good entry points for women as employers and employees, whereas some mentioned especially agriculture, tourism, industry, services and administration in medium and larger companies as employing women.

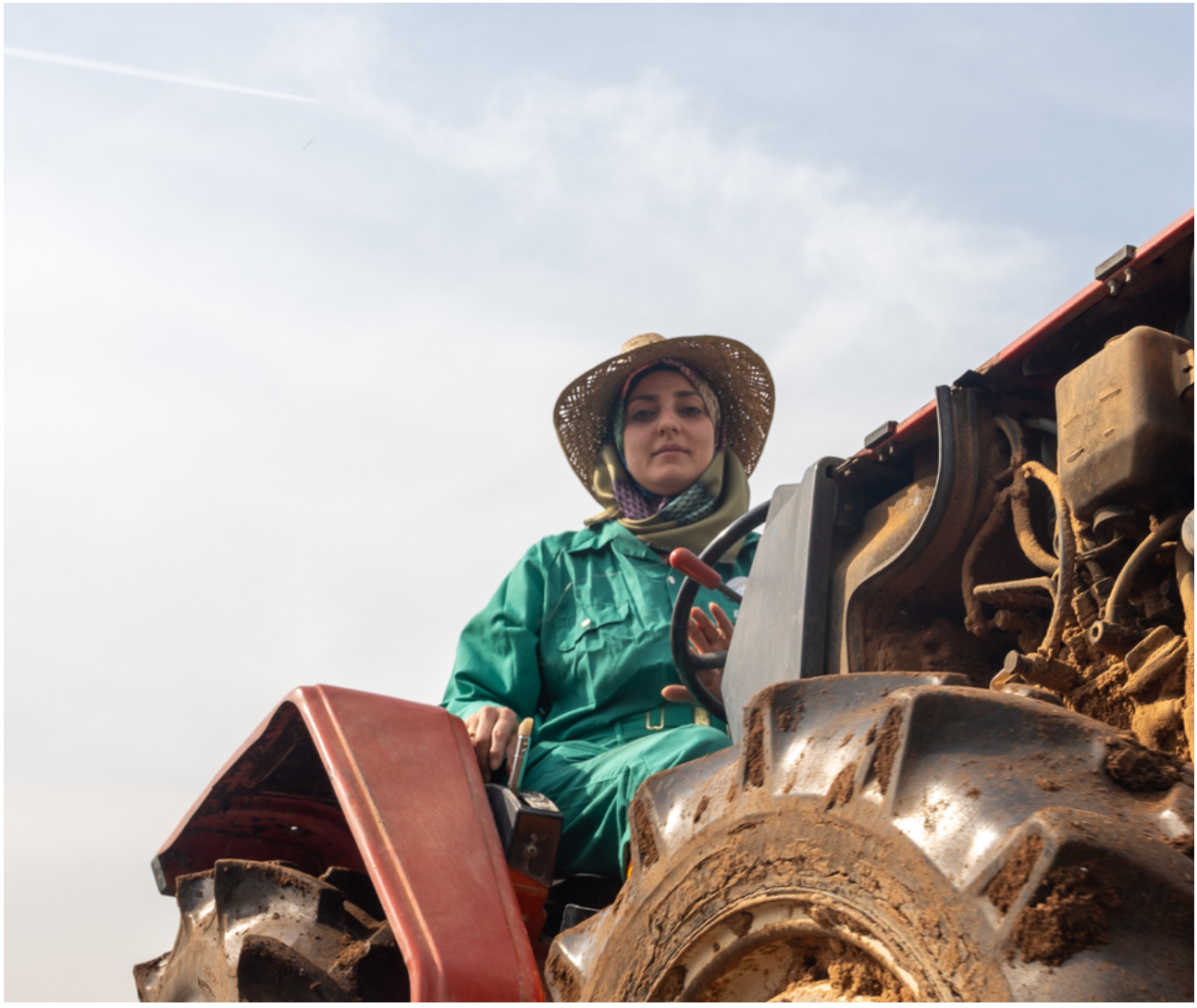


CONCLUSIONS AND RECOMMENDATIONS

In conclusion, funding green businesses under EDF is possible, especially in terms of capital requirements. However, there are many different methods for going greener, from modifying one component of the production process, greening the entire process or even producing green products. Hence, a specific EDF-Green business will need to show a high potential for greening production practices if not producing green products.The latter will therefore require some major operational revision along some major shifts in thinking, which will likely represent the most challenging task in implementing EDF-G.

RECOMMENDATIONS FOR EDF-G

- Support businesses that either create 1) green **products** or services such as the various renewable energy providers, recycling companies, organic food preparation, and many more.[33] Moreover, EDF-G can also support businesses which are 2) **green and could further green their practices** (meaning businesses that provide standard products or services but have or could additionally green their production process), these should demonstrate potential to do so in the following dimensions of their operations (or at least in the majority of the following dimensions) as outlined in the table below:



33 Some examples:

Table 11: Green processes to be considered during the different stages of EDF-Green adapted from the ILO Green Business Booklet, 2017.

Dimensions of businesses operations to be considered during the different EDF stages for EDF-Green	Main pillars	Remarks
Recycling and waste reduction	- Reducing, reusing, recycling	
Energy and water conservation	- Saving heat and electricity - Saving water - Using efficient equipment - Using only when needed -Using source from renewable sources	
Pollution prevention	- Using low emission equipment - Operating efficiently - Using degradable materials	
Green procurement	- Procuring environmentally sustainable and local materials/products - Choosing suppliers that try to be environmentally friendly	
Green distribution	- Avoiding transportation to far- away places - Using the most sustainable methods of transport -Choosing distributors that try to be environmentally friendly	This pillar seems the most limited in Iraq, especially in consideration of the challenges of transportation and especially sustainable means of transportation

- The examples of greening dimensions outlined above are indicative only and will require additional revisions, especially in terms of IOM's ability to effectively capture these elements in the screening processes and subsequent phases upon the EDF-G reward. A brainstorming session should follow on how to operationalize the changes required for EDF-Green. The latter will inform all the following stages, including preparation of flyers during the EoI, the EDF-G EoI form that will score firms also on these elements, the EoI verifications that will also verify firms on these elements. Also, the application will need to include these elements by simultaneously ensuring clarity and ease for filling the form. The milestone verification will require checking for adherence to the proposed greening processes.
- In consideration of the available funding and to gain some time, it is recommended to launch a closed call for businesses already providing green products or services with all the relevant revisions required for EDF-Green – that should consider businesses greening their practices too as outlined above- running in parallel. Admittedly, considering that these businesses would need to provide green products, a closer examination on how green are their operations is to some extent less needed – as it should already be as such – and could more or less

assessed like other businesses, at least at this stage. A first, a call for EDF-G could therefore include the most 'obvious' sectors such as businesses in the entire renewable energy value chain, all type of waste sorting and recycling, manufacturing businesses using recycled materials in their production (for example, recycled water pipes), any type of organic food preparation and processing, eco-tourism, and other. It is recommended to leave agriculture out for now as the latter will require revisions of the EDF process, which will allow to assess and monitor the greening of the entire operations.

- Amounts disbursed could be kept as usual, between USD 5,000 and 30,000 including the usual costs per job of USD 6,000 with higher costs per job allowed during the EoI and EoI verification stages (for example, USD 8,000, which could be subsequently reduced). Exceptions could be applied for businesses actually producing green products if needed, but overall, at this stage it does not seem that with the usual amounts the majority of green businesses would be left out.
- Considering the novelty of green businesses, allow for minimum 2 years of operations.
- There is no limit to areas or locations – admittedly, different areas host different types of sectors – so calls could be open in all IOM areas of operation.
- Considering the usually high degree of education among such businesses support for loans should be also provided to EDF-G grantees as these would be likely fairly receptive and considering that sometimes capital needs are high, even more so. So enrolment into IOM's Access to Finance should be also offered, from the outset.
- Staff will require training on green businesses as the latter is not simply a sector or twist to an EDF but a general rethinking of doing business.
- Conduct a climate risk assessment for EDF (and ILA).
- It is recommended to support start-ups, this should be reserved to businesses producing or planning to produce green products, especially through the different incubators operating across Iraq.
- In regards to solar panels in particular, it is advisable to ensure these are not tied to slave labor concerns in China, since *"the Uyghur Region accounts for approximately 45% of the world's solar-grade polysilicon supply with 95% of solar panels globally relying on one primary material – solar-grade polysilicon.*[34]
- In general, IYB and other trainings should include climate change and green practices as part of their curricula, as per ILO latest guidelines. This should be included into all IYB trainings.
- Working with businesses only is not enough as also businesses themselves have pointed out. Coordination and work with civil society on raising awareness is also recommended. However, 'tokenistic' parallel activities should be avoided and therefore devising a strategy on working with civil society – through community engagement - is needed in order to maximize the effects of EDF-G.
- M&E will also require revision, especially in capturing the impact on the environment and climate change therefore scoring of businesses applying the Rio Markers for example is needed.

RECOMMENDATION FOR EDF

Finally, it is also recommended to introduce some changes to EDF in general, especially in terms of favouring/ more highly scoring SMEs that show the ability and potential in greening their operations on the elements and pillars on greening processes as outlined above. The latter, as in EDF-Green, would affect all the stages of EDF. In addition, the latter should be also introduced to the Individual Livelihood Assistance.

34 Anti-Slavery, Report exposes solar panel industry Uyghur forced labour links https://www.antislavery.org/solar-panel-industry-uyghur-forced-labour/

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