# Tracing the Link between Climate Justice Action and the NDCs in Israel

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## Table of Acronyms

NDCs- Nationally Determined contributions
INDCs- Intended Nationally Determined Contributions
GHG- Greenhouse Emissions
CSO- Civil Society Organizations
LA- Local Authority
ETF- Enhanced Transparency Framework
PV- Photovoltaic
RE- Renewable Energy
ToR- Terms of Reference
BAU- Business as Usual
MoEP- Ministry of Environmental Protection
NIS- New Israeli Shekel
EV- Electric Vehicles
IEC- Israeli Electricity Company

## **Executive Summary**:

Israel, a small country in the middle east, emits 0.14% of the global CO2 emissions, while CO2 emissions per capita is 6.13 metric tons (2021). Yet, its NDCs, especially its renewable energy targets, are not ambitious: 30% renewable energy for the year 2030 while no target was set for the year 2050. NDCs are translated into national policies. The different Israeli governments have issued several decisions related to climate change and transition to a low carbon economy. However, to this day, the Climate Bill has not been approved, and the government decision's implementation is subject to changeable attitudes of the politicians in the relevant governmental offices. Generally, the Israeli governments are not committed to fulfilling the decisions and International commitments. Different ministries have launched several plans and strategies, translated partly into budgeted projects; however, the projects remain segmented with no overall view and coordination.

The energy sector in Israel, and specifically electricity production, is the country's main GHG emitter, thus in order to meet Israel NDC's electricity production must shift away from fossil; and solar energy should be prioritized over gas. Yet, Israel's renewable energy targets are relatively moderate, and even these moderate goals are not met. The government has attempted to translate its energy targets into policies and strategies; However, the steps taken by government offices are sporadic, and do not reflect deep understanding of the threat posed by global warming, nor commitment to achieving the goals. This gap is especially apparent in the financial aspects, where regulatory bodies such as the Electricity Authority are committed only to the price and market criteria, and refuse to offer massive support to increase renewable energy generation through subsidies, for example. Furthermore, efforts to increase renewable energy, mainly solar energy, are facing several regulative and infrastructural obstacles that should be overcame. CSOs play an important role in both challenging the government to set higher emission reduction goals, and in implementing the goals set. For example, the Heschel Center's NZO research work and the support initiatives led by CSOs for enhancing the acceptance of solar systems within LAs.

The attempt to trace back reported ETF communications to implemented local level climate actions in Israel seems hard. Israel has been submitting reports under the UNFCCC irregularly. In 2000, Israel submitted its first national communications. In 2010, Israel submitted its second national communications. In 2012, the second communication and GHG inventory were submitted. In 2015, the INDC was submitted. In 2016, Israel submitted its first biennial update report and its first NDC. In 2018, the third communication report was submitted. In 2020, the 2020 GHG inventory was submitted and the national inventory report. In 2021, Israel submitted its first revised NDC. However, Israel has not submitted a strategic plan. On the national level, Israel has different institutions and bodies that issue different reports in a sporadic manner. In regard to local implementation reports, local actors including LAs are not obliged to report on climate action and most of them do not do so. Therefore, it is recommended to regulate Israel reporting on the national and local level.

Solar energy has a crucial role in just transitioning to a low carbon economy, if implemented correctly. For that to be the case, PV systems should be installed mainly within the built areas (as opposed to open lands), and to create benefits for the residents of the areas where the systems are built; either from the profits the systems generate, from consuming the electricity or from other advantages such as increasing shading in public areas. In Israel, as solar energy is the main source of renewable energy, transition to it should be done in a just way.

There are several different RE projects while none of them could be considered, as-it, best practice. Models related to weak local authorities; including what is called 'HaPais' model where loans are offered to weak LAs; And the 'Jaljulia' model (A Leasing model)- both have their strengths and weaknesses. On the other end of the spectrum, a bottom up model initiated in the unrecognized Palestinian Bedouin villages in the Naqab is highly valued in terms of local energy sovereignty and ownership; Yet it lacks crucial aspects of just transition as this underprivileged community with the least contribution to climate change, bears a significant burden, having no other solution in the lack of governmental support. Just models should address key aspects:

1. Ensure the LA receives a just share of the income produced by its assets
2. Ensure long term maintenance of the systems
3. Builds capacity within the LA to carry out further projects and serve as active agents.
4. Maximize GHG emissions reduction potential within the LA.
5. Recognize and support bottom-up projects.

## Study Scope and Methodology

**The research scope:**

This study aims at achieving the following objectives:

1. **TRANSPARENCY**: Tracking international climate commitments to climate relevant policies at the local level in Israel.
2. **EFFECTS**: Checking for communication and interaction along horizontal and vertical organizational lines in Israel.
3. **ACTION**: Understand if and how the NDC is being implemented in a socially just manner exemplary in the energy sector in Israel; Finding best practice examples.

**Methodological approach:**

This research takes a "case study" approach which allows in depth investigation of the research questions. The following research questions were defined in the ToR by the mandating foundations:

1. Are NDC targets translated into national law, policies & strategies and further defined in an enabling environment for ambitious climate action (e.g., work-plans, local development plans, sustainable agriculture strategies etc.) at local level? In other words, how are policies stated in/related to NDCs implemented at local level?
2. Can the climate actions reported in the ETF communications be consistently traced back to implemented local level climate actions? Can the achieved effect of climate and energy action reported in the ETF communications be consistently traced back to implemented local level climate actions?
3. Are government funded energy production projects socially just? Are they equitable according to the RES principles provided by CIDSE? Are there best practice examples to be found within the country's context? What makes them best practices?

In May 2022, a scoping meeting was held with Misereor representatives. During the meeting, the ToR was discussed; a timeframe for submitting the different phases of the study was agreed on. Following that, **The Galilee Society** and its consultant **"Heschel Center for Sustainability'' held** several meetings during which they worked on the case study design.

For the first research question:

**Data collection** was made from different sources. It included literature review; extensive desk research of governmental and official documents including the reports submitted to the UNFCCC by Israel, government decisions, ministerial strategies, legislations and regulations, position papers, news articles and more; Digital presentations by relevant governmental officials on mitigation and renewable energy policies; Interviews with governmental officials.

**Data analysis and interpretation:** the data and the information were critically reviewed; A classification of mitigation policies and measures (governmental decisions, laws and regulations, central government plans and strategies) was outlined and analyzed in accordance with the sectoral targets committed by Israel taking into account the environment these policies are implemented within.

**Reporting:** A contextual information was provided with main finding and conclusions on the extent of Israeli mitigation targets and recommendations to achieve higher targets in the solar energy sector.

For the second research question:

**Data collection** was carried out from different sources. It included literature review; extensive desk research of governmental and official reports included reports submitted to the UNFCCC, reports published by the central government, reports published by official bodies including the electricity authority and the comptroller office; Interviews with governmental officials.

**Data analysis and interpretation:** the reports were critically reviewed and analyzed quantitatively and qualitatively.

**Reporting:** A contextual information was provided with main finding and conclusions.

For the third research question:

Selection criteria for the just transition projects was determined in the following way: first, solar energy projects were chosen since this is the major and the most potential renewable energy source in Israel. Secondly, three different models of solar energy projects were chosen. Project 1 (Hapais project) represents a model where weak local authorities were provided with loans to implement solar energy projects on public buildings; Project 2 (Jajulia project) represents an initiative of local authorities to implement solar energy project in a leasing method; And project 3 (Naqab projects) represents a bottom up model where local communities in unrecognized villages in Naqab (Southern Israel) initiated solar energy projects.

**Data collection** was carried out from different sources. It included literature review; extensive desk research of governmental and official documents; Digital presentations of relevant stakeholders. In addition, Heschel accompanied the planning and implementation of project 1, therefore, knowledge and insights gained through the process were incorporated. For project 2, the staff also interviewed the stakeholders connected to the project, including the engineer in

charge of planning and implementing the project. For project 3, the staff made a guided tour to the Naqab during which different solar projects in unrecognized villages were visited and different stakeholders were interviewed (including residents of the villages, school principals and activists).

**Data analysis and interpretation:** The RES principles were operationalized and the three projects were analyzed according to these principles.

**Reporting:** A contextual information was provided with main finding and conclusions.

## Background: Climate Change in Israel

Climate Change and global warming are witnessed all over the world. Its impacts are already present in Israel:

- Extreme temperature events have shown a significant increase in number and intensity: 6°C higher for more than 3 consecutive days.
- Warming trend in all regions
- Decrease of rate of precipitation in the northern region
- Sea level rise of 10 mm per year

Israel is located in the Mediterranean basin, which is expected, according to the predictions of many models, to experience significant changes in its climate (Broom, 2019)
According to the Israeli meteorological service, a mean rise in temperature of 4°C is expected at the end of this century. In the BAU scenario, a rise of 5°C is expected in the minimum summer temperature.
In a nutshell, the climate in Israel will be **hotter and drier**, extreme weather events will be more **intense**, and **sea level** will **rise.**

It is known that GHG emissions are the major contributor to global warming and to climate change as a result. The GHG emissions per capita in Israel have been trending down in recent years (inconsistent decline from 10.7 tons of CO2-eq in the year 2000 to 8.8 tons of CO2(eq) per capita in 2018). The GHG emissions per square Kilometer in Israel are relatively high (3.6 tons per Km2as for 2018); this combined with the number of the population (9.3 Millions), result in GHG emissions that are equivalent to a medium country. (The state comptroller and Ombudsman of Israel, 2021)
Between 1995-2020 there has been an increase in the GHG emissions in absolute terms due to population growth (of 1.9% annually) and increase in goods and services production. On the other hand, the decrease in emissions per capita is mainly due to the transition from coal to a gas based electricity production starting from 2012.

International Treaties to combat climate change

The United Nations Framework Convention on Climate Change is an international treaty that was funded in 1992 as a framework for international cooperation to limit global warming, stop climate change, and to cope with its impacts. As a step to reduce GHG emissions, the Kyoto protocol was signed by developed countries. Nowadays, 192 countries signed the named Protocol. In 2015, the Paris agreement was signed with the aim to limit global warming under 2°C above pre-industrial levels, and to make efforts to achieve a more ambitious goal of under 1.5°C.

The Paris agreement is legally binding and was adopted by 196 Parties and entered into force in November 2016. The agreement works on a 5- year cycle of increasingly ambitious climate action. To reach the goals of the Paris Agreement, countries had to submit in 2020 their plans for climate action known as **NDCs**, through which countries communicate their planned actions to reduce their GHG emissions to reach the goals of the agreement. In addition, actions to build resilience to adapt to climate changes are also a part of the NDCs. Enhancing transparency of action through a transparency framework is a key element of this agreement.

For countries to better communicate progress in climate change mitigation and adaptation measures, an **ETF** was established. This information will help assess the collective progress towards the long-term climate goals and help adapt and improve each county's plans.

Israel's NDCs

## submission, national law, policies & strategies & local implementation & development plans

### Overview of Israel's international commitments regarding climate change

**From Paris Agreement till now**

Israel joined the UNFCCC in May 1996. In March 2004 Israel joined the Kyoto Protocol. In 2015, Israel signed the Paris Agreement. Israel has defined itself till the Paris Agreement as a developing country, and so did not commit to reach its climate targets. However, during COP 21 in Paris 2015 Israel "made binding international commitments to adopt concrete mitigation targets and enact policies that would reduce its GHG emissions" (Tal, 2020)

Under the Paris Agreement, Israel communicated its INDC on 29 September 2015, and later submitted an updated NDC upon ratification of the Paris Agreement on 22 November 2016. In July 2021 the NDC was updated, after passing the government decision no. 171 on the 25th of July 2021, entitled "Transition to a Low Carbon Economy."

Israel uses the GHG Emissions in the year 2015 as reference year in its NDC upon submission. Per capita GHG Emissions were communicated in its INDC, and later in its updated NDC in 2021 unconditional absolute numbers were used.

In this and the next chapter, sectoral mitigation targets from Israel's most updated NDC will be presented, dating from 29/07/2021.

*Table 2 Comparison of mitigation goals between NDC and INDC*

| | Updated NDC July 2021 (Decision 171) | | INDC (Decision 542 from year 2015) | |
|---|---|---|---|---|
| Year | MtCO2eq | Reduction relative to 2015 | MtCO2eq | Reduction relative to 2015 |
| 2015 | 79 | | 79 | |
| 2030 | 58 | -27% | 81.65 | +3% |
| 2050 | 12 | -85% | | |

The updated NDC significantly improved the 2030 GHG emissions goal, from an absolute emissions rise of 3% in the INDC to a reduction of 27% in the NDC. 85% reduction of GHG emissions (compared to 2015) was set for 2050 in the NDC.

Israel has not committed to net zero emissions by 2050. Israel only communicates the desire of a net-zero emissions goal by 2050, in the context of global efforts to limit global warming to 1.5°C. For that matter the 2050 goal will be periodically revisited.

Israel's most updated NDC - July 2021

The sectoral targets of GHG emissions reduction communicated by Israel through the NDC (MoEP, 2022) are as follows:

*Table 3 Sectoral mitigation goals according to updated NDC 2021*

| Sector | **2030** | **2050** |
|---|---|---|
| **Electricity generation** | 30% | 85% |
| **Transport** | 3.3% increase | 96% |
| **Industry** | 30% | 56% |
| **Waste** | 47% | 92% |

Israel has set specific sectoral targets, milestones and measures to reduce GHG emission as the following:

### Electricity Generation

- Reduction of GHG emissions from electricity generation by 2030 by 30% compared to emissions measured in 2015, which were 37.6 MtCO2e, taking into account the renewable energy targets set in Government Decision No. 465 (see below).
- Reduction of GHG emissions from electricity generation by 2050 by at least 85% compared to emissions measured in 2015.

### Energy Intensity

- To set a new energy intensity target so that by 2030 the energy intensity of GDP will be 122 MWh per NIS 1 million.

### Transportation

- As of 2026, all new municipal buses purchased will be clean vehicles as defined in section 77A of the Transport Ordinance [New Version].
- Limit the increase in GHG emissions from transportation by 2030, so that the total increase in emissions will be only 3.3% compared to emissions measured in 2015, which were 17.6 MtCO2e.
- Limit the amount of GHG emissions from new vehicles, weighing up to 3.5 tonnes, registered from 2030, to an amount equal to 5% of the average GHG emissions for a new vehicle, weighing up to 3.5 tonnes, registered in 2020. This target will be reexamined in 2025, and will be updated as necessary, having regard to technological developments, the extent of the penetration of electric vehicles in Israel and globally, electricity infrastructure and the deployment of charging stations in Israel.
- Reduction of GHG emissions from transport by 2050 by at least 96% compared to emissions measured in 2015.

### Waste

- Reduction of GHG emissions from solid waste by 2030 by at least 47% compared to emissions measured in 2015, which were 5.5MtCO2e.
- A 71% reduction in the amount of municipal waste landfilled by 2030 compared to the amount of municipal waste landfilled in 2018, which was about 4.5 million tonnes.
- Reduction of GHG emissions from municipal waste by 2050 by at least 92% compared to emissions measured in 2015.

### Industry

- Reduction of greenhouse gas emissions from industry by 2030 by at least 30% relative to emissions in 2015, which were 12 MtCO2e.
- Reduction of industrial greenhouse gas emissions by 2050 by at least 56% relative to emissions in 2015.

### Climate Impacts of Goods and Services

- To establish a voluntary mechanism for reporting and publicizing information on the GHG emissions associated with products and services manufactured in and imported to Israel.

The following table sums up Israel's sectoral targets for GHG reduction by MtCO2e and by rate of change according to its most updated NDC

*Table 4 Detailed sectoral mitigation plans from the updated NDC 2021*

| Sector | GHG emissions (MtCO2e) in 2015 | GHG emissions (MtCO2e) in 2030 | **Rate of change in 2030 relative to 2015** | GHG emissions (MtCO2e) in 2050 | **Rate of change in 2050 relative to 2015** |
|---|---|---|---|---|---|
| **Electricity generation** | 37.6 | 26.3 | 30% | 5.6 | 85% |
| **Transport** | 17.6 | 17 | 3.3% increase | 0.7 | 96% |
| **Industry** | 12 | 8.4 | 30% | 5.3 | 56% |
| **Waste** | 5.5 | 2.9 | 47% | 0.4 | 92% |
| **Other** | 6.3 | N\A | - | N\A | - |
| **Total** | **79** | **58** | **27%** | **12** | **92%** |

**Israel's Policies to achieve NDC's Targets**

Policy Making Processes in Regard to GHG Emissions in Israel

In theory, Israel employs several policy tools to achieve its policy goals including legislation, regulation, taxes, etc. De facto, the governance structure in Israel significantly affects policy tools employed. In recent decades, Israel has been facing an acute problem of governability that imposes difficulties on policy making and implementation processes. (Mizrahi, 2018)

The Knesset (the Israeli Parliament) passes the laws. Legislation can be passed by the government (Government Bills), by one or more Knesset members (Private Bills), and by Knesset committees. (The Knesset Lexicon, n.d.) The Ministry for Environment promoted a Climate Bill proposal that passed the first stage (out of three stages called "Readings") in June 2022. The Climate Bill proposal includes the following five themes: 1. Setting targets for GHG emissions' reduction- 27% for 2030; Mandating the governmental ministries to prepare adaptation plans; 3. Establishing a Committee consisting of ministers headed by the prime minister; 4. Establishing an inter-

ministerial committee for climate change and a scientific committee.; 5. Mandating climate risk evaluation for projects that have the potential for impacting GHG emissions.

### The policy tool "Governmental Decisions"

The main policy tool in Israel is "Governmental Decisions". Governmental decisions are not statutory but rather reflect formal agreement among the government's members. Starting from 2015, the Prime Minister Office publishes an annual report of the implementation of the governmental decisions. The Israeli governments issued several decisions in regard to climate change coinciding with global events. The following table summarizes the major ones. (The state comptroller and Ombudsman of Israel, 2021)

*Table 5 Israel's events and decisions related to climate change – based on state comptroller and processed by Galilee Society team*

| | **GLOBAL EVENTS** | **ISRAEL'S EVENTS** |
|---|---|---|
| **1996** | COP2 - Geneva | May- Israel ratified UNFCCC treaty |
| **1997** | COP3 - Japan<br>Kyoto Protocol was adopted | |
| **2004** | COP10 - Buenos Aires | March- Israel became a party in Kyoto Protocol after ratifying it on 15.3.04 |
| **2008** | | September - Governmental Decision 4095 that sets goals for electricity efficiency of 20% by 2020 |
| **2009** | Copenhagen· COP15 -<br>Copenhagen Accord that acknowledges for the first time keeping global warming within 2 °C | January- Governmental Decision 4450t that states that by 2020 10% of the electricity generation will be from renewable energy with interim target of 5% by 2014-<br>June- Governmental Decision 474 to establish CEOs' Committee for preparedness for climate change and reduction of emissions that will be in charge of consolidating recommendations for a national action plan with targets, recommendations for reduction |

| | | |
|---|---|---|
| | | measures, budgets, schedules, milestones, indicators for outputs and results and more.<br>December- the President declaration in Copenhagen conference that Israel will be doing her best to reduce greenhouse gasses by 20% in comparison to BAU scenario |
| **2010** | | January- a formal notice of Israel was sent to UNFCCC secretary in regard to her aspiration to reduce 20% of BAU scenario in 2020<br><br>March- Governmental Decision 1504<br>- Abolishing the sections that deal with greenhouse emissions in Governmental Decision 474<br>- Appointing a steering committee headed by the Treasure Minister to consolidate an action plan with policy measures that are required to reduce greenhouse emissions by 20% by 2020. The committee was required to identify barriers and to suggest policy measures, economic tools and allocation of resources.<br><br>November- Governmental Decision 2508 on a national plan to reduce greenhouse gasses that assigned the CEOs' Committee (from 2009) to prepare a comparison analysis of the economic efficiency of projects to reduce greenhouse emissions. The ministers for environment, energy, treasures, transportation, housing and economy were assigned to implement different activities in these fields that are within their responsibility. 2.2 Miliard NIS were allocated for implementing the plan between 2011-2020. |

| | | |
|---|---|---|
| **2013** | | May- The national plan budget was frozen for 3 years (By then 106 million NIS were allocated in the years 2011-2012) and the implementation of the plan was stopped (The plan didn't include budgets to promote renewables). |
| **2015** | COP21 - Paris | Governmental Decision 378 that cancels the implementation of the national plan to reduce emissions for the years 2016-2023 and instructs the ministers for energy, treasure and environment to suggest an alternative plan to the government before the COP in Paris. The ministry for environment submitted a plan and a governmental Decision was made in 2016. |
| **2018** | | August- Governmental Decision 208 "Transition to Green Energy and Updating Governmental Decision". The main theme is overcoming barriers, accelerating the development of solar facilities for electricity production, storage facilities and agro-voltaic facilities. |
| **2021** | November COP26 - Glasgow | October- Governmental Decision 4079 to establish the Climate Change Administration that will be headed by the Ministry for Environment and will be in charge of coordinating the activities in regard to climate change mitigation and adaptation. The Administration first convened in 25.10.2018<br><br>October- Governmental Decision 544 "Encouraging Technological Innovation to Combat Climate change". This decision relates to both mitigation and adaptation and encourages, among other things, research and development. |

| | | |
|---|---|---|
| | | July- Governmental Decision 171 that updates Israel's targets to 27% reduction of emissions by 2030 and 85% by 2050 along with sectoral new targets (2015). |

### Transversal barriers of Policies in regard to GHG emissions reduction

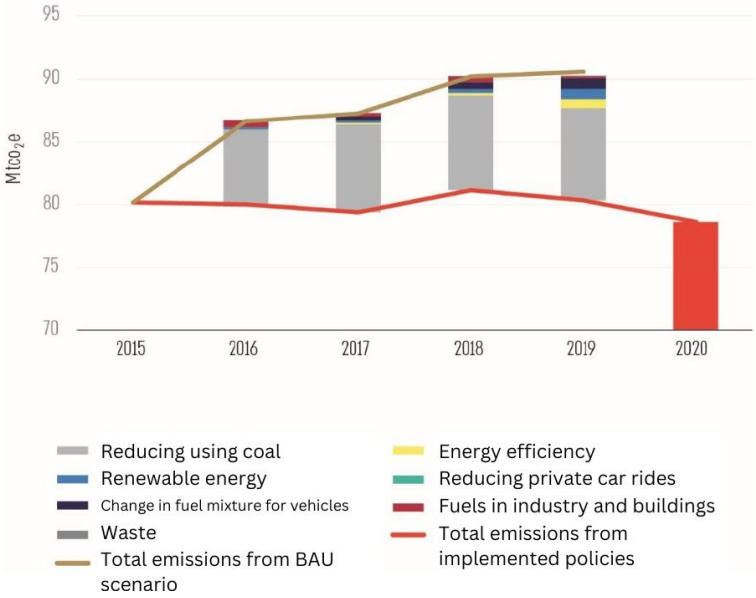
Beside the general policy-making limitations, there are additional transversal barriers to policy-making in regard to reduction of GHG emissions in Israel. These can be summarized as the following:

- Many legislative and administrative authorities are involved in policy making and implementation regarding GHG reduction actions: The Ministry for Energy, the Planning Authorities, Israel lands Authority, the Ministry for Economy, the Ministry for Environmental Protection, the Ministry for Health, the Electricity Authority, Standards Institute, and the Ministry of Finance that is in charge of budgeting the activities. The coordination between these bodies is complicated and leads in many cases to not realizing set plans. This barrier is obvious, for example, in regard to establishing solar facilities in built-up areas or on dual-use facilities, and transition to electric vehicles.
- Conflicting Goals: the main considerations that guide each body are not necessarily consistent with the goal of reduction of emissions of GHG. The different ministries promote their areas of interests and give them priority over the consideration of GHG reduction of emissions.
- A gap between responsibility and authority: The MoEP is in charge of determining the targets of GHG emissions and monitoring the progress in its implementation. However, this ministry doesn't have regulatory authority over the main sources of GHG emissions. These sources are under the authority of other ministries like the Ministry for Energy, the Ministry for Transportation and the Planning Administration. Therefore, the ability of the MoEP to use policy tools and regulations in order to reduce emissions from different sources is limited and dependent on the considerations of the different ministries.
- An exceptional influence of the Ministry of Finances on greenhouse gas reduction policies. For example, in May 2013, this Ministry decided to freeze the implementation of the National Plan for Reduction of GHG for three years (2013-2015) because of budget limitations. Moreover, the relatively more ambitious "Climate Bill" proposal was downsized by the Ministry of Finance. (Raviv, 2022)

  **Attached in excel sheet an overview of the main policies of Israel in regard to climate change.**

Israel's NDC policies by sectors

According to the data of the MoEP, the GHG in Israel consists of 88% CO2 and 12% Methane. Electricity generation is, and is expected to be, the major source for GHG emissions. Transportation is the second largest contributor, however with the transition to electrified vehicles, the emissions are expected to drop sharply. Waste landfills are the major source of Methane emissions.




The implemented policies between 2015 till 2019 resulted in an estimated **10 MtCO2-eq** reduction of GHG emissions, as Figure 2 shows (Ministry of Environmental Protection, 2021)

Table 6 quantifies the reduction of implemented policies compared to a BAU scenario. The most effective means of GHG mitigation was reducing the usage of coal and replacing it with fossil gas.

*Table 6 Mitigation of GHG emissions in 2019 broken down into means of mitigation with their quantified contribution*

| **Means** | **Actual mitigation in 2019 (MtCo2-eq)** |
|---|---|
| Reduction in using coal | 7.4 |
| Increasing RE | 0.8 |
| Increasing energy efficiency | 0.7 |
| Increasing fuel efficiency in cars | 0.8 |
| Increasing fuel efficiency in industry and buildings | 0.1 |

| | |
|---|---|
| Reduction in landfilled mixed waste | 0.07 |

If the policies which were set till May 2021 will be implemented, a reduction of 20% GHG emissions compared to 2015 is estimated by the MoEP in 2030, e.g. an absolute amount of 64 MtCO2-eq GHG emissions (see Figure 2). This means a 40 MtCO2-eq mitigation in 2030 compared to the BAU scenario. Those policies include:

*Table 7 List of means of mitigations from existing policies that could lead to a mitigation of 40 MtCO2-eq GHG emissions*

| Means of mitigation | Related policy |
|---|---|
| Excluding using coal in electricity production till 2026 | Governmental Decision 465 from 25.10.2020 |
| Increasing the percentage of electricity produced from renewables to 20% in 2025 and 30% in 2030 | Governmental Decision 465 from 25.10.2020 |
| New strategy for waste: 20% of waste in landfills in 2030, sealing and capture of GHG in landfills and more | Plan of the MoEP 08.02.2021 |
| Green building | Updating sub-law 5281 |
| Reducing HFCs | Updating sub-law |

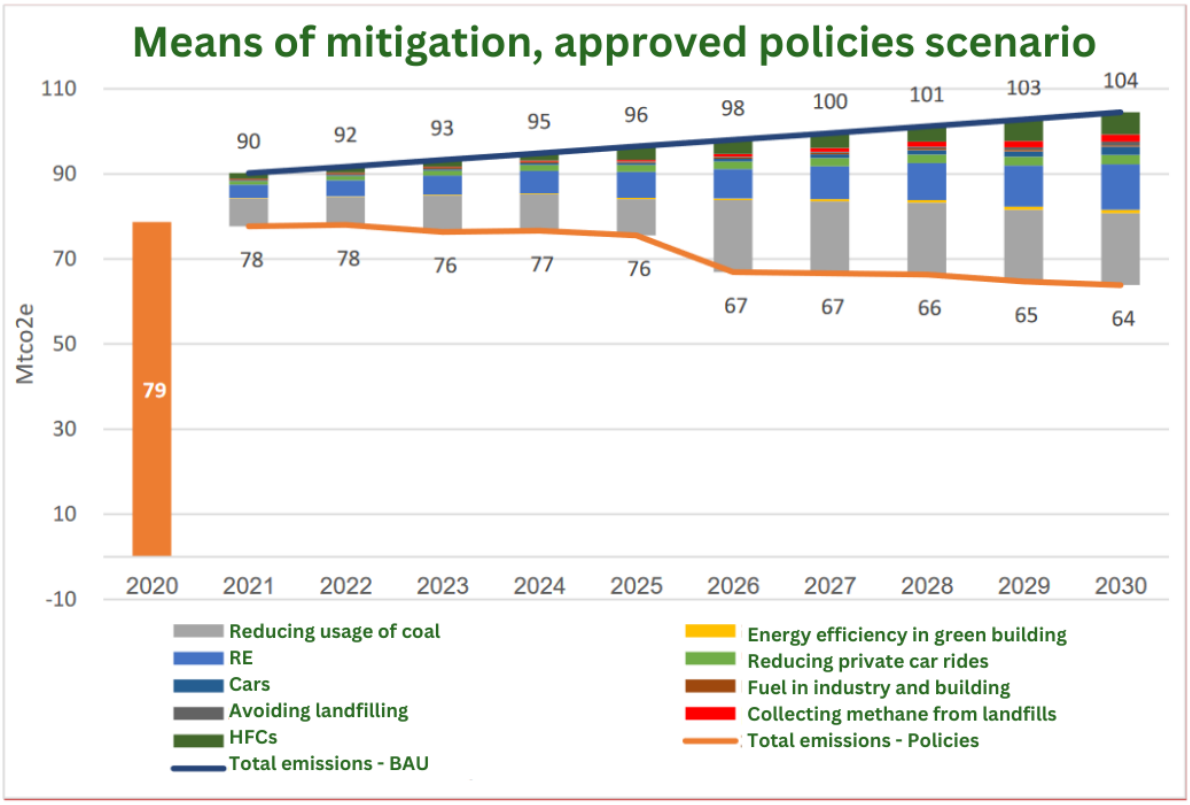



*Figure 2 Estimated GHG mitigation according to a scenario where all set policies will be implemented*

The detailed means of GHG mitigation and their quantified contribution list as follows

| **Means** | **Estimated mitigation in 2030 (MtCo2-eq)** |
|---|---|
| Reduction in using coal | 17 |
| Increasing RE to 30% | 10.7 |
| Reducing HFCs | 5.3 |
| Reducing private car rides | 2.2 |
| Increasing fuel efficiency in cars | 1.9 |
| Methane collection | 1.7 |

| | |
|---|---|
| from landfills | |
| Avoiding landfilled mixed waste | 0.8 |
| Applying green building sub-laws | 0.8 |
| Changing industry fuel | 0.4 |

## Energy Sector

**Energy challenges in Israel**

The most significant primary energy resources in Israel are oil (mainly for transportation), gas and coal. Compared to the OECD, renewables account for a relatively low percentage, and none from nuclear.

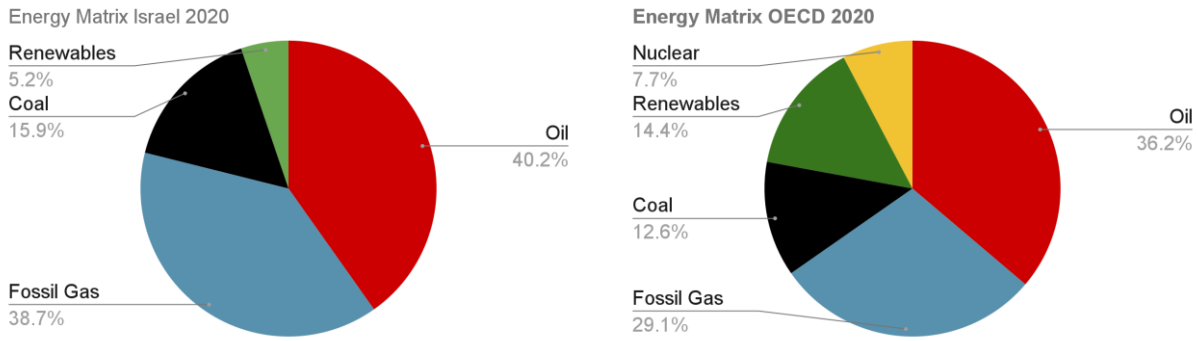
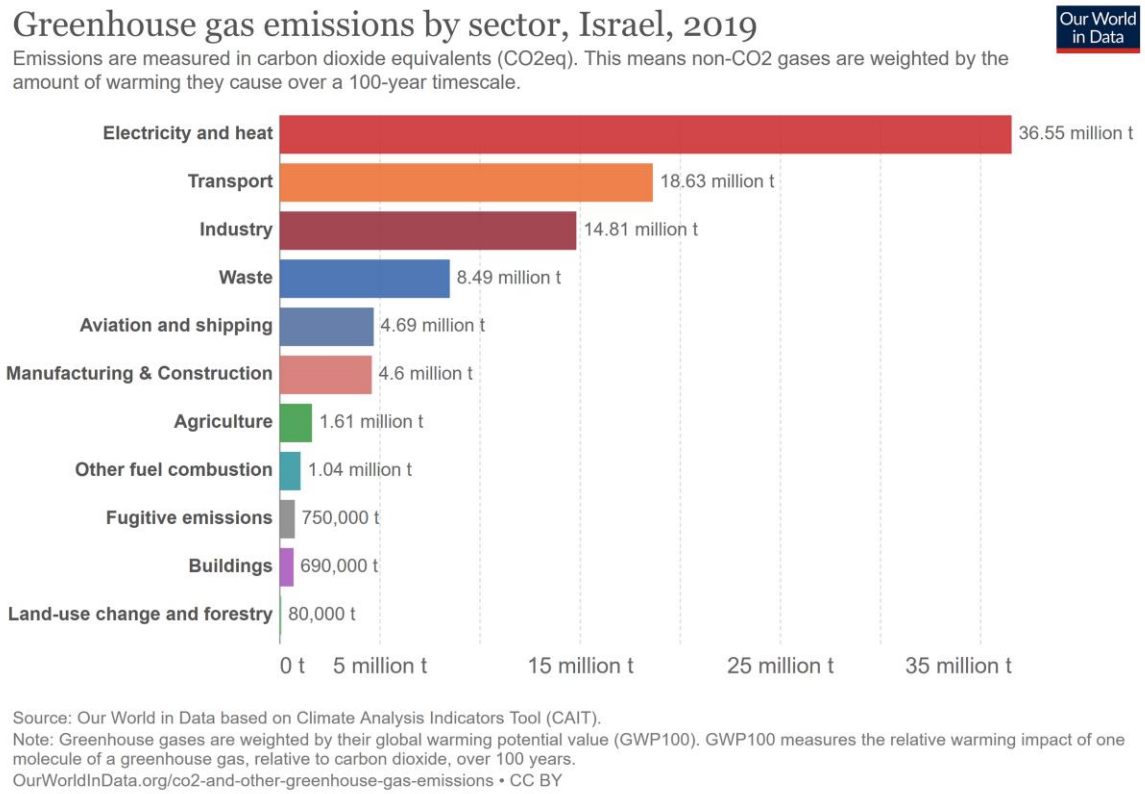



*Figure 3 Energy matrix pie in Israel and in the OECD, 2020 (Ministry of Energy, 2021)*

Solar energy was the main source for renewable energy in 2020, accounting for 96.7% of RE and 5% from total primary energy, while wind contributed for 0.01%, and 0.17% came from other renewable energy sources.

The biggest users of primary energy are electricity production, transport, and industry. Following is a graph that shows the GHG emissions from each sector in Israel in 2019.




## Electricity production

In the last 20 years, electricity production in Israel has already made a radical shift, from basing on coal and heavy fuels at the turn of the millennium, to natural gas based production. The shift was expedited by the discoveries of large gas reservoirs in Israel's territorial waters, and contributed to a considerable reduction of emissions from electricity production. (MoEP, 2021).

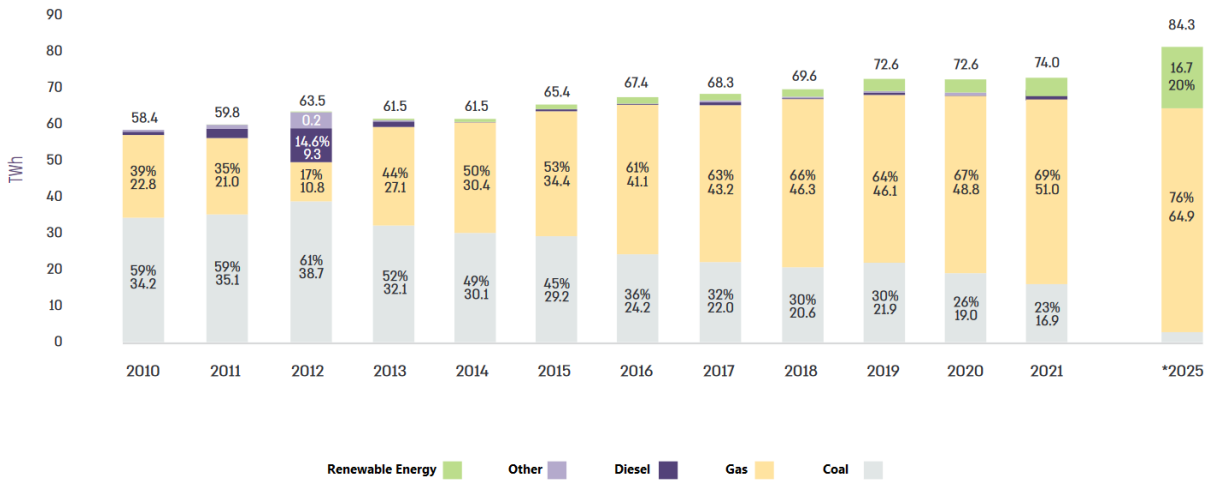
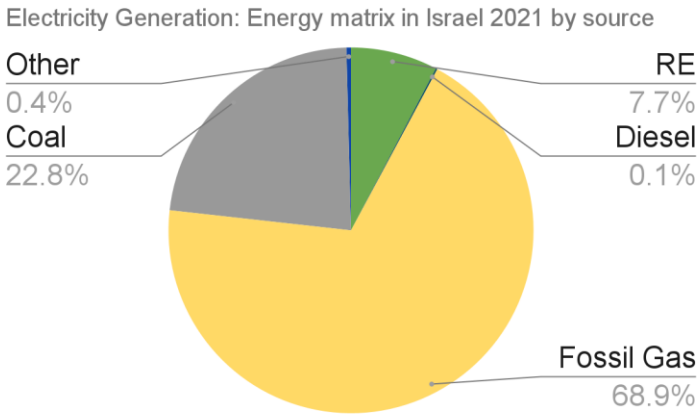



*Figure 4 Israel's electricity production energy resources, 2010-2021 (Israel Electricity Authority, 2021)*




The fossil gas paradox

The large gas reservoirs did enable rapid decrease in GHG emission, but at the same time decreased the possibility of making further progress towards renewables. In Israel, fossil gas is promoted and perceived by many officials and the public, as a clean energy source that provides both energy security and economic benefits, and is more reliable than renewable energies. The debate regarding exportation of gas to other nations almost exclusively focuses on the amount of gas that should be left for domestic usage (whether to keep reserves for 25 years or more), but not whether the fossil resource should be exploited at all, in order to avoid the emissions associated with it. This contradicts with the international commitments that obligates Israel to set goals to move the market to renewable energies.

Main renewable energy sources worldwide include a wide variety of technologies, about two third of which are hydropower and wind: (Authority of Electricity, 2020)

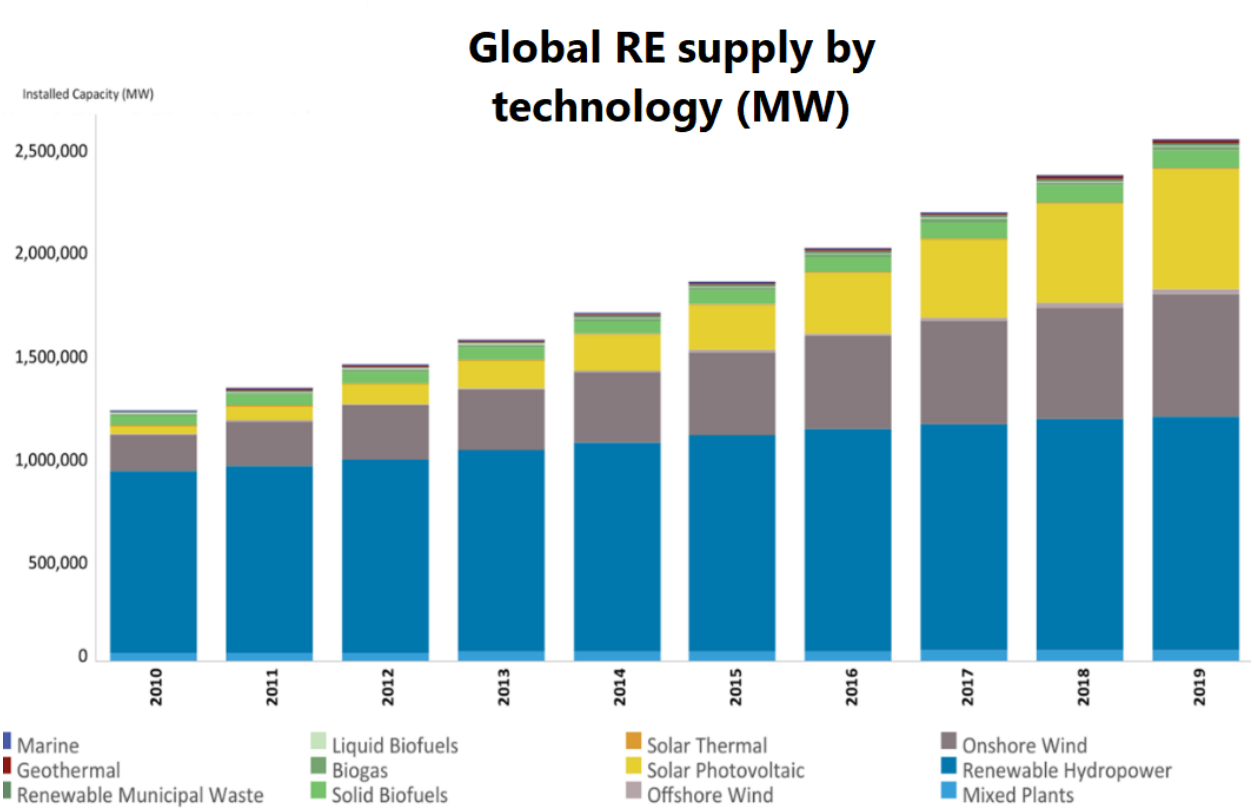



*Figure 6 Installed capacity of electricity produced worldwide using renewables by technology*

Israel has distinctive properties; thus the relevant renewable energies are somewhat different:

- **Hydro-electric**: Israel has no potential for hydro-electric production, partly because of limited water supply.
- **Wind power**: Israel has limited potential for wind energy, due to relatively weak winds in most of the country. Thus, the national goal was set to only 730 MW installed capacity from wind power by 2030, out of 15.8 GW RE in total (~4.5% wind energy out of total RE). To this day, only a handful of wind projects were initiated in Israel, mainly due to concerns by environmental conservation bodies, as Israel is a major migration route and the wind turbines are expected to have devastating effects on migrating birds, as well as on local endangered species such as vultures. Other objections come from nearby towns and villages, due to fear of infra-sound effects on people's health. Additional objection has been issued by the Ministry of Security against installing wind turbines in nearby areas that are defined by them as "Sensitive".

- **Hydroelectric pumped storage**: in this technology, a turbine pumps water into a high reservoir, to be dropped down again to the low reservoir when needed. This is one of the most efficient ways to store large volumes of electricity, with the ability to meet high demand at high response times. The first pumped storage project in Israel, with a capacity of 300 MW, operates on the Gilboa mountain. A second, 330 MW project, is under construction, and a third is in the initial phases of planning. All in all, they will have the capability to generate over 900 MW. It is important to note that HPS is not RE production technology, however since storage is complementary to RE, it is considered here.
- **Biogas and waste to energy**: In Israel it is considered to be mainly a method for waste treatment, and less so for energy production. The goals set in 2030 are 100 MW installed capacity. Despite efforts by the MoEP to encourage construction of facilities, the progress is very slow, and only few facilities are under construction.
- **Solar**: Solar energy is the major potential source of renewable energy in Israel. There are two main technologies:
    - Thermo-solar: in which mirrors are used to collect and concentrate sunlight to produce high temperature heat, which is then used to generate electricity. One thermo-solar power station was built in Israel, in the Negev. Its main advantage is the ability to produce electricity for a certain time after sunset, due to the heat conserved. However, electricity produced is much more expensive than other methods, it consumes a large area, and creates a visual hazard due to the dazzling effect from the heated thermal unit (in the picture: Ashalim thermo-solar power station. Photo by Haim Horenstein.). Noteworthy mentioning, that although this station and another power station that produce electricity for bee'r al sabea', are located nearby the Palestinian Unrecognized village, Wadi El Na'am, it is not connected to the grid due to Israel's policies as will be elaborated in the section on 'Just transition'.

    - Photovoltaic (PV): a technology by which solar panels convert sunlight directly to electricity. Today, this technology is more efficient than other solar technologies both energetically and in terms of land use, thus it is the only solar technology that is currently promoted in Israel. The PV systems in israel are roughly divided into two kinds:
        - Ground mounted: where the panels are installed on the ground, thus transforming the usage of the area from open land, agricultural or other, into a solar farm.

- Dual use systems: by which the panels are installed over man-made infrastructures, such as rooftops, industrial buildings, water reservoirs, as a shading method for sport courts, etc.
- In addition to these two, first pilots for Agri-Voltaic systems are being held, in which the solar panels are to be installed over agricultural corps.

The following figure presents the development of renewable energy in Israel throughout the last decade:

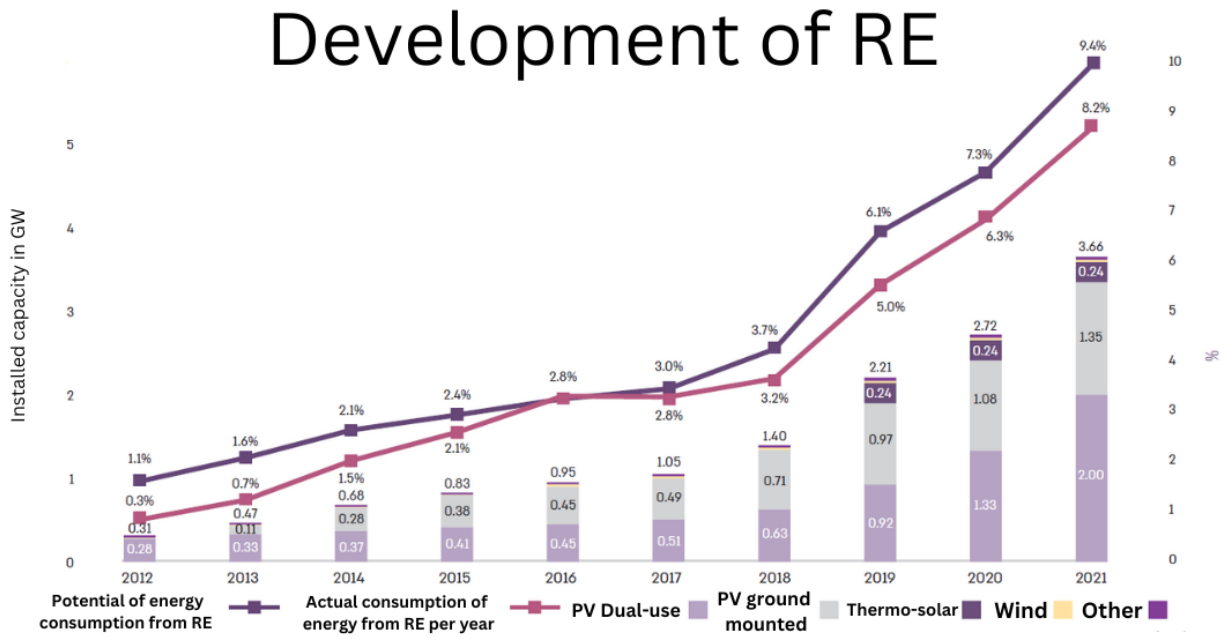



*Figure 8 development of renewable energy in Israel, 2012-2021 (Israel Electricity Authority, 2021)*

To sum up, renewable energy production in Israel is almost exclusively solar, as Israel lacks potential for other common renewable energy sources such as hydro-power or geothermal. Wind energy has limited potential and raises threats to the environment due to Israel's unique location along bird-migration routes, thus is not planned to be a major source.

### Renewable energy goals

Israel's target for renewable energy production was first set in **government decision no. 2664** from 2002, to 2% of renewable energy out of total production, by 2007. This goal was not met. In 2009, **government decision no. 4450** (Prime Minister's Office, 2009) set a goal of 10% renewable energy by 2020. This goal was not met either, and the actual renewable production in 2020 was only 6.4% of total electricity production.

Since 2012, however, GHG emissions from electricity production fell dramatically (The electricity company, 2021) due to the shift from coal to natural gas. GHG emissions from electricity

production in 2021 were 41% lower than 2012 (the first year when reports were published). This is despite a 16.6% rise in total electricity production. There was a 27% reduction in CO2 emissions in the same time period. (Authority of Electricity, 2021)

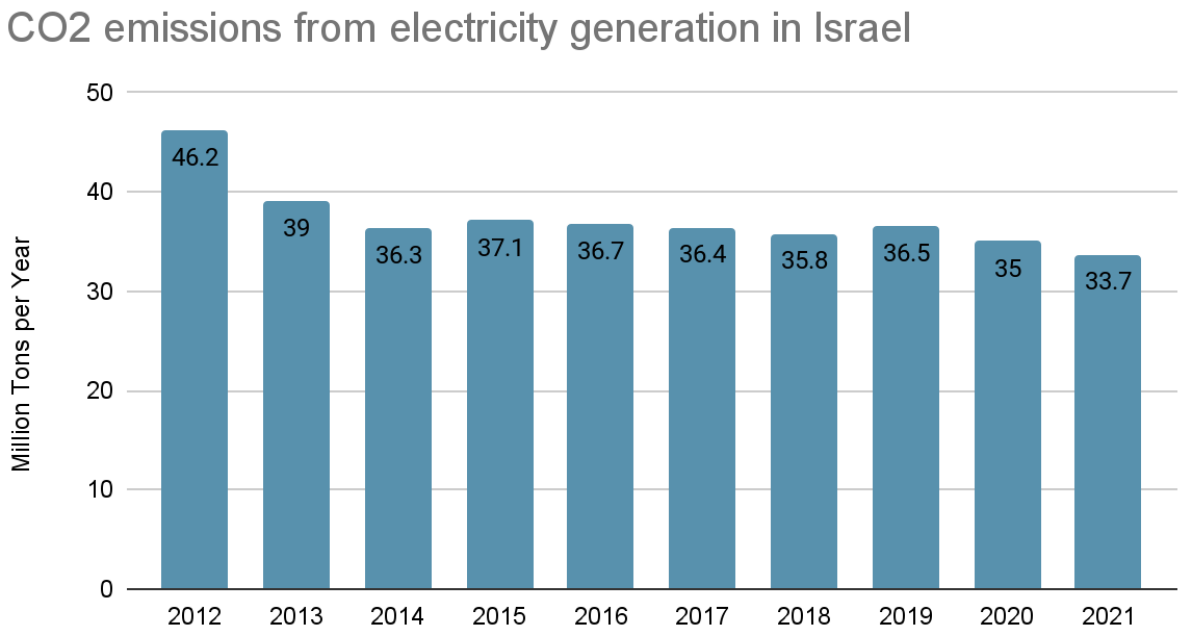



*Figure 9 CO2 emissions from electricity generation in Israel*

In 2015, **government decision no. 542** set a goal of 17% renewable energy by 2030. This was updated by **government decision no. 465** from 2020 (Prime Minister's Office, 2020), which set renewable production targets to be **30% by 2030**, and set the phase-out of coal-fired power generation to 2026. Thus, electricity production from fossil gas is set to 70% by 2030. This Decision was based on the Electricity Authority report that examined the implications of increasing the renewable energy share in electricity production in 2020 (Authority of Electricity, 2021). According to this report, the installed capacity for producing electricity from renewable energy in 2030 will be six times more than the capacity at the end of 2020 which will result in 50% reduction of GHG emissions per capita. To this date, Israel has not set an official renewable energy target for 2050. In August 2022 Israel's Electricity Authority published the outlines for renewable energy goals to 2050 to public hearing. (Authority of electricity, 2022)

Civil society groups have proposed more ambitious detailed roadmaps for a quicker and wider transformation of the electricity markets. The most comprehensive of them is "NZO 2050" (Heschel, n.d.) by the Heschel center for sustainability, which claims that a goal of 50% renewable energy by 2030, and 95% renewable energy by 2050 is viable.

Obstacles for implementation of solar energy

Dependence on solar energy as an almost exclusive source of energy for electricity production, as intended in Israel, poses several challenges. The most fundamental one is the availability throughout the day, and across seasons. Massive **storage** capacity has to be built in order to overcome this challenge.

A second challenge is the large area that is needed to install sufficient solar capacity. Several works have assumed the needed area to be 800-850 square KM. (NZO Heshel, 2021). As Israel is one of the most densely populated countries, and given its unique ecological location and biodiversity, it is preferred that most of the solar capacity will be installed in dual-use: on house rooftops, over water reservoirs, as a shade over sport courts, etc.

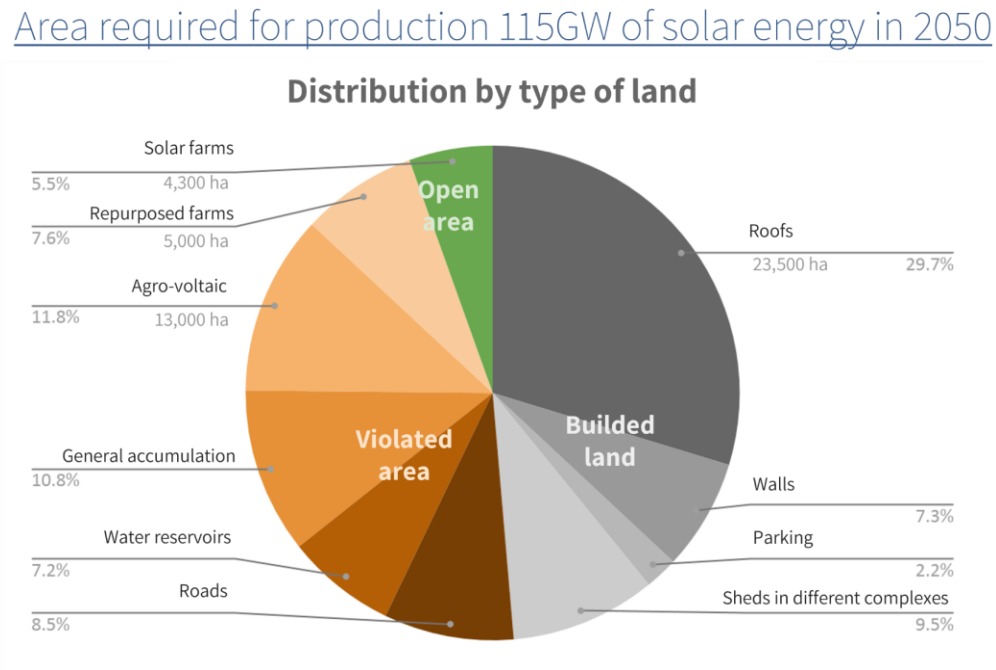



*Figure 10: estimated area required for production of 115 GW of solar energy,according to NZO 2050 model (source: the Heschel center)*

Implementation of solar energy in Israel involves many different governmental bodies, all of which have set policies to facilitate the installation of solar energy in the past decades. Examples of policies includes:

- The Electricity Authority sets production quotas and tariffs for different kinds of installation methods (i.e. ground-mounted and dual-use PV etc.)
- Israel Land Authority sets regulations as to the places where land solar facilities can be built, and to its extent.

- The Ministry of Interior Affairs set regulations for the maximum property tax municipalities can charge.
- Ministry of energy offered support in various ways to encourage PV installations, including loans to local municipalities, industry and business, information portal for citizens, etc.,
- Local municipalities initiated actions to encourage PV installations by private citizens and businesses.

Despite much efforts, wide implementation of solar energy in Israel still confronts many obstacles. Among the major ones:

- **Availability of transmission network:**
  Israel's electricity grid has been designed to support centralized production, in few large scale fossil-fuel based power plants. Those were built along Israel's coastline, from Ashkelon in the south to Haifa in the north, close to the consumption sites, which are the densely populated cities in central Israel. The electricity grid was designed accordingly. However, the renewable energy market is inherently decentralized among many small-scale production sites. Most of the potential production sites are located in the periphery of Israel, far away from the demand areas. Today, the transmission system cannot support large-scale energy production in the periphery, and new solar facilities cannot be established in large parts of Israel, mainly on the north and south periphery. (Electricity Company, n.d.)
  Thus, the transformation to renewable energy based-market requires re-designing the transmission grid, and building long transmission lines and switching stations. In August 2022, NOGA, the electricity system management company, published the development program for the grid to make it adequate to 30% renewable energy production. (Noga - Electricity System Management, 2022). Environmental bodies criticize the plan as insufficient to meet the goals.
- **Quality of distribution network:**
  The electricity distribution networks within cities and villages in Israel are often inadequate for current electricity needs. This is specifically true in two different kinds of settlements:
    - Moshav - agricultural villages, where solar production potential is high, mainly in dual-use over agricultural structures.
    - Arab towns and villages - where many of the connections to the grid were done unofficially, as will be described below, thus the distribution system cannot support the load.
- **Unauthorized building, and disputes over land ownership:**
  According to current regulations, a solar system can be connected to the electricity grid only if there is no dispute over land ownership, and the house was built according to Israel's regulations. In Arab settlements today as many as 29,000 buildings do not have

permits, (Sikkuy-Aufoq for shared and equal society, 2022) thus cannot build a solar system. This excludes large RE potential, and at the same time deprives large sectors of the society from enjoying the profits.
In November 2021 a bill allowing thousands of illegally built homes to be connected to the national power grid passed the Knesset Interior Committee. The bill was incorporated into Israel's Planning and Construction Law in January 2022. (Ministry of Law, n.d.)

- **Energy security and reliability**
  Today, Israel is an "Energy Island": its electricity grid is not connected to neighboring countries, which could have provided backup in case of long periods of limited solar supply that regular storage cannot compensate for (i.e. sand storms, consecutive cloudy days, etc.)**.** European countries' grids are connected, thus can compensate for the deficit in electricity production. Yet, Hawaii, another "energy island", set a goal of 100% renewables by 2045. It invests in solar storage, which continuously becomes cheaper reaching 15 cents/kWh in 2020. (Tal, 2020)
  To overcome this challenge Israel has to further pursue cooperation projects with neighboring countries (like the Red-Dead canal project), and at the same time invest more in energy storage systems, which are currently economically rentable.

**Examples of support programs offered by the government to enhance adaptation and mitigation steps:**

Governmental budgets allocation is done through the Budget Bill, which has a legislative status. This is a major tool for the government to implement its policy and commitments. During the past two decades, various attempts were made to encourage solar production and reduce GHG emissions, through governmental support.

- Ministry of Environment:
  - Support for the replacement of asbestos roofs and installation of solar systems (MoEO, 2021): 121.5 million NIS during 2021-2022. Unfortunately, very little of this budget was used due to other (non-funding related) barriers.
  - Support for Arab municipalities, for installations of PV systems, and energy efficiency (2022).
  - Budget for preparation of climate action plans for municipalities (2022), including both mitigation and adaptation measures.
- Ministry of Energy:
  - Loans for PV installation on public rooftops in municipal authorities (Ministry of Energy, 2020) - 527 million ILS were offered to 141 municipalities, to install PV systems over more than 1200 public buildings. This initiated large-scale interest in municipalities, and today most municipalities in Israel have at least some solar systems installed, which contribute both for GHG reduction and economic resilience.

    - Support for implementation of climate resilience program in LAs (Ministry of Energy, 2022): subsidies are given for storage systems, energy efficiency tools, EV, as well as to "soft" measures such as education and community advocacy for solar systems and energy efficiency, etc.
    - Subsidies for EV charging stations in local authorities (2018, 2020, 2022)
    - In March 2023, the Ministry of Energy allocated a 200 million NIS budget to aid LAs in energy efficiency and solar production.
- Ministry of Economy:
    - Support for solar shading in public areas (2022), and for energy efficiency measures in municipalities and in the industrial sector.

### Roadmaps for other sectors

#### Energy Intensity

Energy intensity is defined as the ratio of energy use to GDP, assessing the energy efficiency of a certain economy. (Martinez et al., 2019) Israel has set the target of GDP to 122 MWh per 1 Million NIS. In comparison to other OECD countries, Israel currently has low energy intensity.

Israel's action on Energy Intensity is based on the Energy Resources Bill (1989) that mandates the government to update a plan for energy intensity every five years. Till 2020, the plans only dealt with electricity. The Governmental Decision No. 542 (from 2015) determines the target of 17% electricity efficiency by 2030, compared with 2015. However, due to the rapid development of the energy economy that includes transition to electric vehicles and transition to electricity use instead of other fuels (for example, electricity instead of gas for cooking), which will result in increasing the demand for electricity, there was a need to expand to other energy resources.

In November 2020, the Ministry for Energy published an updated plan for energy intensity for the years 2020-2030 that includes different sectors including electricity, fuels, transportation, industry and buildings (commercial and public and domestic). The major new indicator in this plan is improving energy intensity.

The main target of the plan is to improve the energy intensity by 18% by 2030 (reference year-2015). According to the plan, the highest potential lies in the industry and the commercial and public sectors. The Plan sets the following:

- 122.4 MWh per million NIS GDP in 2030 and an interim target of 131.7 MWh for Milion NIS GDP in 2026.
- To establish a ministerial committee headed by the Ministry of Energy that will be monitoring the implementation of the plan.
- Grants for energy efficiency. The Ministry of Energy will allocate 350 million NIS between the years 2022-2026 for the industrial sector. The MoEP was supposed to allocate 100 million NIS in 2022 to the business and LAs.

According to the Ministry for Energy, the financial gain from implementing this plan is 87 billion NIS. The plan was approved by the government on 24.10.2021 (Governmental Decision 541).

### The building sector

The building sector is a major contributor to GHG emissions. The Israeli green building standard was first adopted in 2005, and has been revised several times since. The standard became obligatory following the National Planning Committee in March 2020, which became effective starting 2022. (MoEP, n.d.) It is expected to reduce 30% of the emissions from buildings.

Long before, LAs set climate goals, a major part of which includes high building standards, including methods to facilitate energy efficiency and renewable energy production. Examples:

- The city of Tel Aviv set regulation to carbon-neutrality in new buildings, which requires high energetic efficiency, as well as massive energy production, including rooftop and Building Integrated PV (BIPV).
- Forum 15, the association of Israel's self-government cities, representing approximately 40% of Israel's population, adopted green building standards for new buildings, which are higher than the national requirements.

### Transportation

Transportation is responsible for around 23% of GHG emissions in Israel (MoEP, 2020), and private cars account for the majority of GHG emitted from road transportation. Thus, shifting the transportation to be electricity-based and encouraging public transportation is vital.

Between 2015-2018 there was a 15% rise in private transport. It continued to rise in 2019 and later there was a decline during 2020 due to COVID restrictions. The Ministry of Transportation estimated in August 2021 that a significant change in transportation habits will take place when new means to encourage usage of public transportation systems will be implemented (i.e. designated routes for public transportation; parking policy; services additions; changing planning policies in regard to land uses and etc.).

According to the Ministry of Finance, there was an increase in the investment in public transportation infrastructure in recent years. This included investment of 25 billion NIS in Light Trains; A development plan of the Train's system and electrification of the trains (10.4 billion NIS for the last target); electrification of the busses and terminals (270 million NIS purchase electric buses); installing charging stations for electric vehicles (grants of 30 million NIS). According to the Ministry of Finance, the development budget of public transportation increased from 5.5 billion NIS in 2017 to 8.46 billion NIS in 2020.

Israel plans to limit the rise of GHG emissions from transportation in 2030 to 3.3%, followed by a mitigation of 96% by 2050, compared to 2015. Two strategies were listed to limit the rise of GHG emissions from transportation:

- Municipal buses bought from the year 2026 on will be "clean" vehicles. The definition of a clean vehicle is for the Minister of Environment to set. A new detailed governmental plan for public transport (municipal buses) was issued with milestones for transition to electric buses (Authority for public transportation, 2022)
- Taxies: The Ministry of Transportation has published a law amendment proposal to encourage moving to electric taxis by giving economic incentives. According to the law proposal, 500 licenses will be granted to electric taxis with discounted fees.
- Reducing private car share to 30%- New vehicles up to 3.5 tons that will be registered from 2030 on will emit 5% of mean emissions from new vehicles registered in 2020.

As the technologies of electric vehicles and their market are developing rapidly, goals will be updated in 2025. Up to 2020, the electric vehicles compromised only 0.05% of the total vehicles

Barriers for EV: There is no infrastructure for charging EV; difficulties in installing charging stations in condos for legal reasons; lack of information at LAs on charging; and lack of a plan to encourage public transportation (The State Comptroller Report, 2021).

### Waste

Emissions from waste accounted for about 7% of GHG emissions in 2015. Israel plans a reduction of at least 47% of GHG from solid waste by 2030 compared to 2015. This will include a reduction of 71% of municipal waste compared to 2018. As for 2050, a total mitigation of 92% compared to 2015 will be pursued.

These targets are challenging, as Israel's waste generation is relatively high, standing at about 1.7 KG per person, and the total Municipal Solid Waste is estimated to be 5 million tons annually, raising about 1.7% annually. Israel's municipal solid waste is characterized by comparatively high levels of organic waste, which is a major source for GHG emissions when not treated appropriately. In 2020, some 80% of Israel's municipal solid waste was landfilled (77.6% in 2018). This is to compare with OECD countries where about 39.3% were landfilled in 2018. (Center of science and research - Knesset, 2022). It is estimated that untreated organic waste contributes 10% of Israel's GHG emissions annually. According to the MoEP, landfills are the major emitters of Methane in Israel. Another major contributor is illegal waste burning. Besides GHG, it is a major source for air pollution.

Israel's waste treatment policy has changed radically more than five times in the past two decades, and none of the policies was fully implemented. The most recent policy was published in February 2021, rejecting the previous one that promoted municipal solid waste incineration, and setting new targets to move from 80% landfilling of municipal solid waste in 2020, to 20% by

2030. This goal is crucial as a recent study indicates that Methane emissions from landfills in Israel are 6 times higher than assumed by the MoEP (Yitzhak, 2022)

One of the most recent policies corresponding to Governmental Decision 171 in regard to waste was issued on Sep 22, 2022. (MoEP, 2022) The new proposed by-laws mandates treatment of municipal organic waste before landfilling. The regulations give economic incentives to establish, upgrade, and operate facilities for organic waste treatment "(60 million NIS).

Milestones

1. From 80% waste landfilling in 2020 to 20% landfilling by 2030
2. No landfilling of untreated organic waste, paper and cardboard by 2030
3. At least 50% methane collection from landfills through sealing active landfills and installing methane collecting and utilization systems.

Main Findings and Recommendations regarding Israel's NDCs

The different Israeli governments have issued several decisions related to climate change and transition to a low carbon economy. However, to this day, the Climate Bill has not been approved, and the decision's implementation is subject to changeable attitudes of the politicians in the relevant governmental offices. Generally, the Israeli governments are not committed to fulfilling the decisions and International commitments (Shakuf, 2021). Different ministries have launched several plans and strategies, translated partly into budgeted projects; however, the projects remain segmented with no overall view and coordination.

The energy sector in Israel, and specifically electricity production, is the country's main GHG emitter, thus in order to meet Israel NDC's electricity production must shift away from fossil and prioritize renewable energy over gas. Yet, Israel's renewable energy targets are relatively moderate, and even these moderate goals are not met. The government has attempted to translate its energy targets into policies and strategies. However, the steps taken by government offices are sporadic, and do not reflect deep understanding of the threat posed by global warming, nor commitment to achieving the goals. This gap is especially apparent in the financial aspects, where regulatory bodies such as the Electricity Authority are committed only to the price and market criteria, and refuse to offer massive support to increase renewable energy penetration through subsidies, for example. Furthermore, efforts to increase renewable energy, mainly solar energy, are facing several regulative and infrastructural obstacles that should be overcame.

CSOs play an important role in both challenging the government to set higher emission reduction goals, and in implementing the goals set. For example, the Heschel Center's NZO research work, which portrayed a roadmap for achieving 95% renewable energy by 2050, aided the Ministry of Environmental Protection to raise Israel targets from 17% to 30% by 2030 (personal communication). At the same time, support initiatives led by CSO were vital for enhancing the acceptance of solar systems within LA. Therefore, their role should be enhanced

## Israel's ETF communications

## Including national & local reports on implemented climate and energy activities & projects

**Civic Space in Israel:**

Israel, being party to the Paris agreement, has committed to undertake action to keep the temperature rise well below 2 C above the pre-industrial levels. The international and the local community can monitor, and thereby influence, Israel's commitments only if a conducive environment exists including proper communication of her action and effects. The Paris Agreement established an Enhanced Transparency Framework (ETF) of action and support under which parties are required to provide "information necessary to track progress made in implementing and achieving its nationally determined contribution under Article 4" (Article 13.7b).

According to the Environmental Democracy theme, three conditions have to be fulfilled in order to ensure environmental policies comply with public good: meaningful public participation in environmental policies; Free access to environmental information; Access to courts to challenge policies. These conditions have been threatened in Israel ever since. According to the Monitor-Tracking Civic Space (CIVICUS), Israel is rated as obstructed (last update 2016). Actually, the civil space has been shrinking ever since, particularly within the Palestinian community (INTERACTIVE TIMELINE ON SHRINKING SPACE IN ISRAEL-PALESTINE). This is also reflected in the unproportional number of Palestinian-Led CSOs to their size; As for 2019 they consisted of only around 7.8% of all active registered CSOs in Israel. Arab CSOs suffer from financial, operational, organizational and other weaknesses. They depend mainly on foreign funding sources that focus on designated projects, with few capacity development funding.

Recently, in 2022-2023, the new right wing government initiated the so-called "Judicial Reform'' which is feared to further weaken the separation of powers and undermine the protection of minorities. As to its implications on environmental rights, many environmental activists and scholars claim that this reform will adversely affect environmental policies in Israel. The reform will hinder the supreme court from protecting the environment from passivity and negligence of authorities and from destructive economic interests. In several countries in the world, courts are playing a vital role in obligating states and corporations to comply with their climate commitments. In light of the Israeli reform, the supreme court will not be able to exercise judicial review on the "Climate Bill '' (Still a proposal- if and when approved) which will allow the Israeli governments to avoid their commitments. Moreover, the supreme court has a vital role in protecting and promoting environmental justice and minorities' rights- which will be hindered by the reform.

**Climate Governance in Israel:**

There is no framework for climate governance in Israel. Yet, there are several bodies/institutions that play a role in climate action. These include:

**1) The President Forum for Climate Change**: 'Haim Herzog', the Israeli President, established in 2022 a Forum, which includes civil society organizations, the academy, the government, the Knesset, the local authorities, participants from the economy sector and the culture sphere, the media. The Forums' goals: to reduce the gap between the global targets and Israel's climate targets, through encouraging a variety of initiatives in all areas of life that are relevant to climate change, which can lead to change in Israel's policy; To open channels to the policy makers for creative initiatives in several spheres that are relevant to climate change; To serve as a platform for inter sectoral solutions toward sustainable solutions to climate change in Israel; To serve as an advisory body for the President.

**2)The State Audit Institution:** In Israel, in order to overcome the dangers involved in giving extensive powers to public officials, the State has put in place a system for controlling and monitoring administrative authorities and their branches in order to ensure the legality and regularity of their activities, integrity, the safeguarding of the individual's rights, good governance, efficiency and economy: "The State Comptroller Institution". External scrutiny of the Executive and publication of the Audit's findings constitutes a major factor in strengthening the accountability of public administration and the transparency of its activities.

**3)The Inter Ministerial Committee on Climate Change:** in 2010, this committee was established to contribute to the national work conducted under UNFCCC (e.g. GHG emission inventories, reports on mitigation and adaptation, action plans for GHG emission reduction, formulation of recommendations and strategies for reducing GHG and for adapting to CC). This Committee is headed by the MoEP and includes representatives of government ministries, industries and non-governmental organizations.

**4) The Ministry of Environmental protection:**
**The MRV System:** As per the Paris Agreement, Israel established a national system for Measurement, Reporting and Verification (MRV) of government measures for reducing greenhouse gas emissions. The system monitors and analyzes relevant data, allowing the government to evaluate the efficacy of different policy measures, and update them as necessary.

The MRV system is based on three components:

- Monitoring and follow-up: Annual follow-up is conducted in cooperation with government ministries and professionals, and in accordance with international guidelines and standards. This supposedly allows Israel to estimate the scope of

expected GHG reduction in 2025 and 2030, and to review measures being taken to meet reduction targets.

- Quality assurance: Quality assurance ensures that data is properly collected and analyzed. Quality assurance procedures are based on international criteria and the guidelines of the United Nations Framework Convention on Climate Change.
- Reporting: Israel's MRV system prepares and publishes reports to the UNFCCC and reports at the national level.

**Israel's communications:**

**Reports by Israel under the UNFCCC:**

**National Communication to the UNFCCC** - a comprehensive climate report including national circumstances, vulnerability assessment, financial resources, and transfer of technology, and education, training and public awareness.

Non-Annex I Parties are required to submit their first NC within three years of entering the Convention, and every four years thereafter. The NCs shall be prepared in accordance with the guidelines contained in decision 17/CP.8.

Israel submitted three national communication reports to the UNFCCC: NC1 2000; NC2 2010; And NC3 2018.

Israel signed and ratified the UNFCCC in 1996. Israel did not submit NCs for the years 2004, 2008, 2012, 2016 and 2020.

**Biennial Update Report (BUR) to the UNFCCC** - an update on the National Communication, including GHG inventories and information on mitigation actions, needs and support received.

Non-Annex I Parties, consistent with their capabilities and the level of support provided for reporting, should submit their first BUR by December 2014, and every two years thereafter. The BURs shall be prepared in accordance with the guidelines contained in decision 2/CP.1

Israel submitted two reports: BUR1 18 April 2016 and BUR2 6 March 2023.

Israel did not submit reports in 2014, 2018, 2020 and 2022.

**National greenhouse gas emissions inventory:** Israel's Central Bureau of Statistics prepares an annual inventory of greenhouse gases in Israel. The inventory is then published by the UN Framework Convention on Climate Change.

The reports detail emissions of the following greenhouse gases: Carbon Dioxide (CO2); Methane (CH4); Nitrous Oxide (N2O); Hydrochlorofluorocarbons (HFCs); Perfluorocompounds (PFCs); Sulfur Hexafluoride (SF6)

Israel has published the following inventories: 2000, 2003-2005- 19 November 2007; 2003-2010- 19 September 2012; 1996, 2000, 2003-2013- 23 November 2015; 1996, 2000, 2003-2015- 11 December 2017; 1996, 2000, 2003-2016- 8 October 2018; 1996, 2000, 2003-2018- 13 October 2020- 1996, 2000, 2003-2019 1 December 2021

**Long Term Strategies:** in accordance with Article 4, paragraph 19, of the Paris Agreement, all Parties should strive to formulate and communicate long-term low greenhouse gas emission development strategies, mindful of Article 2 taking into account their common but differentiated responsibilities and respective capabilities, in the light of different national circumstances.

Israel has not submitted a long term strategy.

**Reports at the national level:**

Israel publishes the following reports on the national level:

**Annual inter-ministerial committee report to the government on implementation of GHG reduction measures:** Since 2016, 3 inter-ministerial reports were published by the ministry of environment: in 2016, 2017, 2021; with a gap of 3 years of not reporting since the former report in 2017. The latest report, from 2021: 'climate change and energy efficiency reduction greenhouse gas emissions 2021 report' concludes that the state of Israel did not achieve the goals it has set for the year 2020. Only 6% of the electricity production was from renewable energies (the goal was 10% according to decision 4450) and electricity efficiency has reached 4% compared to the goal of 20%. These annual reports are published in the website of the ministry for environment only in the Hebrew language, not translated to Arabic, while Arab Palestinian citizens in Israel constitute 21% of the population, which distributes the transparency process. Furthermore, the ministry is not publishing and disseminating these reports proactively (for example, through campaigns), thereby these reports do not reach the wide public.

**Voluntary GHG Registry:** Israel launched a voluntary national greenhouse gas registry in July 2010. Organizations and companies from all sectors were invited to participate in the registry by agreeing to report their annual greenhouse gas (GHG) emissions - both direct and indirect. 21 companies and organizations participated in what was designated as a pilot project in 2011, the first reporting year. While participation is voluntary, those who choose to partake are expected to calculate and report their emissions using the Ministry of Environmental Protection's official quantification methods and procedures. Preparation of the voluntary reports gives participants the added benefit of identifying opportunities for saving on energy and resources, and thus cutting costs.

It should be noted that owners of heavy vehicle fleets with at least 100 vehicles are obligated to report the GHG emissions of their fleets.

A protocol was developed which is largely based on the WRI/WBCSD (World Resources Institute/World Business Council for Sustainable Development) protocol for reporting, and is compatible with the International Organization for Standardization's ISO 14064.The protocol consists of guidance for mapping, quantifying, and reporting GHG emissions in Israel and provides a starting point for companies to identifying, quantifying, and reporting their emissions. The quantification methods described also assist in forming the basis of a consistent database for assessing future GHG emission reductions.

Data exists for the years 2010-2017 which includes: number of reporting entities; Total emissions from reporting entities) in million tons CO2); Total emissions in Israel (in million tons CO2); Percentage of emissions in Israel from reporting entities.

**Pollutant Release and Transfer Register:** A Pollutant Release and Transfer Register is an environmental database or inventory of pollutants released to air, water and soil, and transferred off-site for treatment or disposal. There are a total of 114 pollutants or groups of pollutants that must be reported, including greenhouse gases that are responsible for climate change.

**The State Audit reports:** In regard to climate action, in October 2021, the State Comptroller's published an audit report on Israeli climate action )https://www.mevaker.gov.il/he/publication/Articles/Pages/2021.10.26-Climate.aspx?AspxAutoDetectCookieSupport=1)

The report reviewed both the government actions to adapt and mitigate climate change.

In regard to adaptation actions, the report concludes the following:

- Though governmental decision no. 4079 (2018) states Israel will be highly prepared for climate change effects; still there is no budgeted operational national adaptation plan.
- 82% out of 63 public authorities have not considered climate change in their risk management and 77% have not conducted risk assessment of climate change on their operations.

In regard to mitigation actions, the report reviewed actions to reduce greenhouse gases between 1996-2020 in three sectors: energy, transportation and waste. The report concluded that Israeli mitigation actions in these sectors range between zero to backwardness. In the energy sector, the audit states that Israel's 30% target of renewable energy by 2030 is low in comparison to OECD countries and not to mention that there are no targets for 2050. On the institutional level, the target of 30% was set solely by the ministry of energy and the Electricity Authority with no involvement of other ministries and relevant bodies.

**The Electricity Authority reports on renewable energy:** the electricity authority publishes situational reports in renewable energy on the electricity sector. So far, 5 reports were published: one covering 2018, A road map for the energy sector; and three reports relating to the year 2022. According to the Electricity Authority, the reports aim at presenting all the relevant data and indicators to the public in order to be able to track the government compliance with the targets set. The latest report covering 2022, presents the installed capacity, actual production, electricity consumption, and the status of meeting the targets.

These reports do not elaborate on renewable energy projects.

https://www.gov.il/he/departments/publications/reports/yehadeie

The Electricity Company published an open access map which shows the probability of connecting new solar systems to the grid in Israel. Dark green- very high probability; Soft green- high probability; Yellow- moderate probability; Orange- low probability; Red- very low probability.

The map can be found in the following link:

https://iecil.maps.arcgis.com/apps/webappviewer/index.html?id=322fe1abffb744fcb478d4d2abf69388&locale=he

**The Planning Administration:** issued an open access application which enables planners, entrepreneurs and the wide public to obtain updated and accessible information on the scope of the ground mounted photovoltaic solar systems promoted in Israel and their geographical

distribution. This application is updated in real time according to data fed into the monitoring system. It should be mentioned that 20,000 dunam were allocated for ground mounted photovoltaic solar systems in Israel till 2030.

(The application can be found in the following link: https://experience.arcgis.com/experience/584d9743ce634debab09396bc901a8f2).

**Local implementation reports:**

In Israel, local climate action, implemented by local actors, is implemented mainly through tenders issued by the different ministries. In light of the centralized governance structure in Israel, local authorities act more as implementers than local governments. Within these ministries, data exists only on the budgets exploited by the local authorities for the different climate projects (which can be obtained through the regulations of freedom of information); including energy efficiency, renewable energy and adaptation projects. The local authorities themselves have no legal obligation to publish about climate projects, not to mention their effects. News on local climate projects can be found in different media outlets; however, one can hardly find reports. For example, few big cities have adopted voluntary climate action plans, and have allocated budgets accordingly. Most of these are “Forum 15” cities, which is the association of Israel’s self-government cities - fiscally autonomous municipalities that do not depend on annual national "balance" or "development" grants from the government. In 2008, Forum 15 launched "Forum 15's Climate Convention", a local version of ICLEI's international convention for climate protection. The 18 major cities signatory to the convention committed to cutting their GHG emissions by 20%, monitoring their emissions, as well as creating and implementing a local climate action plan for the reduction of air pollution and greenhouse gas emissions within their boundaries (Forum15). Forum 15 have launched several campaigns to facilitate Climate Actions thereafter.

*Table 7: Summary of the Israeli communication reports:*

| Report | Level: International, national, local | strength | weakness | Rate |
|---|---|---|---|---|
| Long term Strategy | International= UNFCCC | | Israel has not submit a long term strategy | |
| National Communication report | International- UNFCCC | It covers all the sectors in the NDCs | Hasn't been regular submission | |
| Biennial Update Report | International- UNFCCC | It covers all the sectors in the NDCs | Hasn't been regular submission | |
| Annual inter-ministerial report | National | It covers all the sectors in the NDCs | Hasn't been regular submission<br>Limited outreach | |
| voluntary GHG registry | National | In 2017, 65 entities submitted information that their total GHG emissions constituted 48% of the total emissions in Israel | Not mandatory | |

| | | | | |
|---|---|---|---|---|
| Pollutant Release and Transfer Register | National | Mandatory by law<br>Covers wide variety of pollutants including GHG | | |
| The Electricity Authority reports on renewable energy | National | It shows the installed capacity and the production of solar energy. | Have no details on geographical sites and | |
| The Planning Administration Map | National<br>(with geographical distribution) | An Interactive map shows updated information on ground photovoltaic systems.<br>It shows the sites | | |
| The State Audit reports: | National | | | |
| Local implementation reports | Local | Data can sometimes be obtained through the Freedom of Information regulations | No obligation to publish reports by local stakeholders (for example: local authorities) | |

**Main finding and recommendations Regarding Israel's ETF communications:**

Israel has been submitting reports under the UNFCCC irregularly. In 2000, Israel submitted its first national communications. In 2010, Israel submitted its second national communications. In 2012, the second communication and GHG inventory were submitted. In 2015, the INDC was submitted. In 2016, Israel submitted its first biennial update report and its first NDC. In 2018, the third communication report was submitted. In 2020, the 2020 GHG inventory was submitted and the national inventory report. In 2021, Israel submitted its first revised NDC. On the national level, Israel has different institutions and bodies that issue different reports in a sporadic manner. In regard to local implementation reports, local actors including local authorities are not obliged to report on climate action and most of them do not do so. Therefore, it is hard to trace back reported ETF communications to implement local level climate actions. Therefore, at first place, it is recommended to regulate Israel's communications on the national and local level.

## Renewable Energy Projects in Israel: Selected Case Studies

## An in-depth investigation of selected renewable energy projects in Israel operationalizing the RES principles by CIDSE

### Energy poverty and disadvantaged populations in Israel

Israel is an affluent country, with an average national income for the adult population that is on a par with European countries such as France and the UK. At the same time, it is one of the most unequal high-income countries (Chancel el al., 2022). Israel faces the challenge of high poverty, especially among the Ultra-orthodox population and among the Palestinian minority in Israel (OECD Economic Surveys: Israel 2020). These and other lower-income groups are likely to suffer more from the effects of climate change: key among these being energy poverty[1], defined here as "the inability to obtain sufficient safe, reliable and affordable energy to meet basic household needs such as cooking, boiling water, lighting, and heating, as well as operating various essential technologies such as medical devices" (Shapira et al., 2021).

There is no legal definition, criteria, or data on the extent of energy poverty in Israel[2]. A Central Bureau of Statistics survey from 2013 indicated that 41% of adults (aged 20 and older), about 2.1 million people, gave up on heating or cooling their home due to economic concerns (Central Bureau of Statistics. 2014). Furthermore, energy poverty is associated with other structural conditions of disadvantage such as poor housing quality. It is estimated that about 2 million apartments in Israel built before the 1980s are energy inefficient. Much of the housing stock dedicated to social housing requires a relatively higher use of electricity to achieve thermal comfort (Aviezer, 2022).

Within this context, the Palestinian minority has a particular set of socio-economic characteristics and structural disadvantages that increase its vulnerability to the effects of climate change in general and especially energy poverty.

As of 2016, the Palestinians in Israel (excluding Jerusalem and the Golan Heights) numbered around 1,421,501; with 54% of the population living in the North, 17.8% in Haifa region, 14.1% in Central Israel, and 17.2% in the “Naqab” (Southern Israel). The Palestinians in Israel also make up around 17.3% of the total population, and 6.7% of which live in unrecognized villages in the

[1] While we focus on low income in this report, it should be noted that it is not the only variable associated with energy poverty. Vulnerability to energy poverty is also influenced by age, single parenthood, large household size, illness and disability, rurality and ethnicity. See in: Teschner, N., Sinea, A., Vornicu, A., Abu-Hamed, T., Negev, M. 2020. Extreme energy poverty in the urban peripheries of Romania and Israel: Policy, planning and infrastructure. Energy Research & Social Science 66.

[2] Teschner et al. Ibid.

Naqab (south). The Palestinian population in Israel is an indigenous minority, suffering from a long-standing, institutional discrimination on both the civil and the political level. On the political level, the successive Israeli governments have refrained from acknowledging the Palestinians as an ethnic minority, thus depriving them of collective rights. On the civil level, discriminatory policies in different areas have resulted in a low socio-economic status which is manifested in education, workforce participation, health, housing, and low living standards. The Arab community is considered poor. The average monthly household income for Palestinian families is 10,733ILS (around 2,600 EUR) which is only two-thirds of an average Jewish household in Israel (The Galilee Society, 2017); a gap which has remained steady for the past ten years. Though there is no accurate data on energy poverty in Israel, it is assumed to be correlated with poverty. As thus, it would be reasonable to assume that the Arab community suffers from energy poverty. On the other hand, Arab localities are facing unique barriers in the transition to renewable energy, mainly as a result of the government unwillingness to legalize existing buildings. This limits their ability to enjoy the revenues and increases inequality.

**A just energy transition in Israel**

A climate policy that sets ambitious targets for a transition to renewable energy can offer many opportunities to reduce social inequalities in general and reduce vulnerability to energy poverty. Lower-income and disadvantaged groups, who contributed least to global heating and are more likely to suffer from climate change, are also those who can benefit most from affordable, clean and safe energy solutions. However, they also face greater barriers to access the gains for a transition to renewable energy and can be disproportionately affected by the cost of some policy measures (Bouyé et al., 2020).

At present, social justice is not a central principle guiding Israel's climate policy. Israel's official policy articulated in the relevant government decisions does not reflect the need for a 'just transition' (following the Paris Agreement). Furthermore, while the Government in its decision from 14.7.2019 (Government Decision 4631) indicated that the UN Sustainable Development Goals (SDGs) should be integrated into the government's strategic planning processes, the SDGs are not integrated into Israel's climate policy. One instance in which the effects of climate policy on disadvantaged populations was considered was Government Decision 286 from 1.8.2021 on the pricing, and future taxation of carbon emissions (Governmental Decision. 2021). The relevant Ministries were instructed to prepare recommendations on measures to mitigate the effects of the potential rise in costs (of electricity, fuel, and other goods) on vulnerable populations[3].

[3] A committee was set up and received inputs from the public. Its recommendations haven't been published to date.

Carbon pricing is one measure characteristic of transitions to renewable energy that directly affects consumers and hence can have positive or negative social impacts. Other potential measures are reforms of consumption fuel subsidies, home efficiency programs and renewable energy expansion. Measures to expand renewable energy, especially the installation of PV systems, have received the most attention and are therefore the focus of the case studies and analysis that follows.

Opportunities for a more equitable renewable energy transition have arisen within the context of changes in the electricity market in recent years opening it to more renewable energy producers, while the infrastructure for electricity transmission and distribution remain under the ownership of the Israel Electric Corporation. This shift to a decentralized renewable energy-based market has the potential to create a stable revenue source for private households, SMEs and Local Authorities, thus contributing to the reduction of inequality and socioeconomic gaps. However, as the case studies demonstrate, there are numerous obstacles (regulatory, planning related, legal, financial, organizational as well as lack of knowledge and awareness), which must be addressed to realize this potential.

In this section we investigate three projects that involved the Arab population, each light a different angle to the opportunities and challenges of the transition:

1. A governmental initiative aiming to aid LAs in Israel to install PV systems over municipal properties and to enjoy the revenues.
2. A municipal initiative to decarbonize its activities, through an innovative financial model.
3. Grass-root off-grid micro PV projects in unrecognized villages at the Naqab, despite governmental objections.

**Case Study 1: "The Pais Project"**

**Governmental Support for the establishment of PV systems on municipal properties**

*A governmental initiative to provide local authorities with loans to install PV systems on public buildings' rooftops, and enjoy long-term income from selling the electricity produced.*

In December 2019, the Ministry of Energy, the Center for Local Government and the Israel Lottery ("HaPais") formed a joint initiative to support LAs throughout Israel to undertake installation of PV systems on the rooftops of public buildings in their jurisdiction. The initiative's goals were to support the strategy of the Ministry to raise their goal for renewable energies from 17% to 30% of national energy production by 2030, while improving the economic balance of LA through the payment they would receive from the feed-in tariff from the electricity produced and sold to the IEC.

The program addresses both a challenge and an opportunity for low socio-economic LAs, which are the majority of Arab LAs. The challenge for LAs that lack sources of income is the ability to provide social services to their residents. Local production of solar energy using existing resources inside the municipality, has the potential to generate income for the municipality. At the same time, rooftop production, in comparison to construction of large, greenfield infrastructure projects, does not interfere with open lands and does not intensify Israel's ecological challenges.

The Pais project included low-interest loans from the Israeli Lottery (the Pais) to install the PV systems, as well as supervision and consultation by two NGOs, the Heschel Center for Sustainability, and the Good Energy Initiative, which were contracted by the Ministry of Energy to support the process.

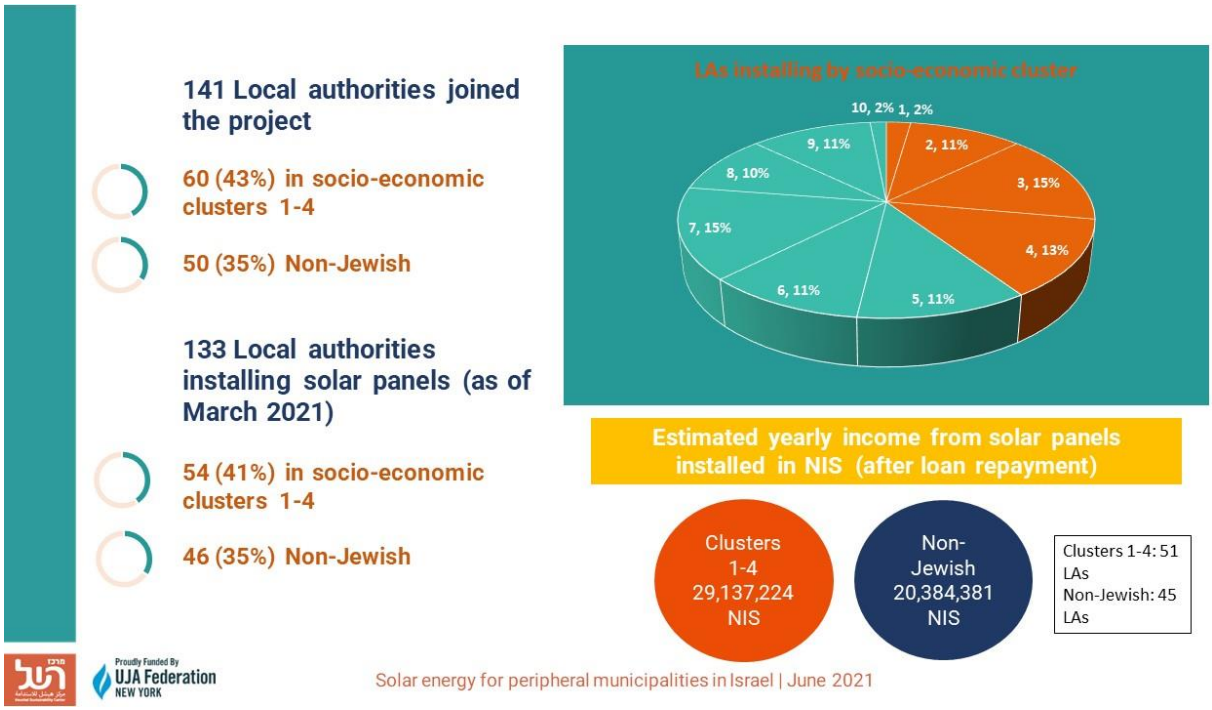
The trigger for this program was previous research conducted by the Heschel Center, which identified the benefits of renewable energy as a potential source of income for municipalities. The output of this research project, based on data from the Ultra-orthodox municipality of Elad, was an economic model to identify the potential of renewable energy infrastructure on public buildings to generate income for the municipality. An additional goal of the project was to identify and help remove bureaucratic barriers to the local production of solar energy. The conclusions of this research project helped shape the Pais project.

The National Lottery's call for applications created a unique opportunity to assist low socio-economic LAs to apply for the loans. Past experience suggested that most LAs would not take advantage of this opportunity due to various obstacles such as not identifying the economic

potential, lack of manpower or funds to invest in applying, or lack of long-term strategic planning and thinking necessary to pursue this possibility.

At the same time, the Ministry of Energy had begun to understand the dramatic shift it needed to undertake in order to reach its short and long-term renewable energy goals. However, they lacked the basic understanding of the economic potential of solar panels for marginalized populations, and the regulations currently in place did not promote the generation of energy from within the city.

The project was designed to support about 10 LAs, with 100 Million NIS in loans. In practice, 141 local and regional authorities applied for the grant, 50 of which were Arab LAs. The total requested budget was 650 million NIS, for installation of solar systems over 1241 public buildings (60% of which are education institutions), with a total area of 1,140,260 square meters, and a total potential installed capacity of 141 KWP (The Ministry of Energy. n.d.).
In response, the Ministry of Energy and the Israel Lottery increased the sums available for loans to 500 million NIS. This enabled all 141 LAs were to take part (Heschel, 2022).




Of the 141 authorities, 90 requested support from the NGOs as part of the initiative. The types of support that were provided varied, and included informational webinars regarding the overall process, helping the participants through the bureaucratic requirements of registration and

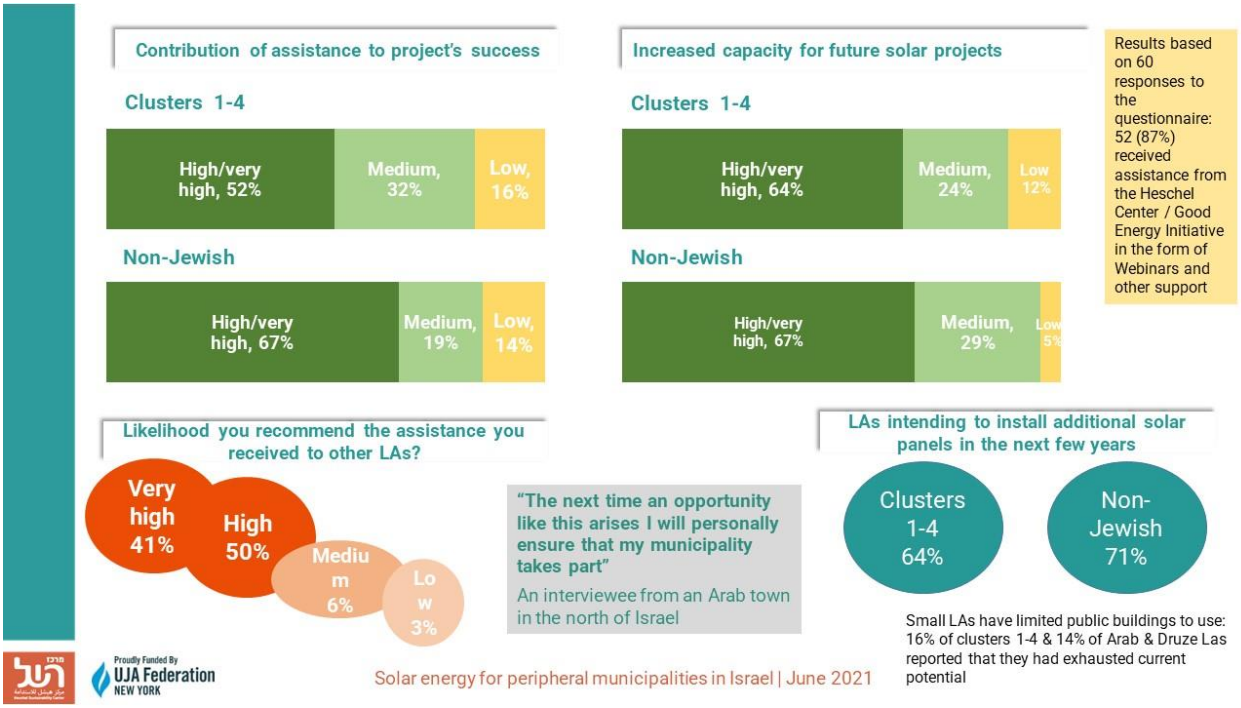
documentation, information regarding selection of professional contractors and consultants, and both individual and general help to guide the project through to fruition.

The project had several major milestones, including listing the roofs at the Israel Electric Corporation by the end of 2020; contracting a solar consultant to aid with technical issues and with preparing a tender for contractors that will safeguard the LAs' interests; successfully publishing a solar contractor; crossing many bureaucratic challenges; building the solar systems; and finally maintaining them and ensuring that the income reaches the communities.

By the end of 2021, almost all of the LAs had successfully completed two important milestones: registering their roofs at the IEC and contracting a solar consultant. By this stage, many peripheral LAs' registration requests were declined by the IEC, since the transmission network could not sustain new connections to the grid. In a combined effort, the Ministry of Energy and the NGOs convinced the IEC to reverse several of these cases.
Many other LAs have completed yet another milestone, which is contracting with a Solar contractor to build the systems.

This result was achieved through the following measures employed by the NGOs:

1. Establishing guidelines for contractual engagement with solar consultants and contractors, which helped authorities take faster action.
2. Facilitating the publication of joint tenders for Solar consultants and contractors through several Regional Clusters. This enabled over 10 authorities to connect with a solar consultant in time to register their roofs at IEC.
3. Providing continuous support to the referents at each LA. This turned out to be a major factor for success, as many of the LAs worked in "emergency mode" during VOVID 19 and had little attention left for new projects. Many of the referents themselves were in isolation for long periods due to severe outbreaks of COVID, and some were seriously ill. The personal support in such a period proved to be crucial.




Follow-up research done by the Heschel Center revealed that the majority of Las are continuing with the project.

The project enabled the utilization of a large number of public roofs for PV systems. However, much wider Solar potential still exists in LAs.

| **Criteria / Relevance** | | | | |
|---|---|---|---|---|
| **PEOPLE** | | | | |
| Governance | | The LAs own the PV systems. Electricity produced is consumed within the LA area, though in Israel this factor is not relevant. | | |
| Welfare Orientation | | Income from the systems goes into the LAs' budget, thus the beneficiaries of the income are the local residents. | | |
| Gender | | There were no direct gender considerations in the project. Indirectly, side benefits such as sealing rooftops from leaking, are expected to | | |

| | | | | |
|---|---|---|---|---|
| | | benefit women who are the majority of workers at public institutions such as schools. | | |
| **ACCESS** | | | | |
| Access | | Not relevant. Access is guaranteed with or without the system. | | |
| Spill-Overs | | The central location of the systems contributes to public awareness of PV systems and can help encourage installations of PV systems by private homeowners. | | |
| Locally adopted Energy-Mix | | At this stage energy is purely solar, later on might be supplemented by electricity storage facilities. | | |
| **PLANET** | | | | |
| Mitigation | | The project directly reduces GHG emissions, through renewable energy production. The rooftop coverage the solar systems provides reduces radiation, thus reducing the energy consumption for cooling. | | |
| Ecology | | Rooftop solar production reduces pressures from establishment of solar fields in natural areas, thus contributing to the conservation of biodiversity and ecological assets. | | |
| Efficiency | | Production close to the consumption sites reduces the electricity loss through transmission lines. | | |
| Sufficiency | | Energy sufficiency is not directly applicable to this project. | | |

**Case Study 2: "Leasing Model for Energy Independency - the Jaljulia Model"**

*A municipal initiative to decarbonize its activities, through an innovative financial model. The initiative overcomes the LA inability to finance large scale renewable energy production and energy efficiency projects, to the benefit of the LA residents.*

Jajulia is an Arab village, located in the central district in Israel; with a population of 10,654 (by February 2023) in the area of Jurisdiction of 2,091 dunam. The local authority score on the socio economic scale is 2 (on a scale of 1-10; while 1 is the lowest).

**Description of the project:** Low socioeconomic LAs, and among them Arab LAs, face several challenges that hinder implementing renewable energy projects. Among these challenges are:

- Funding: low socioeconomic LAs have difficulties getting loans from the banks to finance projects.
- Governmental bureaucracy: several financial models that eliminate the LA's need to recruit loans from the bank, require a long process of approval by the Ministry of Interior affairs, such as BOT (Build, Operate, Transfer).
- Lack of knowledge within the LA regarding the process, best practices, methods to ensure the LA interests when shaping tenders for consultants, contractors etc.
- Regulatory: many buildings do not have the proper regulatory documentation; thus adjustments must be made before initiating a project.
- Monitoring and Maintenance: in order to enjoy revenues from the PV systems, suitable monitoring must be done. LAs have hardship qualifying personnel for this purpose.
- Public concerns regarding possible radiation from PV systems that evoke resistance among residents to such projects.

To overcome these obstacles. During 2021-2022, Jaljulia LA planned and implemented a project titled: "Energy Independence in a Leasing Way". As the title implies, the concept behind this project is to achieve energy independence in public buildings, balance between energy consumption and energy production in terms of KW and in financial terms.

The project included both energy production and efficiency measures to reduce consumption.

As for energy production, LAs usually either self-finance the projects using bank loans (as was the case in the HaPais project), and get all the revenues, or lend the rooftops to an external entrepreneur who takes all the risk, and gets a certain rent.

As for energy efficiency measures, LAs either finance it through bank loans, or by an ESCO model, in which an external entrepreneur does all the investment and the revenues from the electricity saved are divided between the LA and the ESCO company.

The project was initiated after Jaljulia tried with no success to implement a project for PV systems over public rooftops through the bank loans offered by the “HaPais'' framework. In order to overcome the challenges facing them in implementing the project, mainly the funding issue and the legal requirement of approving the tenders and the contracts by the Minister for Interior, the LA adopted a Leasing model.

The project of “Energy Independence” includes the following elements:

1. Energy efficiency in street lighting
2. Energy efficiency in interior lighting in public buildings
3. Energy efficiency in sport yards’ lighting
4. Energy efficiency in air conditioning
5. Installing and operating Building Control System
6. Installing PV systems on public buildings roofs
7. PV systems over car parks and sport courts
8. Solar energy storage and supply: the LA provided the land for installing the solar system. The entrepreneur company sells the electricity to the Electricity Company.
9. Garbage grinders for households- Garbage grinders are being distributed to households. Organic waste is transferred to the sewage system resulting in less household waste and thereby contributing to GHG reduction.

Since the LA did not have the financial measures to carry out such a large project, an innovative model was established. The key aspects of the model include:

1. A comprehensive electricity survey was conducted.
2. The LA issued a tender for a commercial company to carry out all the energy-related measures described above.
3. The company that won the tender takes all of the LA’s electricity bills, and starts paying them from day 1.
4. The company has the right to build PV systems over the public building’s rooftops.
5. The company can carry out all energy efficiency measures - which is its interest, in order to reduce the electricity bills it pays.

6. After returning the company's investments, revenues produced by selling the electricity from the PV systems are divided between the company and the LA (in Jaljulia, some 70% goes to the entrepreneur company, and 30% to the LA)

Thus, according to this model, the LA stops paying electricity bills from day 1 to the engagement.

At the beginning, a comprehensive energy survey was conducted that included electricity consumers of the local authority, street lighting, interior lighting in public buildings, air conditioning in public buildings, and lighting in sport courts. In addition, a survey of the roofs was conducted to find the potential of installing solar energy facilities and recruiting a targeted funding to replace all the street lighting.

**The energy survey findings:**

**The electricity consumption in 2020 was 1830000 KW.**

| The component | Quantity | Annual consumption (KW) | The current cost of consumption in NIS | Annual Savings KW | The project cost |
|---|---|---|---|---|---|
| **Street lightings** | **700** | **780000** | **320000** | **400000** | **800000** |
| **Indoor lightings** | **1500** | **450000** | **270000** | **300000** | **1100000** |
| **Air conditioning** | **130** | **600000** | **360000** | **260000** | **500000** |
| **Total** | | **1830000** | **950000** | **960000** | **2400000** |
| **Total- without street lightening** | | **1050000** | **630000** | **560000** | **1600000** |

Estimated investment/cost: 18 million NIS.

**Financial Zeroing (benefits)**

| Expenses | Saving/ benefits |
|---|---|
| **The current situation:**<br>Annual electricity costs: 630,000 NIS.<br>Maintenance: 270000 NIS.<br>Total: 900,000 NIS.<br>The future situation:<br>After implementing the energy efficiency project, the electricity expenses will drop down to 300000 NIS. In addition, the local authority will pay the entrepreneur a sum of 240000 NIS. And the maintenance expenses will be 50000 NIS.<br>This budget item will be 590000 NIS. | **The current situation:**<br>There is no income.<br>The future situation:<br>The local authority will gain an income of 700,000 NIS from solar systems. In addition, a sum of 310,000 NIS savings. Furthermore, the local authority saves many other indirect expenses; for example, renewing air conditioners, lightings, sealing of roofs, etc. |

**Energy survey key findings:**

- The project of street lighting: results in 400000 KW annual saving.
- Electricity consumption in 2020 minus electricity consumption of street lights is 1050000 KW.
- The annual electricity saving after energy efficiency (street lighting, indoor lighting, and air conditioning) is 870000 KW.
- The annual electricity expenses are 400000 NIS.
- The electricity expenses invoices are transferred to the company. They pay the electricity bills. It is considered as an expenditure which will credit them later in VAT amount. This way the margin of their gain increases.

**Economic Viability Calculation:**

| Project | Quantity | Unit Cost | Total Cost |
|---|---|---|---|
| **Solar Energy** | **3700 KW** | **2800 NIS/KW** | **10360000 NIS** |

| | | | |
|---|---|---|---|
| **Roofing of Yards** | **12000 Meter Square** | **700 NIS/Meter Square** | **8400000 NIS** |
| **Indoor lightings** | **1500** | | **1100000 NIS** |
| **Air Conditioning** | **130** | | **500000 NIS** |
| **Total** | | | **20360000 NIS** |

**Expected Income:**

- Income from solar systems: 2676000 NIS.
- Payment for maintenance 70 NIS per KW: 260000 NIS
- Payment to the local authority for rent: 633150 NIS
- The Project cost: 17000000 (Cost for the contractor)
- Net income: 1777585 NIS annually
- Return of Investment: 9.5 years
- (This calculation doesn't take into account credits for system depreciation, VAT return for paying for electricity bills by the consumers).

To sum up, this project offers low socioeconomic LA with the opportunity to carry out large scale GHG emission reduction projects, without taking the financial risks that usually accompany them. It has considerable financial benefits to the LA, and can serve to enhance its economic stability. However, it is yet to be seen how the LA interests are kept in the long term, for example when the need arises to add electricity consuming devices, such as air-conditioning, which is expected to reduce the profits of the company.

Evaluation of the project according to RES principles:

| **Criteria / Relevance** | | | | |
|---|---|---|---|---|
| **PEOPLE** | | | | |
| Governance | | This is a Leasing model which means that the owner of the systems is the entrepreneurial company. Electricity produced is consumed | | |

| | | | | |
|---|---|---|---|---|
| | | within the local authority area, though in Israel this factor is not relevant. | | |
| Welfare Orientation | | Income from the systems goes into the local authority budget, thus the beneficiaries of the income are the local authority residence.<br>Moreover, courses that build the capacity of Arab citizens in installing and maintaining solar systems are arranged which enhance Arab citizens' opportunities of employment. | | |
| Gender | | There were no direct gender considerations in the project. Indirectly, side benefits such as sealing rooftops from leaking, are expected to benefit women who are the majority of workers at public institutions such as schools; Street lighting contributes to women's safety. | | |
| **ACCESS** | | | | |
| Access | | Not relevant. Access is guaranteed with or without the system. | | |
| Spill-Overs | | The central location of the systems enlarges public acquaintance with the subject and the introduction of innovation culture among the local authority employees, thus it is expected to encourage installations of solar systems by private homeowners.<br>On the downside, the storage systems in open spaces have negative ecological effects (Many trees were cut). | | |
| Locally adopted Energy-Mix | | At this stage energy is purely solar, later on might be supplemented by electricity storage facilities. | | |
| **PLANET** | | | | |
| Mitigation | | The project directly reduces GHG emissions, through:<br>- renewable energy production. The rooftop - coverage the solar systems provides reduces radiation on them, thus reducing the energy consumption for cooling.<br>- Replacing appliances<br>- Reducing organic waste | | |
| Ecology | | Rooftop solar production aids to reduce pressures from establishment of pen lands solar | | |

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| | | fields, thus helps to conserve biodiversity and ecological assets.<br>Solar systems in open spaces in Jaljulia has negative impact on diversity (trees has been cut) | | |
| Efficiency | | - Production close to the consumption sites reduces the electricity loss through transmission lines.<br>- Replacing appliances (street lightings; air conditioners, etc.) for efficient ones.<br>- The Building Control System reduces unneeded energy | | |
| Sufficiency | | Not applicable | | |

### Case Study 3: community based solar energy in the unrecognized village Al-Serra in the Naqab

*Grass-root off-grid micro PV projects in unrecognized villages at the Naqab. The projects answer energy needs of the inhabitants in places that are not connected to the national electricity grid due to Israel's discriminatory planning and zoning policies.*

**Background on the unrecognized villages in the Naqab:**

The Arab Palestinian Bedouins in the Naqab are indigenous people who lived in the area for hundreds of years prior to the Nakba (Palestinian catastrophe) and the establishment of Israel in 1948. During the war of 1948, around 88,000 Arab Palestinian Bedouins were expelled from the Naqab to Jordan, Syria and Egypt and only 11,000 stayed in their lands. After 1948, some of them were displaced from their villages by the state of Israel which concentrated the Bedouin community in a restricted area around Beer el Sabea (Be'er Sheva) which constituted only 10% of their original lands. Later on between the years 1968-1989 Israel established 7 high dense towns, while ignoring all the other 47 Bedouin villages and denying indigenous land ownership. In a nutshell, the ongoing displacement of the Bedouins and the dispossession of Palestinian lands was carried out through a complex manipulation of historical legal policies (Amara, 2013). This has led to a reality of "unrecognized villages" which are the historical Palestinian Arab villages that were not recognized by the Israeli regime after 1948. Some of those villages were established after the displacement of Bedouin from their historical lands during the 1950s' while others are standing before 1948. The Bedouins basic rights are violated in the unrecognized villages, they live under constant threat of evictions, lack of access to the national grid of electricity, water and sewage, and without public services such as transportation, health and

education (Adala, 2013)[1].
In 1999, 11 of the villages were recognized by the state of Israel in a governmental decision, but this did not affect their daily life since all the villages still suffer from lack of public services and constitutional discrimination as Palestinians in Israel. Today, the Arab Palestinian citizens of the Naqab constitute 36% of the Naqab residents while the land they live on is only 3.5% (Sikuy, n.d.) of the total area. They are facing an increasing number of eviction orders (since the beginning of 2023, the Israeli state has issued more than 600 demolition orders (Haaretz, 2023).

**Renewable energy in the unrecognized villages at the Naqab:**

According to a latest survey in 2020, the majority of energy needs in the unrecognized villages are covered by solar energy (65%) (Shibly et al, 2022). Another survey showed that 60% of the Bedouin in the Naqab villages reported that the electricity generated is not enough for daily uses (Kattan et al. 2018), Yet it is perceived as an improvement to electricity production from the costly and polluting diesel generators, since people get the opportunity to use electricity from clean energy for longer hours during the nights. According to the same study, a vast majority of the interviewees emphasized the improvement of daily life due to the solar energy systems, especially in enabling studying at night, watching TV, access to mobile, use refrigerators to keep food and medicine, etc.

There are several types of renewable energy projects initiated in the Bedouin villages in the Naqab, among them:
1. Community based solar projects in the unrecognized and recognized villages: "Bottom-up" projects.
2. Projects initiated by NGOs that target public needs. The most known one is "Saeed al khroumi initiative" or "Shamsuna" - an NGO that aims to strengthen and empower the Bedouin community by improving access to energy, through solar energy projects. One of their projects is aiming to establish PV systems in schools in the Bedouin villages, instead of the polluting generators.
3. Ground mounted solar fields

In the recognized Bedouin villages and towns, renewable energy projects are similar to other LAs in Israel, i.e. PV systems on local authorities buildings, on private business and households etc. .

In this case study we are focusing on the first type of projects, established by the Bedouin community in an unrecognized village.

**Solar energy systems in Al Serra unrecognized village:**

Al Serra village was established in 1927 at the north-eastern Naqab, and currently, is a home for around 500 Bedouin citizens. Traditionally, the Bedouin lifestyle did not rely on electricity, and indigenous knowledge empowered the people so they could grow and preserve food, ration rainwater, and produce their own medicines from the local plants. With the rise of modernization, and the Israeli oppressive policies against the Bedouin traditional lifestyle, the need for electricity and running water to handle daily life actions, became crucial.

The village's residents, just like all the unrecognized villages, suffer from daily violations of their basic rights for housing, water, electricity, sewage, health, planning, education and transportation (Minority Rights Group International, 2011). In order to have clean water, the villagers had to connect their homes privately and on their own expenses, to a water pipe located 6 Km away in the village Kuseife, and thus they face a lot of water cutoffs.

Energy wise, in the year 1990, the families of El Serra collected money to buy diesel power generators for the village, to produce electricity. The number of generators was growing and reached around 20. Using the generators was not ideal at all; it had ramifications on the health, environment and financial conditions of the people in the village. People had to carry out the outcome of air pollution, which affects their health and the GHG emissions, noise pollution and heavy expenses.

In the year 2003, the first solar energy system was set on the roof of a house of an activist from the village Al Serra, named Khalil Alamouri, who initiated the project in the village. Many families followed him during the following years, until they have reached a 100% electricity produced by PV systems and a storage system in the village in the year 2023.

According to Alamouri's reporting, although the high expenses people had to pay in the beginning of the project, it was a financially wise choice that saved redundant costs on fossil fuels.

The PV systems got no subsidy or any governmental or formal support from the state; it was sponsored by private loans taken by the residence and aid from CSOs, and was possible due to the PV systems' price drops during last years.

Electricity usage is monitored by the residents constantly, to match their needs and the capacity of the system. Despite being an improvement form previous status, the energy produced is much less than the average household consumption in Israel (which stands at about 8,000 KW/h annually). For example, none of the households has electric ovens or electric kettles, and washing machines and air conditions are rarely found. Instead, they rely on natural gas for cooking, and on biomass (firewood) for heating. This can indicate the energy poverty in the village relative to the level in Israel.

All in all, the project is community based and reflects energy sovereignty.

However, the unrecognized villages still struggle for energy justice, as part of their wider struggle for justice. To this day, such projects are usually targeted and being confiscated by the Israeli authorities in all Bedouin villages in the Naqab, as part of the execution of demolition and eviction orders. For example, in 2019 the state demolished around 238 structures, including equipment, solar panels and batteries in enforcement procedure without a warrant (Negev Coexistence Forum for Civil Equality, 2020).

Analysis of the case in accordance of RES principles:

| **Criteria** | **Solar Energy in the Palestinian unrecognized village "Al Serra" ,Naqab, Israel.** |
|---|---|
| **Context** | a community -based solar energy initiative in the Palestinian "unrecognized village" Al Serra in the Naqab desert in Israel.<br>The village is home to 500 indigenous Palestinians, and the project was started in 2003 by some activists in the village, and was expanded and spread out within the people of the village, and today they have reached 100% reliance on solar energy.<br>The village is off-grid, due to its denied existence by the Israeli state, and used to rely on diesel generators which have caused harmful pollution and noise effects. |
| **Governance** | The project has been developed gradually during the years by the community, each family installed the solar system separately, but with the support of other families when needed. The people of Al Serra have gained technical skills to maintain the solar system.<br><br>- there was no financial support from any organizations, but some people had to take out loans. |
| **Welfare orientation** | The systems are owned by the communities themselves, thus it has an important effect on their welfare. |

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| **Gender** | Women still hold the traditional role of household, and with the SE systems they could rely on electronic devices such as a washing machine and minimize their daily work and maximize their time for other activities. Also, women have gained knowledge and practice in operation and maintenance of the PV system. |
| **Access** | 100% of households of the indigenous community in the village have no access to the Israeli national electricity grid, like all the other 36 unrecognized villages in the Naqab. Therefore, the citizens benefited from the solar panels, which replaced the polluting "solar generators" that were used before. |
| **Spill-Overs**<br>**Flexible Energy Mix** | a pre-nursery play group was opened to serve the families of the village, and created 2 jobs for teachers.<br>A guest house was opened and created income to families, and an opportunity to raise awareness about the status of the unrecognized villages.<br>There is a youth center that was initiated lately that could be sustained thanks to the solar energy panels. |
| **Flexible Energy Mix** | The village relies solely on off-grid solar systems. The lack of alternative energy sources reduces its energetic resilience, and makes it vulnerable to extreme weather conditions such as severe dust storms. |
| **Mitigation** | The village relies on 100% solar energy in daily life, thus there was a significant reduction in GHG emissions. |
| **Ecology** | The initiative started with a holistic ecological view, which aims to build a sustainable model in all aspects of life, such as: reducing waste, separating waste by recycling materials and composting organic waste, growing food gardens and chicken, raising sheep and goats, and using greywater for irrigation, and planting local trees. |

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| **Efficiency** | People apply energy saving practices, by minimizing and monitoring their electricity usage. The use of electrical devices is limited due to the limited electricity supplied by the solar panels, especially during night time. the residents calculate their usage of electricity. For example, using high electricity consumption devices is prevented by the residents, like the electric kettle and electric oven, thus they rely only on gas to heat water and baking. They consider starting a dry toilet system which can also produce heat for cooking. |
| **Sufficiency** | Not relevant. |

**Main Findings and Recommendations from the Case Studies:**

Solar energy can have a crucial role in Just Transition to a low carbon economy, if implemented correctly. For that to be the case, PV systems should be implemented mainly within the built areas (as opposed to open lands), and to create benefits for the residents of the areas where the systems are built. Those benefits can be direct income that the systems generate, increase shading in public areas, enhanced energetic security and resilience, etc.

In this work, three different types of RE projects were investigated.
Hapais project (project no. 1), offered governmental support to LA, both in better loan conditions and support given by CSOs. This governmental support encouraged many LA to make the first step into RE production, and uncovered many obstacles that hindered their efforts to do so. Yet, it is unclear whether LA would be able to maintain the systems in the long run. The Jaljulia model (project no.2) bypasses the LA need to recruit funds for energy production and efficiency, and to maintain and operate the PV systems in the long run. However, the LA receives less profits, and it is yet to be seen if its interests are kept. The Bottom-Up, self-organized model in the URV in the Naqab, answers the residents' basic needs for energy, and is 100% renewable. Yet, the energy produced is unable to meet people's electricity needs and bring them to the average level of energy consumption of the population in Israel.

We can conclude that just models should address the following key aspects:

1. Ensure all parts of the population can take a fair share in energy production and the profits it can provide.
2. Ensure the LA/residence receives a just share of the income produced by its (or their) assets.

3. Ensure long term maintenance of the systems
4. Builds capacity within the LA to carry out further projects and serve as active agents.
5. Maximize GHG emissions reduction potential within the LA.

**Recommendations:**

- Governmental support is needed in order to increase the economic viability of the municipal PV projects.
- Governmental incentives for local authorities are needed in order to promote the PV projects (for example: a higher feed-in tariff for electricity produced).
- Simplification of bureaucratic process to approve financial contracts done by LA, especially tenders that deal with energy independence.
- Create support programs to build the capacities of weak local authorities in operating and maintaining solar energy systems (currently promoted by the Ministry of Energy).
- Enhance the role of civil society organizations in assisting weak local authorities in implementing PV projects through guiding, consulting and accompanying them.

The recommendations above are relevant to places where there are statutory bodies such as LAs. This is not the case in unrecognized villages, such as Serra. Therefore, the main recommendations in order to guarantee a just transition to renewable energy are:

- Recognition and compensation for the historical injustices by the state.
- Political and financial support from the state authorities to ensure energy security for all people, even without recognizing the villages themselves. This includes support in finding and operating PV systems that will ensure basic energy needs.
- Empowerment of the local communities including women, and perceiving them as agents for change, by supporting programs to build knowledge and skills in the operation and maintenance of the PV systems to increase their energy autonomy.

## Conclusions and Recommendations

In addition to the conclusions and the recommendations elaborated on in the previous sections, the following are a summary of the main recommendations to enhance the NDC in upcoming submission cycles along the study objectives (Transparency, Effects and Action).

**General:**
In order to improve climate transparency, effects and action in Israel, a fundamental requirement should be filled i.e supportive legislative systems and Independent court.
it is recommended to promote legislative framework (including the Climate Bill) that anchors Israel's targets and commitment in regard to climate change.

**In order to enhance transparency:**
For central government:

- Prioritize solar energy over fossil, and specifically gas sources.

For civil society actors:

- Advocating for higher NDCs including higher renewable energy targets.
- Monitoring governments' progress in the goals it set.
- Assisting in implementing local climate actions.

**In order to enhance effectiveness:**
For central government:

- establishing a coordinating body that publishes information and reports (it could be the current inter-ministerial committee)
- providing accessibility to relevant information including in Arabic language.

For local authorities:

- Reporting on local climate actions

**In order to promote just transition to Renewable energy:**

- Map all the populations that might suffer from climate change, and currently cannot enjoy the fruits of the shift to low carbon economy, and prepare plans to include them in.
- Recognizing the role of CSOs that represent weak communities, including the Arab ones, who could inform the national policies on the special needs, constraints and strength of their community in transition to a low carbon economy. Establishing long term partnership with them.
- Supporting bottom up initiatives

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